RP 11.000 to RP 38.476				
Traffic	Average Daily			
Current 2013	Pass: N/A	Trucks: N/A	Total: 415	
Forecast 2033	Pass: N/A	Trucks: N/A	Total: 510	
Clear Zone Distance: N/A		Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645 FT		Bridges: N/A		
Sight Dist. for No Passing Zone: 1,100 FT				
Pavement Design Life 20 (years)				
Design Accumulated One-way Flexible ESALs: 274,305				

RP 38.476 to RP 39.478				
Traffic	Average Daily			
Current 2013	Pass: N/A	Trucks: N/A	Total: 1,500	
Forecast 2033	Pass: N/A	Trucks: N/A	Total: 1,835	
Clear Zone Distance: N/A		Design Speed: 25, 45 MPH		
Minimum Sight Dist. for Stopping: 155, 360 FT		Bridges: N/A		
Sight Dist. for No Passing Zone: 450, 700 FT				
Pavement Design Life N/A (years)				
Design Accumulated One-way Flexible ESALs: N/A				

RP 39.478 to RP 53.440				
Traffic	Average Daily			
Current 2013	Pass: N/A	Trucks: N/A	Total: 455	
Forecast 2033	Pass: N/A	Trucks: N/A	Total: 560	
Clear Zone Distance: N/A		Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645 FT		Bridges: N/A		
Sight Dist. for No Passing Zone: 1,100 FT				
Pavement Design Life 20 (years)				
Design Accumulated One-way Flexible ESALs: 379,806				

JOB # 16
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

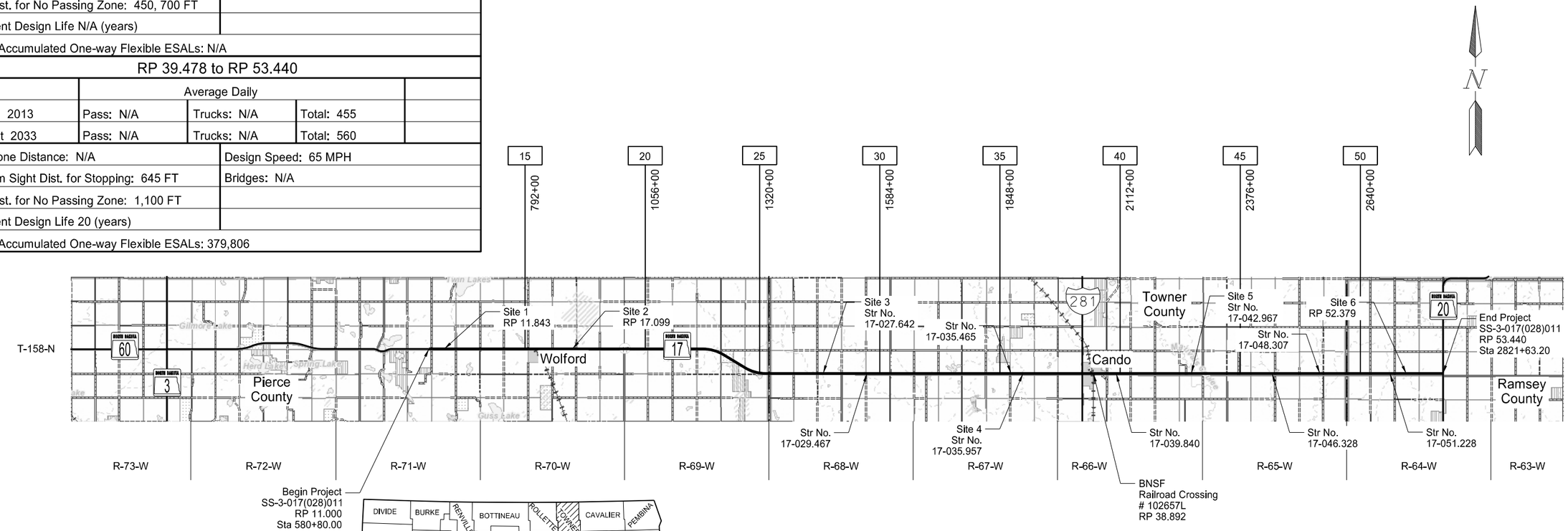
SS-3-017(028)011

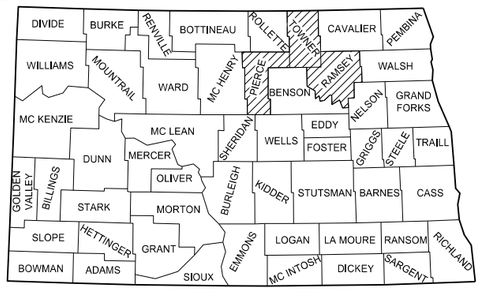
Pierce, Towner, and Ramsey Counties
ND 17 - 11 Mi E of Jct ND 3 E to Jct ND 20
HMA, Subcut, Guardrail, Signing, and Rail Retrofit

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	20285	1	1

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
SS-3-017(028)011	0.632	42.440





STATE COUNTY MAP

DESIGNERS

Adam M. Ruud, PE

Steven L. Strack

APPROVED DATE 2/10/16

Roger Weigel /s/
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

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 February 4, 2016

Adam R. Walker /s/
Houston Engineering, Inc.

This document was originally issued and sealed by Adam R. Walker, Registration Number PE- 5845, on 2/4/16 and the original document is stored at the North Dakota Department of Transportation

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PLAN SECTIONS

SPECIAL PROVISIONS

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D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32	Symbols
D-203-8	Standard Rural Approaches
D-260-1	Erosion and Siltation Controls - Silt Fence
D-261-1	Erosion Control - Fiber Roll Placement Details
D-704-1	Attenuation Device
D-704-2	Traffic Control For Coring of Hot Bituminous Pavement
D-704-5	Construction Sign Detail
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-704-15	Road Closure Layouts
D-704-20	Terminal and Seal Coat Sign Layouts
D-704-22	Construction Truck and Temporary Detour Layouts
D-704-24	Shoulder Closures and Bridge Painting Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Traffic Control Plan for Moving Operations
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation - Grinding Shoulder Rumble Strips
D-706-1	Bituminous Laboratory
D-748-1	Curb & Gutter and Valley Gutter
D-754-9	Letter and Arrow Details for Variable Length Signs
D-754-23	Perforated Tube Assembly Details
D-754-24, 25	Mounting Details Perforated Tube
D-754-24A	Breakaway Coupler System for Perforated Tubes
D-754-26	Sign Punching, Stringer and Support Location Details Regulatory, Warning, and Guide Signs
D-754-50	Sign Punching, Stringer and Support Location Details for Variable Length Signs
D-754-61	Sign Punching, Stringer and Support Location Details - Route Marker Signs
D-760-4	Rumble Strips Undivided Highways (Shoulders Less Than 4')
D-762-4	Pavement Marking
D-762-6	Short-Term Pavement Marking
D-764-1	W-Beam Guardrail General Details
D-764-5	Sequential Kinking Terminal
D-764-6	Flared Energy Absorbing Terminal
D-764-7	Slotted Rail Terminal
D-764-10	Thrie Beam Transition to Double Box Beam Retrofit
D-764-20	Short Term End Treatment for Bridges (Attenuation Device Method)
D-764-21	Short Term End Treatment for Bridges (Guardrail Method)
D-764-22	Typical Grading at Bridge Ends with W-Beam Guardrail
D-764-23	Typical Grading at Obstructions with W-Beam Guardrail

Number	Description

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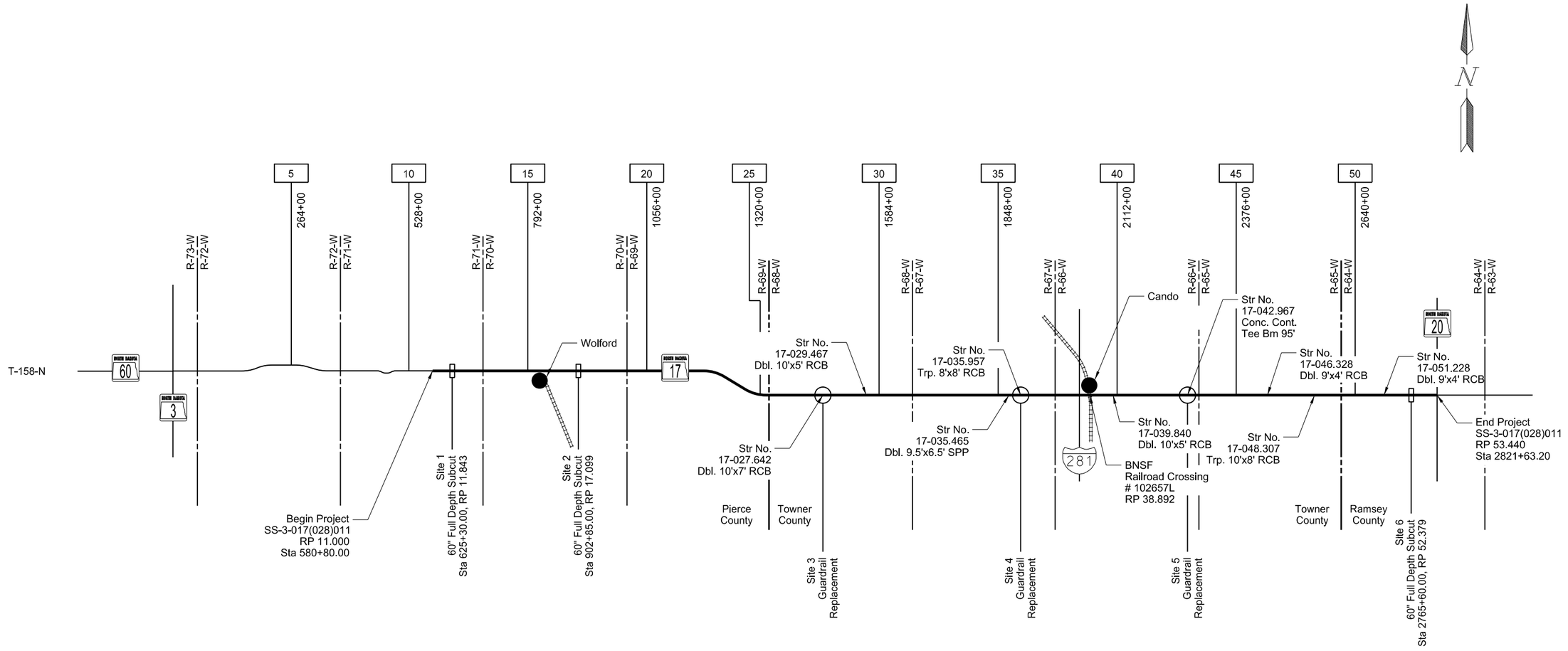

Full Depth Subcut
(3 Locations, Total Length = 1,866.14 Feet)

Guardrail Replacement
(3 Locations)

Note:
Stationing and Reference Point shown for full depth subcut areas is approximate center of repair area.

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Scope of Work

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

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NOTES

107-700 HAUL ROADS: The Engineer will not designate paved roads off the state system as haul roads.

107-710 HAUL ROADS: Before submitting a proposal, contact the appropriate State, County, Township, or City officials to determine if there are any roadways that will be designated as “no haul routes”.

107-P01 HAUL ROADS: The entire haul cycle, loaded and empty, will be considered for haul routes.

107-P02 HAUL ROADS: Obtain written permission from the applicable local entities prior to use of a paved road off the state system for this project. Perform inspection, maintenance, restoration, and release of the haul road at no additional cost.

107-P03 HAUL ROAD RESTORATION: Use Class 13 aggregate for haul road restoration.

202-P01 REMOVAL OF PAVEMENT: Include the cost of full depth vertical saw cuts adjacent to pavement removal areas, specified in Section 202.04A “General”, in the price bid for “Removal of Pavement”.

203-P01 COMMON EXCAVATION-SUBCUT: Removed subgrade material below ND 17 may be used on approach inslopes and as ditch block embankment. Dispose of any remaining excavated material in accordance with Section 107.17, “Removed Material”.

230-P01 SHOULDER PREPARATION: Perform shoulder preparation at guardrail locations.

261-P01: PERMANENT FIBER ROLLS: If fiber rolls are to remain on the project, use fiber rolls that are composed of plastic or natural fiber photodegradable netting that has a life expectancy between 12 to 24 months. If the photodegradable netting is plastic, the netting color must be either clear or green. Black plastic netting will not be allowed.

302-P01 AGGREGATE BASE COURSE CL 5: Do not substitute Salvaged Base Course for Aggregate Base Course CL 5.

401-P01 BLOTTER MATERIAL CL 44: Blotter material is not a pay item. Include all costs to obtain and apply Blotter Material CL 44 in the price bid for “Prime Coat”.

430-P01 CONTRACTOR CORING: Before placing bituminous material into core holes, apply a tack coat on all sides of the core holes as specified in Section 401, “Prime or Tack Coat and Fog Coat”.

430-P02 GRADE REFERENCE IN REMOVAL AREAS: Use a string line to control the screed height in subcut areas.

704-P01 TRAFFIC CONTROL FOR UNEVEN PAVEMENT: If the adjacent driving lanes are not even at the end of the day, the following criteria will apply:

Place the following sign assembly at the locations listed below.

Sign Assembly: Sign No. W8-11-48 “Uneven Lanes” and supplemental plate Sign No. W20-52-54 to identify the distance. Install Sign No. R4-1-48 “Do Not Pass” between the uneven lanes sign and the beginning of the uneven pavement.

Locations:

- Minimum of 720 feet in advance of the uneven lanes

Install tubular markers spaced at two times the posted speed limit on the centerline where uneven pavement exists.

Sign assemblies and devices will be measured and paid for according to Section 704, “Temporary Traffic Control”.

704-P02 TRAFFIC CONTROL: Maintain a minimum of one lane of traffic open to public travel during subcut operations. At the end of the working day, open the roadway to two-way traffic with a minimum 30’ wide driving surface and 4:1 traversable inslopes or flatter. No drop-off greater than 2 inches will be permitted. If two-way traffic cannot be obtained, maintain a minimum 15’ wide driving surface with flagging until two-way traffic operation conditions can be met. No additional payment to be made for flagging operations outside of working hours.

704-P03 TRAFFIC CONTROL: The traffic control devices list has been developed using the layouts shown in the plans and the following Standard Drawings:

1. D-704-2, Coring of hot bituminous pavement.
2. D-704-15, Layout A: For subcuts and other operations that require a lane closure. In addition, it will also be used for temporary roadway closures during paving operations.
3. D-705-15, Layout B: For subcuts.
4. D-704-20, Layout G: For all construction operations.
5. D-704-22, Type K and Type L: For construction trucks hauling material.
6. D-704-24, Type R: For shoulder closures.
7. D-704-26, Type CC, EE, and GG for paving operations.
8. D-704-27, Pavement marking operations.
9. D-704-56, Rumble strips.

Traffic control quantities have been developed based on two subcut operations and one guardrail replacement operation occurring simultaneously. The required traffic control signs and devices are included in the “Traffic Control Devices List” and will be measured and paid for at the price bid for each device. Include all costs to remove and reset traffic control devices in the price bid for each item.

704-P04 FIELD DRIVE AND SECTION LINE ROADS: Coordinate access to field drives and section lines roads with the Engineer in the field prior to the start of subcut operations.

706-P01 LABORATORY: Provide laboratories wired for DSL Broadband internet with Wi-Fi and have the capability to allow for hard wiring the computer.

Include the cost of the installation and monthly fee in the price bid for each laboratory.

764-P01 GUARDRAIL: Existing w-beam and box beam guardrail designated to be removed and not reset will remain the property of the NDDOT. Deliver to the Devils Lake maintenance yard west of Devils Lake, ND, RP 266.922 on US Highway 2. Include all costs to deliver existing W-beam and box beam guardrail in the price bid for guardrail removal items.

Dispose of remaining guardrail materials in accordance with Section 107.17, “Removed Material”.

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ENVIRONMENTAL COMMITMENTS

ENVIRONMENTAL COMMITMENTS (EC): The North Dakota Department of Transportation and the Federal Highway Administration have made environmental commitments to secure approval of this project. The environmental commitments are as follows:

EC-1: Unavoidable permanent impacts will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank in accordance with the mitigation guidance[2, 3].

ACTION REQUIRED /TAKEN: 0.00 acres of permanent USACE impacts to jurisdictional waters and 0.00 acres of permanent impacts to EO 11990 wetlands will require mitigation. Therefore, mitigation will not be required. 0.10 acres of temporary impacts will result from construction. Temporary impact areas will be graded to preconstruction contours.

Wetland Impact Table

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size (Acres)	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts (Acres)		USFWS Easement Impacts (Acres)		Wetland Mitigation								
											Mitigation Required			Bank		Onsite			
							Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acres	Mitigation Location; Ratio	Acres	Constructed Site #	Constructed Size (Acres)
1a	Sec. 22, T158N, R70W	PEMCx	Ditch	0.17	Artificial	No	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
1b	Sec. 23, T158N, R70W	PEMAx	Ditch	0.01	Artificial	No	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
2a	Sec. 21, T158N, R68W	PEMC	Basin	0.04	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
2c	Sec. 21, T158N, R68W	PEMC	Basin	0.02	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
2d	Sec. 28, T158N, R68W	PEMC	Basin	0.02	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
2f	Sec. 28, T158N, R68W	PEMC	Basin	0.02	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
3	Sec. 23, T158N, R67W	PEMCx	Ditch	0.06	Artificial	No	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
6	Sec. 21, T158N, R64W	PEMCx	Ditch	0.07	Artificial	No	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
7	Sec. 21, T158N, R64W	PEMAx	Ditch	0.16	Artificial	No	0.02	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
8	Sec. 28, T158N, R64W	PEMAx	Ditch	0.04	Artificial	No	0.02	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
9	Sec. 28, T158N, R64W	PEMAx	Ditch	0.17	Artificial	No	0.06	0.00	0.00	0.00	N	N	N	N/A	N/A	N/A	N/A	N/A	N/A
			Totals	**0.78**			**0.10**	**0.00**	**0.00**	**0.00**					**0.00**		**0.00**		**0.00**

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ENVIRONMENTAL COMMITMENTS

Other Waters Impact Table

Other Waters											Other Waters Mitigation				
			Size				Impacts to Other Waters				Mitigation Required				
							Acres		Linear Feet						
Number	Location	Type	Acres	Linear Feet	Feature	USACE Jurisdictional[1]	Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Mitigation Location; Ratio	Method
#OW 2b	Sec. 21, T158N, R68W	Stream	0.04	NA	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A
#OW 2e	Sec. 28, T158N, R68W	Stream	0.04	NA	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A
#OW 4a	Sec. 23, T158N, R67W	Stream	0.13	NA	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A
#OW 4b	Sec. 26, T158N, R67W	Stream	0.11	NA	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A
#OW 5a	Sec. 24, T158N, R66W	Named Stream	0.20	NA	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A
#OW 5b	Sec. 25, T158N, R66W	Named Stream	0.19	NA	Natural	Yes	0.00	0.00	0.00	0.00	N	N	N	N/A	N/A
		Totals	**0.71**	**NA**			**0.00**	**0.00**	**0.00**	**0.00**					

[1] A wetland Jurisdictional Determination was issued by the USACE on 10/23/2014; NWO-2014-2322-BIS.

[2] All impacts to natural wetlands (natural/jurisdictional and natural/non-jurisdictional), regardless of size, as well as impacts greater than 0.10 acre to artificial/jurisdictional wetlands require mitigation.

[3] All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), and temporary impacts do not require mitigation.

Summary Impact Table

Total Permanent Impact Summary		Temporary Impacts and Additional Information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/LF)
Natural/JD	0.00	Temporary JD	0.00
Natural/Non-JD	0.00	Temporary Non-JD	0.10
Artificial/JD	0.00	Permanent JD > 0.10	0.00
Artificial/Non-JD	0.00	Permanent OW	0.00
Total	0.00	Temporary OW	0.00

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SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
202	0137	REMOVAL OF PAVEMENT	SY	7,955	7,955
203	0109	TOPSOIL	CY	3,808	3,808
203	0121	TOPSOIL-WETLAND	CY	81	81
203	0138	COMMON EXCAVATION-SUBCUT	CY	13,928	13,928
203	0218	GUARDRAIL EMBANKMENT	EA	4	4
216	0100	WATER	M GAL	579	579
230	0125	SHOULDER PREPARATION	MILE	0.408	0.408
251	0200	SEEDING CLASS II	ACRE	4.72	4.72
251	1000	WETLAND SEED	ACRE	0.10	0.10
251	2000	TEMPORARY COVER CROP	ACRE	4.72	4.72
253	0101	STRAW MULCH	ACRE	9.44	9.44
260	0200	SILT FENCE SUPPORTED	LF	1,015	1,015
260	0201	REMOVE SILT FENCE SUPPORTED	LF	1,015	1,015
261	0112	FIBER ROLLS 12IN	LF	3,690	3,690
261	0113	REMOVE FIBER ROLLS 12IN	LF	1,330	1,330
302	0120	AGGREGATE BASE COURSE CL 5	TON	28,323	28,323
401	0050	TACK COAT	GAL	351	351
401	0060	PRIME COAT	GAL	2,199	2,199
430	0042	SUPERPAVE FAA 42	TON	1,984	1,984
430	1000	CORED SAMPLE	EA	8	8
430	5828	PG 58-28 ASPHALT CEMENT	TON	119	119
624	3001	DOUBLE BOX BEAM RAIL RETROFIT-FREE STANDING	LF	188.6	188.6
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	1,200	1,200
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4,246	4,246
704	1052	TYPE III BARRICADE	EA	12	12
704	1060	DELINEATOR DRUMS	EA	25	25
704	1067	TUBULAR MARKERS	EA	80	80
704	1080	STACKABLE VERTICAL PANELS	EA	160	160
704	1185	PILOT CAR	HR	100	100
706	0500	AGGREGATE LABORATORY	EA	1	1
706	0550	BITUMINOUS LABORATORY	EA	1	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	1
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	14,293	14,293
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	80	80
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	6	6
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	112	112
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	177	177
754	0592	RESET SIGN PANEL	EA	2	2
760	0005	RUMBLE STRIPS-ASPHALT SHOULDER	MILE	0.714	0.714
760	0007	RUMBLE STRIPS-ASPHALT CENTERLINE	MILE	0.357	0.357
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	1,416	1,416
762	1104	PVMT MK PAINTED 4IN LINE	LF	4,244	4,244
764	0131	W-BEAM GUARDRAIL	LF	483	483
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	14	14
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	800	800
764	1050	RESET W-BEAM GUARDRAIL	LF	513	513
764	2080	REMOVE BOX BEAM GUARDRAIL	LF	613	613
764	2081	REMOVE END TREATMENT & TRANSITION	EA	14	14

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BASIS OF ESTIMATE

Summary of Quantities

Material	Unit	Site 1 (60" Subcut)	Site 2 (60" Subcut)	Site 3 (Guardrail Replacement)	Site 4 (Guardrail Replacement)	Site 5 (Guardrail Replacement)	Site 6 (60" Subcut)	Approaches	Total
Common Excavation - Subcut	CY	5,990	3,821	-	-	-	4,117	-	**13,928**
Removal of Pavement	SY	2,902	2,029	-	-	20	2,453	551	**7,955**
Geosynthetic Material Type G	SY	5,921	3,999	-	-	-	4,373	-	**14,293**
Shoulder Preparation	Mile	-	-	0.133	0.129	0.146	-	-	**0.408**
Aggregate Base Course CL 5	Ton	11,678	7,573	144	118	152	8,330	328	**28,323**
Prime Coat	Gal	710	496	121	139	190	543	-	**2,199**
Blotter Material CL 44 (Not a Pay Item)	Ton	22	15	-	-	-	16	-	**53**
Tack Coat	Gal	135	95	-	-	-	103	18	**351**
Superpave FAA 42	Ton	675	472	51	58	81	571	76	**1,984**
PG 58-28 Asphalt Cement	Ton	40.5	28.3	3.1	3.5	4.8	34.2	4.6	**119**

Subcuts

Material	Unit	Stations (Site, RP): Sta 621+42.38 to Sta 629+10.30 (Site 1, RP 11.843); Distance = 7.68 Sta				Stations (Site, RP): Sta 900+11.50 to Sta 905+48.63 (Site 2, RP 17.099); Distance = 5.37 Sta				Stations (Site, RP): Sta 2762+72.79 to Sta 2768+53.88 (Site 6, RP 52.379); Distance = 5.81 Sta				Total
		Width (Ft)	Area (SF)	Quantity Per Sta	Subtotal	Width (Ft)	Area (SF)	Quantity Per Sta	Subtotal	Width (Ft)	Area (SF)	Quantity Per Sta	Subtotal	
Common Excavation - Subcut	CY	-	-	-	5,990	-	-	-	3,821	-	-	-	4,117	**13,928**
Removal of Pavement	SY	34.0	-	377.8	2,902	34.0	-	377.8	2,029	38.0	-	422.2	2,453	**7,384**
Geosynthetic Material Type G	SY	-	-	-	5,921	-	-	-	3,999	-	-	-	4,373	**14,293**
Aggregate Base Course CL 5 (For Subcut Backfill) @ 1.875 Ton/CY	Ton	-	-	-	9,670	-	-	-	6,169	-	-	-	6,796	**27,581**
Aggregate Base Course CL 5 (12" Depth) @ 1.875 Ton/CY	Ton	-	37.65	261.5	2,008	-	37.65	261.5	1,404	-	38.02	264.0	1,534	
Prime Coat @ 0.25 Gal/SY	Gal	33.28	-	92.4	710	33.28	-	92.4	496	33.64	-	93.4	543	**1,749**
Blotter Material CL 44 @ 15 lbs/SY (Not a Pay Item)	Ton	33.28	-	2.8	22	33.28	-	2.8	15	33.64	-	2.8	16	**53**
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	31.64	-	17.6	135	31.64	-	17.6	95	31.82	-	17.7	103	**333**
Superpave FAA 42 (4.5" Depth) @ 2 Ton/CY	Ton	-	11.87	87.9	675	-	11.87	87.9	472	-	-	-	0	**1,718**
Superpave FAA 42 (5" Depth) @ 2 Ton/CY	Ton	-	-	-	0	-	-	-	0	-	13.26	98.2	571	
PG 58-28 Asphalt Cement @ 6.0%	Ton	-	-	5.27	40.5	-	-	5.27	28.3	-	-	5.89	34.2	**103**

Approaches

Material	Unit	Gravel Section Line: No. of Locations = 1					Gravel Field Drive: No. of Locations = 4					Total
		Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Quantity Per Location	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Quantity Per Location	Subtotal	
Removal of Pavement	SY	1,647	-	-	183	183	825	-	-	92	368	**551**
Aggregate Base Course CL 5 (6" Depth) @ 1.875 Ton/CY	Ton	-	-	-	0	0	565	0.50	44	21	84	**328**
Aggregate Base Course CL 5 (12" Depth) @ 1.875 Ton/CY	Ton	1,647	3.42	126	144	144	260	3.42	30	25	100	
Tack Coat @ 0.05 Gal/SY	Gal	1,736	-	-	10	10	280	-	-	2	8	**18**
Superpave FAA 42 (Transition 4.5" to 4" Depth) @ 2 Ton/CY	Ton	1,647	0.25	126	46	46	260	0.25	30	7	14	**76**
Superpave FAA 42 (Transition 5" to 4" Depth) @ 2 Ton/CY	Ton	-	-	-	-	0	260	0.28	30	8	16	
PG 58-28 Asphalt Cement @ 6.0%	Ton	-	-	-	2.76	2.8	-	-	-	0.45	1.8	**4.6**

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	10	2

BASIS OF ESTIMATE

Guardrail - Site 3, RP 27.642														
		Stations				Stations				Stations				
		Sta 1458+33.86 Lt to Sta 1460+43.66 Lt				Sta 1457+60.50 Rt to Sta 1460+50.97 Rt				Sta 1460+89.28 Lt to Sta 1462+88.51 Lt				
Material	**Unit**	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	**Total**
Shoulder Preparation	Mile	-	-	-	0.040	-	-	-	0.055	-	-	-	0.038	**0.133**
Aggregate Base Course CL 5 (3.75" Depth) @ 1.875 Ton/CY	Ton	1,207	0.44	141	31	1,337	0.44	292	38	737	0.44	104	19	**144**
Aggregate Base Course CL 5 (9.75" Depth) @ 1.875 Ton/CY	Ton	148	2.05	70	18	-	-	-	0	423	2.05	98	38	
Prime Coat @ 0.25 Gal/SY	Gal	1,509	-	-	42	1,550	-	-	43	1,308	-	-	36	**121**
Superpave FAA 42 (2" Depth) @ 2 Ton/CY	Ton	1,355	0.06	211	18	1,337	0.06	292	18	1,160	0.06	202	15	**51**
PG 58-28 Asphalt Cement @ 6.0%	Ton	-	-	-	1.1	-	-	-	1.1	-	-	-	0.9	**3.1**

Guardrail - Site 4, RP 35.957										
		Stations				Stations				
		Sta 1897+26.89 Lt to Sta 1901+08.59 Lt				Sta 1896+61.56 Rt to Sta 1899+62.24 Rt				
Material	**Unit**	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	**Total**
Shoulder Preparation	Mile	-	-	-	0.072	-	-	-	0.057	**0.129**
Aggregate Base Course CL 5 (3.75" Depth) @ 1.875 Ton/CY	Ton	2,374	0.44	385	63	2,111	0.44	302	55	**118**
Prime Coat @ 0.25 Gal/SY	Gal	2,655	-	-	74	2,331	-	-	65	**139**
Superpave FAA 42 (2" Depth) @ 2 Ton/CY	Ton	2,374	0.06	385	31	2,111	0.06	302	27	**58**
PG 58-28 Asphalt Cement @ 6.0%	Ton	-	-	-	1.9	-	-	-	1.6	**3.5**

Guardrail - Site 5, RP 42.967																		
		Stations				Stations				Stations				Stations				
		Sta 2266+87.63 Lt to Sta 2268+18.26 Lt				Sta 2265+64.46 Rt to Sta 2268+18.26 Rt				Sta 2269+13.26 Lt to Sta 2271+61.09 Lt				Sta 2269+13.26 Rt to Sta 2270+48.06 Rt				
Material	**Unit**	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	Surface Area (SF)	Slough End Area (SF)	Slough Length (LF)	Subtotal	**Total**
Shoulder Preparation	Mile	-	-	-	0.025	-	-	-	0.048	-	-	-	0.047	-	-	-	0.026	**0.146**
Removal of Pavement	SY	-	-	-	5	-	-	-	5	-	-	-	5	-	-	-	5	**20**
Aggregate Base Course CL 5 (3" Depth) @ 1.875 Ton/CY	Ton	702	0.32	134	15	2,382	0.32	180	45	2,061	0.32	194	40	763	0.32	138	16	**152**
Aggregate Base Course CL 5 (9" Depth) @ 1.875 Ton/CY	Ton	-	-	-	0	205	1.78	78	20	169	1.78	59	16	-	-	-	0	
Prime Coat @ 0.25 Gal/SY	Gal	800	-	-	22	2,775	-	-	77	2,415	-	-	67	864	-	-	24	**190**
Superpave FAA 42 (2" Depth) @ 2 Ton/CY	Ton	702	0.06	134	9	2,587	0.06	258	33	2,230	0.06	253	29	763	0.06	138	10	**81**
PG 58-28 Asphalt Cement @ 6.0%	Ton	-	-	-	0.5	-	-	-	2.0	-	-	-	1.7	-	-	-	0.6	**4.8**

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	10	3

BASIS OF ESTIMATE

HBP Cored Samples							
	A	B	C	D			
Specification Section	**Distance (Ft)÷2000**	**Lanes**	**Lifts**	**Sublots (A × B × C)**	**Quantity (D × 2)**	**Quantity (1 per mile)**	**Unit**
430.04 I.2.b(1), "General"	1	2	2	4	8	N/A	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"	N/A	N/A	N/A	N/A	N/A	0	EA
				Total	8	0	EA

Permanent Pavement Markings		
Location - Type	Basis	Quantity
Centerline - Yellow Painted 4 IN Line	Centerline Skips 1,320 LF/Mile	472 LF
Edge Lines - White Painted 4 IN Line	10,560 LF/Mile	3,772 LF

Short Term 4 IN Line - Type NR		
Location - Type	Basis	Quantity
Yellow Centerline - Top of 1st Lift	Centerline Skips 1,320 LF/Mile	472 LF
Yellow Centerline - Top of 2nd Lift	Centerline Skips 1,320 LF/Mile	472 LF
Yellow Centerline - For Rumble Strips	Centerline Skips 1,320 LF/Mile	472 LF

Water

Water for Compaction

- 20 Gal/Ton for Aggregate Base Course CL 5 X 28,323 Ton = 567 M Gal
- 10 Gal/CY for Embankment X 245 CY = 3 M Gal

Water for Dust Palliative @ 25 M Gal/Mile

- 0.357 Miles X 25 M Gal/Mile = 9 M Gal

Rumble Strips

Asphalt Shoulder

- 0.357 Mile X 2 = 0.714 Mile

Asphalt Centerline

- 0.357 Mile

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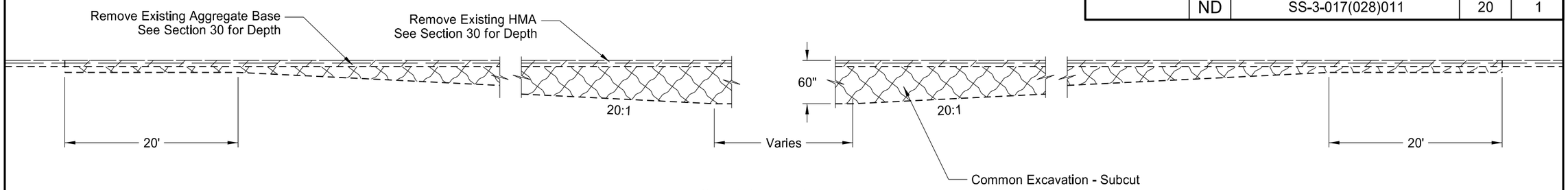
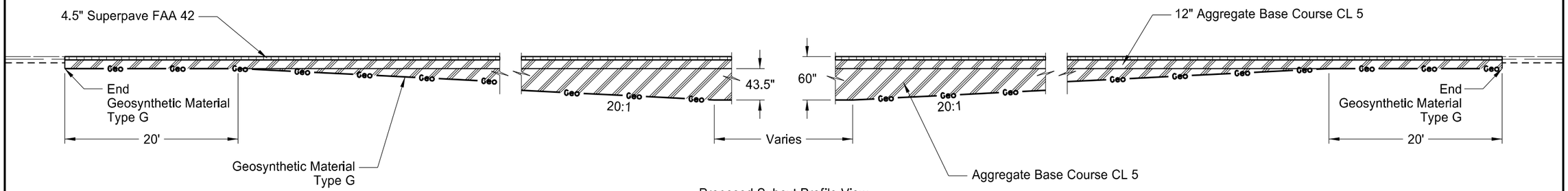
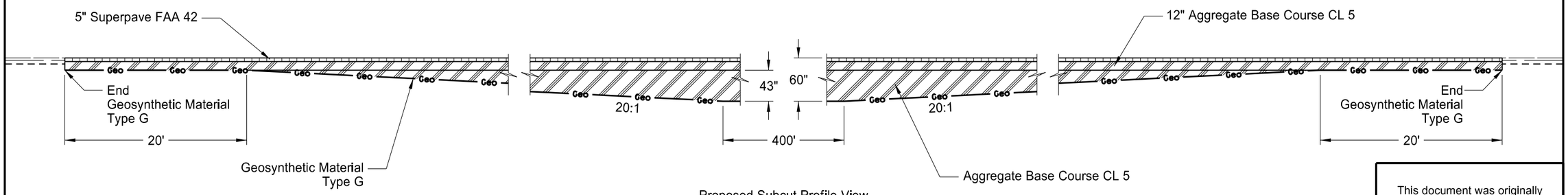
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	20	1



Subcut Removal Profile View
Sta 621+42.38 to Sta 629+10.30 (Site 1, RP 11.843)
Sta 900+11.50 to Sta 905+48.63 (Site 2, RP 17.099)
Sta 2762+72.79 to Sta 2768+53.88 (Site 6, RP 52.379)



Proposed Subcut Profile View
Sta 621+42.38 to Sta 629+10.30 (Site 1, RP 11.843)
Sta 900+11.50 to Sta 905+48.63 (Site 2, RP 17.099)



Proposed Subcut Profile View
Sta 2762+72.79 to Sta 2768+53.88 (Site 6, RP 52.379)

Location of Full Depth of Subcut	Common Excavation - Subcut (CY)	Removal of Pavement (SY)	Geosynthetic Material Type G (SY)
Sta 621+42.38 to Sta 629+10.30	5,990	2,902	5,921
Sta 900+11.50 to Sta 905+48.63	3,821	2,029	3,999
Sta 2762+72.79 to Sta 2768+53.88	4,117	2,453	4,373

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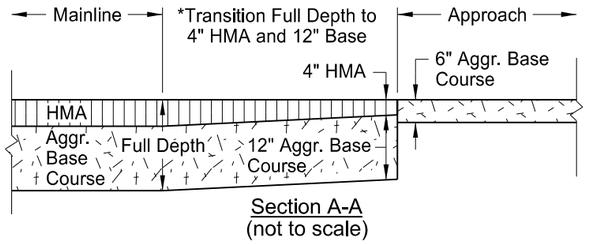
Subcut Details

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

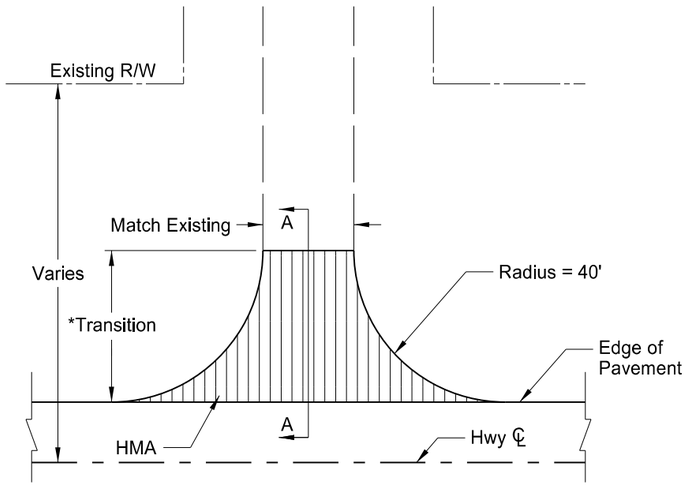
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	20	2



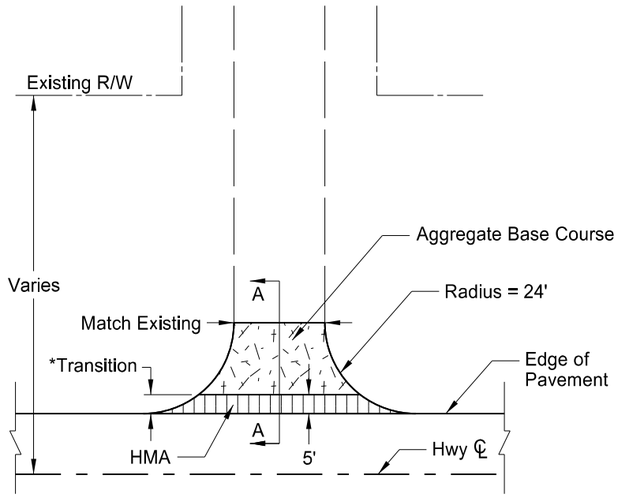
Section A-A
(not to scale)

Notes:

1. Actual HMA paving and aggregate base course locations may vary in the field, as approved by the Engineer.
2. Quantity totals have been included in the bid items of the "Estimate of Quantities" of the plans.



(1) Gravel Section Line



(2) Gravel Field Drive Approach

Approach Locations				
RP	Station	Location	Type	Notes
11.816	623+90	Rt	(2) Gravel Field Drive	
17.079	901+75	Lt	(2) Gravel Field Drive	
17.079	901+75	Rt	(1) Gravel Section Line	46th Ave NE
52.435	2768+55	Lt	(2) Gravel Field Drive	
52.435	2768+55	Rt	(2) Gravel Field Drive	

BASIS OF ESTIMATE		(1)	(2)	
ITEM	UNIT	Gravel Section Line	Gravel Field Drive	TOTALS
Number of Locations	#	1	4	5
Removal of Pavement	SY	183	92	551
Aggregate Base Course CL 5	TON	144	46	328
Tack Coat	GAL	10	2	18
Superpave FAA 42	TON	46	7.5	76
PG 58-28 Asphalt Cement	TON	2.76	0.45	4.6

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Approach Paving Details

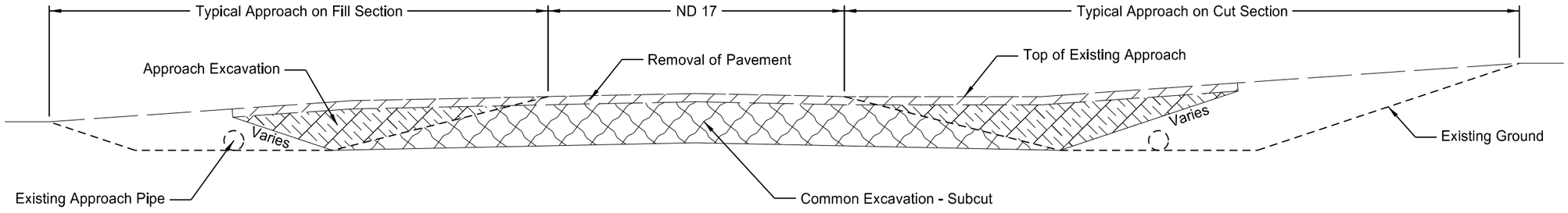
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	20	3

Notes:

1. Remove existing approaches within subcut areas to provide a uniform subcut aggregate section.
2. Include all costs for labor, materials, and equipment to excavate and reconstruct the approach embankment upon completion of the subcut in the price bid for "Common Excavation - Subcut".
3. Utilize approach excavated material to reconstruct the approach embankment. Do not use excavated material beneath ND 17 for subcut improvements.
4. Removal of existing HMA and aggregate base has been included in the quantity for "Removal of Pavement".



Location
Sta 623+90 Rt (Site 1, RP 11.843)
Sta 901+75 Lt (Site 2, RP 17.099)
Sta 901+75 Rt (Site 2, RP 17.099)

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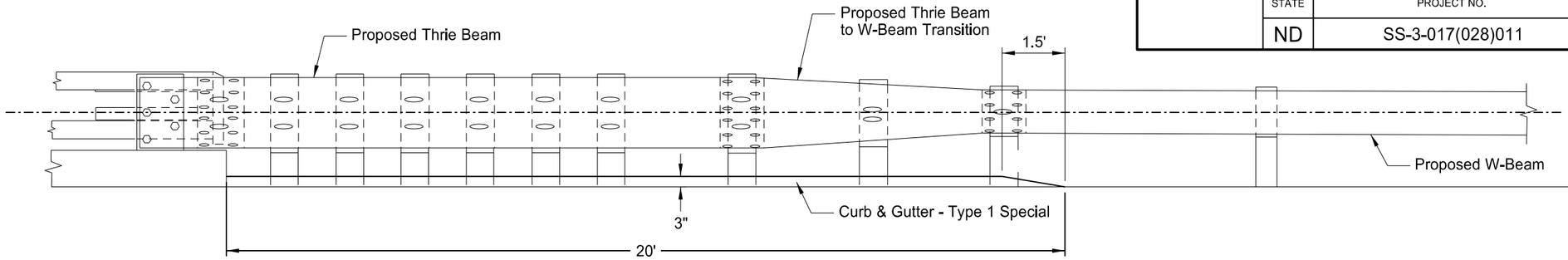
Typical Approach Excavation in Subcut Areas

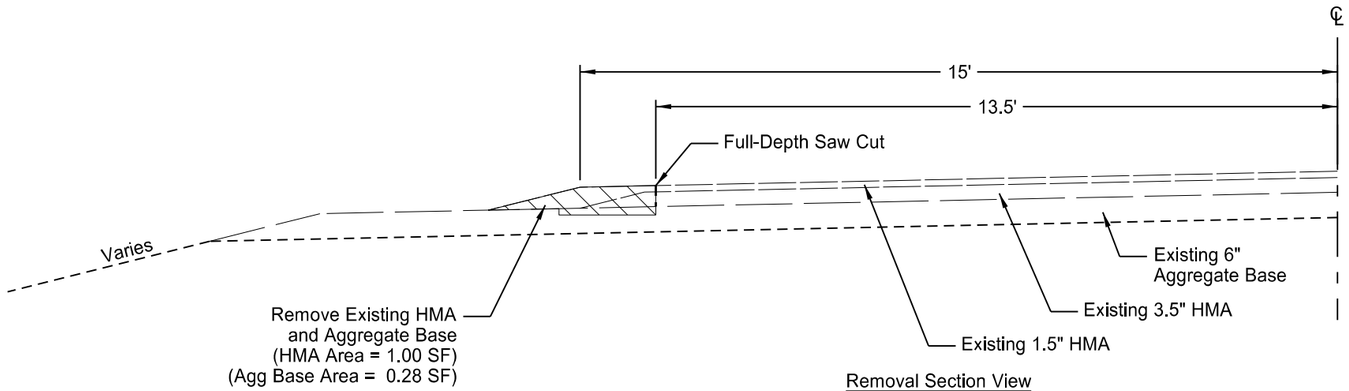
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

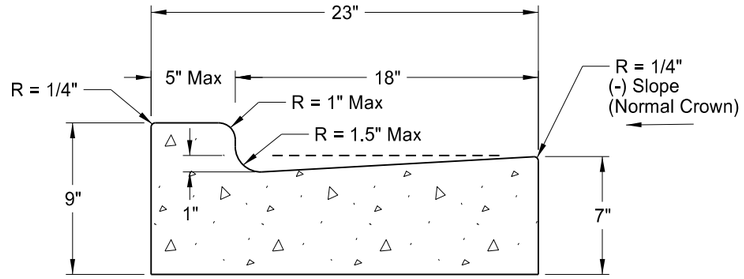
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	20	4



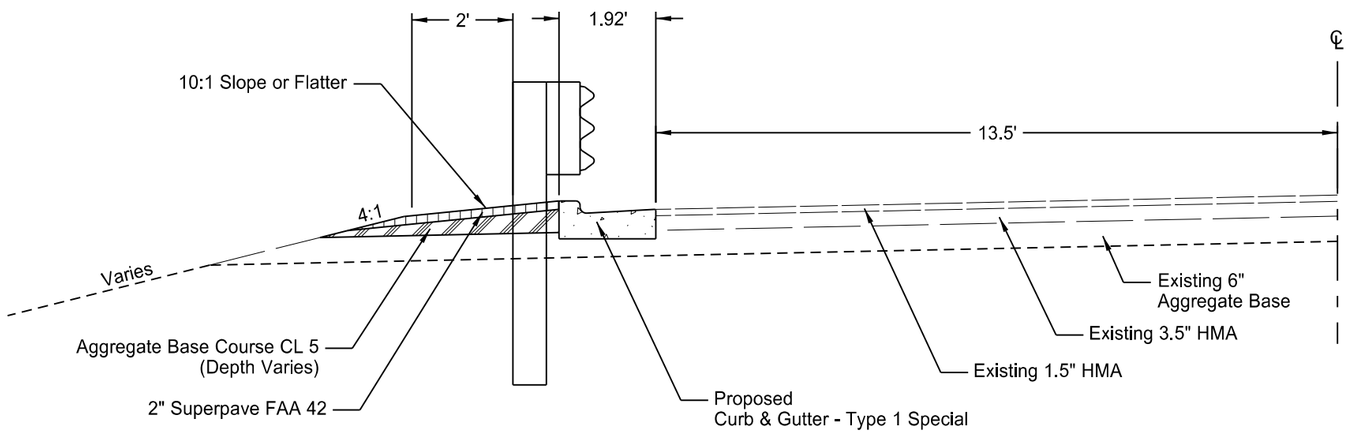
Elevation View



Removal Section View
Sta 2267+98.26 Lt to Sta 2268+18.26 Lt (Site 5, RP 42.967)
Sta 2267+98.26 Rt to Sta 2268+18.26 Rt (Site 5, RP 42.967)
Sta 2269+13.26 Lt to Sta 2269+33.26 Lt (Site 5, RP 42.967)
Sta 2269+13.26 Rt to Sta 2269+33.26 Rt (Site 5, RP 42.967)



Curb & Gutter - Type I Special
Section View



Proposed Section View
Sta 2267+98.26 Lt to Sta 2268+18.26 Lt (Site 5, RP 42.967)
Sta 2267+98.26 Rt to Sta 2268+18.26 Rt (Site 5, RP 42.967)
Sta 2269+13.26 Lt to Sta 2269+33.26 Lt (Site 5, RP 42.967)
Sta 2269+13.26 Rt to Sta 2269+33.26 Rt (Site 5, RP 42.967)

Note:

1. Refer to Standard Drawing D-748-1 for additional details.
2. Superpave FAA 42 and Aggregate Base Course CL 5 quantities have been included in the guardrail grading quantities shown on Section 20 Sheet 5.
3. Removal of existing HMA and aggregate base required to install the curb and gutter has been included in the quantity for "Removal of Pavement".
4. Removal and proposed section views shown for one direction of traffic only. Mirror section views for opposite direction.

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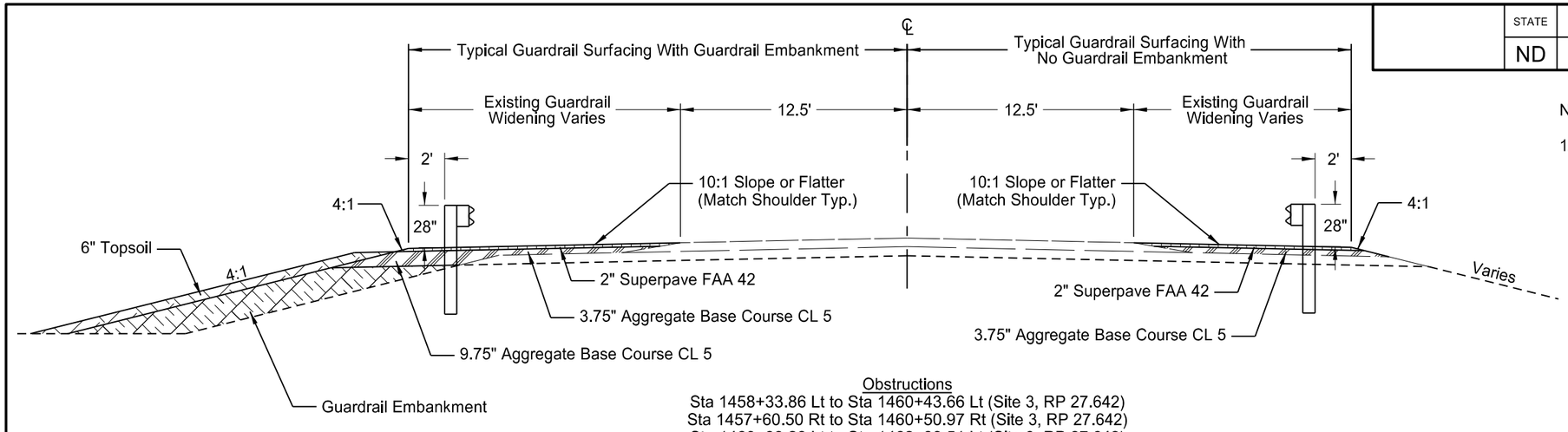
Curb & Gutter - Type 1 Special
Details

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

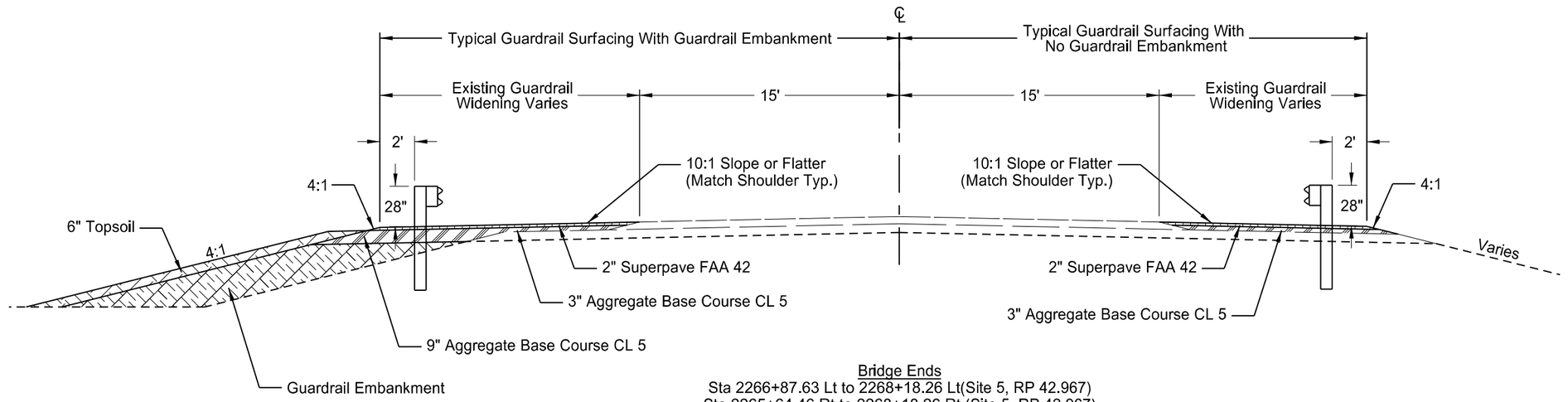
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	20	5



Note:

1. See Standard Drawing D-764-22 and D-764-23 for additional details.

Obstructions
Sta 1458+33.86 Lt to Sta 1460+43.66 Lt (Site 3, RP 27.642)
Sta 1457+60.50 Rt to Sta 1460+50.97 Rt (Site 3, RP 27.642)
Sta 1460+89.28 Lt to Sta 1462+88.51 Lt (Site 3, RP 27.642)
Sta 1897+26.89 Lt to Sta 1901+08.59 Lt (Site 4, RP 35.957)
Sta 1896+61.56 Rt to Sta 1899+62.24 Rt (Site 4, RP 35.957)



Bridge Ends
Sta 2266+87.63 Lt to 2268+18.26 Lt(Site 5, RP 42.967)
Sta 2265+64.46 Rt to 2268+18.26 Rt (Site 5, RP 42.967)
Sta 2269+13.26 Lt to 2271+61.09 Lt (Site 5, RP 42.967)
Sta 2269+13.26 Rt to 2270+48.06 Rt (Site 5, RP 42.967)

Location	Aggregate Base Course CL 5 (Ton)	Prime Coat (GAL)	Superpave FAA 42 (Ton)	PG 58-28 Asphalt Cement (Ton)	Removal of Pavement (SY)	Shoulder Preparation (Mile)
Sta 1458+33.86 Lt to Sta 1460+43.66 Lt	49	42	18	1.1	-	0.040
Sta 1457+60.50 Rt to Sta 1460+50.97 Rt	38	43	18	1.1	-	0.055
Sta 1460+89.28 Lt to Sta 1462+88.51 Lt	57	36	15	0.9	-	0.038
Sta 1897+26.89 Lt to Sta 1901+08.59 Lt	63	74	31	1.9	-	0.072
Sta 1896+61.56 Rt to Sta 1899+62.24 Rt	55	65	27	1.6	-	0.057
Sta 2266+87.63 Lt to Sta 2268+18.26 Lt	15	22	9	0.5	5	0.025
Sta 2265+64.46 Rt to Sta 2268+18.26 Rt	65	77	33	2.0	5	0.048
Sta 2269+13.26 Lt to Sta 2271+61.09 Lt	56	67	29	1.7	5	0.047
Sta 2269+13.26 Rt to Sta 2270+48.06 Rt	16	24	10	0.6	5	0.026

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Typical Surfacing at Guardrail Locations

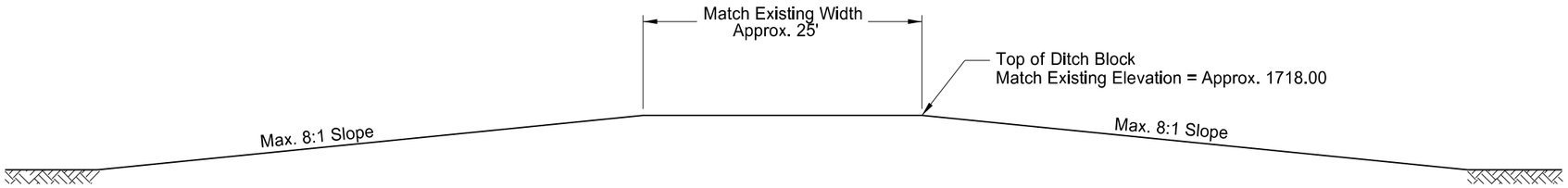
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	20	6

Note:

1. Include the cost of the labor, equipment, and materials to reconstruct ditch block in the price bid for "Common Excavation - Subcut."



Location
Sta 623+20 Lt (Site 1, RP 11.843)

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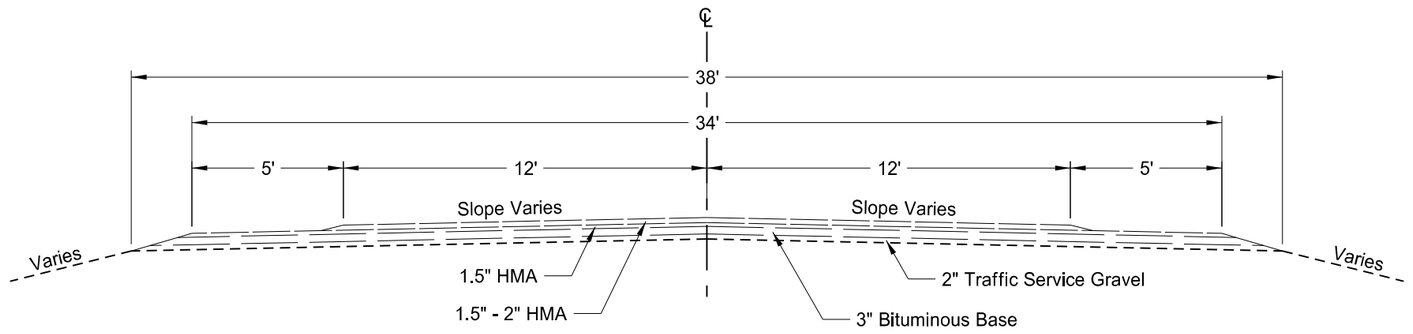
Ditch Block Detail

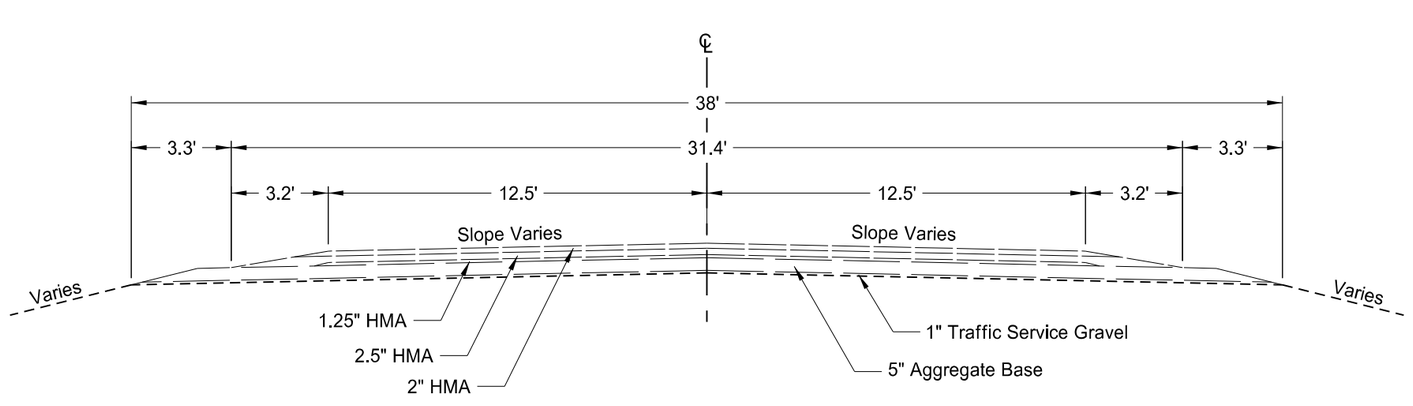
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	30	1



Existing Typical Section
Sta 580+80.00 to Sta 1452+00.00
RP 11.000 to RP 27.500



Existing Typical Section
Sta 1452+00.00 to Sta 2031+53.28
RP 27.500 to RP 38.476

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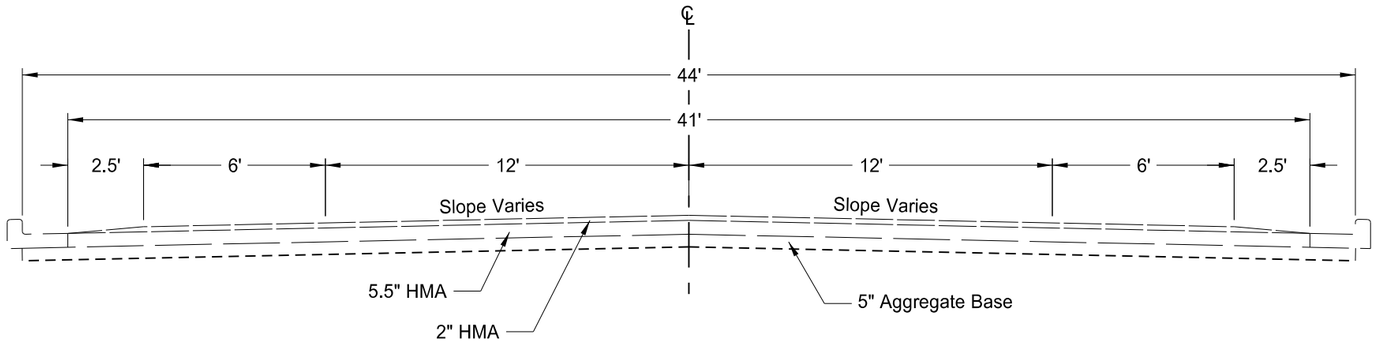
Existing Typical Section

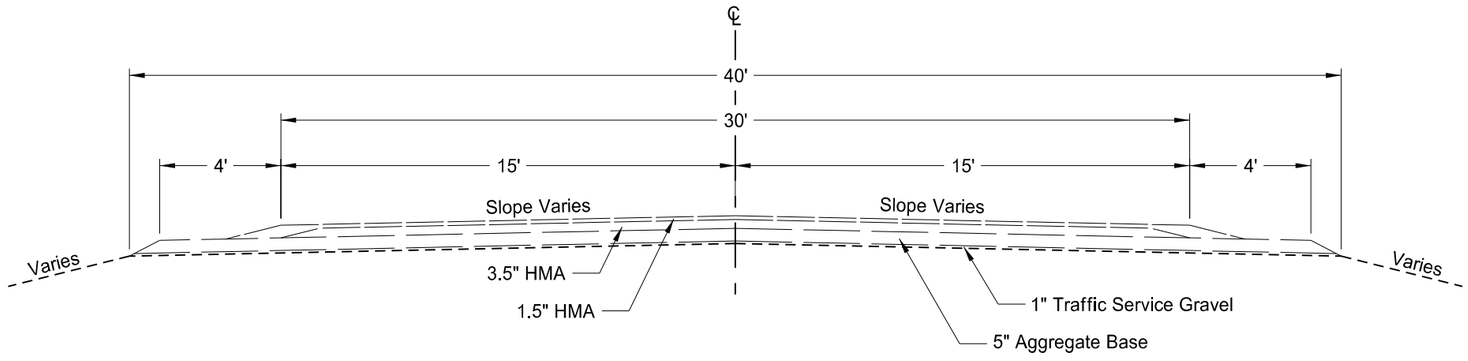
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	30	2



Existing Typical Section
Sta 2031+53.28 to Sta 2057+93.28
RP 38.476 to RP 38.976



Existing Typical Section
Sta 2057+93.28 to Sta 2821+63.20
RP 38.976 to RP 53.440

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Existing Typical Section

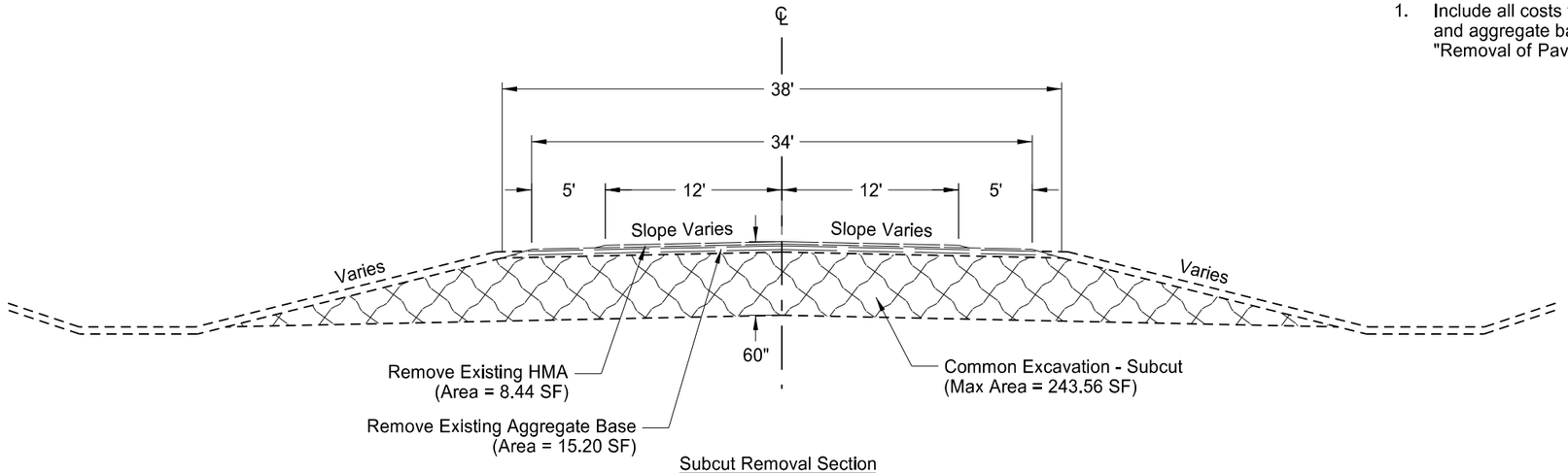
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

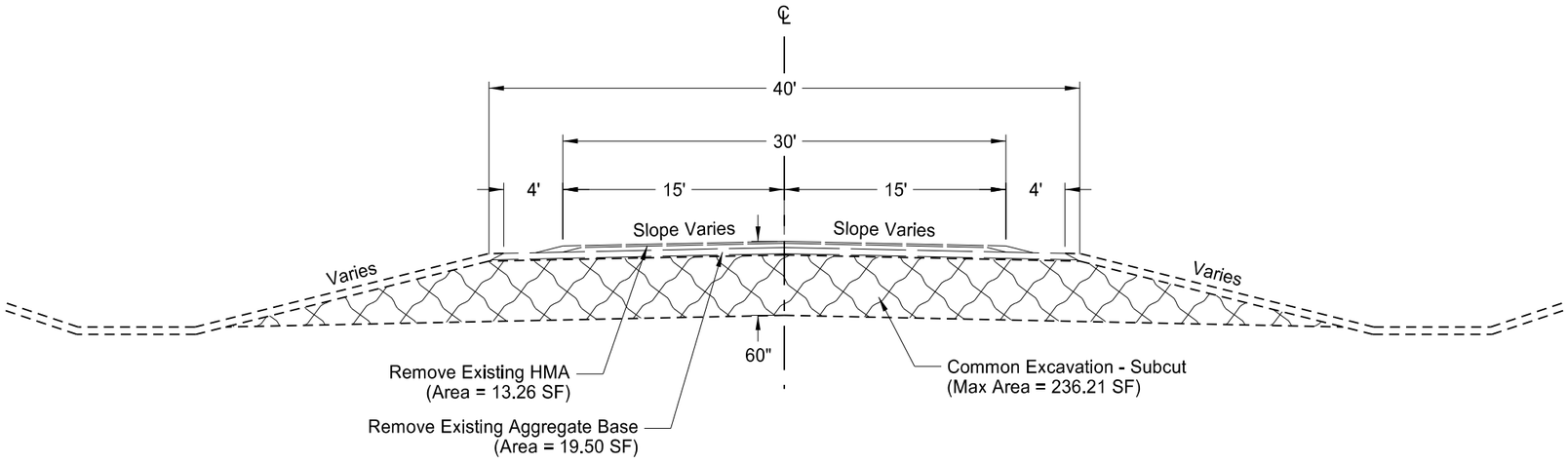
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	30	3

Note:

1. Include all costs for removal of existing HMA and aggregate base in the price bid for "Removal of Pavement".



Subcut Removal Section
Sta 621+42.38 to Sta 629+10.30 (Site 1, RP 11.843)
Sta 900+11.50 to Sta 905+48.63 (Site 2, RP 17.099)



Subcut Removal Section
Sta 2762+72.79 to Sta 2768+53.88 (Site 6, RP 52.379)

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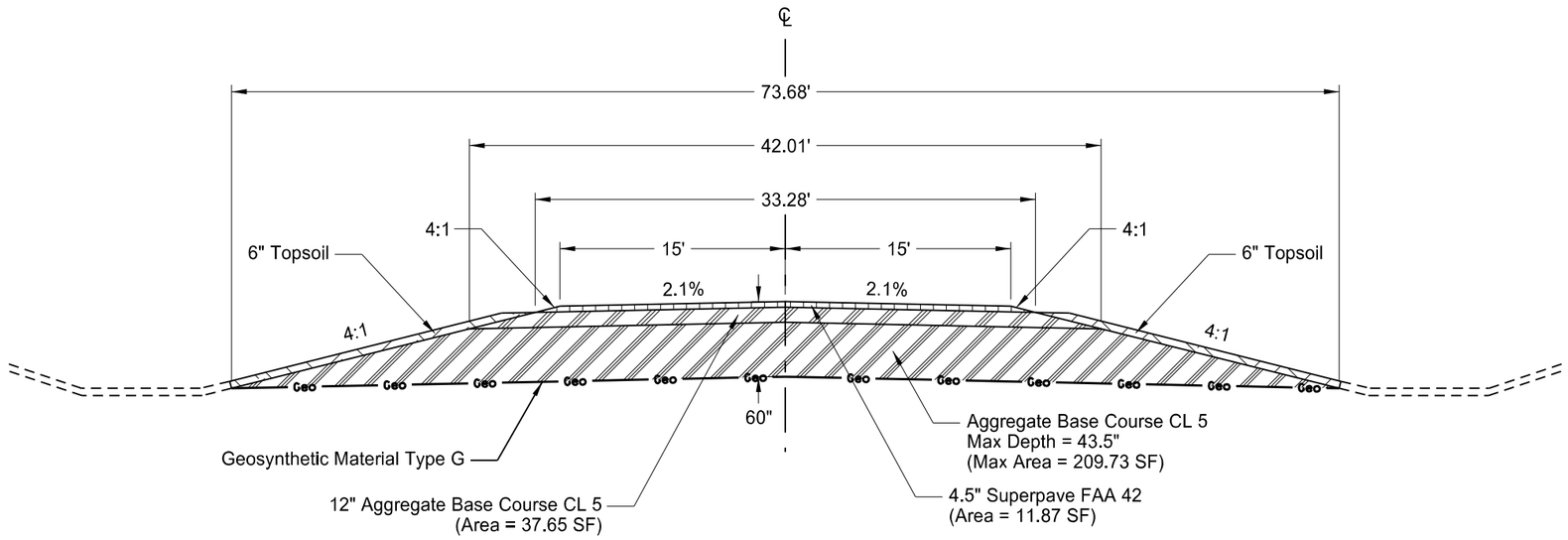
Subcut Removal
Typical Section

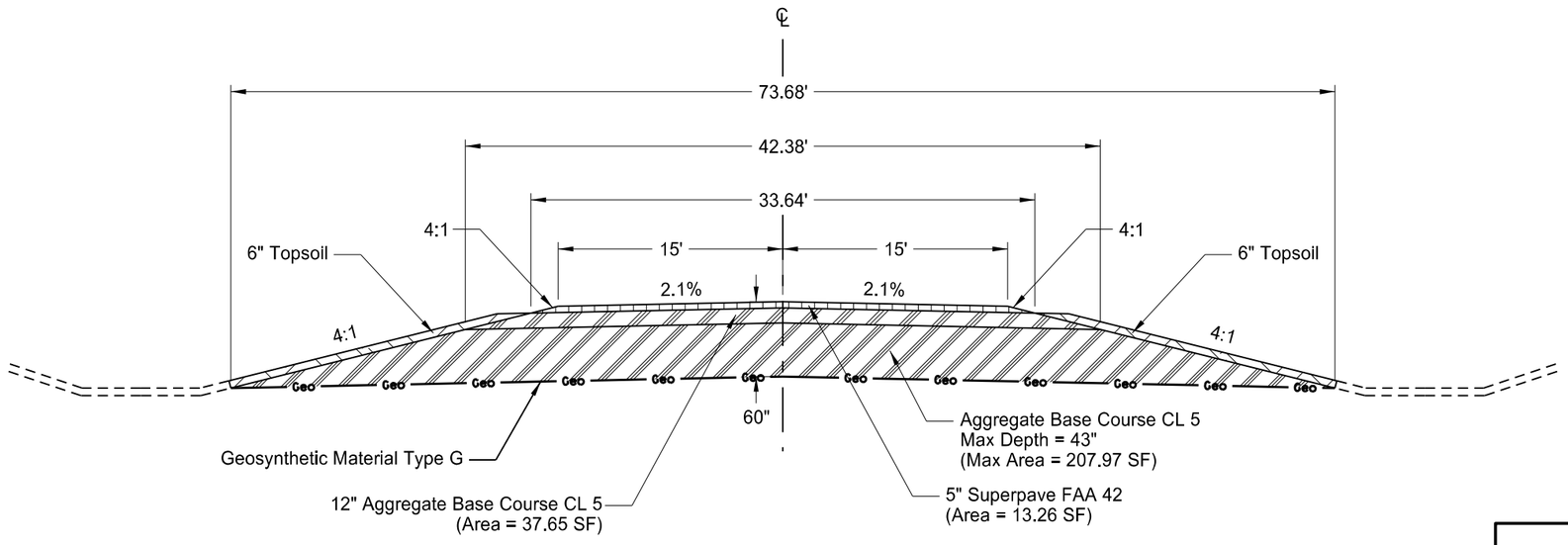
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	30	4



Proposed Subcut Section
Sta 621+42.38 to Sta 629+10.30 (Site 1, RP 11.843)
Sta 900+11.50 to Sta 905+48.63 (Site 2, RP 17.099)



Proposed Subcut Section
Sta 2762+72.79 to Sta 2768+53.88 (Site 6, RP 52.379)

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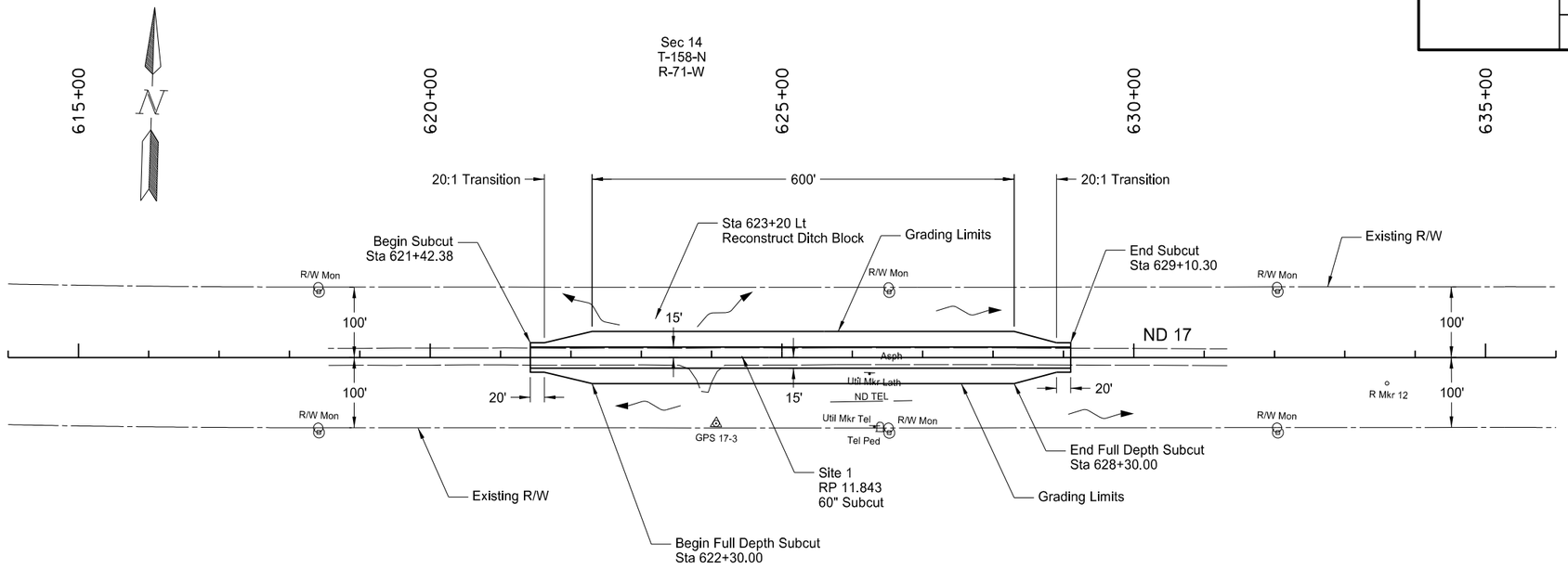
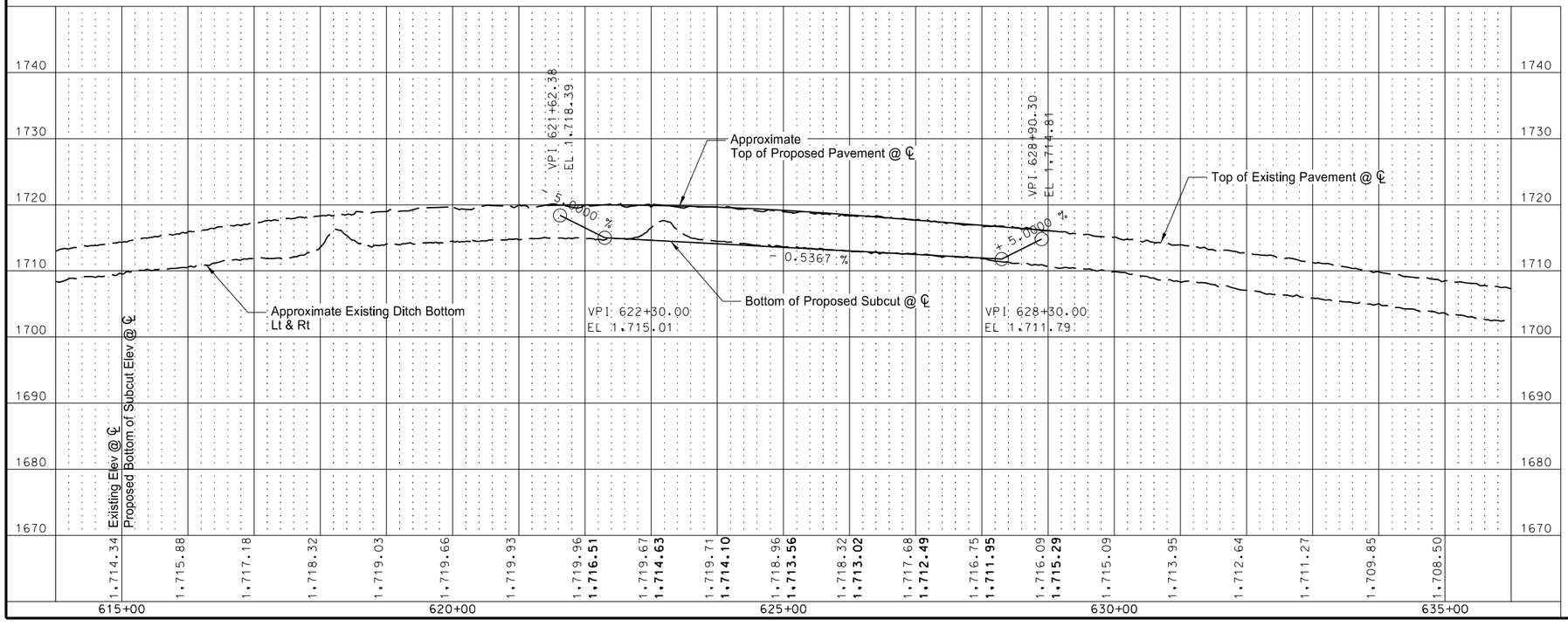
Proposed Subcut
Typical Section

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	60	1





Note:

1. Utility locations are approximate, based on field survey and utility maps.

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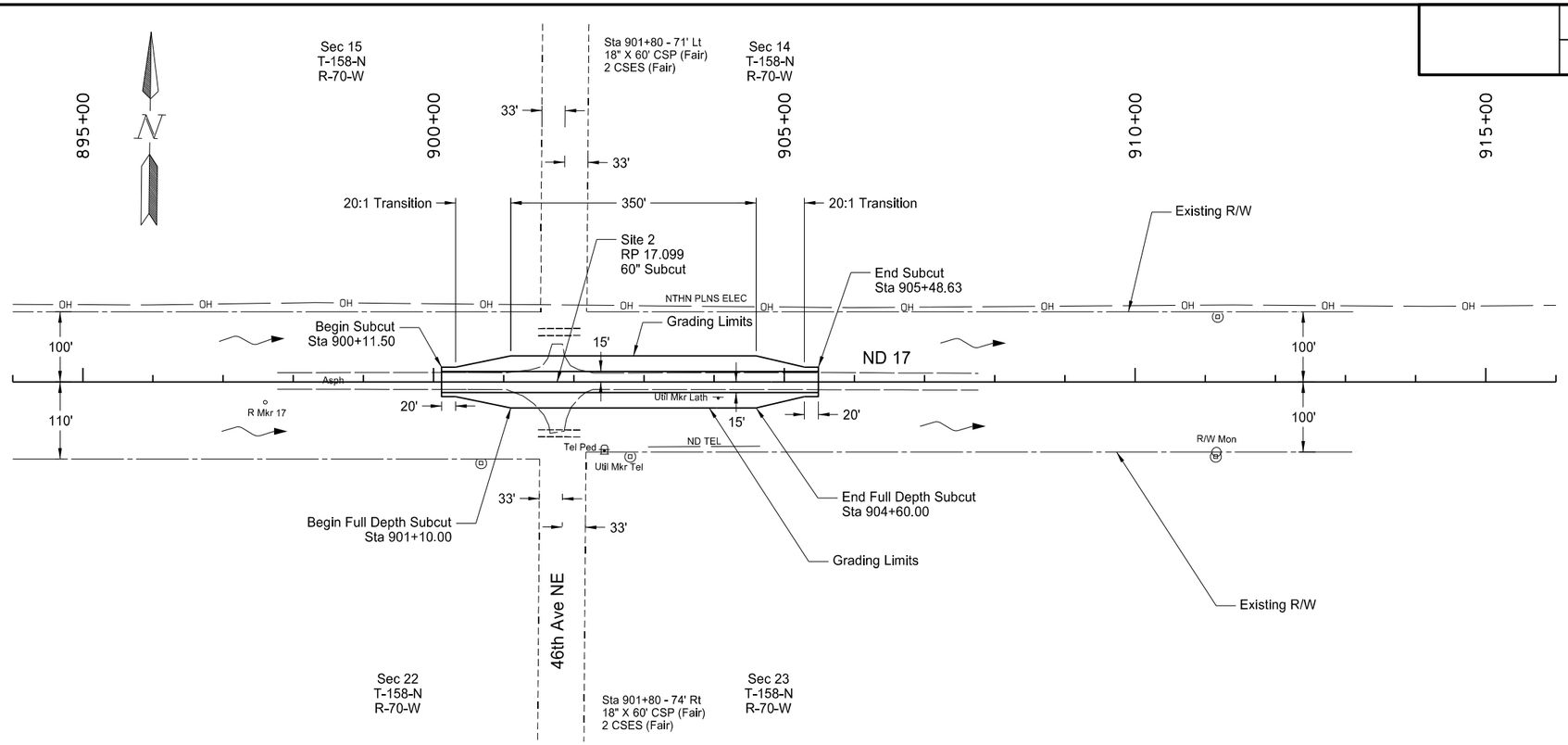
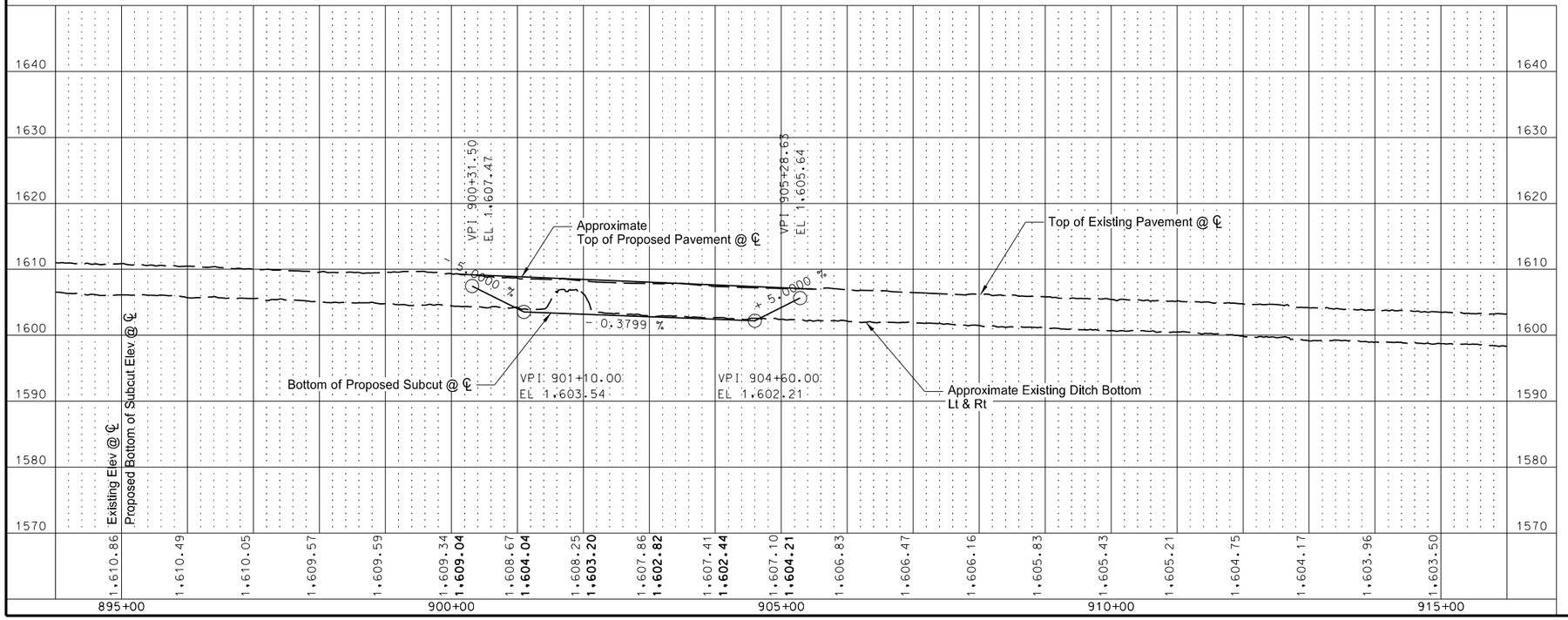
Plan & Profile
Subcut Repair - Site 1

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	60	2





Note:

1. Utility locations are approximate, based on field survey and utility maps.

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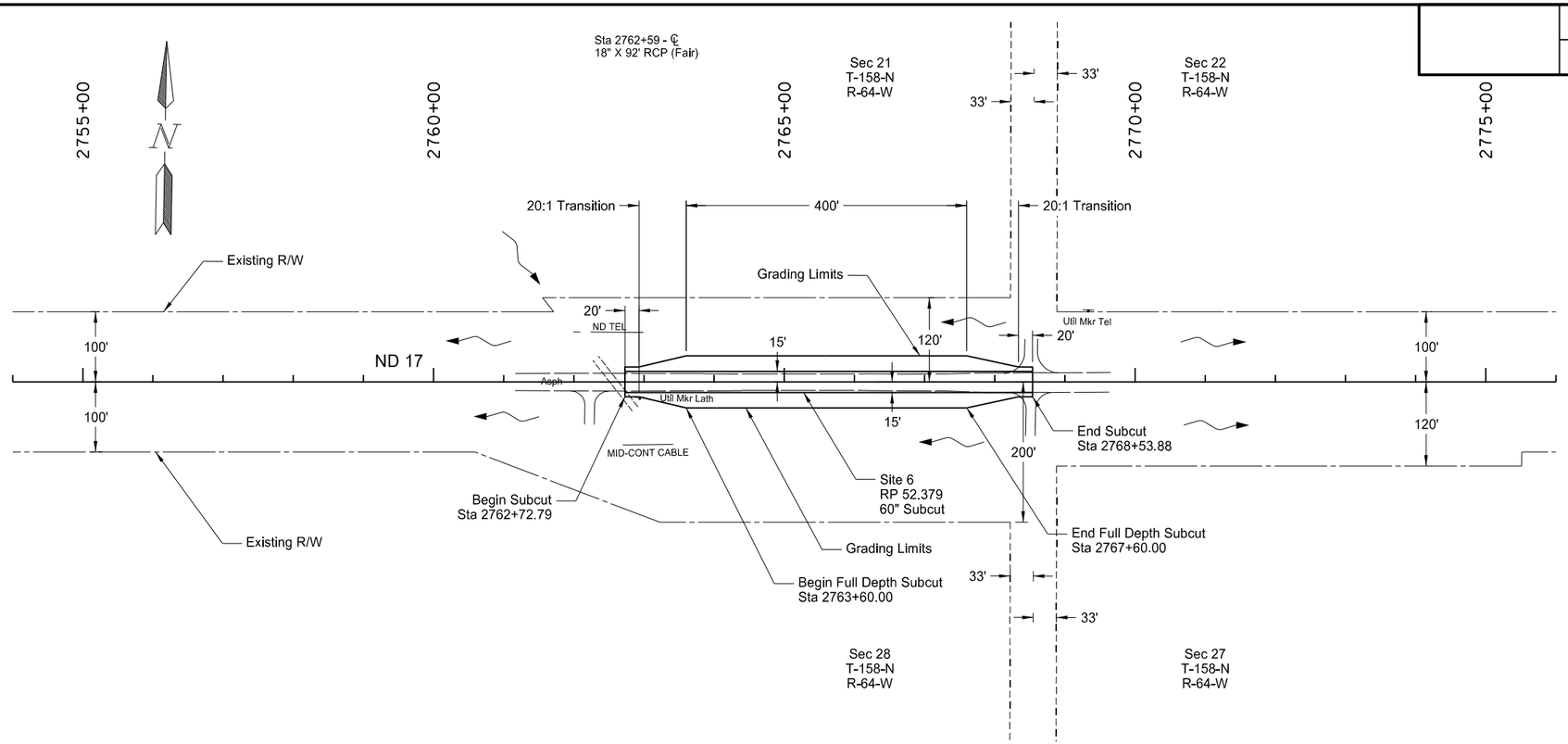
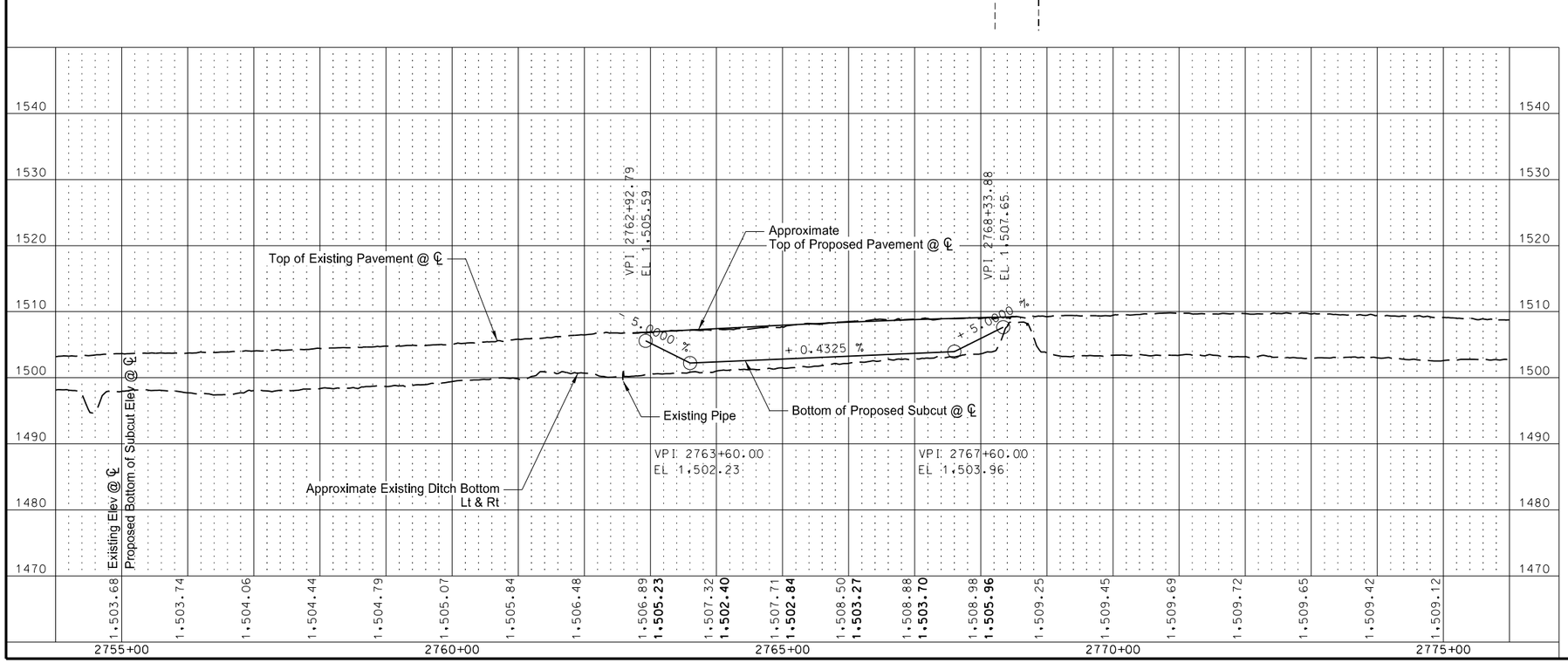
Plan & Profile
Subcut Repair - Site 2

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	60	3





Note:

1. Utility locations are approximate, based on field survey and utility maps.

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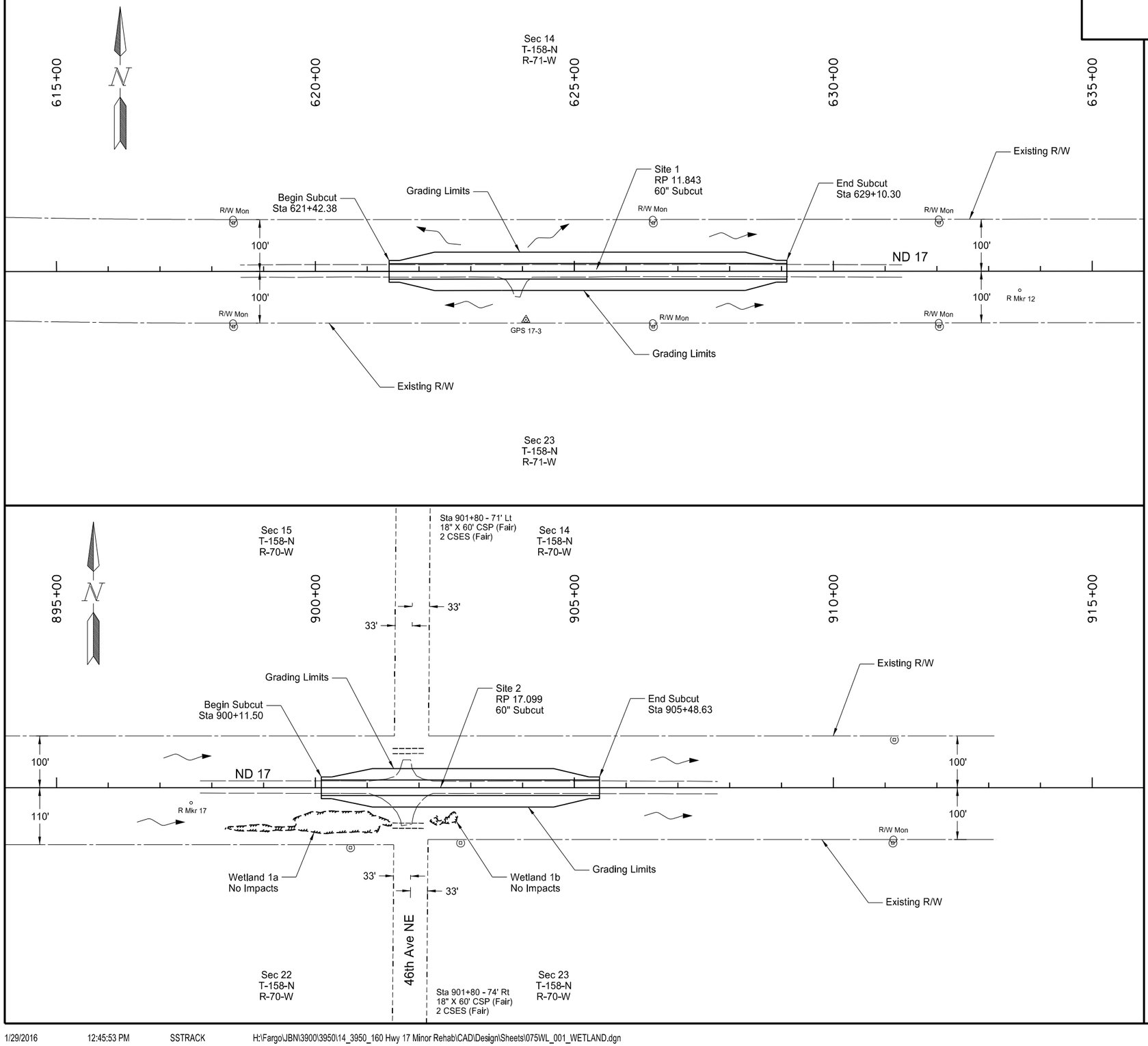
Plan & Profile
Subcut Repair - Site 6

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	75	1



Permanent Wetland Impacts

Temporary Wetland Impacts

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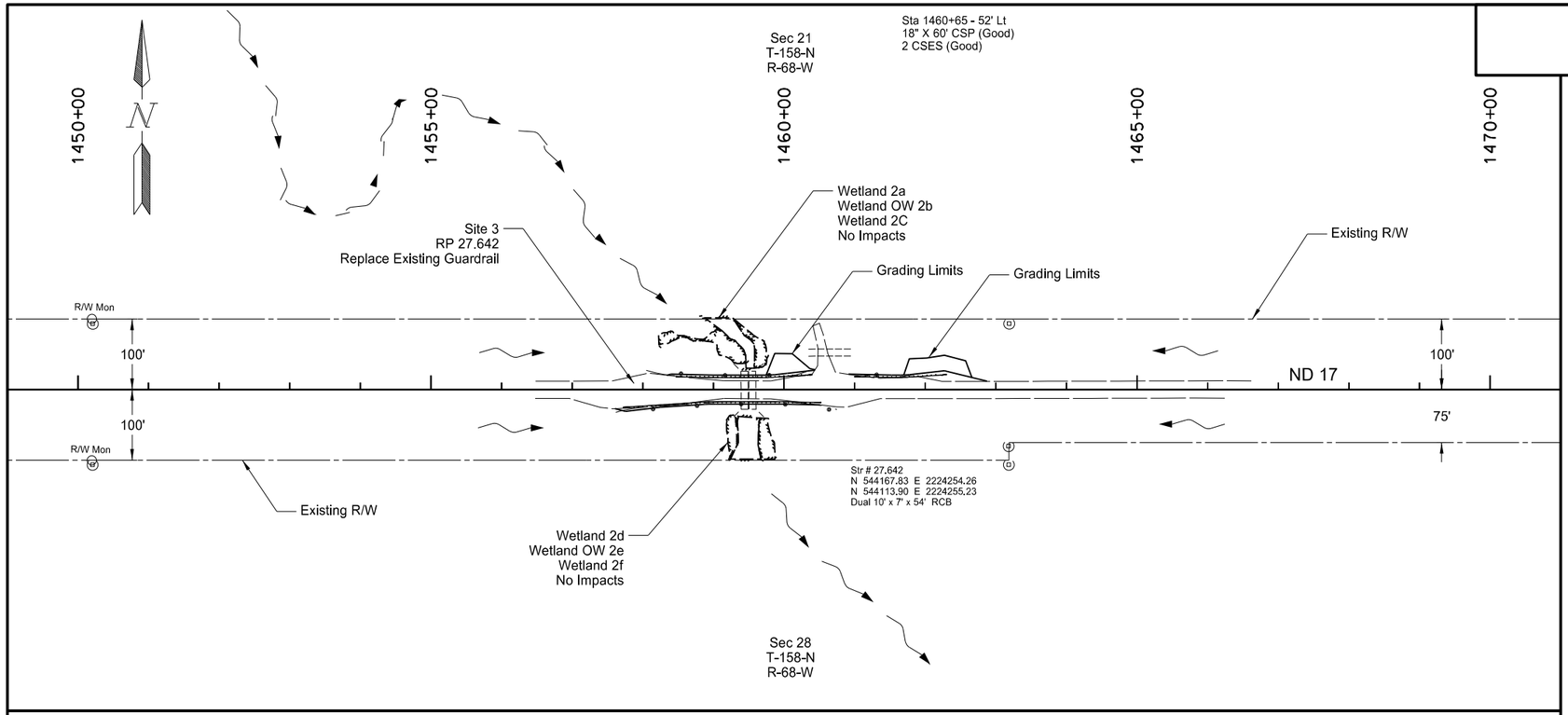
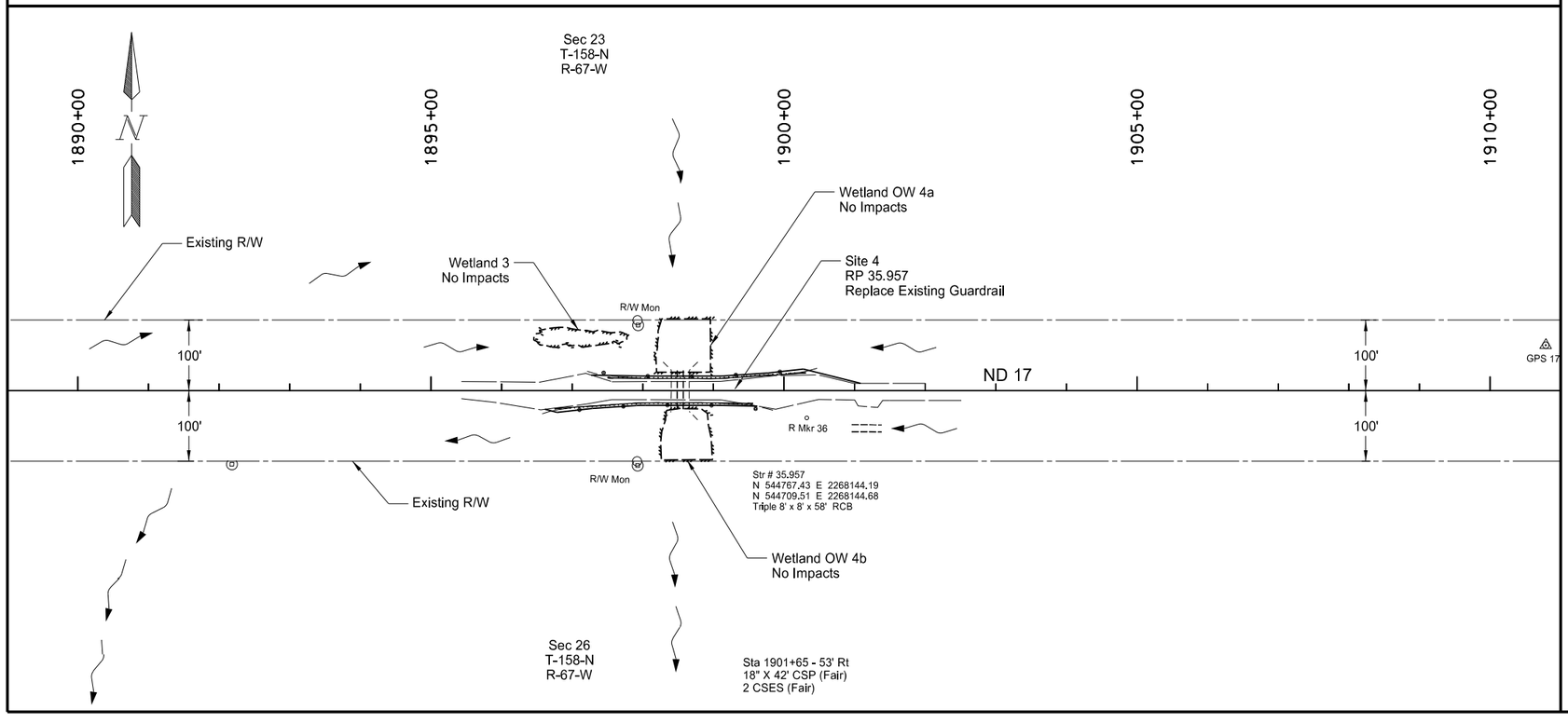
Wetlands and Environmental Impacts

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	75	2





Permanent Wetland Impacts

Temporary Wetland Impacts

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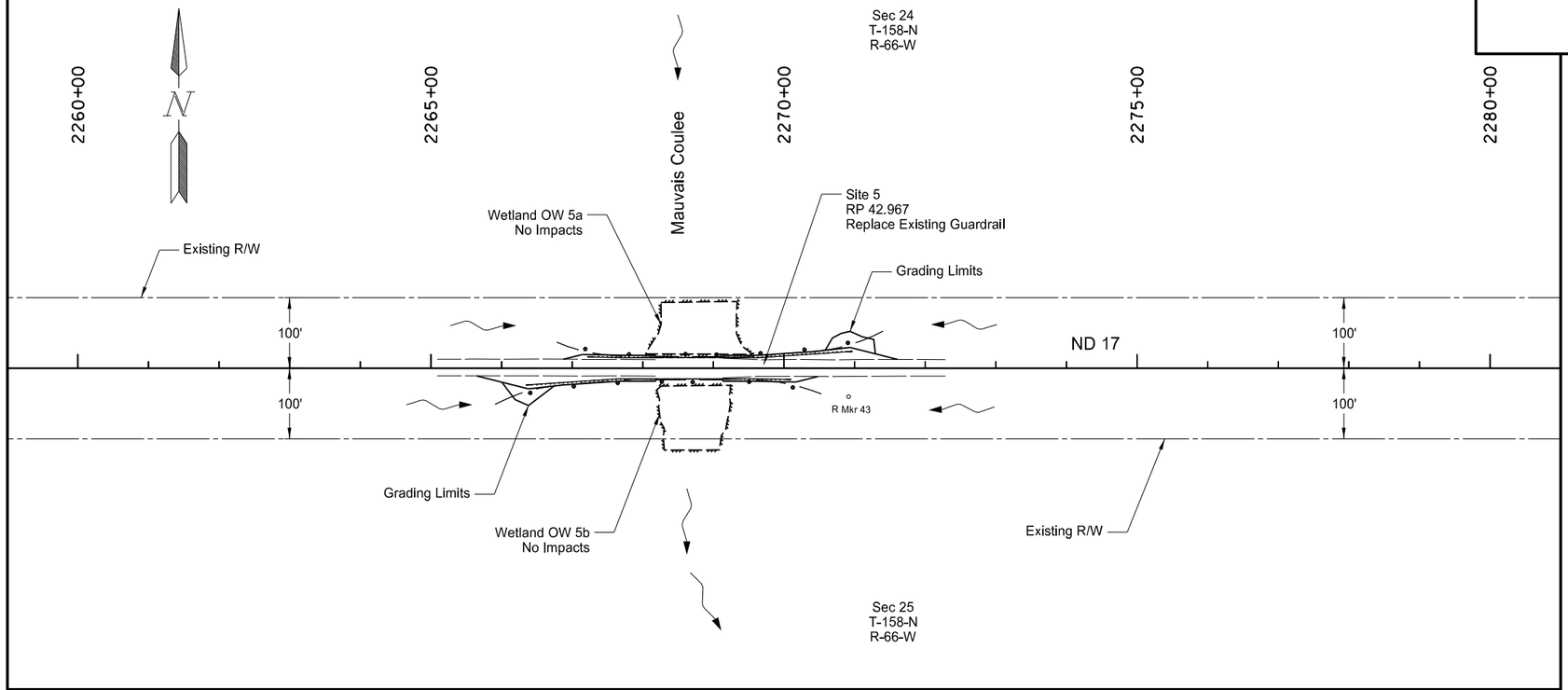
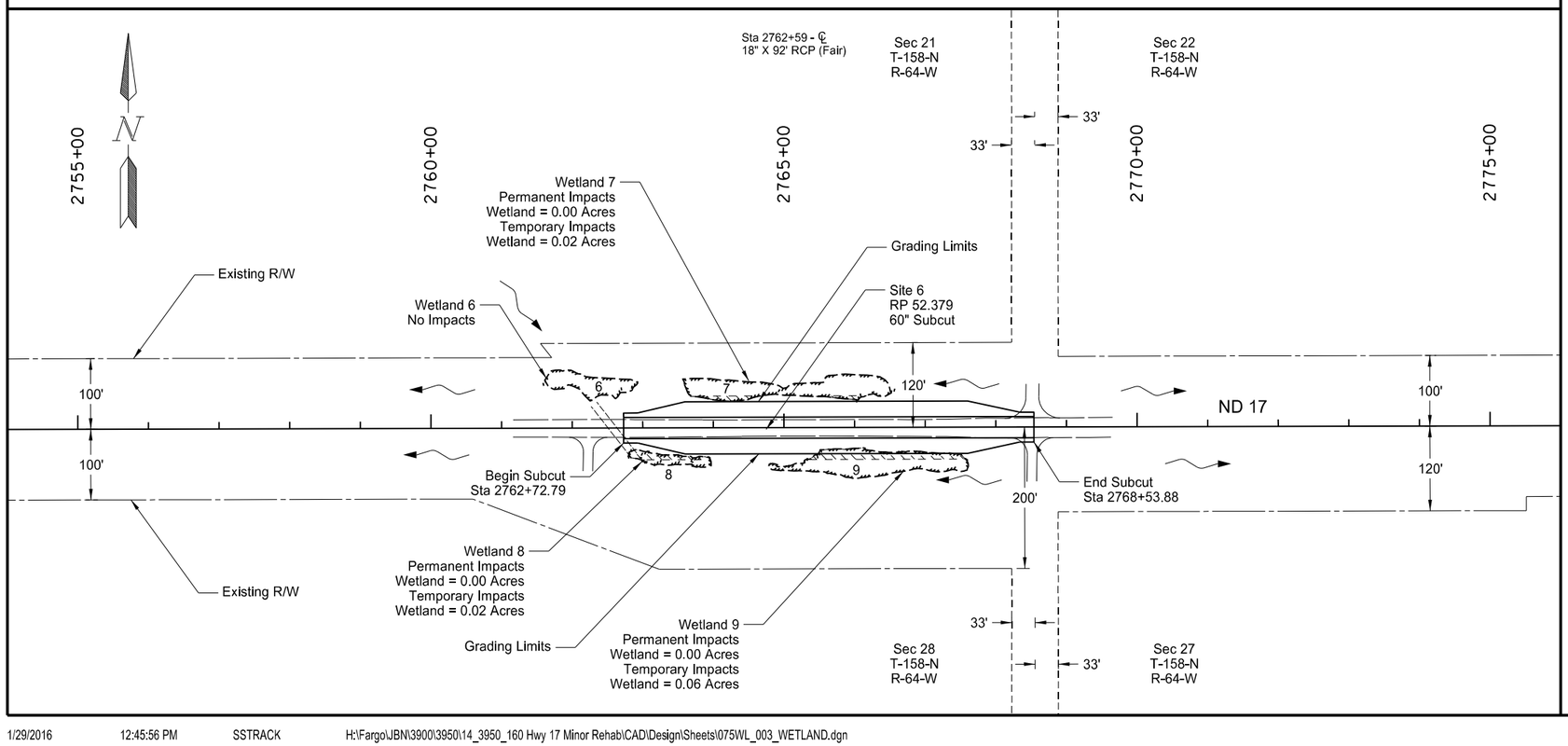
Wetlands and Environmental Impacts

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	75	3





Permanent Wetland Impacts

Temporary Wetland Impacts

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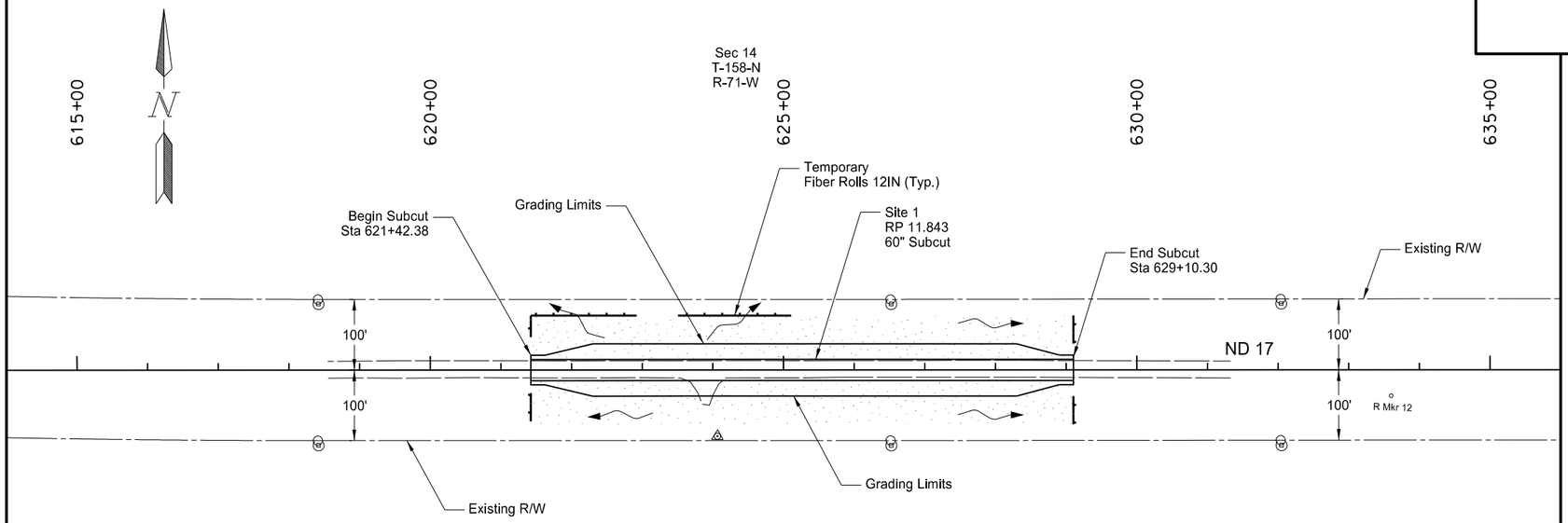
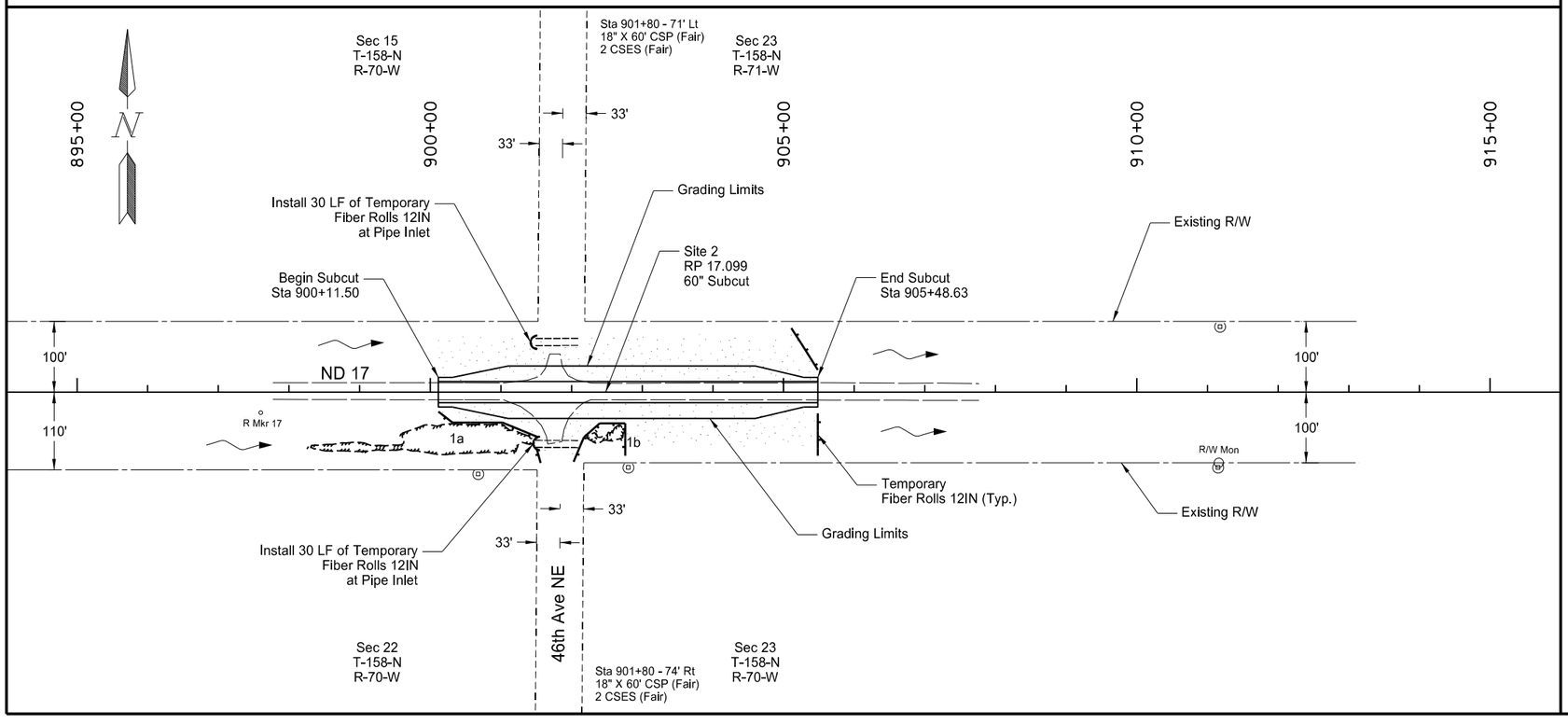
Wetland and Environmental Impacts

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	76	1





Item	Description	Quantity	Unit
251-2000	Temporary Cover Crop		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	1.09	ACRE
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	1.07	ACRE
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	0.77	ACRE
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	0.58	ACRE
253-0101	Straw Mulch		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	1.09	ACRE
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	1.07	ACRE
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	0.77	ACRE
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	0.58	ACRE
261-0112	Fiber Rolls 12IN		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	380	LF
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	80	LF
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	100	LF
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	410	LF
261-0113	Remove Fiber Rolls 12IN		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	380	LF
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	80	LF
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	100	LF
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	410	LF

Temporary Cover Crop
Temporary Straw Mulch

Temporary Fiber Rolls 12IN

Temporary Silt Fence Supported

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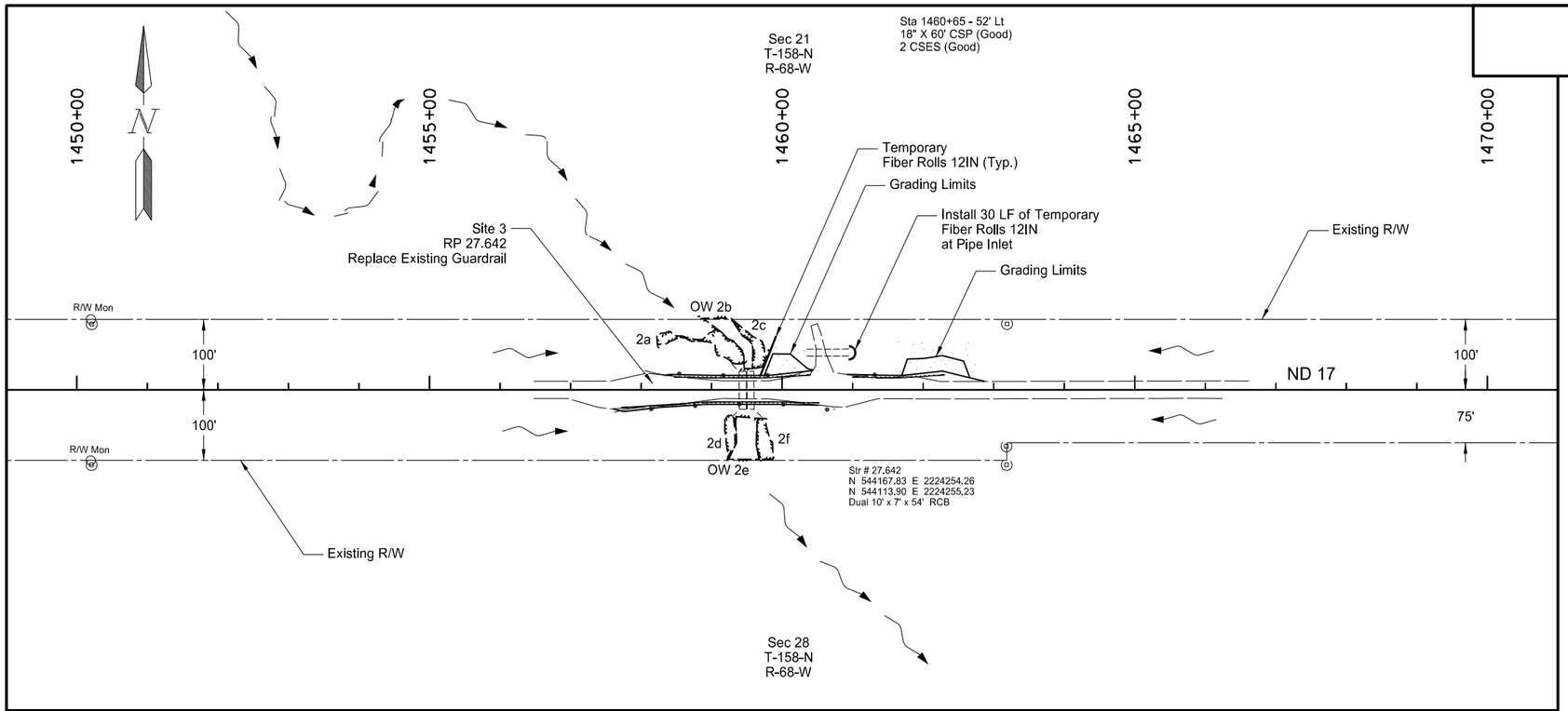
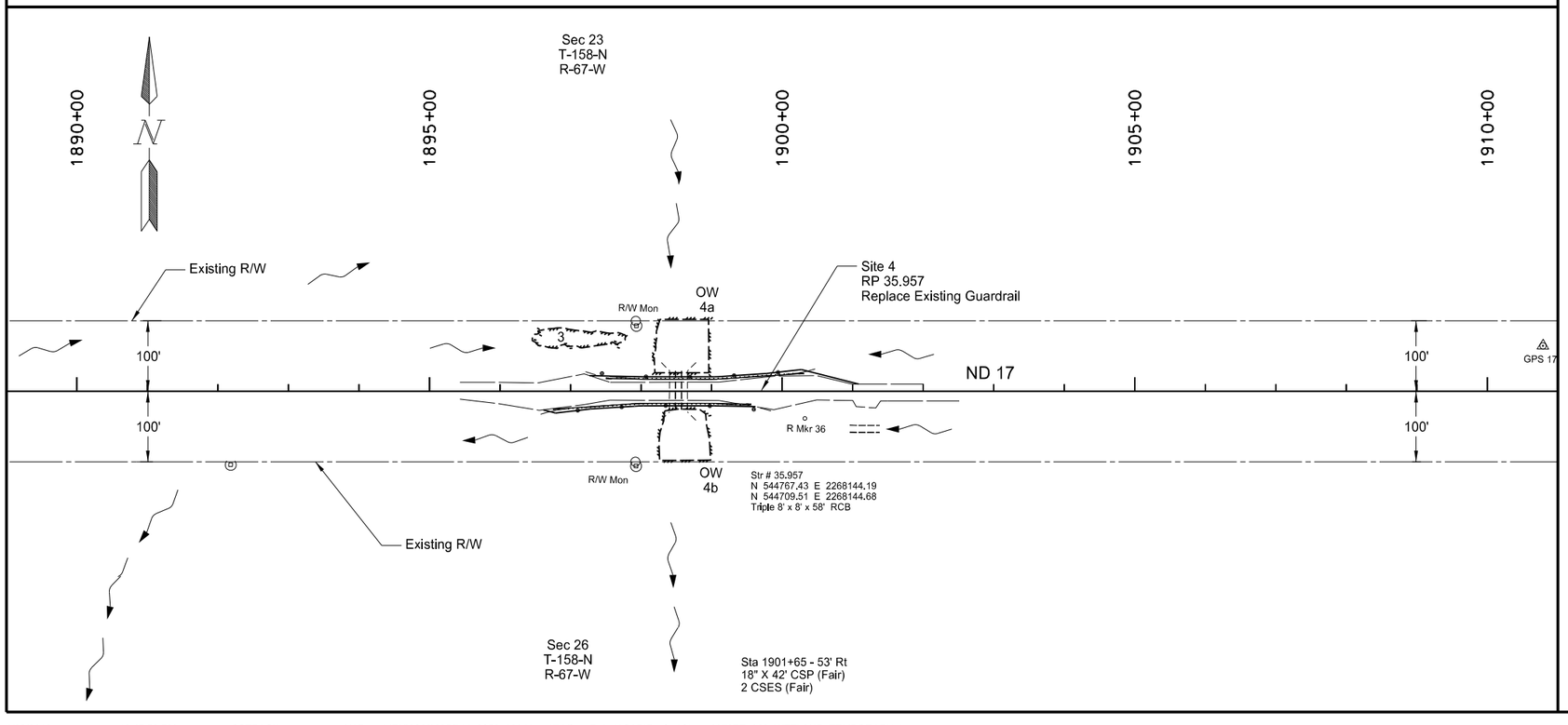
Temporary Erosion Control and Seeding

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	76	2





Item	Description	Quantity	Unit
251-2000	Temporary Cover Crop Sta 1459+69.14 Lt to Sta 1462+76.10 Lt	0.20	ACRE
253-0101	Straw Mulch Sta 1459+69.14 Lt to Sta 1462+76.10 Lt	0.20	ACRE
261-0112	Fiber Rolls 12IN Sta 1459+69.14 Lt to Sta 1461+03.87 Lt	90	LF
261-0113	Remove Fiber Rolls 12IN Sta 1459+69.14 Lt to Sta 1461+03.87 Lt	90	LF

Temporary Cover Crop
Temporary Straw Mulch

Temporary Fiber Rolls 12IN

Temporary Silt Fence Supported

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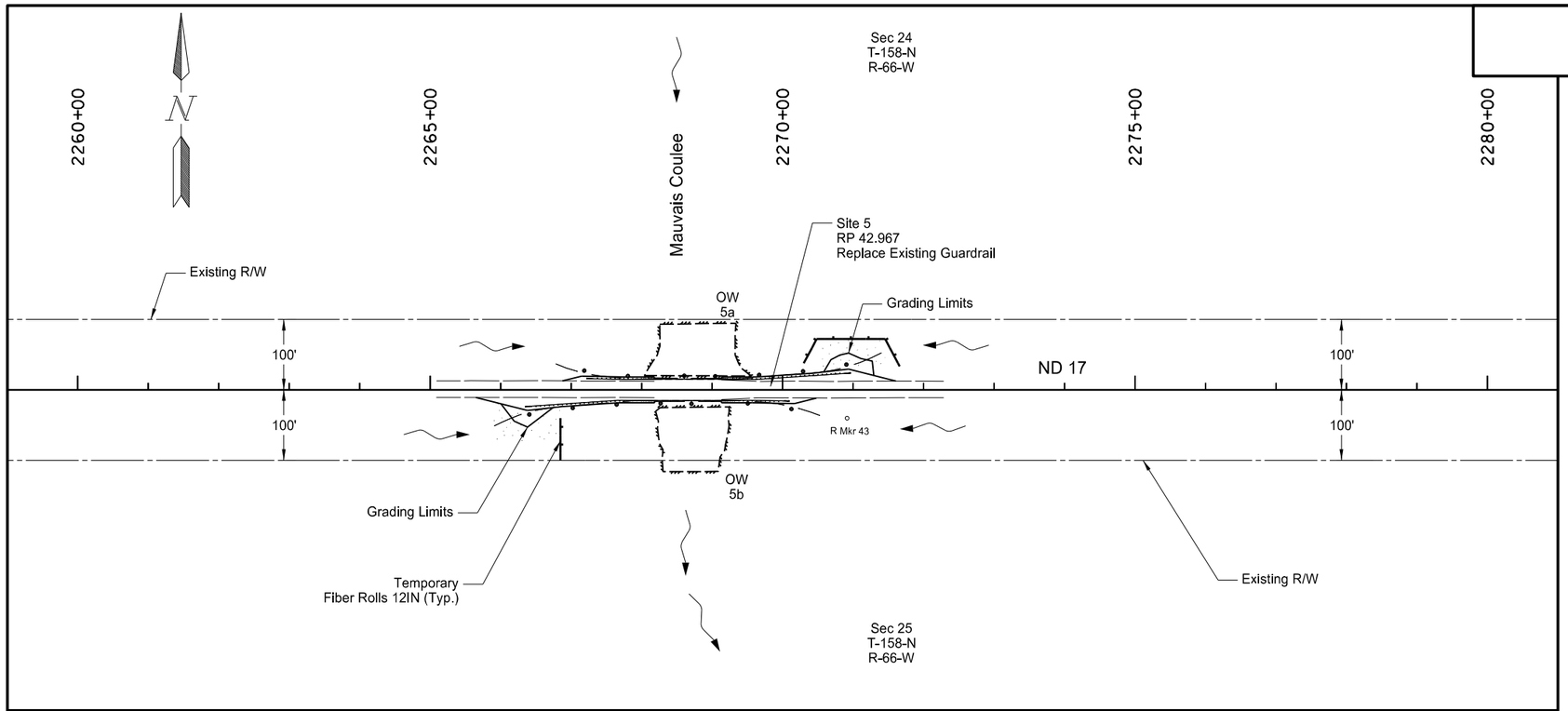
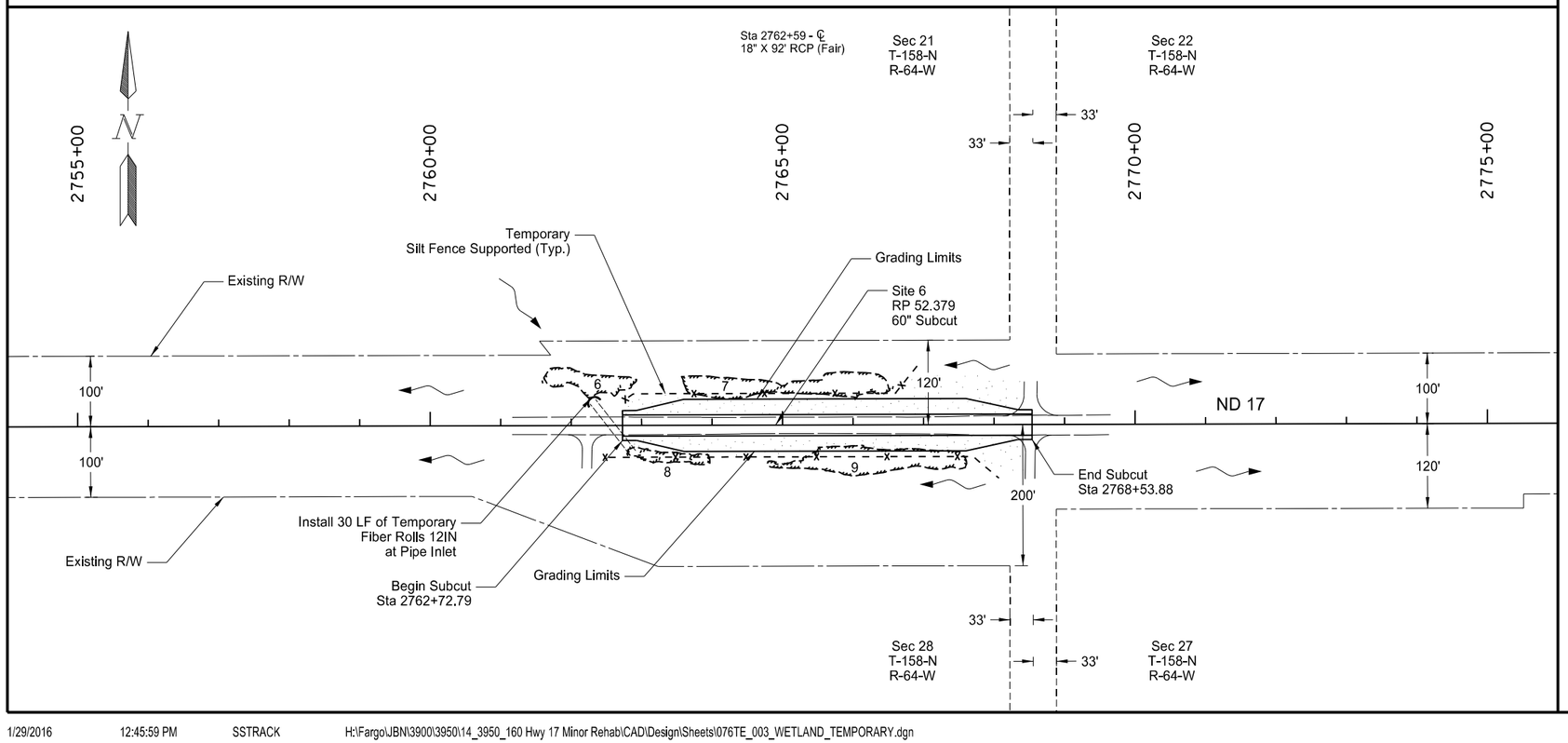
Temporary Erosion Control and Seeding

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	76	3





Item	Description	Quantity	Unit
251-2000	Temporary Cover Crop		
	Sta 2270+48.37 Lt to Sta 2271+45.52 Lt	0.11	ACRE
	Sta 2265+89.58 Rt to Sta 2266+84.73 Rt	0.11	ACRE
	Sta 2762+72.79 Lt to Sta 2768+42.02 Lt	0.45	ACRE
	Sta 2762+72.79 Rt to Sta 2768+41.56 Rt	0.34	ACRE
253-0101	Straw Mulch		
	Sta 2270+48.37 Lt to Sta 2271+45.52 Lt	0.11	ACRE
	Sta 2265+89.58 Rt to Sta 2266+84.73 Rt	0.11	ACRE
	Sta 2762+72.79 Lt to Sta 2768+42.02 Lt	0.45	ACRE
	Sta 2762+72.79 Rt to Sta 2768+41.56 Rt	0.34	ACRE
260-0200	Silt Fence Supported		
	Sta 2762+72.79 Lt to Sta 2766+91.24 Lt	440	LF
	Sta 2762+43.00 Rt to Sta 2768+06.79 Rt	575	LF
260-0201	Remove Silt Fence Supported		
	Sta 2762+72.79 Lt to Sta 2766+91.24 Lt	440	LF
	Sta 2762+43.00 Rt to Sta 2768+06.79 Rt	575	LF
261-0112	Fiber Rolls 12IN		
	Sta 2270+29.92 Lt to Sta 2271+65.97 Lt	180	LF
	Sta 2266+84.73 Rt to Sta 2266+84.73 Rt	60	LF
	Sta 2762+28.46 Lt	30	LF
261-0113	Remove Fiber Rolls 12IN		
	Sta 2270+29.92 Lt to Sta 2271+65.97 Lt	180	LF
	Sta 2266+84.73 Rt to Sta 2266+84.73 Rt	60	LF
	Sta 2762+28.46 Lt	30	LF

Temporary Cover Crop
Temporary Straw Mulch

Temporary Fiber Rolls 12IN

Temporary Silt Fence Supported

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Temporary Erosion Control and Seeding

ND 17

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Temporary Fiber Rolls 12IN									
RP 11.843, Site 1 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
621+42.38	46' Lt	622+91.96	77' Lt	180	621+42.38	33' Rt	621+42.38	73' Rt	40
623+51.74	77' Lt	625+10.82	77' Lt	160	629+10.30	37' Rt	629+10.30	77' Rt	40
629+10.30	37' Lt	629+10.30	77' Lt	40					
			Subtotal Lt	380				Subtotal Rt	80
								Total	460

Temporary Fiber Rolls 12IN									
RP 17.099, Site 2 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
901+41.95	70' Lt	901+41.95	70' Lt	30	900+11.50	27' Rt	901+52.39	64' Rt	150
905+11.10	91' Lt	905+48.63	32' Lt	70	901+45.83	72' Rt	901+45.83	72' Rt	30
					901+50.78	81' Rt	901+56.28	100' Rt	20
					902+02.81	100' Rt	902+75.79	90' Rt	150
					905+48.63	30' Rt	905+48.63	90' Rt	60
			Subtotal Lt	100				Subtotal Rt	410
								Total	510

Temporary Fiber Rolls 12IN									
RP 27.642, Site 3 (Guardrail Replacement)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
1459+69.14	20' Lt	1459+90.74	74' Lt	60					
1461+03.87	52' Lt	1461+03.87	52' Lt	30					
			Subtotal Lt	90				Subtotal Rt	0
								Total	90

Temporary Fiber Rolls 12IN									
RP 42.967, Site 5 (Guardrail Replacement)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
2270+29.92	38' Lt	2271+65.97	33' Lt	180	2266+84.73	40' Rt	2266+84.73	100' Rt	60
			Subtotal Lt	180				Subtotal Rt	60
								Total	240

Temporary Fiber Rolls 12IN									
RP 52.379, Site 6 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
2762+28.46	39' Lt	2762+28.46	39' Lt	30					
			Subtotal Lt	30				Subtotal Rt	0
								Total	30

Temporary Silt Fence Supported									
RP 52.379, Site 6 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
2762+72.79	34' Lt	2766+91.24	84' Lt	440	2762+43.00	45' Rt	2768+06.79	76' Rt	575
			Subtotal Lt	440				Subtotal Rt	575
								Total	1,015

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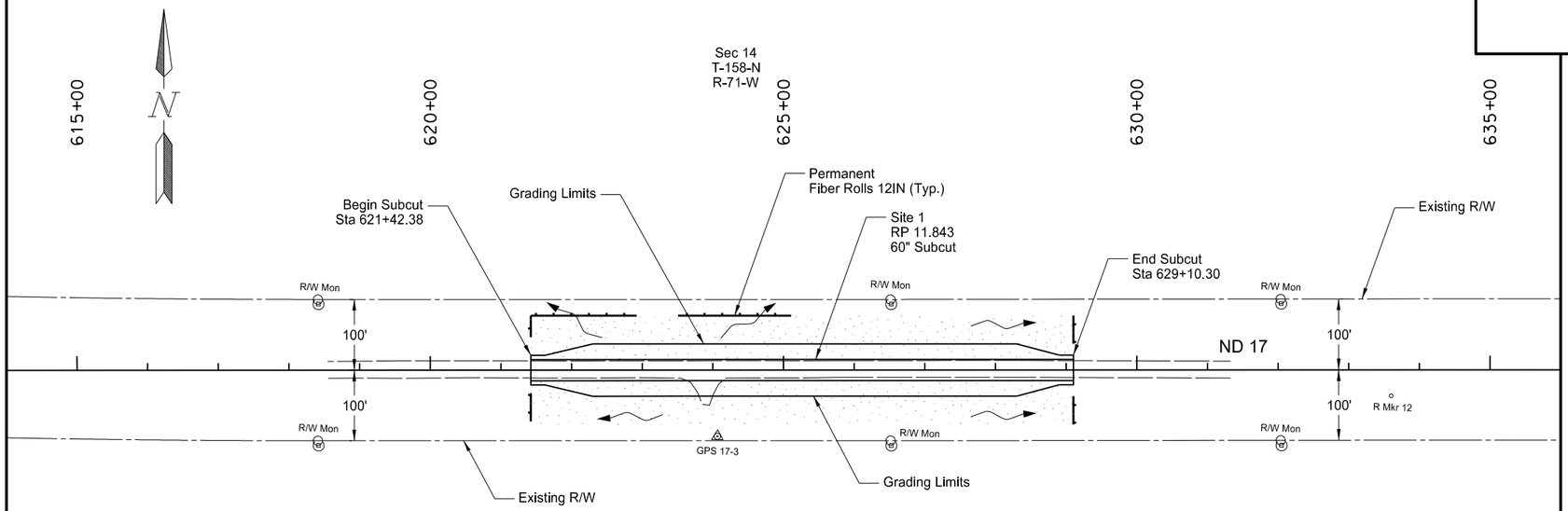
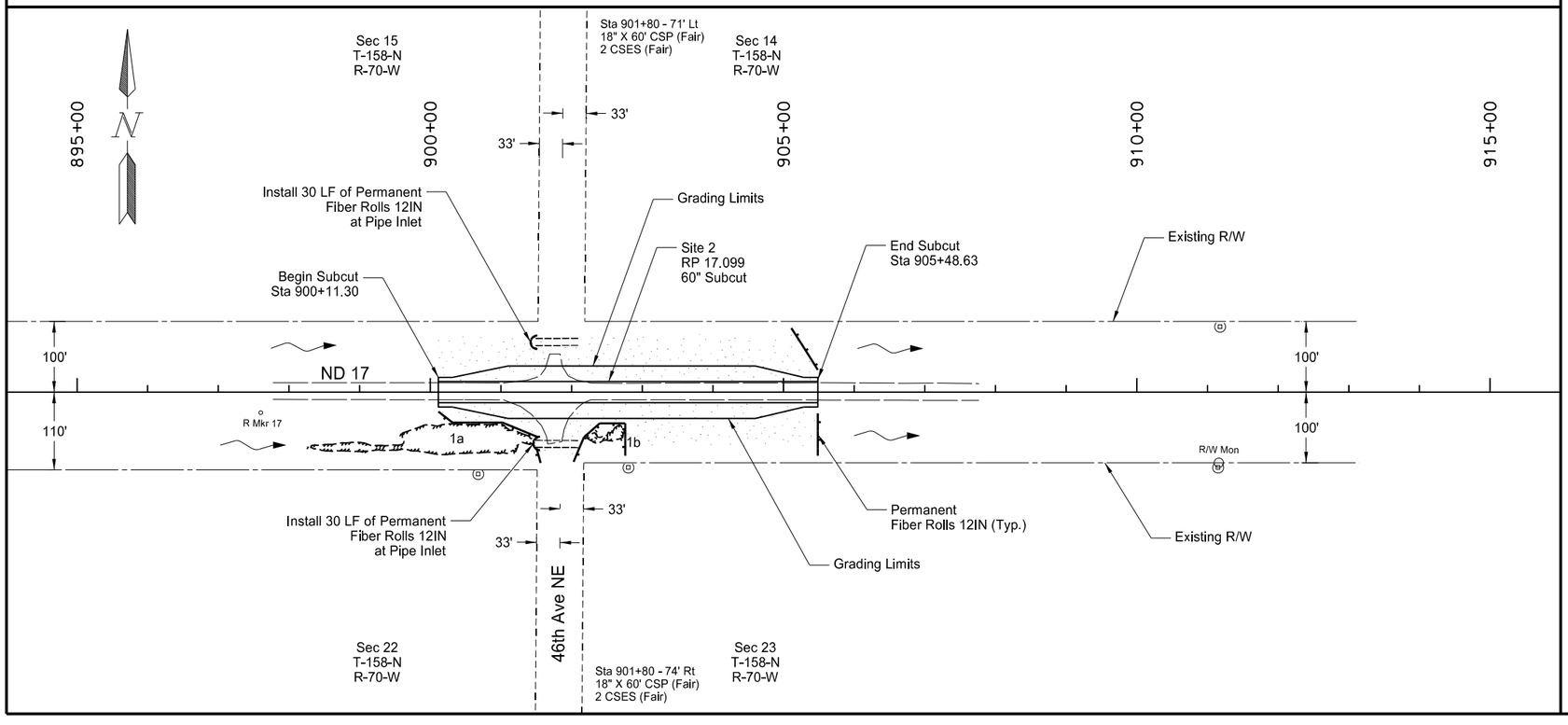
Temporary Fiber Rolls 12IN and Silt Fence Supported Table

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	77	1





Item	Description	Quantity	Unit
251-0200	Seeding Class II		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	1.09	ACRE
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	1.07	ACRE
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	0.77	ACRE
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	0.58	ACRE
253-0101	Straw Mulch		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	1.09	ACRE
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	1.07	ACRE
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	0.77	ACRE
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	0.58	ACRE
261-0112	Fiber Rolls 12IN		
	Sta 621+42.38 Lt to Sta 629+10.30 Lt	380	LF
	Sta 621+42.38 Rt to Sta 629+10.30 Rt	80	LF
	Sta 900+11.50 Lt to Sta 905+48.63 Lt	100	LF
	Sta 900+11.50 Rt to Sta 905+48.63 Rt	410	LF

Seeding Class II
Straw Mulch

Wetland Seed

Fiber Rolls 12IN

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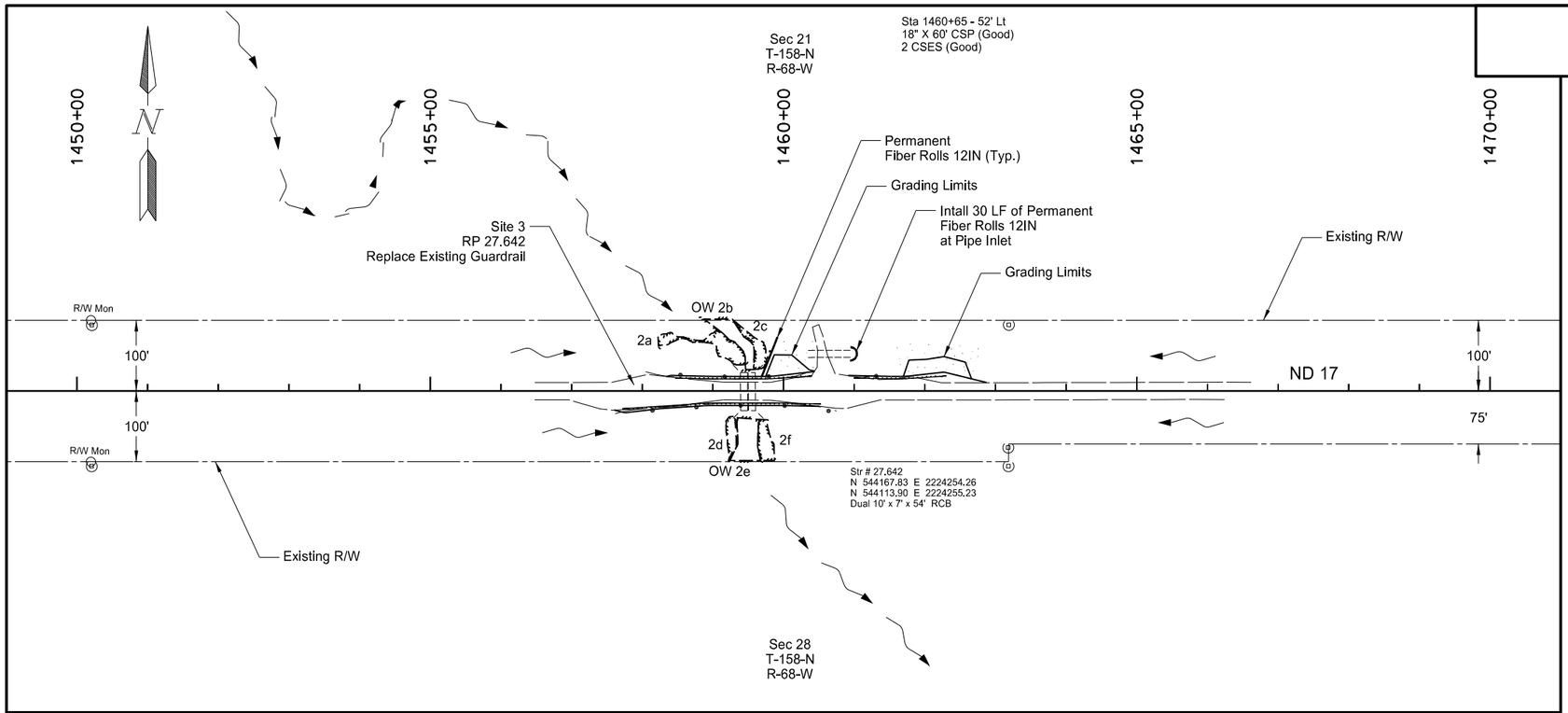
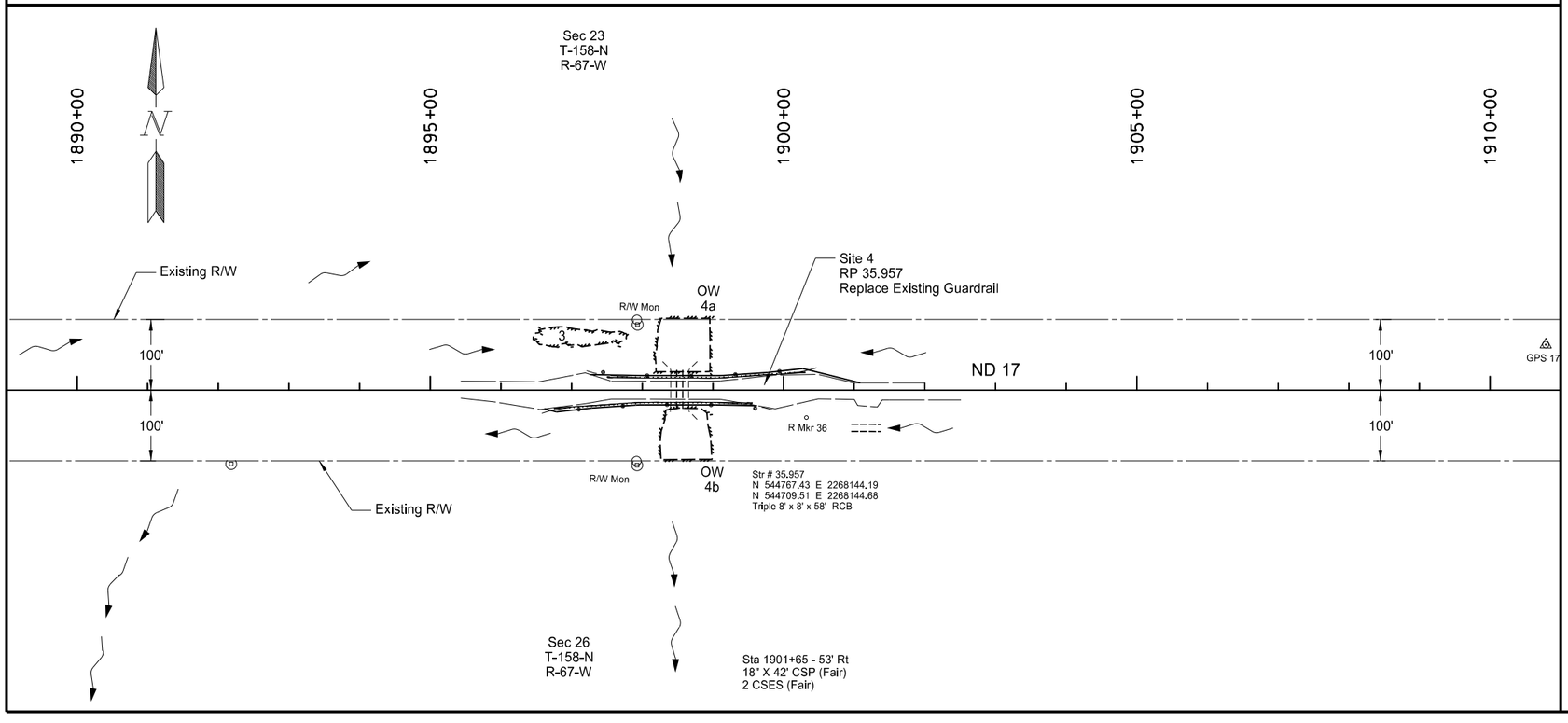
Permanent Erosion Control and Seeding

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	77	2





Item	Description	Quantity	Unit
251-0200	Seeding Class II Sta 1459+69.14 Lt to Sta 1462+76.10 Lt	0.20	ACRE
253-0101	Straw Mulch Sta 1459+69.14 Lt to Sta 1462+76.10 Lt	0.20	ACRE
261-0112	Fiber Rolls 12IN Sta 1459+69.14 Lt to Sta 1461+03.87 Lt	90	LF

Seeding Class II
Straw Mulch

Wetland Seed

Fiber Rolls 12IN

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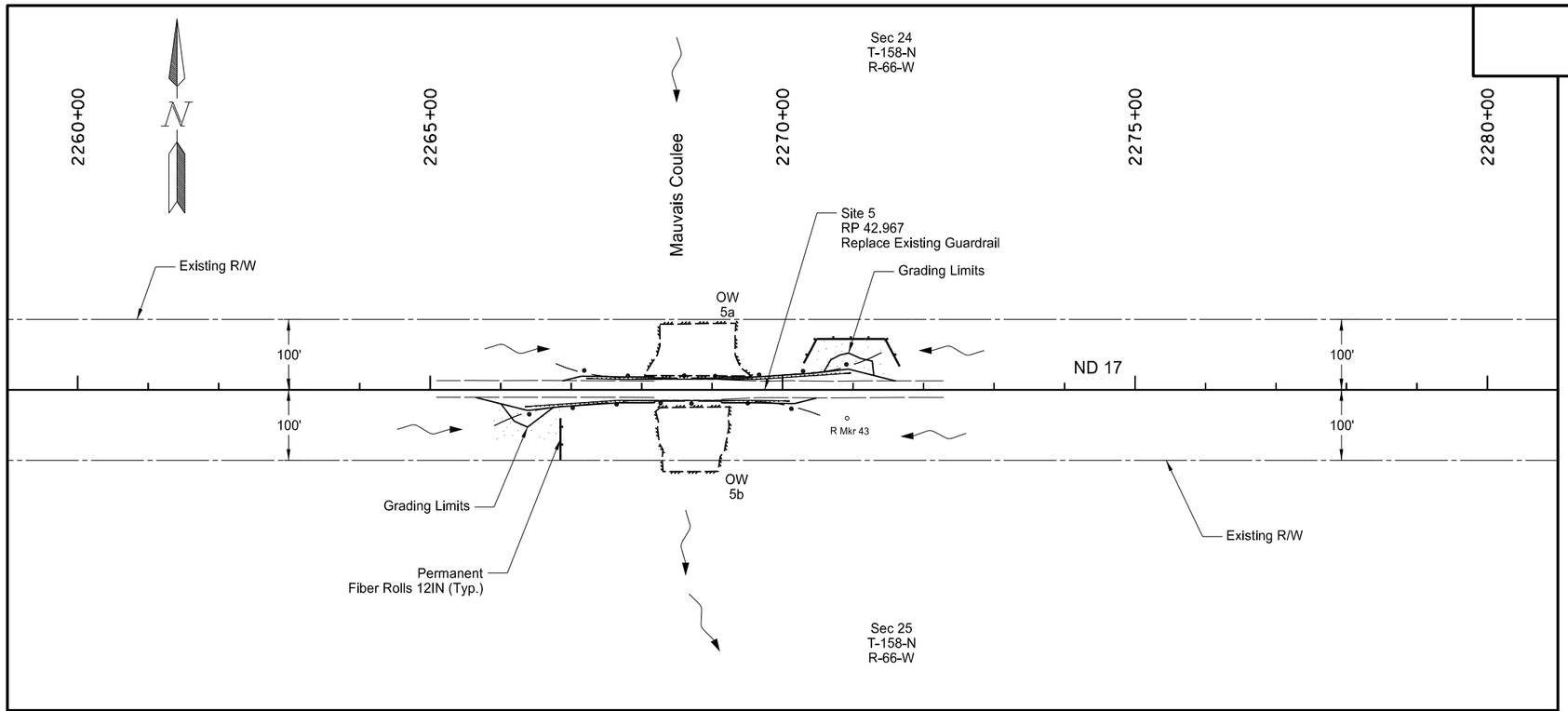
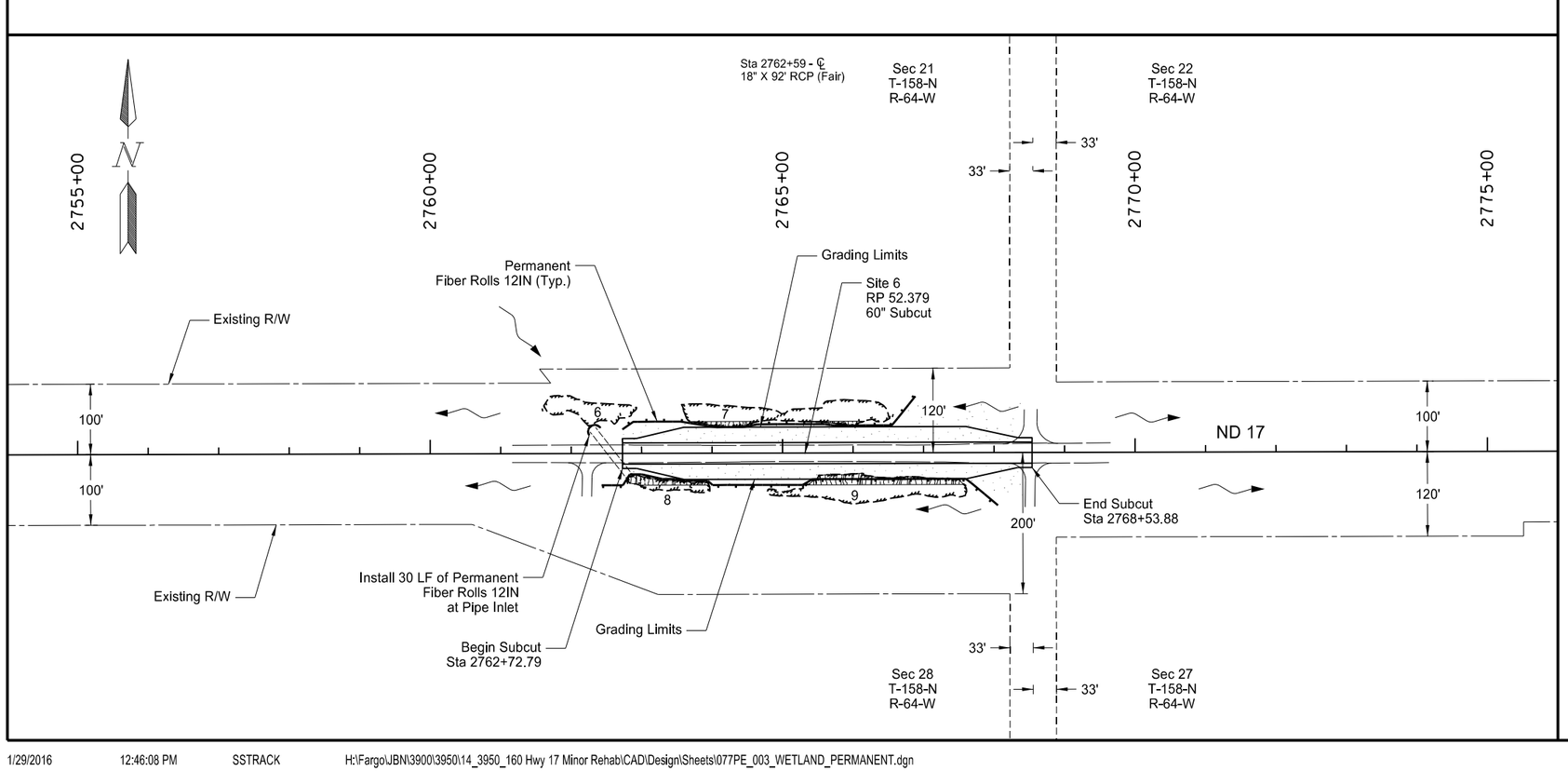
Permanent Erosion Control and Seeding

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	77	3





Item	Description	Quantity	Unit
251-0200	Seeding Class II		
	Sta 2270+48.37 Lt to Sta 2271+45.52 Lt	0.11	ACRE
	Sta 2265+89.58 Rt to Sta 2266+84.73 Rt	0.11	ACRE
	Sta 2762+72.79 Lt to Sta 2768+42.02 Lt	0.45	ACRE
	Sta 2762+72.79 Rt to Sta 2768+41.56 Rt	0.34	ACRE
251-1000	Wetland Seed		
	Sta 2763+68.03 Lt to Sta 2766+16.85 Lt	0.02	ACRE
	Sta 2762+79.73 Rt to Sta 2767+56.84 Rt	0.08	ACRE
253-0101	Straw Mulch		
	Sta 2270+48.37 Lt to Sta 2271+45.52 Lt	0.11	ACRE
	Sta 2265+89.58 Rt to Sta 2266+84.73 Rt	0.11	ACRE
	Sta 2762+72.79 Lt to Sta 2768+42.02 Lt	0.45	ACRE
	Sta 2762+72.79 Rt to Sta 2768+41.56 Rt	0.34	ACRE
261-0112	Fiber Rolls 12IN		
	Sta 2270+29.92 Lt to Sta 2271+65.97 Lt	180	LF
	Sta 2266+84.73 Rt to Sta 2266+84.73 Rt	60	LF
	Sta 2762+28.46 Lt to Sta 2766+88.61 Lt	470	LF
	Sta 2762+43.00 Rt to Sta 2768+05.35 Rt	590	LF

Seeding Class II
Straw Mulch

Wetland Seed

Fiber Rolls 12IN

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Permanent Erosion Control and Seeding

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	77	4

Permanent Fiber Rolls 12IN									
RP 11.843, Site 1 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
621+42.38	46' Lt	622+91.96	77' Lt	180	621+42.38	33' Rt	621+42.38	73' Rt	40
623+51.74	77' Lt	625+10.82	77' Lt	160	629+10.30	37' Rt	629+10.30	77' Rt	40
629+10.30	37' Lt	629+10.30	77' Lt	40					
			Subtotal Lt	380				Subtotal Rt	80
								Total	460

Permanent Fiber Rolls 12IN									
RP 17.099, Site 2 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
901+41.95	70' Lt	901+41.95	70' Lt	30	900+11.50	27' Rt	901+52.39	64' Rt	150
905+11.10	91' Lt	905+48.63	32' Lt	70	901+45.83	72' Rt	901+45.83	72' Rt	30
					901+50.78	81' Rt	901+56.28	100' Rt	20
					902+02.81	100' Rt	902+75.79	90' Rt	150
					905+48.63	30' Rt	905+48.63	90' Rt	60
			Subtotal Lt	100				Subtotal Rt	410
								Total	510

Permanent Fiber Rolls 12IN									
RP 27.642, Site 3 (Guardrail Replacement)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
1459+69.14	20' Lt	1459+90.74	74' Lt	60					
1461+03.87	52' Lt	1461+03.87	52' Lt	30					
			Subtotal Lt	90				Subtotal Rt	0
								Total	90

Permanent Fiber Rolls 12IN									
RP 42.967, Site 5 (Guardrail Replacement)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
2270+29.92	38' Lt	2271+65.97	33' Lt	180	2266+84.73	40' Rt	2266+84.73	100' Rt	60
			Subtotal Lt	180				Subtotal Rt	60
								Total	240

Permanent Fiber Rolls 12IN									
RP 52.379, Site 6 (60" Subcut)									
Start Sta	Offset	End Sta	Offset	Length (LF)	Start Sta	Offset	End Sta	Offset	Length (LF)
2762+28.46	39' Lt	2762+28.46	39' Lt	30	2762+43.00	45' Rt	2768+05.35	75' Rt	590
2762+72.79	34' Lt	2766+88.61	80' Lt	440					
			Subtotal Lt	470				Subtotal Rt	590
								Total	1,060

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Permanent Fiber Rolls 12IN Table

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**2**	**34**	**68**
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**19**	**38**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**	**64**	**128**
G20-50a-72	**72"x36"**	**ROAD WORK NEXT __ MILES RT & LT ARROWS**	**10**	**37**	**370**
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**	**2**	**59**	**118**
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	
R1-1-48	**48"x48"**	**STOP**	**2**	**32**	**64**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**6**	**5**	**30**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**12**	**39**	**468**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**4**	**10**	**40**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**6**	**39**	**234**
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**	**4**	**28**	**112**
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**	**8**	**35**	**280**
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	
W1-6-48	**48"x24"**	**LARGE ARROW**	**4**	**26**	**104**
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**6**	**35**	**210**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**6**	**35**	**210**
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	
W8-1-48	**48"x48"**	**BUMP**	**12**	**35**	**420**
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**	**6**	**35**	**210**
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT.**	**2**	**35**	**70**
W8-55-48	**48"x48"**	**TRUCKS CROSSING AHEAD or __ FT.**	**2**	**35**	**70**
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)**	**8**	**11**	**88**
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**8**	**35**	**280**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.		35	
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**6**	**35**	**210**
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)**	**6**	**12**	**72**
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	**48"x48"**	**FRESH OIL**	**1**	**35**	**35**
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5-48	**48"x48"**	**SHOULDER WORK**	**1**	**35**	**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	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

Consign 1	**48"x48"**	**Pavement Breaks**	**6**	**35**	**210**
	18"x18"	**Orange Blank Sign**	**6**	**12**	**72**

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**4246**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**1200**
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	
704-1052	**TYPE III BARRICADES**	**EACH**	**12**
704-1060	**DELINEATOR DRUMS**	**EACH**	**25**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**80**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	**STACKABLE VERTICAL PANELS**	**EACH**	**160**
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	
704-1185	**PILOT CAR**	**HR**	**100**
704-1500	OBLITERATION OF PVMT MK	SF	
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**	**1416**
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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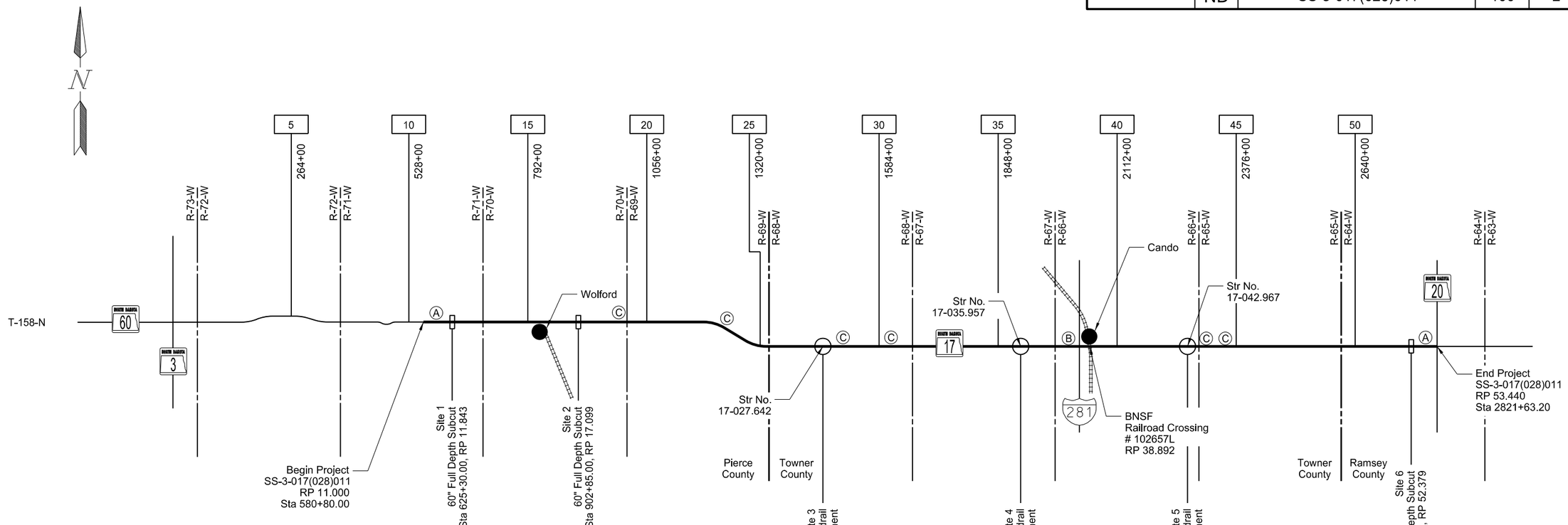
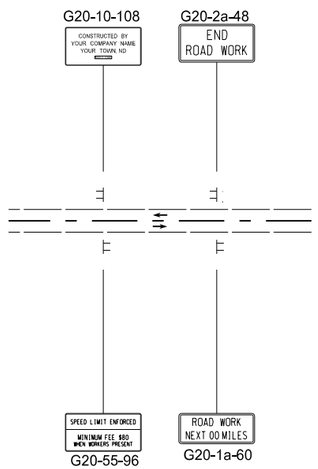
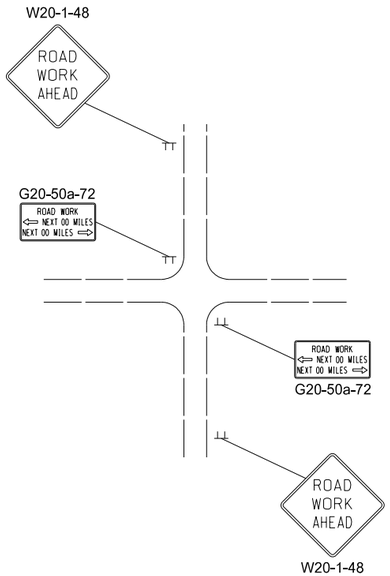
Traffic Control Devices List

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	100	2

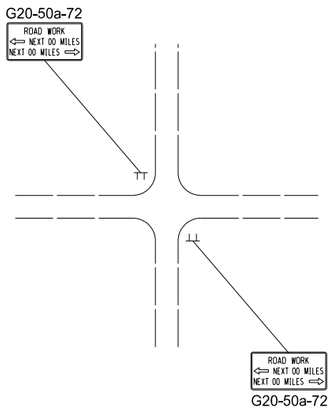




Traffic Control Layout Ⓐ
(See Note 1)



Traffic Control Layout Ⓑ
(See Note 2)



Traffic Control Layout Ⓒ
(See Note 3)

Notes:

1. Traffic Control Layout A is shown for Eastbound traffic. Mirror layout for Westbound traffic.
2. Use Traffic Control Layout B for the following crossroads:
   -US Hwy 281
3. Use Traffic Control Layout C for the following crossroads:
   -48th Avenue NE
   -52nd Avenue NE
   -57th Avenue NE (Northbound approach only)
   -59th Avenue NE (Southbound approach only)
   -72nd Avenue NE (Southbound approach only)
   -73rd Avenue NE (Northbound approach only)

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Work Zone Traffic Control

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

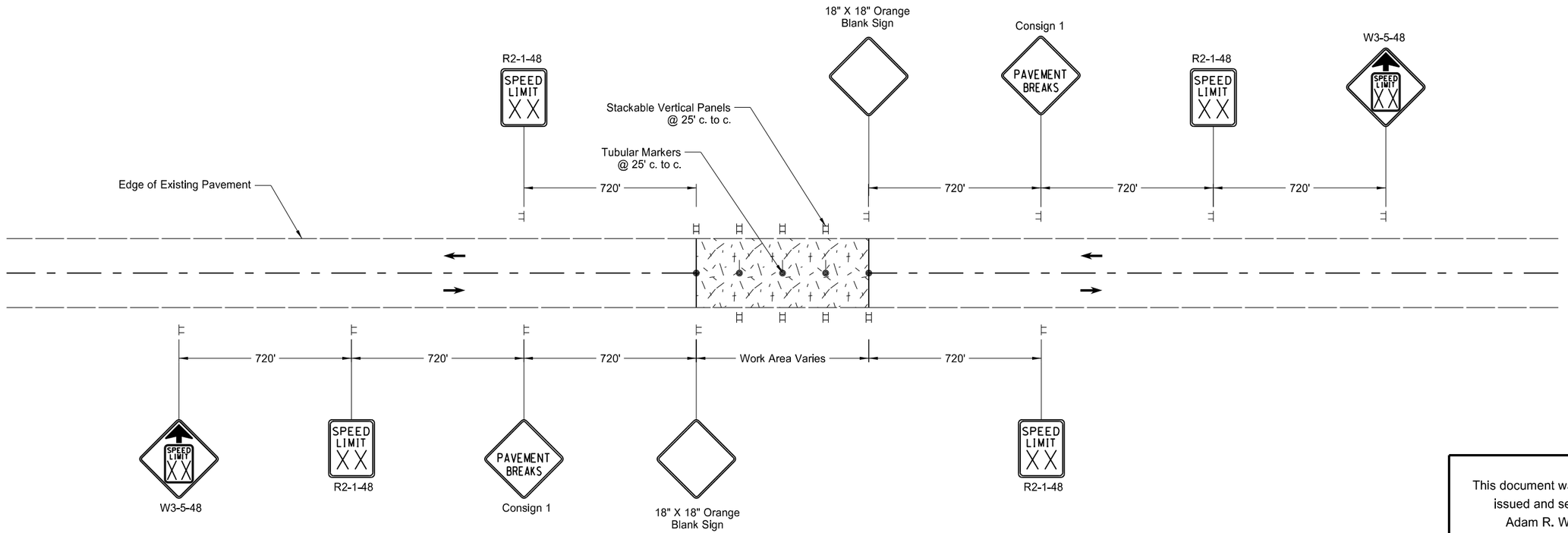
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	100	3

N

Notes:

1. Traffic control signs and devices shown have been provided to be placed at the following subcut areas:
   -RP 11.843
   -RP 17.099
   -RP 52.379

2. See Standard Drawing D-704-15 Type A TEMPORARY ROAD CLOSURE for when work is present.



Aggregate Surfacing

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Work Zone Traffic Control
Subcut Locations
When No Work is Present

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

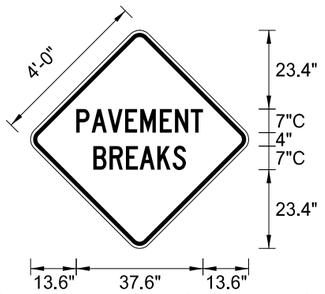
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	100	4

SIGN NUMBER	Consign 1
WIDTH x HEIGHT	5'-5" x 5'-5"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: Diamond Grade
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):

AREA: 16.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: NDDOT_Pavement Breaks,ssl

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
P	A	V	E	M	E	N	T												37.6	7	C 2000
13.6	18.2	23	28.1	32.6	38.4	42.9	47.6														
B	R	E	A	K	S														27.5	7	C 2000
18.6	23.5	28.3	32.4	37.6	42.2																

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Construction Sign Details

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SS-3-017(028)011	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
ND 17																						
586+00 Lt		1			10.4				2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga	1			
901+80 Rt		1		5.2	10.4				2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
1002+30 Rt	SN 1		51.8		11.9	12.6	13.3	14.0	2.5 x 2.5 10 ga	15.1	2.6	3.3	4.0	4.7	2.19 x 2.19 10 ga	4	4	3 x 3 7 ga			4	
1013+80 Lt	SN 2		51.8		11.9	12.6	13.3	14.0	2.5 x 2.5 10 ga	15.1	2.6	3.3	4.0	4.7	2.19 x 2.19 10 ga	4	4	3 x 3 7 ga			4	
2026+15 Rt			4.0																			Mount on Existing Supports
2030+75 Lt			4.0		7.9				2.5 x 2.5 10 ga	9.1						1	4	3 x 3 7 ga	1		1	
Sub Total			111.6	5.2		**Total**	132.6									**Total**	44		2	0	9	
Grand Total			111.6	5.2		**Total**	132.6									**Total**	44		2	0	9	

Basis of Estimate
Sign Support Lengths

The sign support lengths have been calculated using the following vertical clearances:

Rural Roadway - 60"

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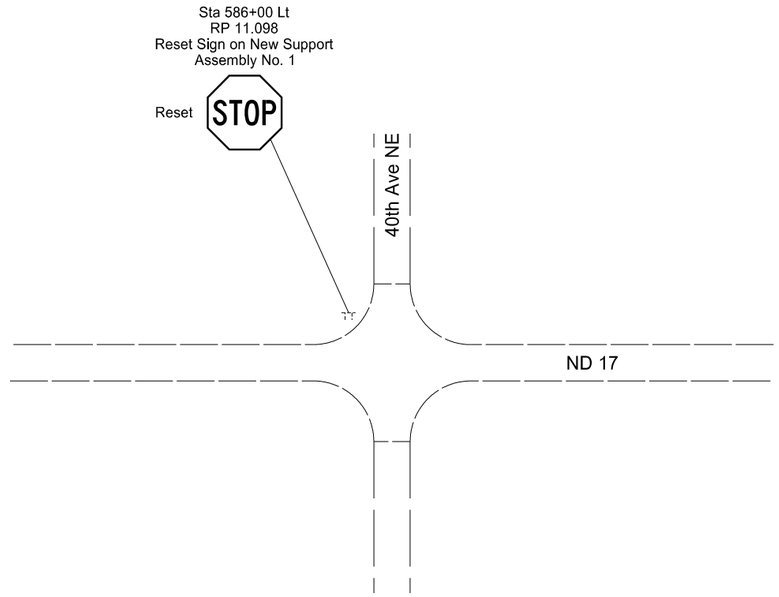
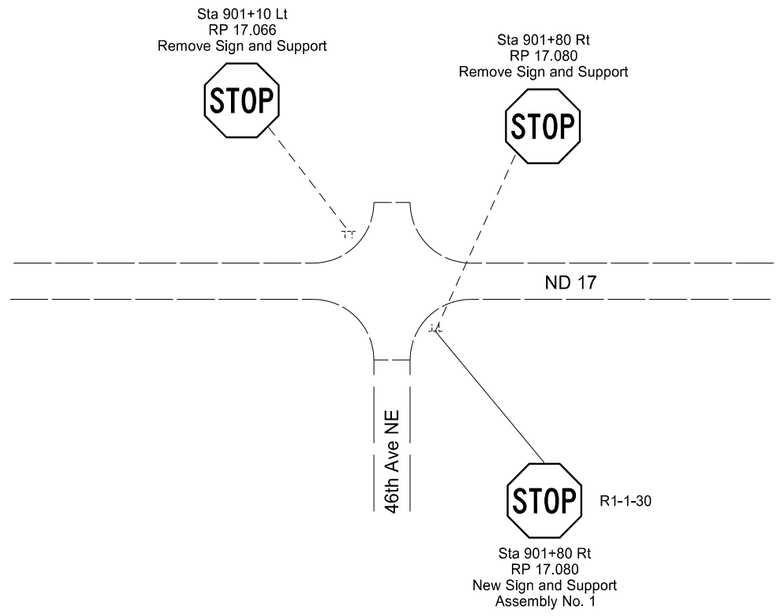
Sign Summary
Perforated Tube

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	110	2





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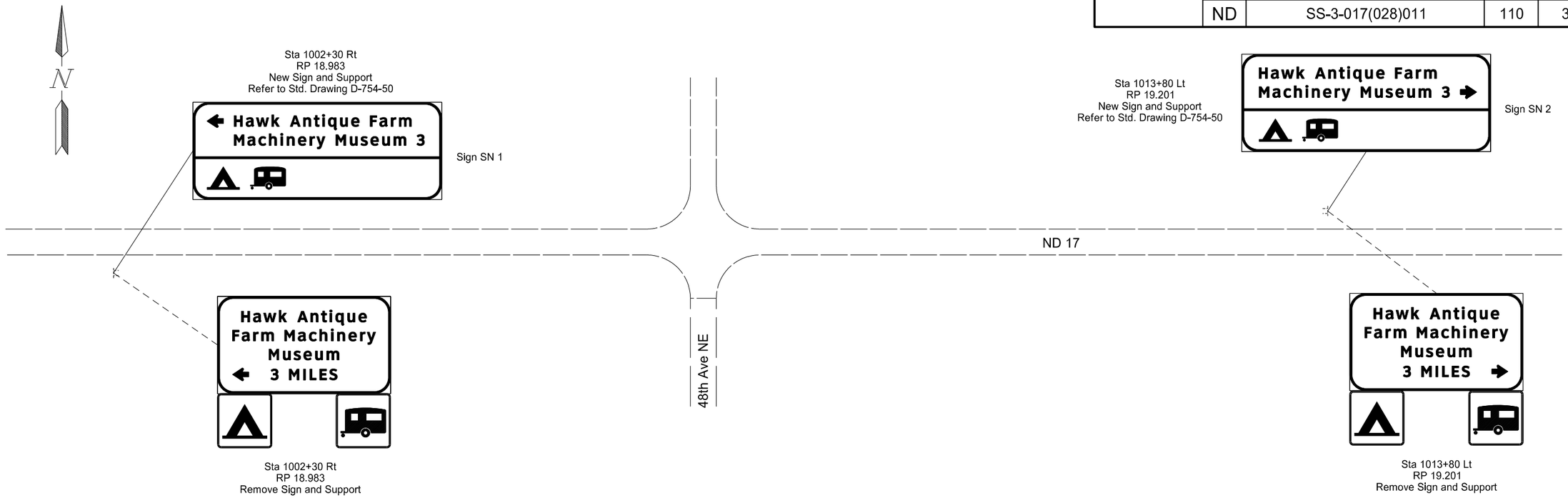
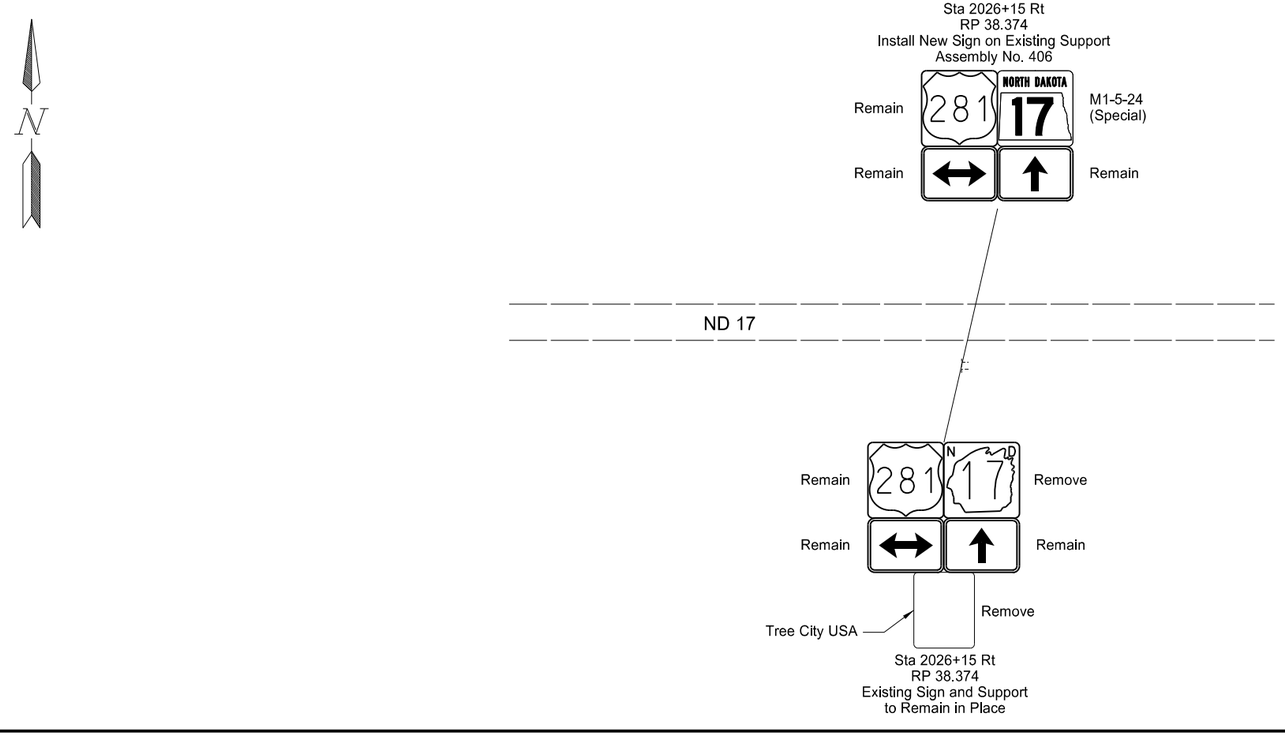
Signing

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	110	3





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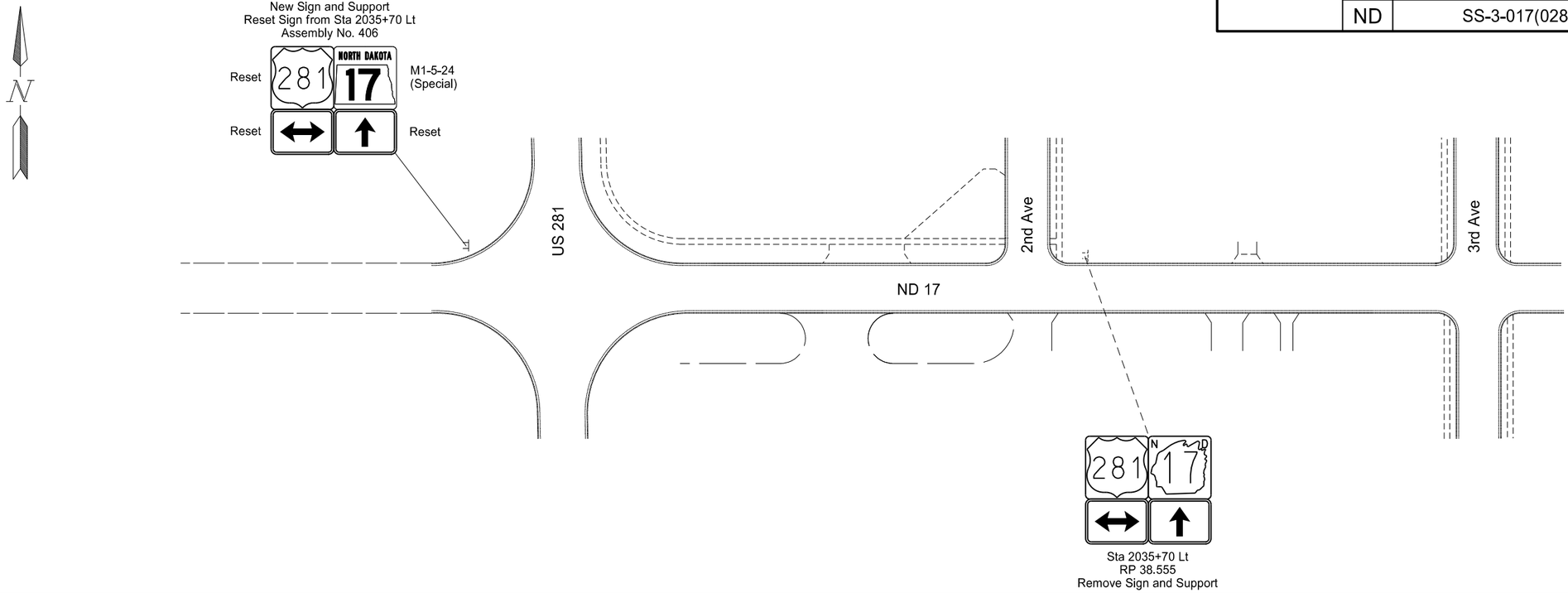
ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	110	4



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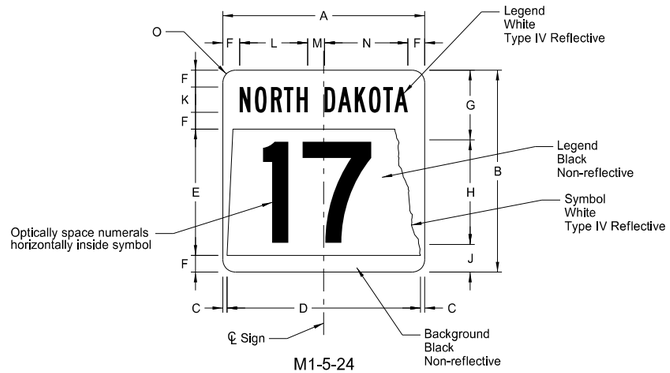
Signing

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	110	5

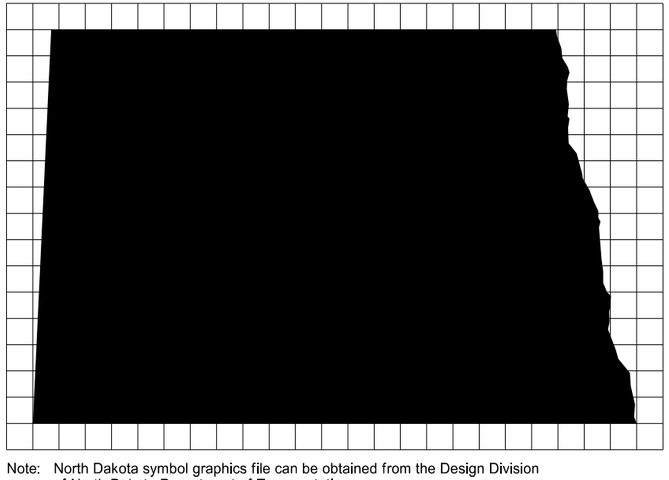


M1-5-24
(Special)

STATE ROUTE MARKER

SIGN	DIMENSION (INCHES)													
	A	B	C	D	E	F	G	H	J	K	L	M	N	O
2 digits	24	24	0.5	23	15	2	8.5	12 D*	3.5	3 B	8.1	2	9.9	1.5

* Reduce numeral spacing by 25%



Note: North Dakota symbol graphics file can be obtained from the Design Division of North Dakota Department of Transportation.

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Sign Details

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

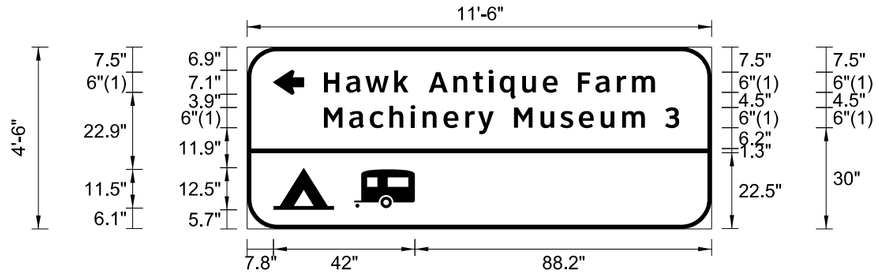
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	110	6

SIGN NUMBER	SN 1
WIDTH x HEIGHT	11'-6" x 4'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: Type IV Reflective
	COLOR: Brown / Brown
LEGEND/BORDER	TYPE: Type IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	7.8	40	7.1	9	90
Camping	7.8	5.7	18	12.5	0
Trailer Camping	31.8	6.2	18	11.5	0

STATION(S):
1002+30 Rt

AREA: 51.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Recreation.ssl

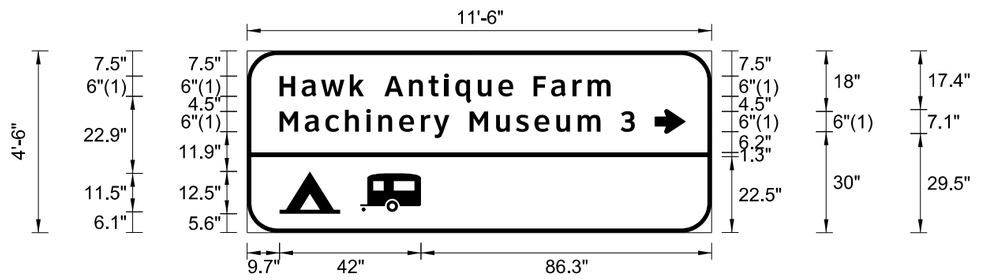
LETTER POSITION (X)																LENGTH	SIZE	SERIES
H	a	w	k	A	n	t	i	q	u	e	F	a	r	m		98.3	6/4.9	ClearviewHwy-5-W
22.8	29.4	35.1	43.7	53.9	61.3	67.1	71.7	75.1	81.7	87.8	98.3	103.5	109.9	114.4				
M	a	c	h	i	n	e	r	y	M	u	s	e	u	m	3	105.5	6/4.9	ClearviewHwy-5-W
22.8	30.3	36.5	42.3	48.6	52.2	58.4	64.8	68.6	79.3	87.1	93	98.6	105	111.4	124.2			

SIGN NUMBER	SN 2
WIDTH x HEIGHT	11'-6" x 4'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: Type IV Reflective
	COLOR: Brown / Brown
LEGEND/BORDER	TYPE: Type IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ARDD	121.1	29.5	7.1	9	270
Camping	9.7	5.7	18	12.5	0
Trailer Camping	33.7	6.2	18	11.5	0

STATION(S):
1013+80 Lt

AREA: 51.8 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Recreation.ssl

LETTER POSITION (X)																LENGTH	SIZE	SERIES
H	a	w	k	A	n	t	i	q	u	e	F	a	r	m		98.3	6/4.9	ClearviewHwy-5-W
9.7	16.2	21.9	30.5	40.8	48.1	53.9	58.6	61.9	68.5	74.7	85.1	90.3	96.7	101.2				
M	a	c	h	i	n	e	r	y	M	u	s	e	u	m	3	105.5	6/4.9	ClearviewHwy-5-W
9.7	17.1	23.3	29.1	35.4	39	45.2	51.6	55.4	66.1	74	79.8	85.4	91.8	98.2	111			

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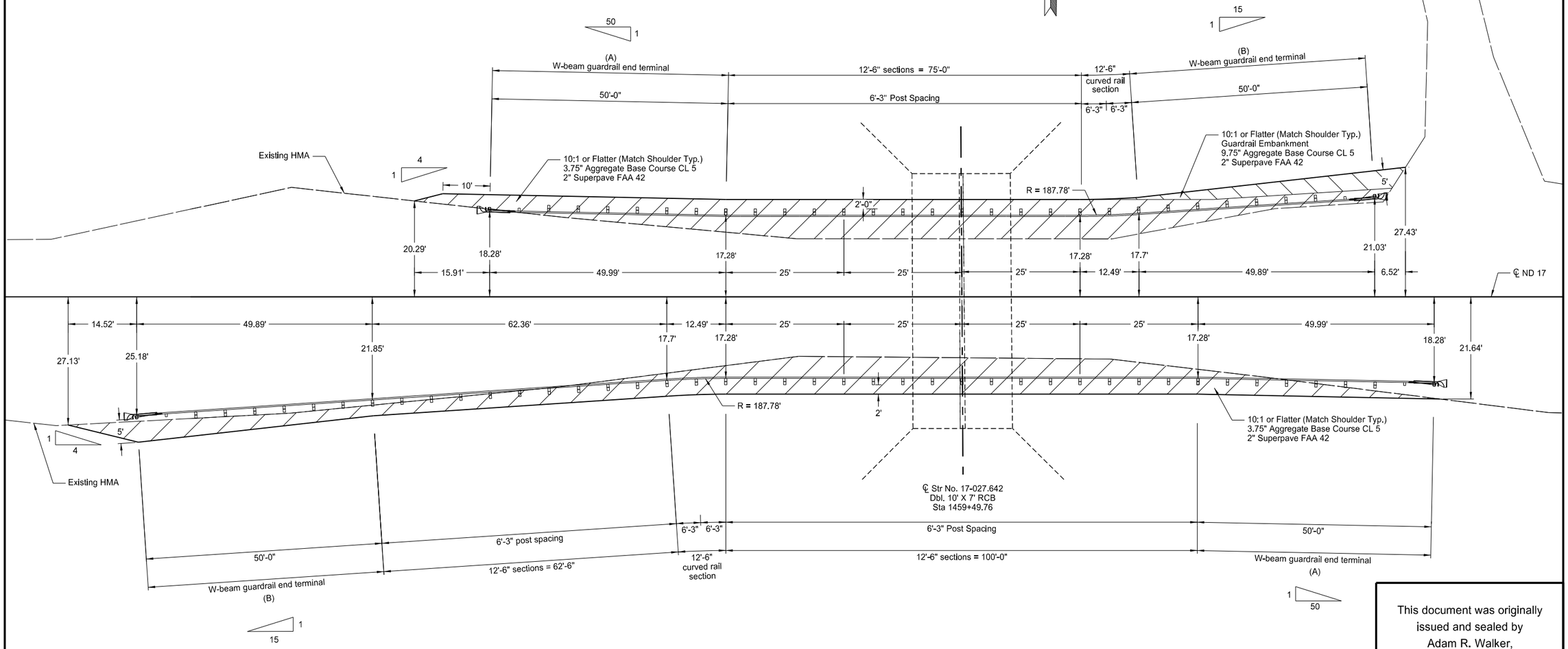
Sign Details

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	130	1

23 USC § 409 Documents
NDDOT Reserves All Objections



(A) Install a FLEAT or SKT end terminal at this location.

If the FLEAT is to be installed, use the flare rate shown on Standard Drawing D-764-6. No additional payment to be made for any additional materials required to allow for installation of the FLEAT.

Use a 50:1 taper for the SKT.

(B) Install a FLEAT end terminal at this location.

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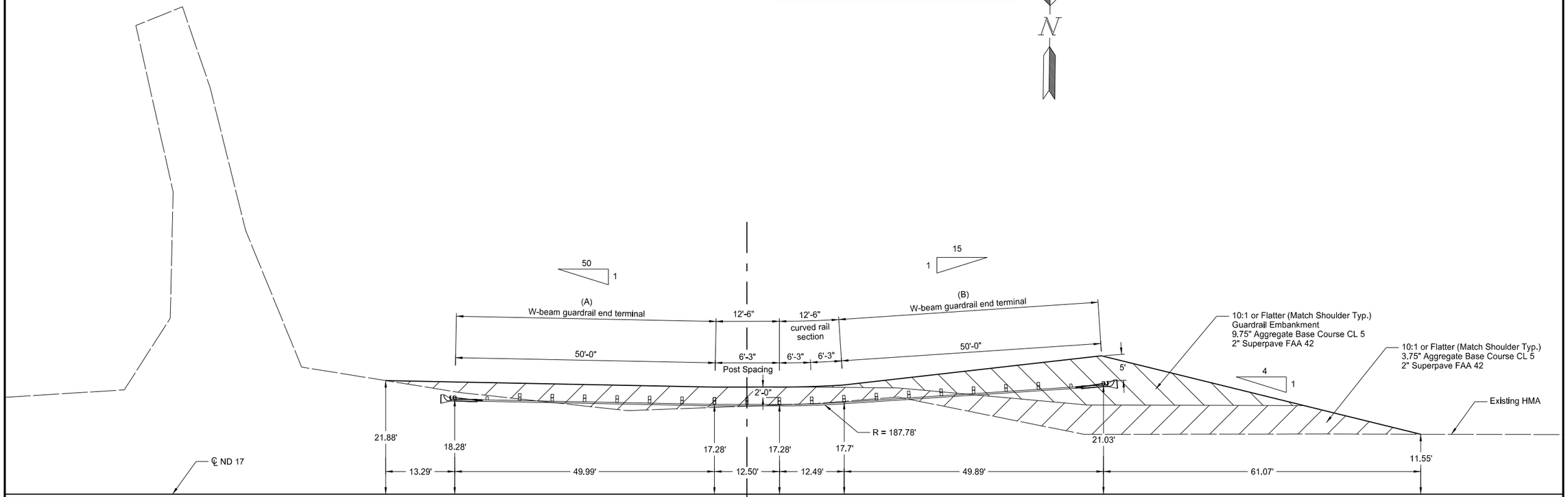
W-Beam Guardrail Layout
Site 3
Str No. 17-027.642

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	130	2



(A) Install a SKT end terminal at this location.
Use a 50:1 taper for the SKT.

(B) Install a FLEAT end terminal at this location.

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W-Beam Guardrail Layout
Site 3
Str No. 17-027.642

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

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23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	130	3

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES									
W-BEAM GUARDRAIL AT OBSTRUCTIONS (SITE 3)									
LOCATION	(A) 5/8" Ø x 18" LONG GUARDRAIL BOLT	(A) 5/8" Ø x 1-1/4" LONG GUARDRAIL BOLT	(A) 6" x 8" x 14" TIMBER BLOCK	(A) 6" x 8" x 6'-0" TIMBER POST	(A) 12'-6" STRAIGHT W-BEAM RAIL SECTION	(A) 12'-6" CURVED W-BEAM RAIL SECTION	(A) REFLECTORIZED PANELS	(A) W-BEAM END SECTION	(B) GUARDRAIL EMBANKMENT
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY
Sta 1458+33.86 Lt to Sta 1460+43.66 Lt	15	64	4	4	0	1	8	2	65
Sta 1457+60.50 Rt to Sta 1460+50.97 Rt	29	120	9	9	2	1	11	2	0
Sta 1460+89.28 Lt to Sta 1462+88.51 Lt	5	24	5	5	1	1	5	2	90
Total	**49**	**208**	**18**	**18**	**3**	**3**	**24**	**6**	**155**

Remove W-Beam Guardrail & Posts

Sta 1458+54.87 Lt to Sta 1459+81.68 Lt		128.4 LF
Sta 1458+11.99 Rt to Sta 1460+25.06 Rt		215.1 LF
	Total	343.5 LF

Remove End Treatment & Transition

Sta 1458+04.87 Lt to Sta 1458+54.87 Lt	1	EA
Sta 1459+81.68 Lt to Sta 1460+31.68 Lt	1	EA
Sta 1457+61.99 Rt to Sta 1458+11.99 Rt	1	EA
Sta 1460+25.06 Rt to Sta 1460+75.06 Rt	1	EA
Sta 1461+08.41 Lt to Sta 1461+46.47 Lt	1	EA
Sta 1461+46.47 Lt to Sta 1461+83.92 Lt	1	EA
Total	6	EA

Reset W-Beam Guardrail

Sta 1458+99.76 Lt to Sta 1459+87.25 Lt	75.0	LF
Sta 1458+24.91 Rt to Sta 1459+99.76 Rt	137.5	LF
Total	212.5	LF

W-Beam Guardrail

Sta 1458+99.76 Lt to Sta 1459+87.25 Lt	12.5	LF
Sta 1458+24.91 Rt to Sta 1459+99.76 Rt	37.5	LF
Sta 1461+52.56 Lt to Sta 1461+77.55 Lt	25.0	LF
Total	75.0	LF

W-Beam Guardrail End Terminal

Sta 1458+49.77 Lt to Sta 1458+99.76 Lt	1	EA
Sta 1459+87.25 Lt to Sta 1460+37.14 Lt	1	EA
Sta 1457+75.02 Rt to Sta 1458+24.91 Rt	1	EA
Sta 1459+99.76 Rt to Sta 1460+49.75 Rt	1	EA
Sta 1461+02.57 Lt to Sta 1461+52.56 Lt	1	EA
Sta 1461+77.55 Lt to Sta 1462+27.44 Lt	1	EA
Total	6	EA

Guardrail Embankment

Sta 1458+49.77 Lt to Sta 1460+37.14 Lt	1	EA
Sta 1461+02.57 Lt to Sta 1462+27.44 Lt	1	EA
Total	2	EA

(A) These items to be included in the price bid for "W-Beam Guardrail".

(B) An approximate in-place, compacted volume is shown above for informational purposes only. Guardrail embankment to be paid as "Guardrail Embankment".

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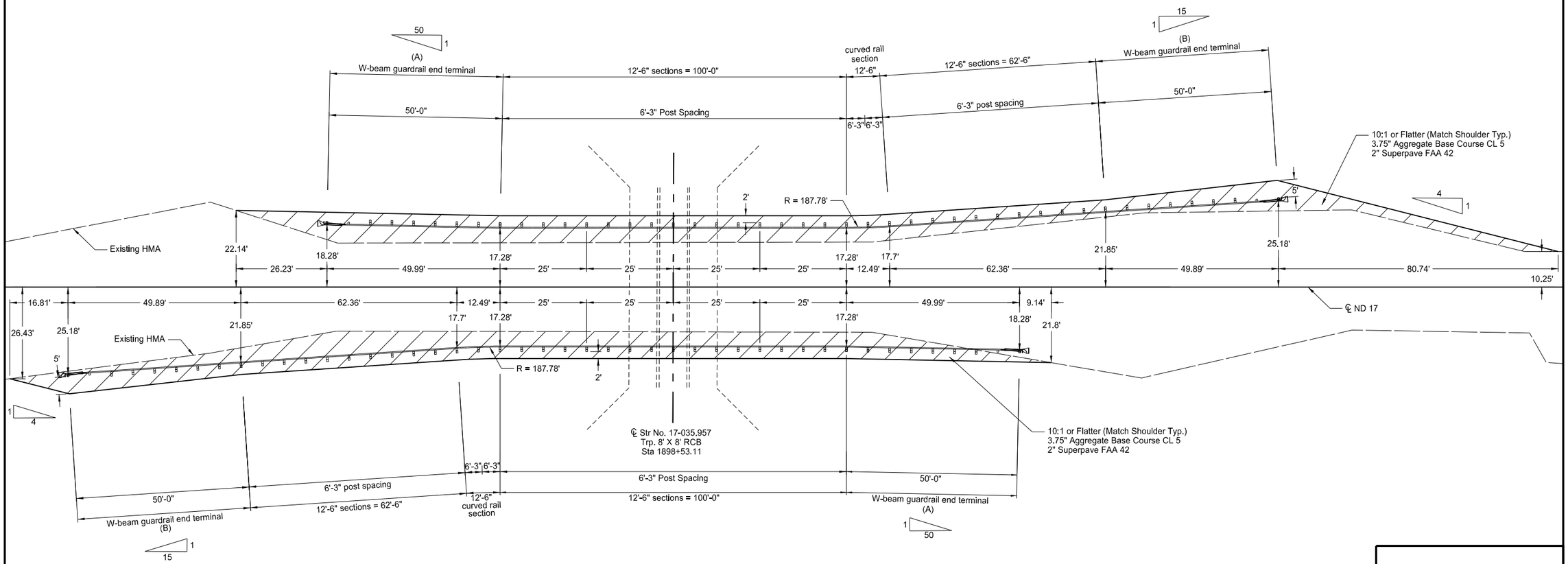
W-Beam Guardrail Quantities
Site 3
Str No. 17-027.642

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	130	4



(A) Install a FLEAT or SKT end terminal at this location.

If the FLEAT is to be installed, use the flare rate shown on Standard Drawing D-764-6. No additional payment to be made for any additional materials required to allow for installation of the FLEAT.

Use a 50:1 taper for the SKT.

(B) Install a FLEAT end terminal at this location.

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W-Beam Guardrail Layout
Site 4
Str No. 17-035.957

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

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23 USC § 409 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	130	5

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES									
W-BEAM GUARDRAIL AT OBSTRUCTIONS (SITE 4)									
LOCATION	(A) 5/8" Ø x 18" LONG GUARDRAIL BOLT	(A) 5/8" Ø x 1-1/4" LONG GUARDRAIL BOLT	(A) 6" x 8" x 14" TIMBER BLOCK	(A) 6" x 8" x 6'-0" TIMBER POST	(A) 12'-6" STRAIGHT W-BEAM RAIL SECTION	(A) 12'-6" CURVED W-BEAM RAIL SECTION	(A) REFLECTORIZED PANELS	(A) W-BEAM END SECTION	(B) GUARDRAIL EMBANKMENT
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY
Sta 1897+26.89 Lt to Sta 1901+08.59 Lt	29	120	7	7	1	1	11	2	0
Sta 1896+61.56 Rt to Sta 1899+62.24 Rt	29	120	7	7	1	1	11	2	0
Total	**58**	**240**	**14**	**14**	**2**	**2**	**22**	**4**	**0**

(A) These items to be included in the price bid for "W-Beam Guardrail".

(B) An approximate in-place, compacted volume is shown above for informational purposes only. Guardrail embankment to be paid as "Guardrail Embankment".

Remove W-Beam Guardrail & Posts

Sta 1897+71.34 Lt to Sta 1899+96.86 Lt		227.5 LF
Sta 1897+07.81 Rt to Sta 1899+34.50 Rt		228.7 LF
	Total	456.2 LF

Remove End Treatment & Transition

Sta 1897+21.34 Lt to Sta 1897+71.34 Lt	1	EA
Sta 1899+96.86 Lt to Sta 1900+46.86 Lt	1	EA
Sta 1896+57.81 Rt to Sta 1897+07.81 Rt	1	EA
Sta 1899+34.50 Rt to Sta 1899+84.50 Rt	1	EA
Total	4	EA

Reset W-Beam Guardrail

Sta 1898+03.11 Lt to Sta 1899+77.96 Lt		150.0 LF
Sta 1897+28.26 Rt to Sta 1899+03.11 Rt		150.0 LF
	Total	300.0 LF

W-Beam Guardrail

Sta 1898+03.11 Lt to Sta 1899+77.96 Lt		25.0 LF
Sta 1897+28.26 Rt to Sta 1899+03.11 Rt		25.0 LF
	Total	50.0 LF

W-Beam Guardrail End Terminal

Sta 1897+53.12 Lt to Sta 1898+03.11 Lt	1	EA
Sta 1899+77.96 Lt to Sta 1900+27.85 Lt	1	EA
Sta 1896+78.37 Rt to Sta 1897+28.26 Rt	1	EA
Sta 1899+03.11 Rt to Sta 1899+53.10 Rt	1	EA
Total	4	EA

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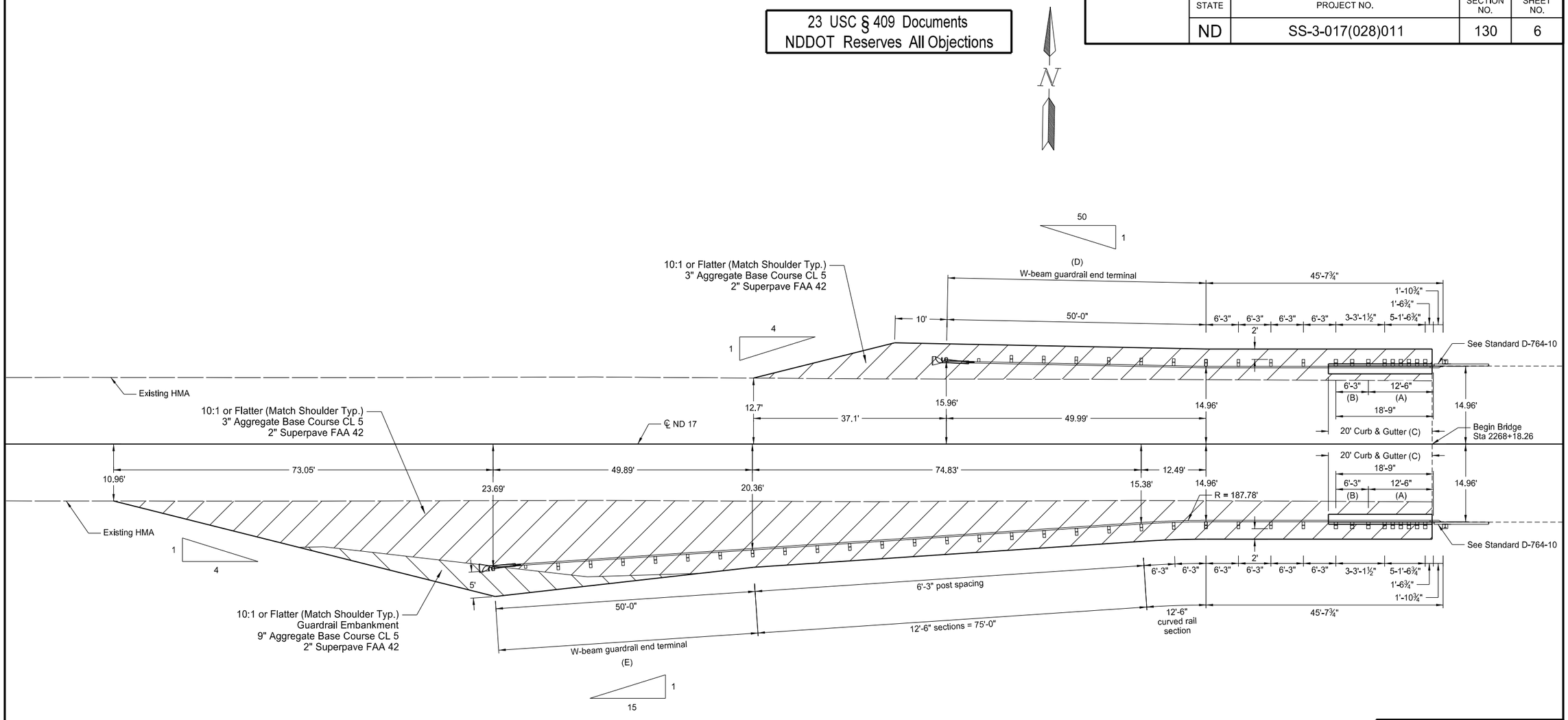
W-Beam Guardrail Quantities
Site 4
Str No. 17-035.957

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	130	6



(A) Thrie beam rail section (Double Thickness).

(B) W-beam to Thrie beam transition section (Double Thickness).

(C) 3" high curb. See Section 20 sheets for details.

(D) Install a FLEAT or SKT end terminal at this location.

If the FLEAT is to be installed, use the flare rate shown on Standard Drawing D-764-6. No additional payment to be made for any additional materials required to allow for installation of the FLEAT.

Use a 50:1 taper for the SKT.

(E) Install a FLEAT or SRT end terminal at this location.

No additional payment to be made for any additional materials required to allow for installation of the SRT.

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Thrie/W-Beam Guardrail Layout at Bridge Ends
Site 5
Str No. 17-042.967

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

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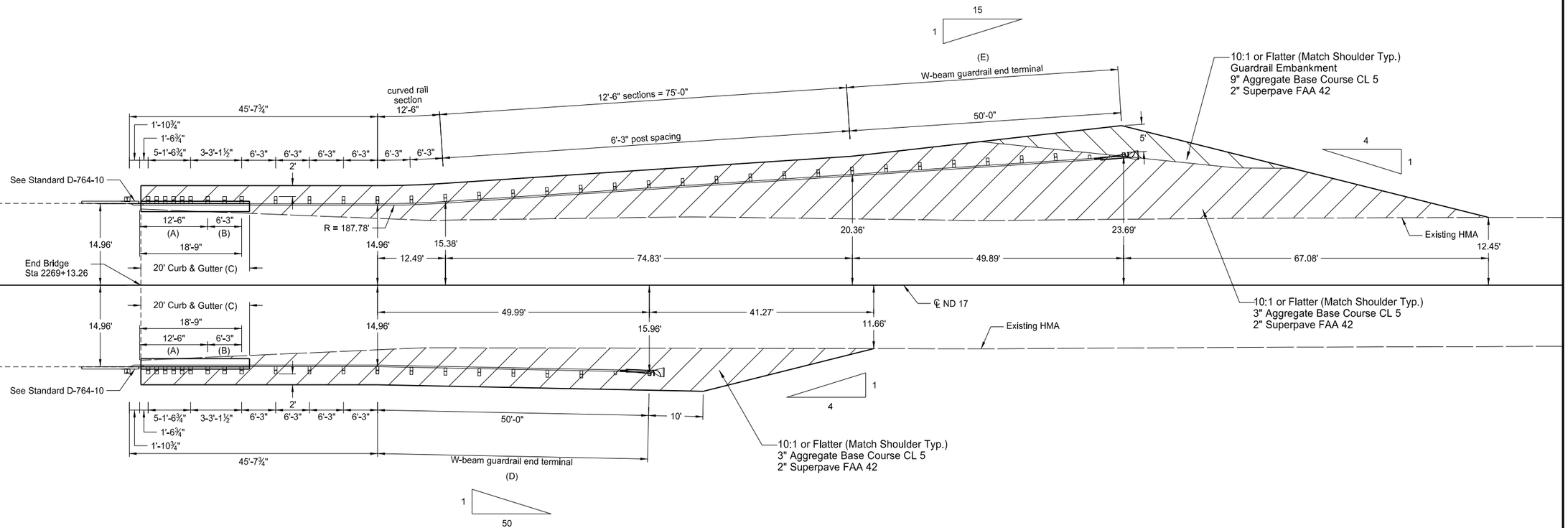
23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	130	7



(A) Thrie beam rail section (Double Thickness).

(B) W-beam to Thrie beam transition section (Double Thickness).

(C) 3" high curb. See Section 20 sheets for details.

(D) Install a FLEAT or SKT end terminal at this location.

If the FLEAT is to be installed, use the flare rate shown on Standard Drawing D-764-6. No additional payment to be made for any additional materials required to allow for installation of the FLEAT.

Use a 50:1 taper for the SKT.

(E) Install a FLEAT or SRT end terminal at this location.

No additional payment to be made for any additional materials required to allow for installation of the SRT.

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Thrie/W-Beam Guardrail Layout at Bridge Ends
Site 5
Str No. 17-042.967

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

23 USC § 409 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-3-017(028)011	130	8

THRIE/W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

THRIE/W-BEAM GUARDRAIL AT BRIDGE ENDS (SITE 5)

LOCATION	(A) 5/8" Ø x18" LONG GUARD-RAIL BOLT	(A) 6" x 8" x 6'-0" TIMBER POST	(A) 6" x 8" x 14" TIMBER BLOCK	(A) 5/8 Ø x 1 1/4" LONG GUARD-RAIL BOLT	(A) 12'-6" STRAIGHT W-BEAM RAIL SECTION	(A) 12'-6" CURVED W-BEAM RAIL SECTION	(A) REFLECTOR-IZED PLATES	(A) 8" x 8" x 6'-0" TIMBER POST	(A) 8" x 8" x 22" TIMBER OFFSET BLOCK	(A) 8" x 8" x 18" TIMBER OFFSET BLOCK	(A) 8" x 8" x 14" TIMBER OFFSET BLOCK	(A) 6'-3" DOUBLE W-THRIE BEAM TRAN-SITION SECTION	(A) 2'-6" THRIE BEAM TERM-INAL CON-NECTOR	(A) 7/8" Ø x VARIABLE LONG POST BOLT	(A) 3/4" Ø x 2-1/2" LONG POST BOLT	(B) GUARDRAIL EMBANKMENT
	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	EACH	CY
Sta 2266+87.63 Lt to Sta 2268+18.26 Lt	21	4	4	48	2	0	4	9	7	1	1	1	1	5	2	0
Sta 2265+64.46 Rt to Sta 2268+18.26 Rt	35	18	18	104	8	1	7	9	7	1	1	1	1	5	2	40
Sta 2269+13.26 Lt to Sta 2271+61.09 Lt	35	18	18	104	8	1	7	9	7	1	1	1	1	5	2	50
Sta 2269+13.26 Rt to Sta 2270+48.06 Rt	21	4	4	48	2	0	4	9	7	1	1	1	1	5	2	0
Total	**112**	**44**	**44**	**304**	**20**	**2**	**22**	**36**	**28**	**4**	**4**	**4**	**4**	**20**	**8**	**90**

Remove Box Beam Guardrail

Sta 2267+28.28 Lt to Sta 2268+18.26 Lt	108.3	LF
Sta 2266+40.90 Rt to Sta 2268+18.26 Rt	198.0	LF
Sta 2269+13.26 Lt to Sta 2270+90.41 Lt	198.2	LF
Sta 2269+13.26 Rt to Sta 2270+03.22 Rt	108.4	LF
Total	612.9	LF

Remove End Treatment & Transition

Sta 2266+78.28 Lt to Sta 2267+28.28 Lt	1	EA
Sta 2265+90.90 Rt to Sta 2266+40.90 Rt	1	EA
Sta 2270+90.41 Lt to Sta 2271+40.41 Lt	1	EA
Sta 2270+03.22 Rt to Sta 2270+53.22 Rt	1	EA
Total	4	EA

W-Beam Guardrail

Sta 2267+74.72 Lt to Sta 2268+18.26 Lt	45.6	LF
Sta 2266+87.40 Rt to Sta 2268+18.26 Rt	133.1	LF
Sta 2269+13.26 Lt to Sta 2270+44.12 Lt	133.1	LF
Sta 2269+13.26 Rt to Sta 2269+56.80 Rt	45.6	LF
Total	357.4	LF

W-Beam Guardrail End Terminal

Sta 2267+24.73 Lt to Sta 2267+74.72 Lt	1	EA
Sta 2266+37.51 Rt to Sta 2266+87.40 Rt	1	EA
Sta 2270+44.12 Lt to Sta 2270+94.01 Lt	1	EA
Sta 2269+56.80 Rt to Sta 2270+06.79 Rt	1	EA
Total	4	EA

Curb & Gutter - Type 1 Special

Sta 2267+98.26 Lt to Sta 2268+18.26 Lt	20	LF
Sta 2267+98.26 Rt to Sta 2268+18.26 Rt	20	LF
Sta 2269+13.26 Lt to Sta 2269+33.26 Lt	20	LF
Sta 2269+13.26 Rt to Sta 2269+33.26 Rt	20	LF
Total	80	LF

Guardrail Embankment

Sta 2266+37.51 Rt to Sta 2268+18.26 Rt	1	EA
Sta 2269+13.26 Lt to Sta 2270+94.01 Lt	1	EA
Total	2	EA

(A) These items to be included in the price bid for "W-Beam Guardrail".

(B) An approximate in-place, compacted volume is shown above for informational purposes only. Guardrail embankment to be paid as "Guardrail Embankment".

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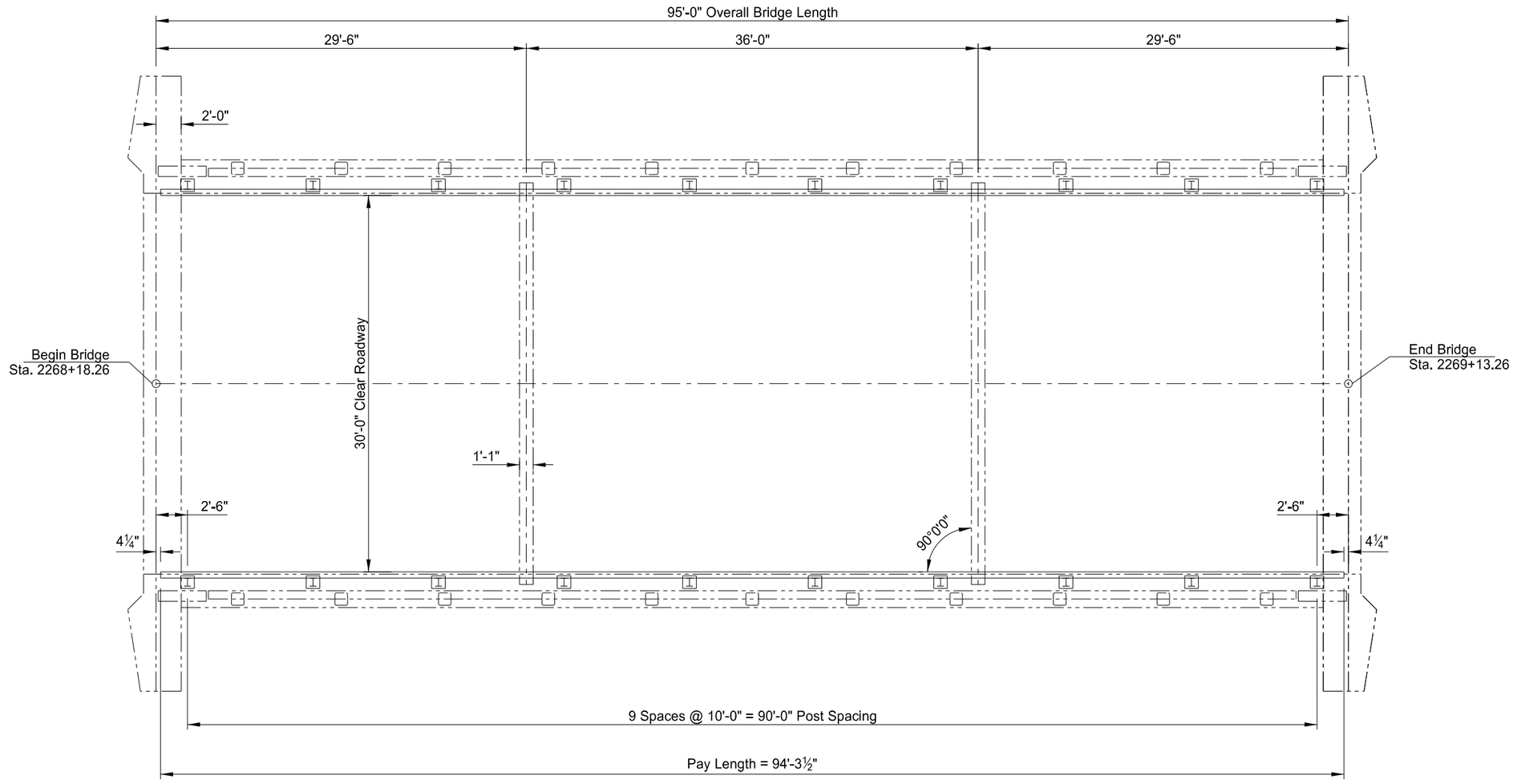
Thrie/W-Beam Guardrail Quantities at Bridge Ends
Site 5
Str No. 17-042.967

ND 17

11 Mi E of Jct ND 3 E to Jct ND 20

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

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	170	1



NOTES:

100 SCOPE OF WORK: Work at this site consists of installing free standing double box beam rail retrofit.

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
624	3001	DOUBLE BOX BEAM RAIL RETROFIT - FREE STANDING	LF	188.6

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NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

MAUVAIS COULEE

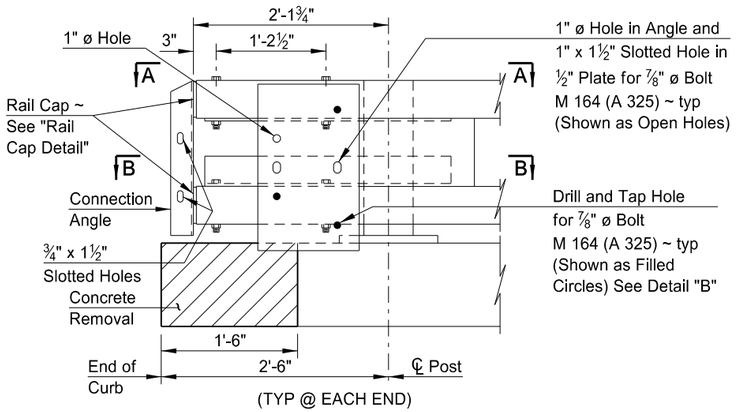
DOUBLE BOX BEAM RAIL RETROFIT LAYOUT (FREE STANDING)

PROJECT: SS-3-017(028)011
STATION: 2268+65.76
TOWNER COUNTY

2/2/16 — DATE
Terrence R. Udland — BRIDGE ENGINEER

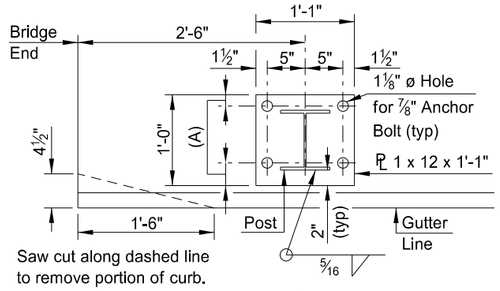
23 U.S.C. 409
NDDOT Reserves All Objections

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	SS-3-017(028)011	170	2



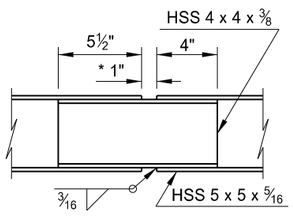
(TYP @ EACH END)

END POST CONNECTION DETAIL



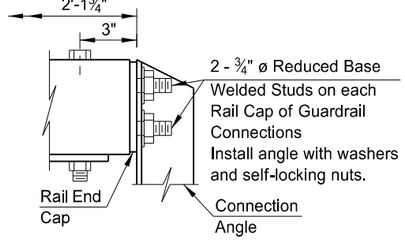
(A) Variable 1½" to 3"

BASE PLATE DETAIL

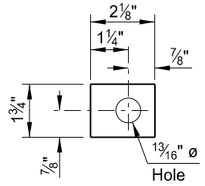


* 2" @ expansion joint.

RAIL SPLICE DETAIL

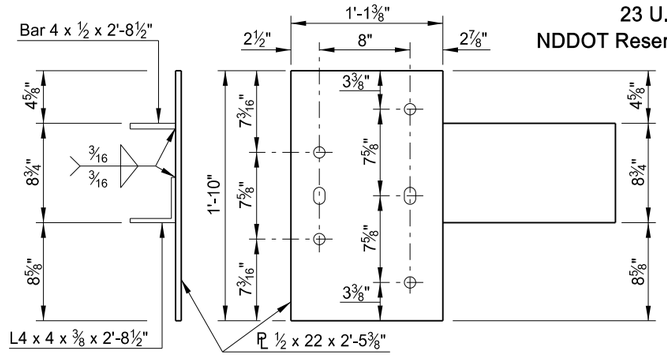


RAIL CAP DETAIL



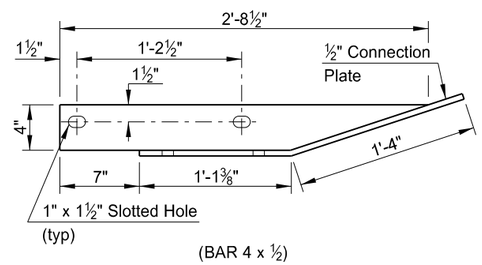
Position washers to completely cover slotted holes.

¼" BAR WASHER "C"



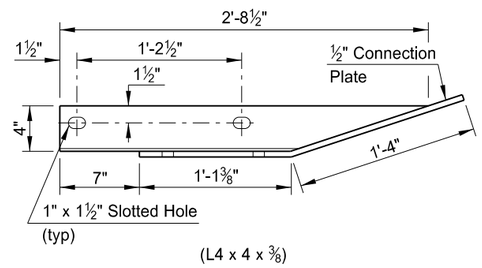
(4 REQUIRED)

GUARDRAIL CONNECTION PLATE DETAILS



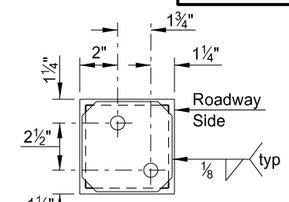
(BAR 4 x ½)

A-A



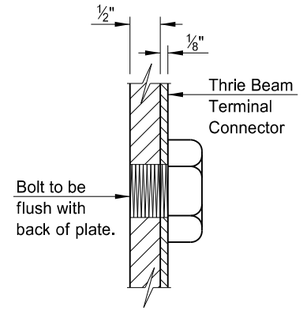
(L4 x 4 x ⅜)

B-B

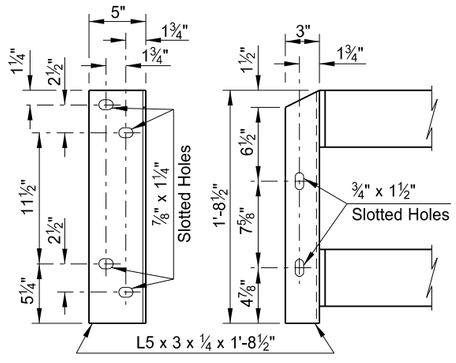


Bar 4¾ x ½ x 4¾"
Cope corners to ¾" to provide zinc drains.

RAIL CAP END VIEW

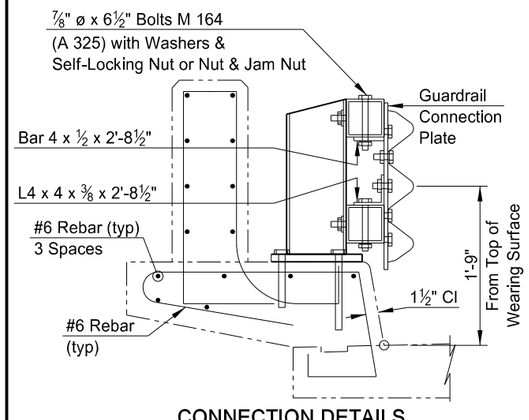


DETAIL "B"

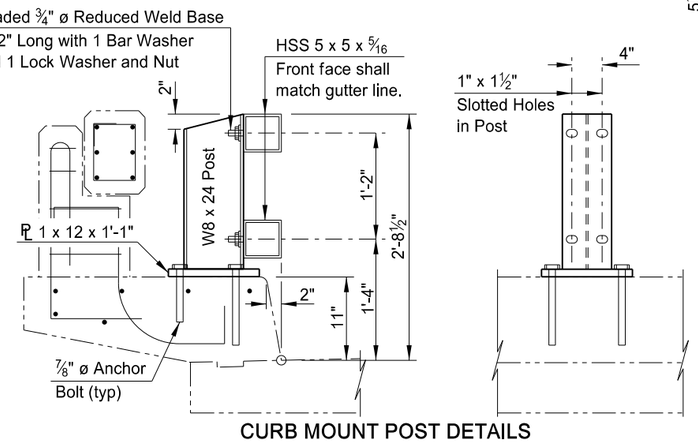


(4 REQUIRED)

CONNECTION ANGLE DETAILS



CONNECTION DETAILS



CURB MOUNT POST DETAILS

NOTES:

Include all cost for furnishing and installing the guardrail connection plates and for sawing and removing portions of the curb in the price bid for "Double Box Beam Rail Retrofit - Free Standing."

Galvanize after fabrication.

Work Drawings:
Submit work drawings for the rail retrofit to the Engineer for review.
Use the following text sizes on all work drawing sheets:

Dimensions and Notes	0.08"
Detail Subtitles	0.09"
Detail Titles	0.10"

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QUANTITIES	
RAIL RETROFIT - FREE STANDING	188.6 LF

MAUVAIS COULEE BRIDGE

DOUBLE BOX BEAM RAIL RETROFIT DETAILS (FREE STANDING)

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
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 ℄	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
Dlnt	delineate
Dlntr	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	
DATE	CHANGE

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NDDOT ABBREVIATIONS

D-101-2

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions

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NDDOT ABBREVIATIONS

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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DATE	CHANGE
08-03-15	General Revisions

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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D-101-20

Line Styles

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

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D-101-21

Line Styles

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

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Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

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Symbols

D-101-31

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

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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 Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate 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 (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

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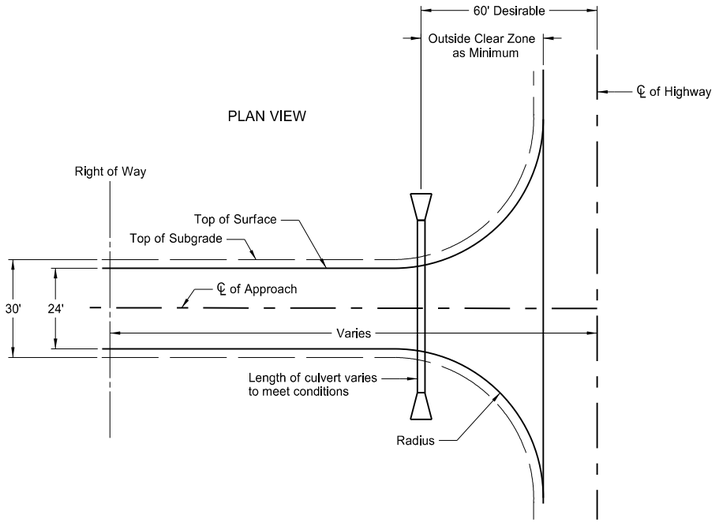
STANDARD RURAL APPROACHES

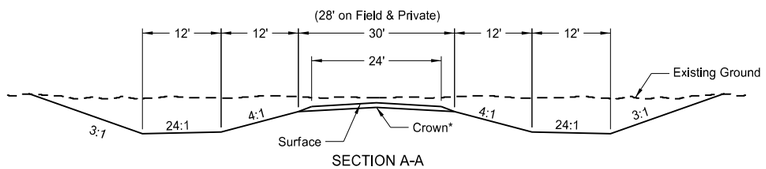
D-203-8

PLAN VIEW



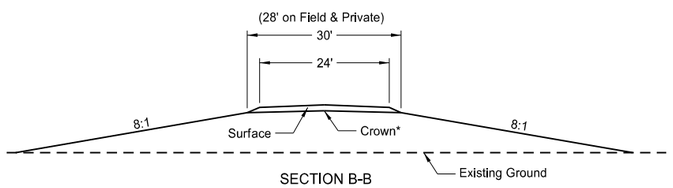
CRITERIA FOR RURAL APPROACH TYPES

	Field Drives	Private Drives	Low Volume Public Roads
Radius	R=24 ft	R=30 ft	R=40 ft
Maximum Grade	10%	7%	7%
Storage Platform	20 ft	24 ft	30 ft
Vertical Curve Length	10 ft	10 ft	Varies (Min. 20 mph)

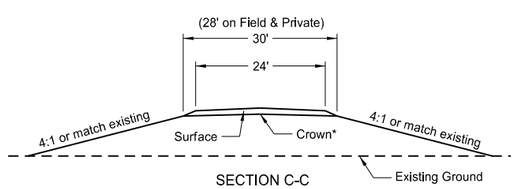


SECTION A-A

*2.1% crown for paved surface
*3.0% crown for gravel surface

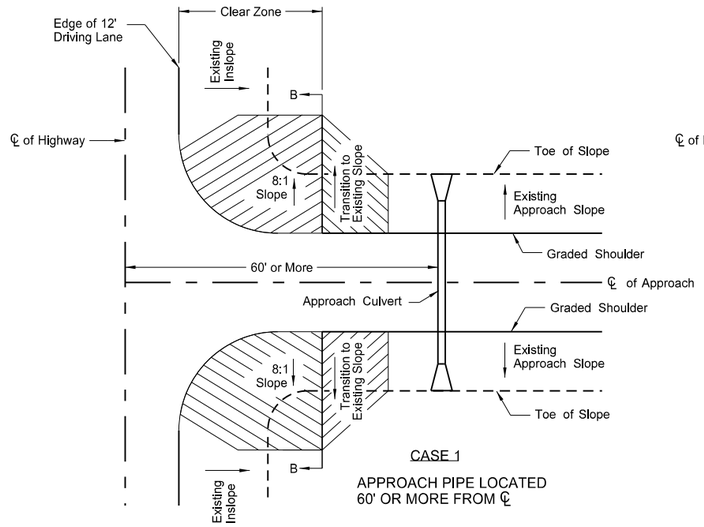


SECTION B-B



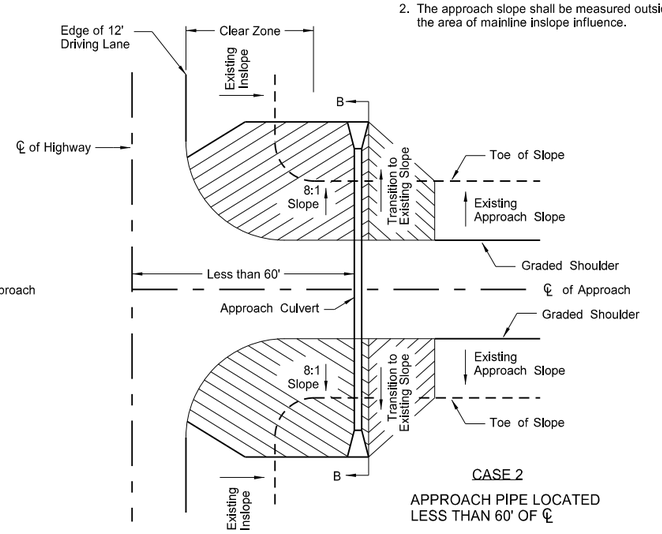
SECTION C-C

APPROACH INSLOPES



CASE 1

APPROACH PIPE LOCATED 60' OR MORE FROM ℄

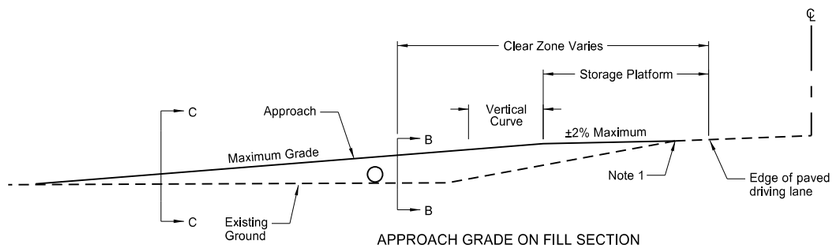


CASE 2

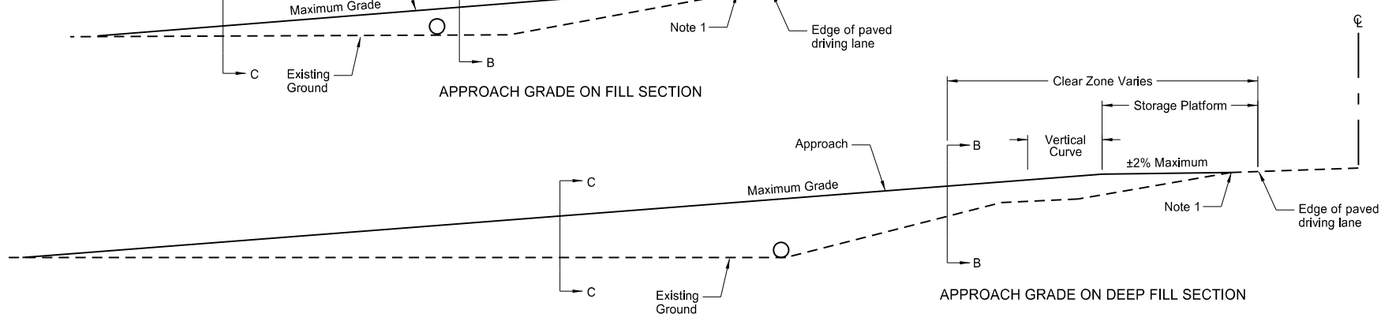
APPROACH PIPE LOCATED LESS THAN 60' OF ℄

NOTES:

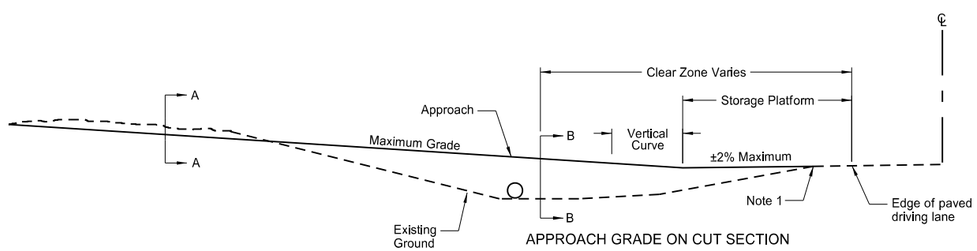
1. Max breakover between approach storage platform and highway shall not exceed 5%.
2. The approach slope shall be measured outside the area of mainline inslope influence.



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION



APPROACH GRADE ON CUT SECTION

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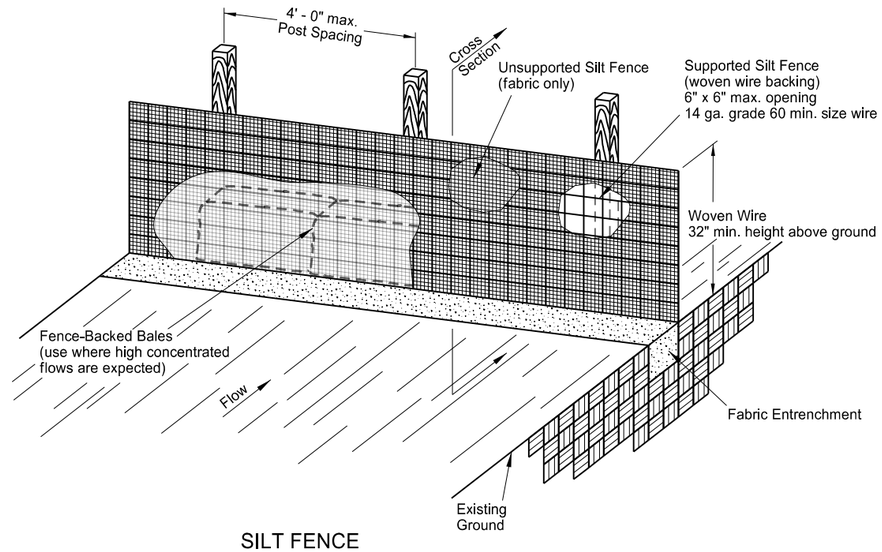
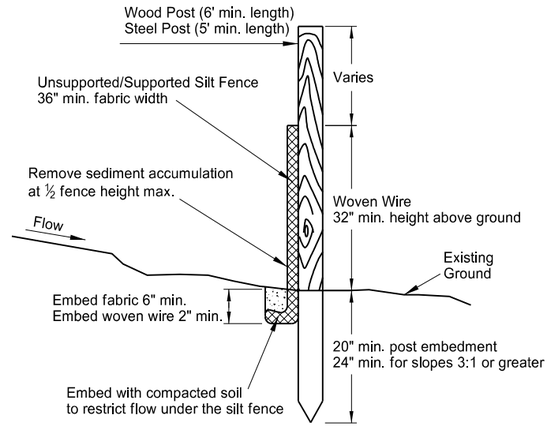
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1



SILT FENCE
SUPPORTED AND UNSUPPORTED



SILT FENCE
CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
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06-26-14	Standard drawing resulted from splitting standard D-708-2.

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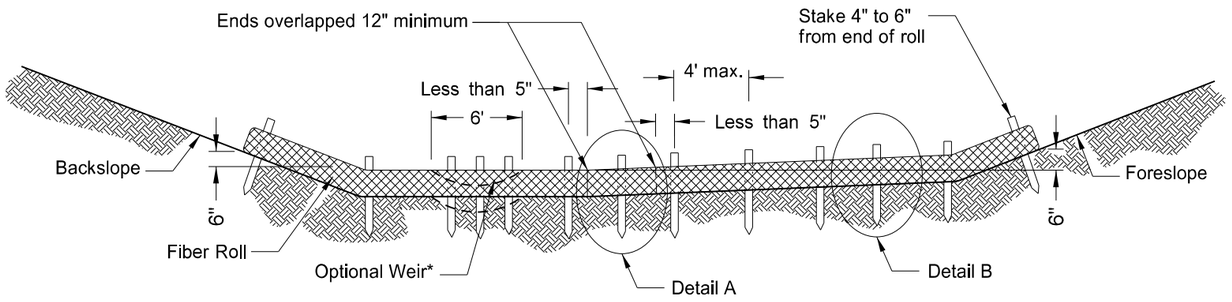
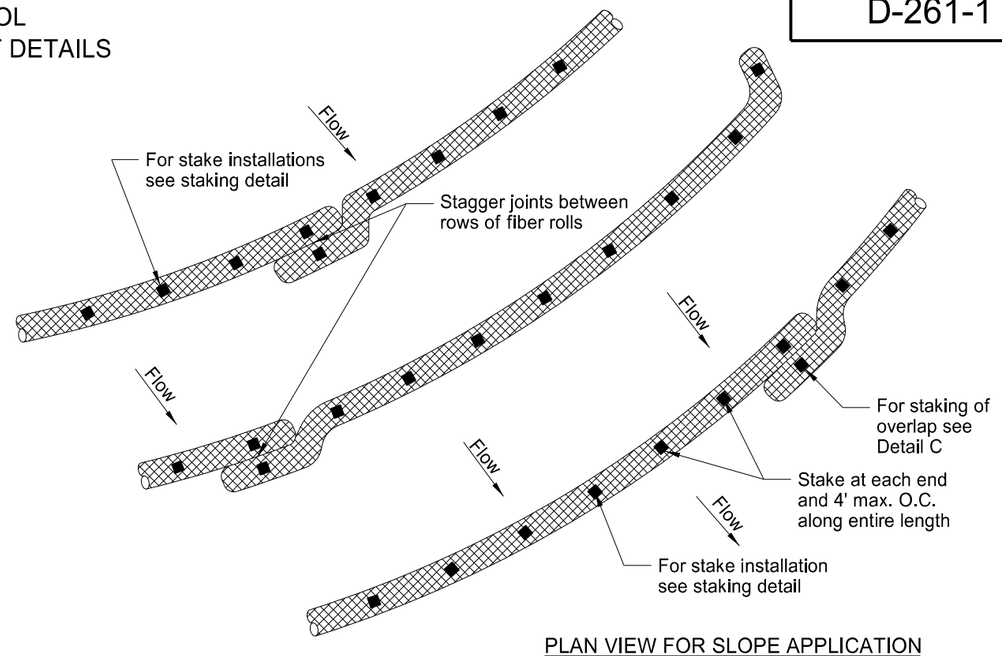
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

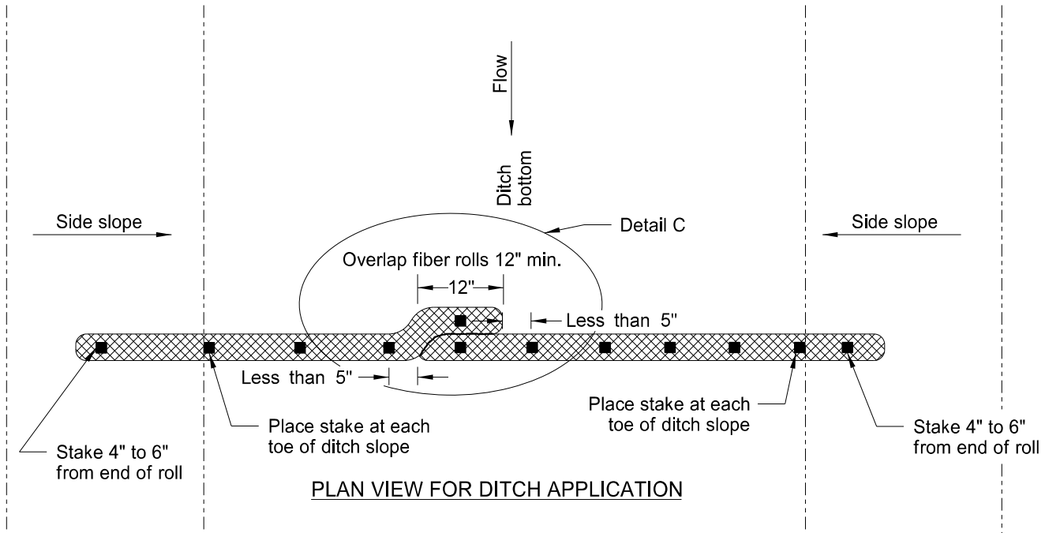


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

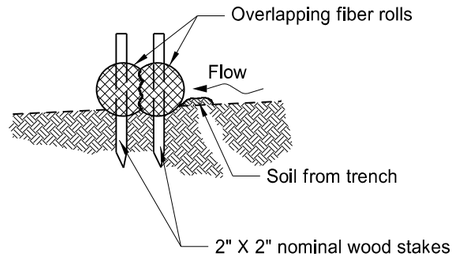
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

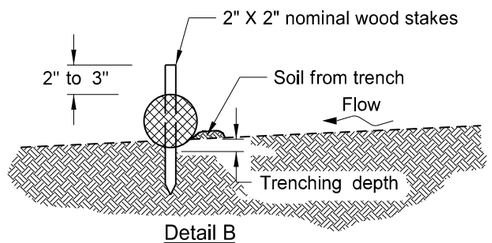


PLAN VIEW FOR DITCH APPLICATION



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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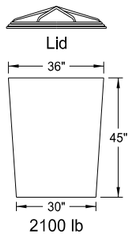
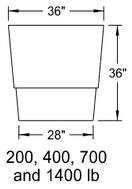
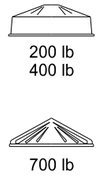
ATTENUATION DEVICE

D-704-1

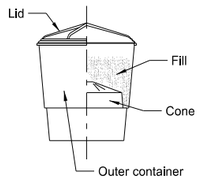




Outer Containers

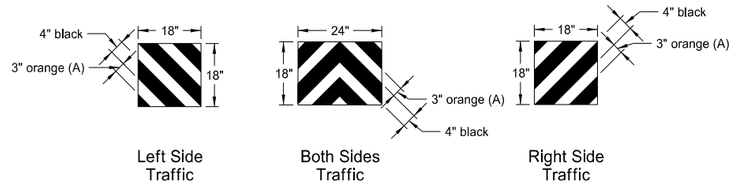


Cones



Typical Assembly

Typical Module
Construction Detail



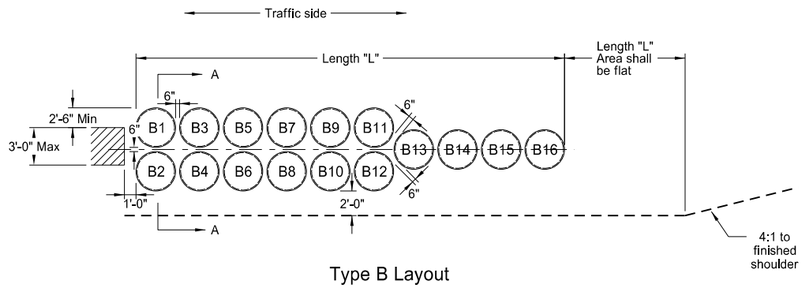
Left Side Traffic | Both Sides Traffic | Right Side Traffic

Reflective Sheet Detail

Note:
The last attenuation device facing traffic shall have a reflective sheet, following the details above, directly applied to the outer container. The sheet may also be applied to a metallic sheet and attached to the container with approved fasteners. The reflective sheeting shall be Type IV as specified in NDDOT Standard Specifications.

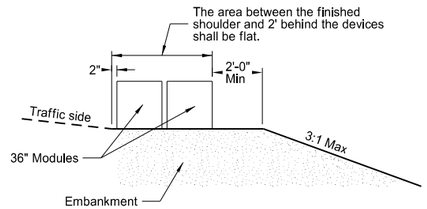
(A) 3" orange sheeting shall be used for temporary installations, and 3" yellow sheeting shall be used for permanent installations.

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



Type B Layout

Note:
When attenuation devices are placed at piers offset from roadway, they shall be angled 10 degrees towards traffic.



Section A-A
(Type B Layout)

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

Notes:

1. Materials
   A) Modules shall be manufactured from a frangible polyethylene material which will shatter upon impact.
   B) Modules shall be filled with class 43 aggregate meeting the requirements for aggregate according to NDDOT Standard Specifications. The fill unit weight shall be at least 100 pounds per cubic foot. Fill left over winter shall have a moisture content of 2% or less.

2. Modules
   The modules shall be provided in two sizes to contain volumes of either 2, 4, 7, 14, or 21 cubic feet as a minimum.
   A) The module for the 2, 4 or 7 cubic foot container shall consist of three components:
      1) A 14 C.F., yellow outer container.
      2) A black lid which locks securely over the top lip of the container.
      3) A cone-shaped supporting insert. The insert shall be varied to allow for the three sizes of modules and capable of supporting 200, 400, or 700 pounds of sand mass. The cone inserts shall be placed inside the 14 cubic foot container.
   B) The module for the 21 cubic foot container shall consist of two components:
      1) A 36" height X 36" width yellow outer container.
      2) A black lid which locks securely over the top of the container.

3. For temporary use: The modules shall be Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. The attenuation devices may be placed on pallets to facilitate maintenance. Pallets shall have a maximum thickness of 3½".

4. For permanent use: Barrel Attenuation Device installations, the outer sand container portion of the modules shall consist of a one-piece container with separate detachable lid. The modules which meet these requirements are Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or an approved equal. Modules having outer sand containers assembled from multiple pieces shall not be accepted for permanent installations.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised sheeting in reflective sheet detail

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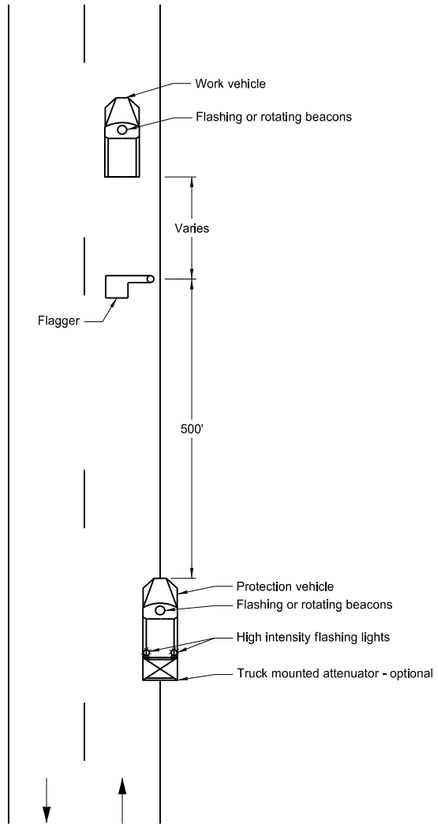
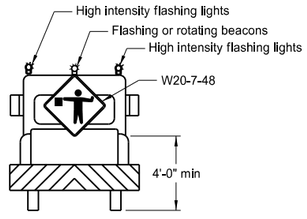
TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

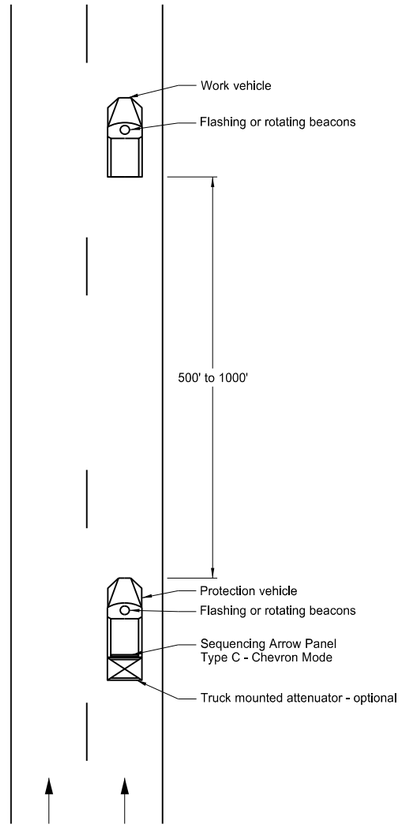
Two Lane, Two Way Roadways

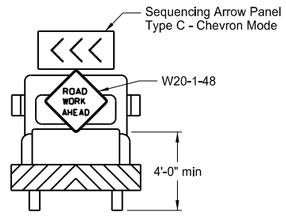




Typical Protection Vehicle

Multilane Roadways





Typical Protection Vehicle

Notes:

1. The working vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light.
2. The shadow vehicle shall display a 360 degree rotating, flashing, oscillating or strobe light. The shadow vehicle for Multilane Roadway shall also have a sequencing arrow panel Type C operated in the chevron mode.
3. This application is for use during daylight hours and in areas of good visibility only.
4. Two lane, two way roadway, a flagger shall be used to protect the work area and warn oncoming traffic.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

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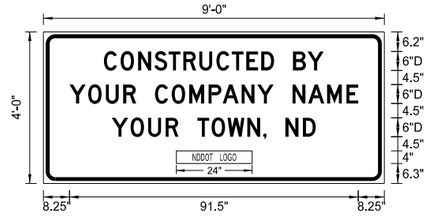
CONSTRUCTION SIGN DETAIL

D-704-5

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

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S): AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

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

Notes:

1. Sign shall be placed a distance of ½A following the End Road Work (G20-2a-48) sign. There shall be a maximum of 2 signs per project.
2. Sign shall be post mounted.
3. Sign required on rural projects with a 30 day or longer duration and it is not required on seal coat projects or other short duration projects.
4. Sign shall not be placed in urban areas or within city limits.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV

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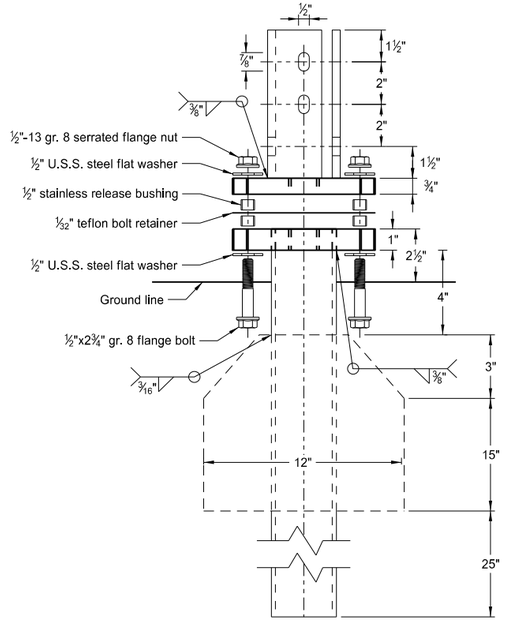
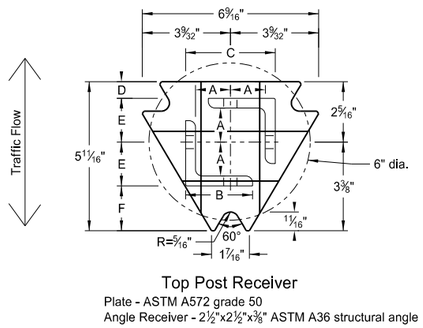
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

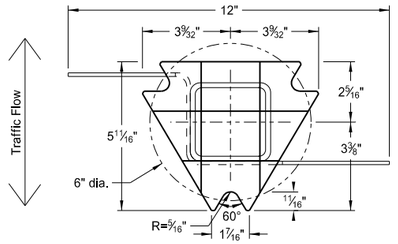


Multi-Directional
Slip Base Assembly

Perforated Tube



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



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

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.

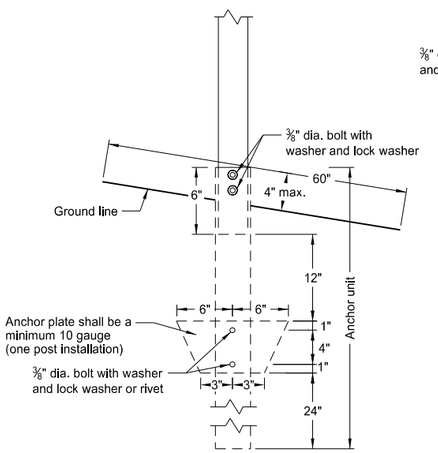
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³⁄₁₆	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia $in.^4$	Cross Sec. Area $in.^2$	Section Modulus $in.^3$
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³⁄₁₆ x 2³⁄₁₆	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

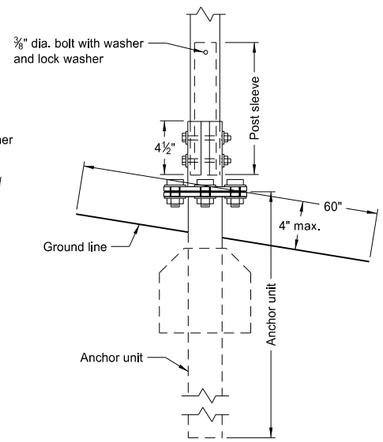
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⁵⁄₁₆"	⅝"	1²¹⁄₃₂"	1¾"

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

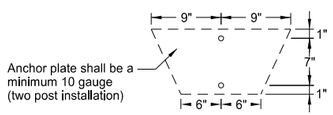
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

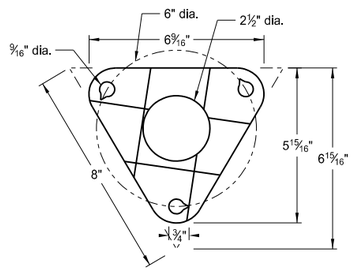


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





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

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

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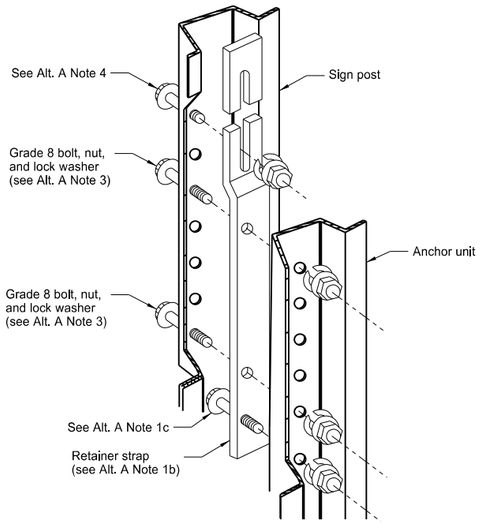
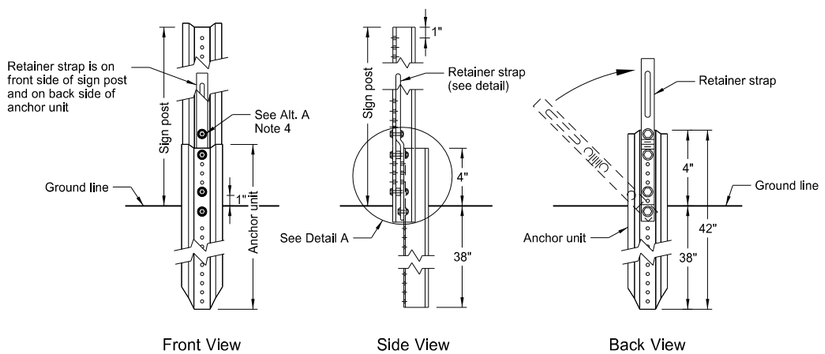
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



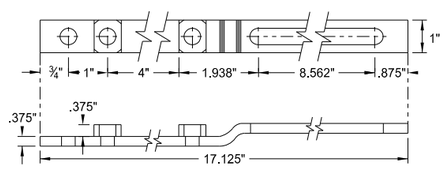
Detail A



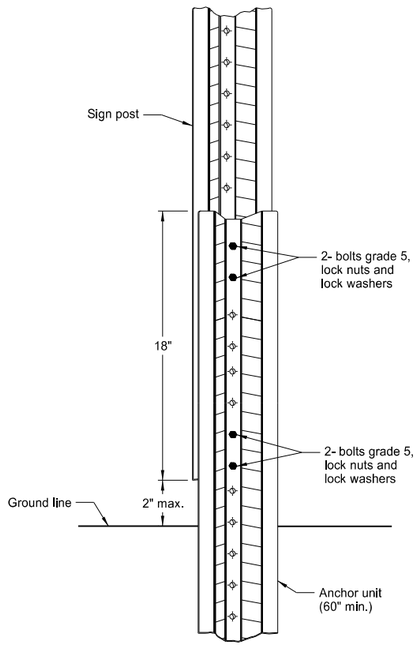
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

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

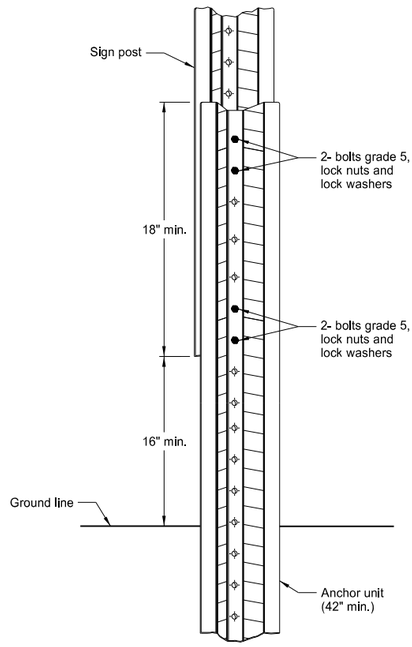


Retainer Strap Detail



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.

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

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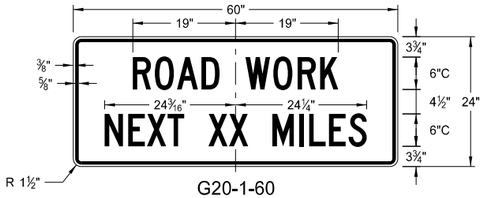
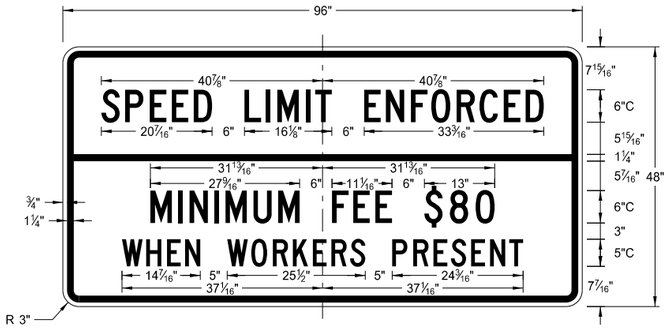
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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

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



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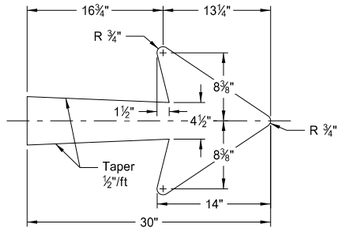
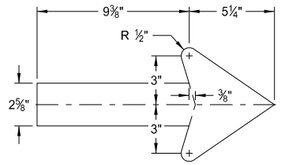
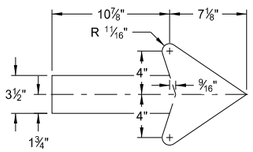


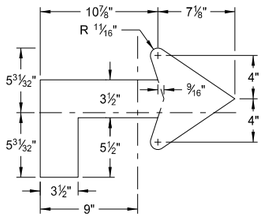
E5-1-48



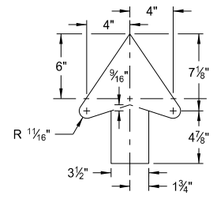
G20-50a-72
G20-52a-72



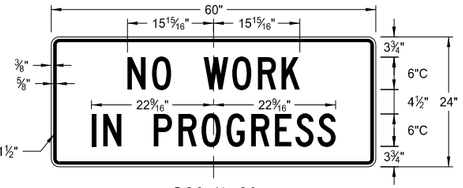
M4-9(L or R)-30
Right or Left



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



M4-9-30
Straight



G20-1b-60
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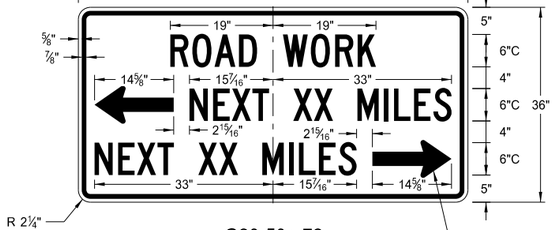
Background: orange



G20-50a-72
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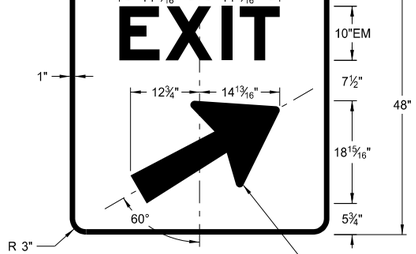
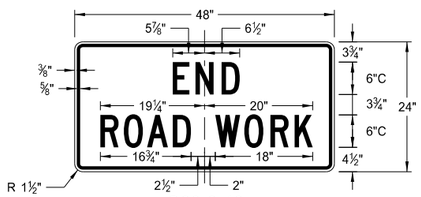
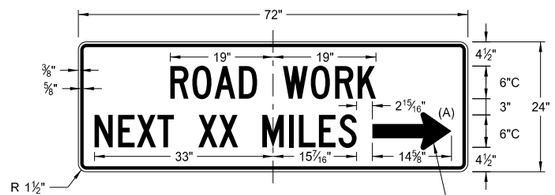
Background: orange



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



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



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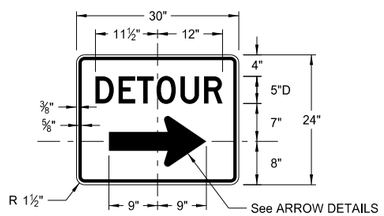

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

ARROW DETAILS

NOTES:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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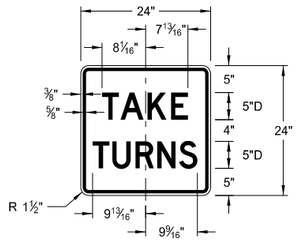
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50-24
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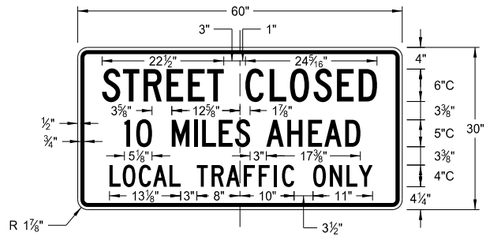
Background: white



R11-3c-60
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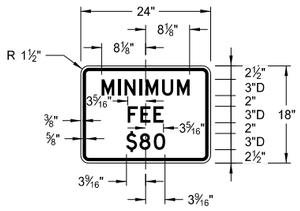
Background: white



R2-1a-24
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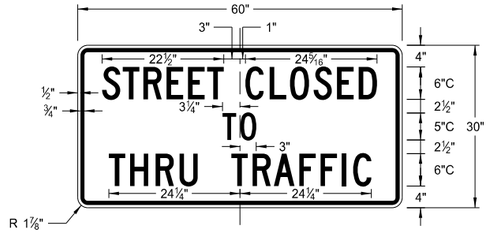

R11-4a-60
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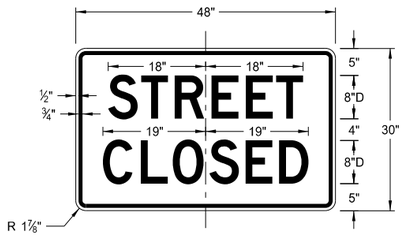

R11-2a-48
Legend: black (non-refl)
Background: white

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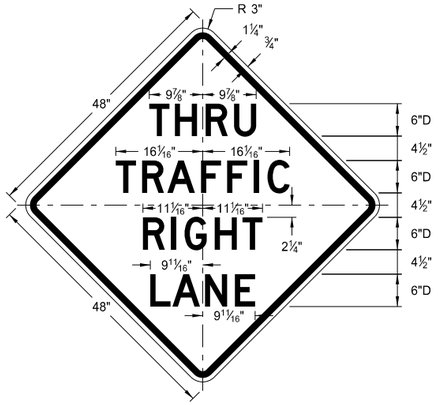
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
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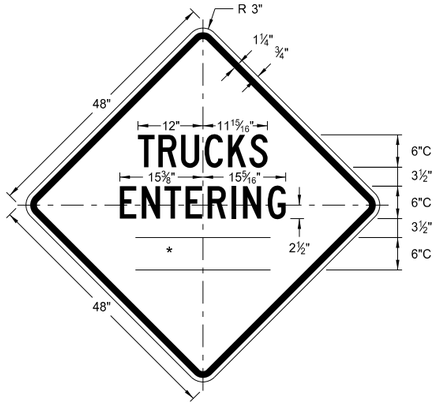
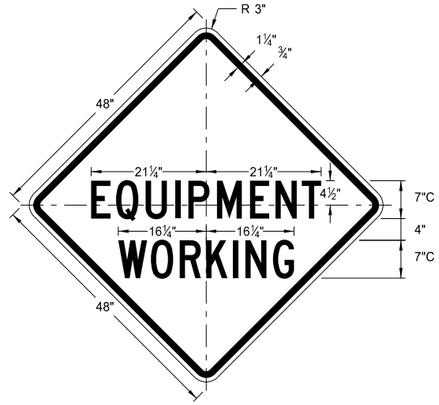
Background: orange



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



W20-51-48
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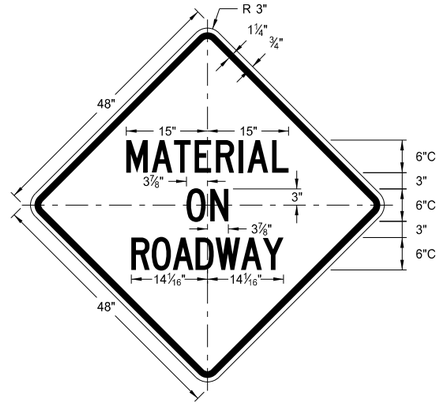
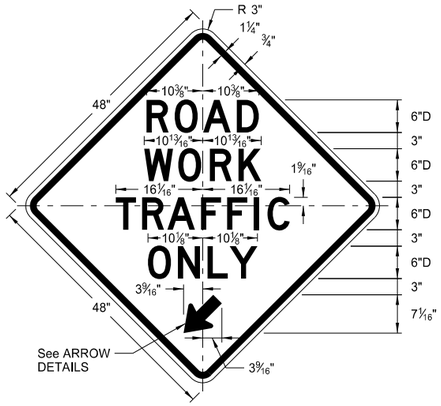
Background: orange



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

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

* DISTANCE MESSAGES



W5-9-48
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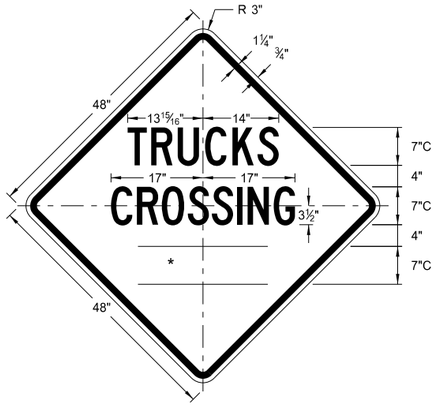
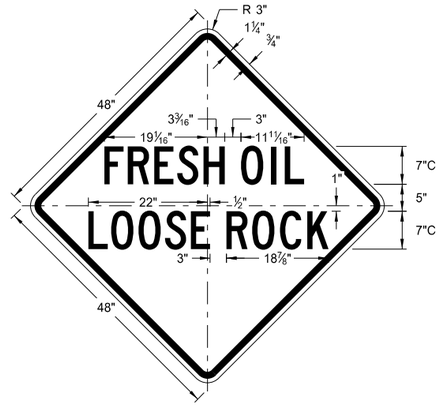
Background: orange



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

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



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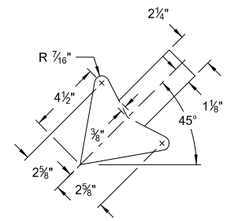
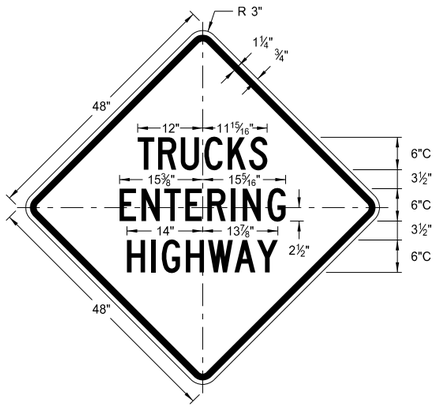
Background: orange



W5-9-48

ARROW DETAILS



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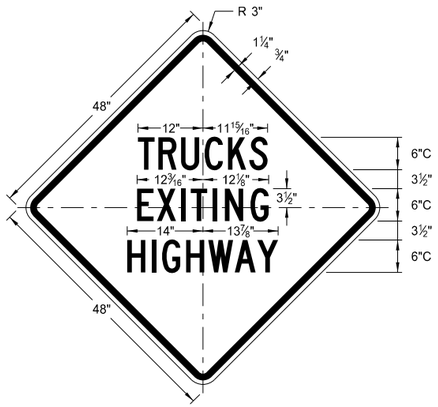

W8-56-48
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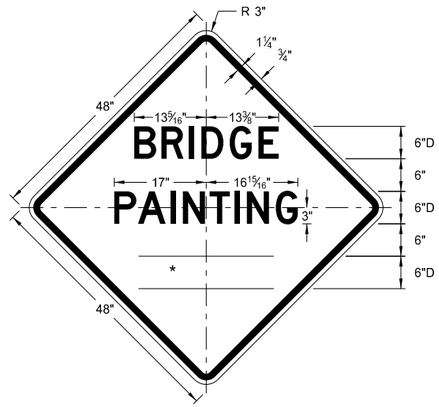
Background: orange



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

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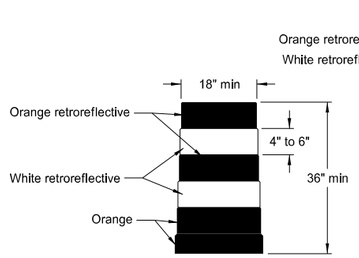
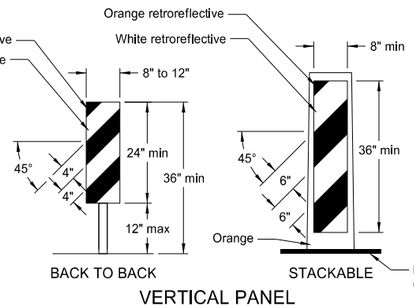
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



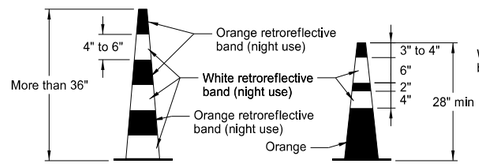
DELINEATOR DRUM

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 nonretroreflectorized 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.



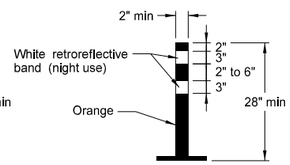
VERTICAL PANEL

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.



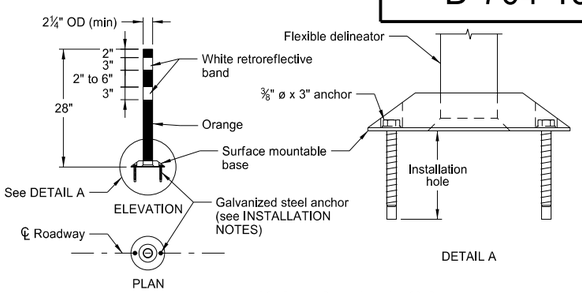
TRAFFIC CONE

Retroreflectorization 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 nonretroreflectorized space between the orange and white stripes shall not exceed 3" wide.



TUBULAR MARKER

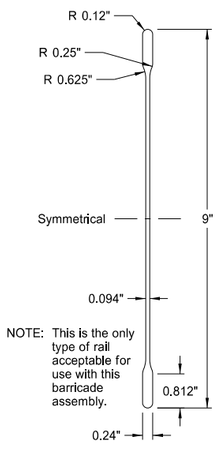
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



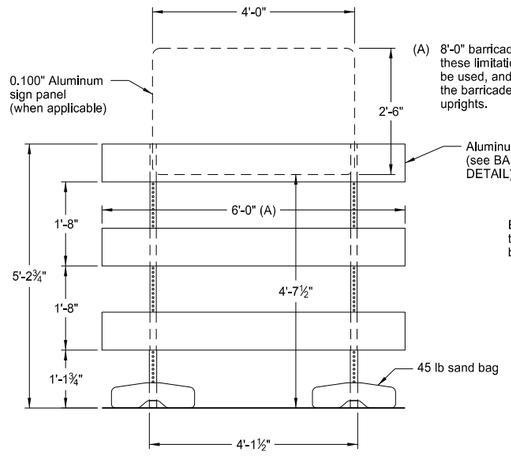
FLEXIBLE DELINEATOR

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.

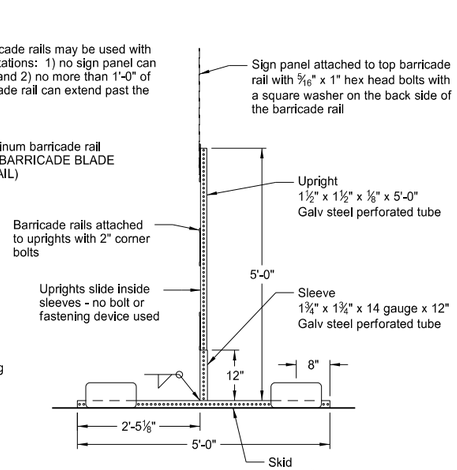


BARRICADE BLADE DETAIL



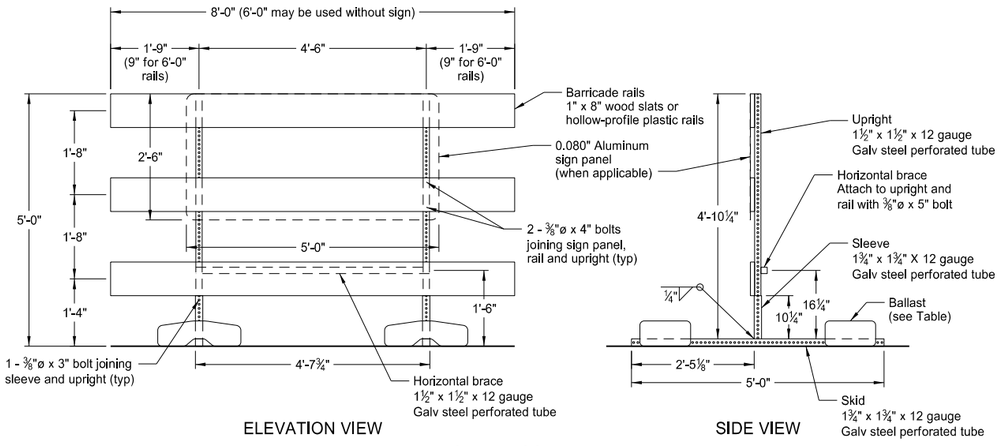
ELEVATION VIEW

(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.



SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

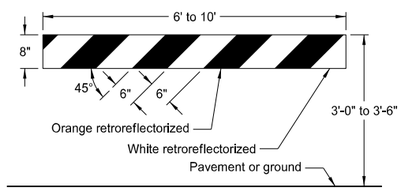


ELEVATION VIEW

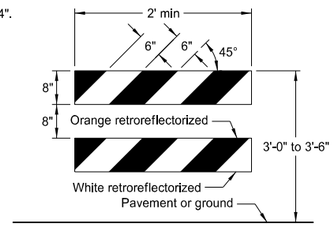
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

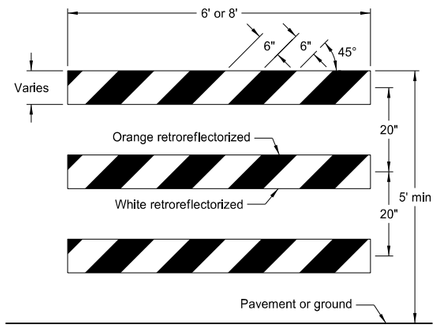
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

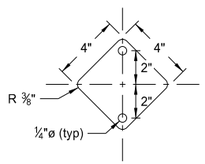


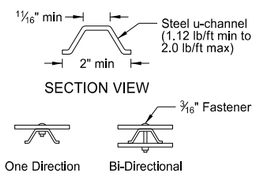
TYPE II BARRICADE

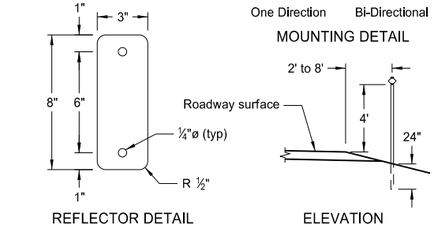


TYPE III BARRICADE

BARRICADE RAIL DETAILS







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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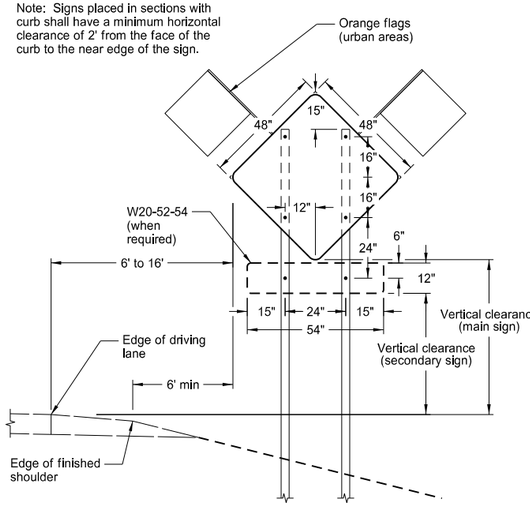
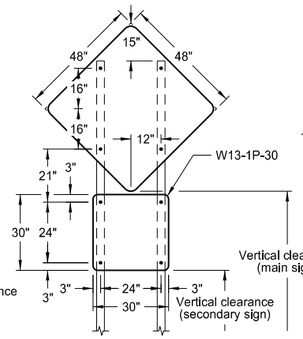
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

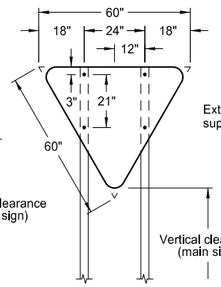
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



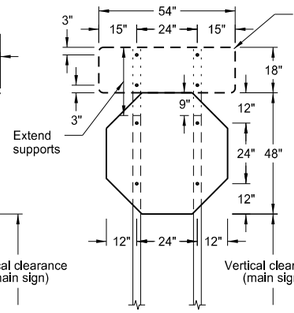
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



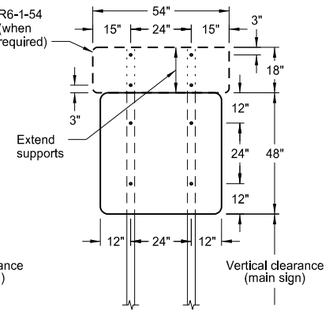
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



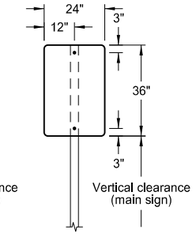
R1-2-60 - YIELD SIGN



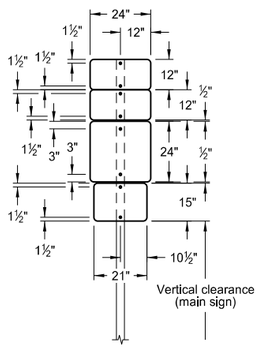
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



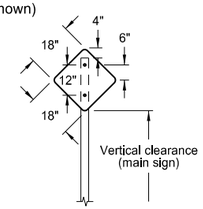
48" x 48" SIGN
(with R6-1-54 sign as required)



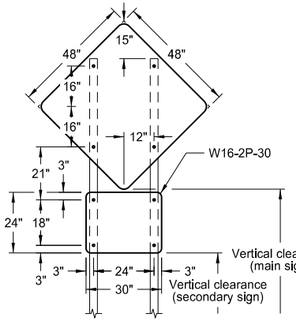
24" x 36" SIGN



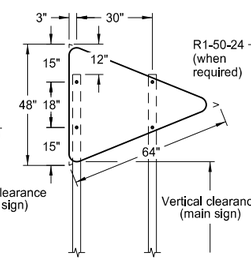
24" x 24"
ROUTE MARKER
ASSEMBLY



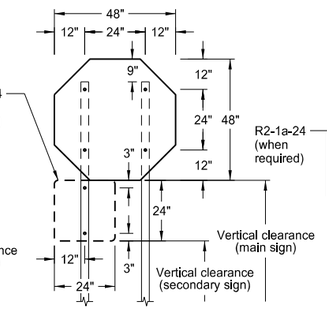
18" x 18"
DIAMOND SIGN



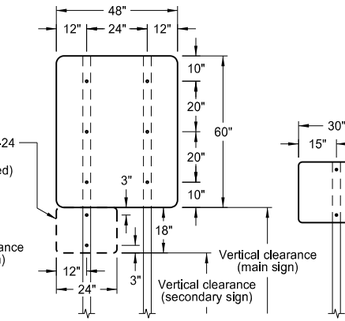
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



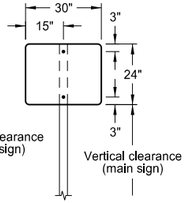
W14-3-64 - PENNANT SIGN



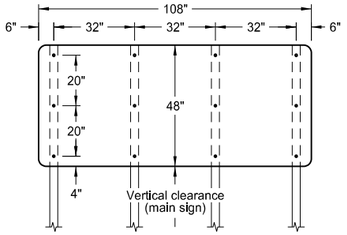
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



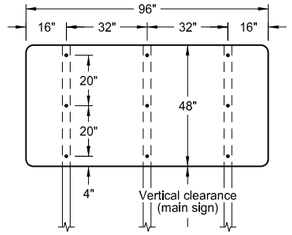
48" x 48" SIGN
(with R2-1a-24 sign as required)



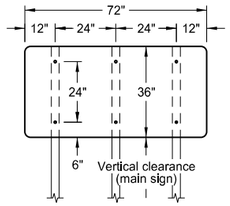
30" x 24" SIGN



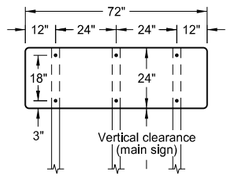
108" x 48" SIGN



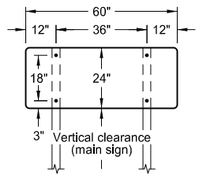
96" x 48" SIGN



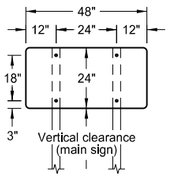
72" x 36" SIGN



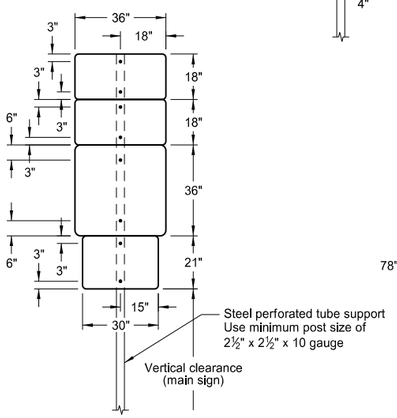
72" x 24" SIGN



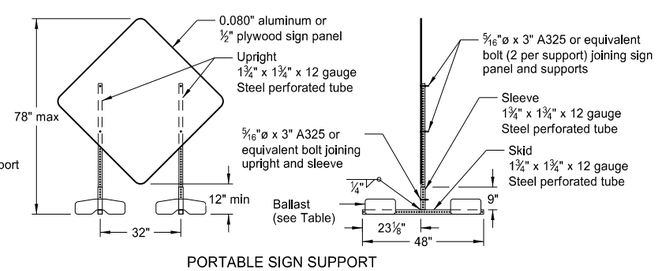
60" x 24" SIGN



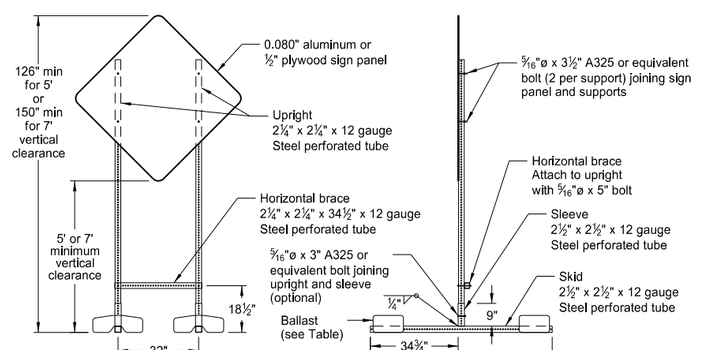
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: 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.

2. 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.

3. 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)

4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

6. 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 unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 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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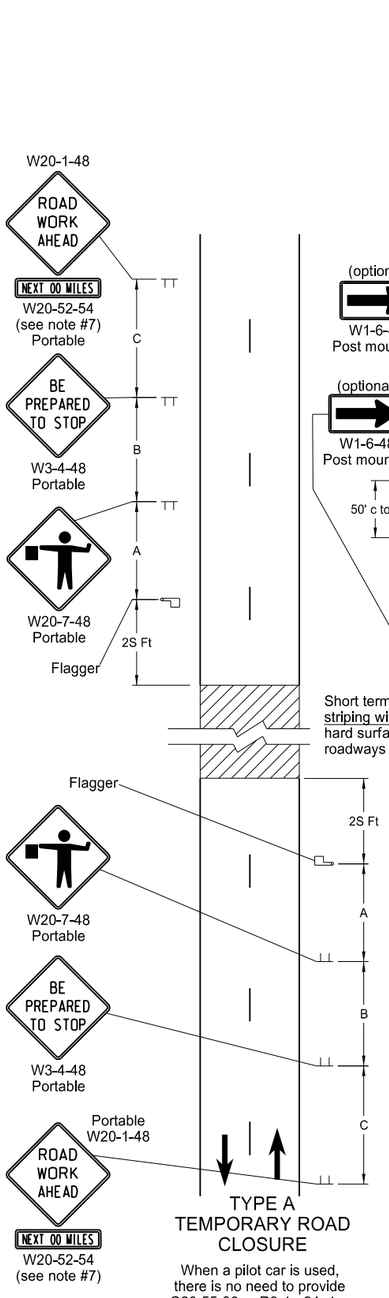
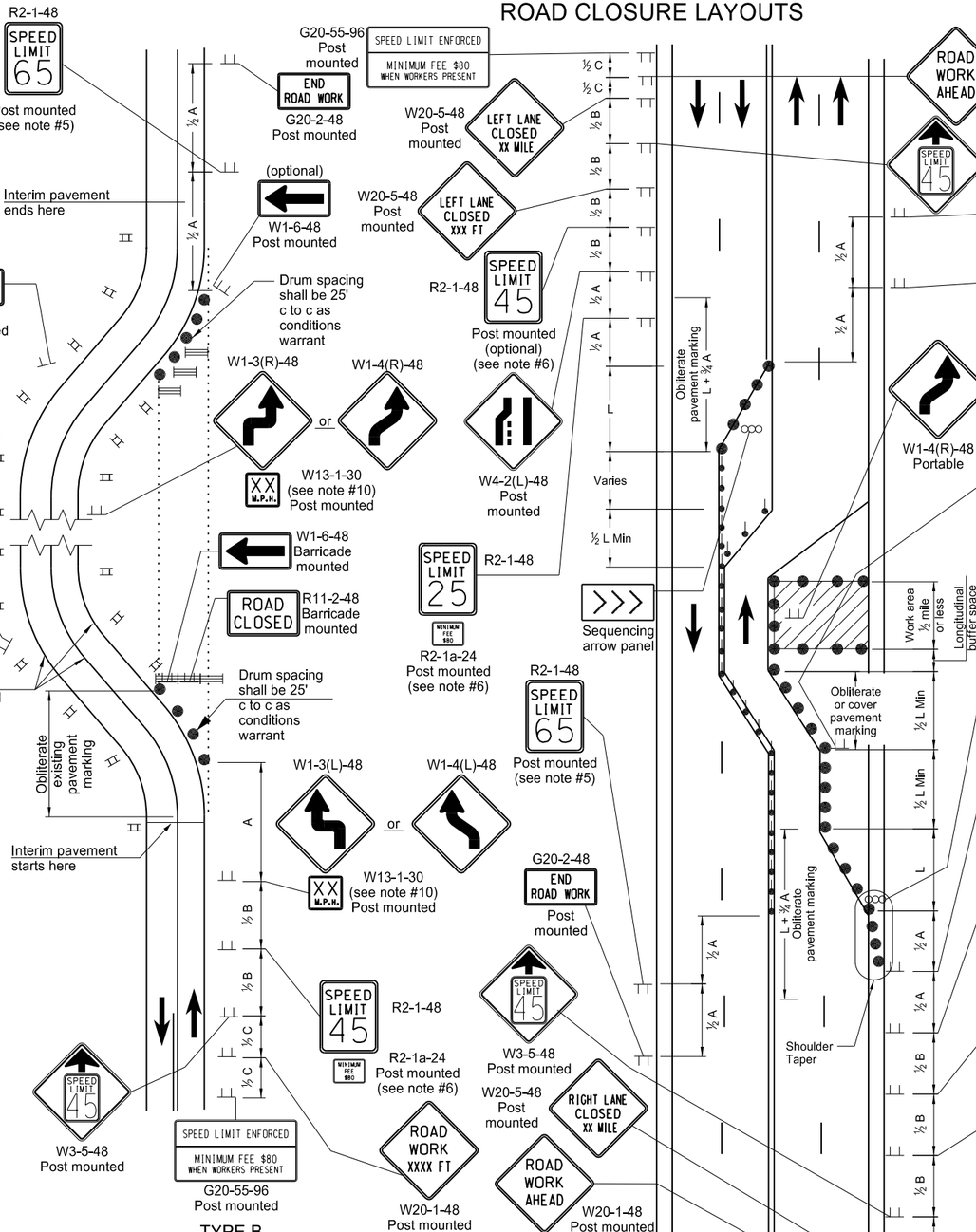
ROAD CLOSURE LAYOUTS

D-704-15



TYPE A
TEMPORARY ROAD CLOSURE

When a pilot car is used, there is no need to provide G20-55-96 or R2-1a-24 sign on the project as the pilot car will control the speed.



TYPE B
ROAD CLOSURE WITH A DIVERSION

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

TYPE C
HALF ROAD CLOSURE ON A MULTI-LANE, HIGH SPEED HIGHWAY

4 lane undivided highway with half the roadway closed.

Notes

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricades placed on roadway shall be on a moveable assembly. Signs placed on roadway shall be placed on skid mounted assemblies.
3. Delineator drums, barricades or cones used for tapering traffic shall be spaced at the dimension "S". Delineator drums or cones used for tangents shall be spaced at 2 times dimension "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface. See Shoulder Closure Standard Drawing.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. 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 ½ B.
7. Use when work area is 1 mile or longer.
8. 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.
9. Existing speed limit signs within a reduced speed zone shall be covered.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
12. 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.

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

KEY

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE

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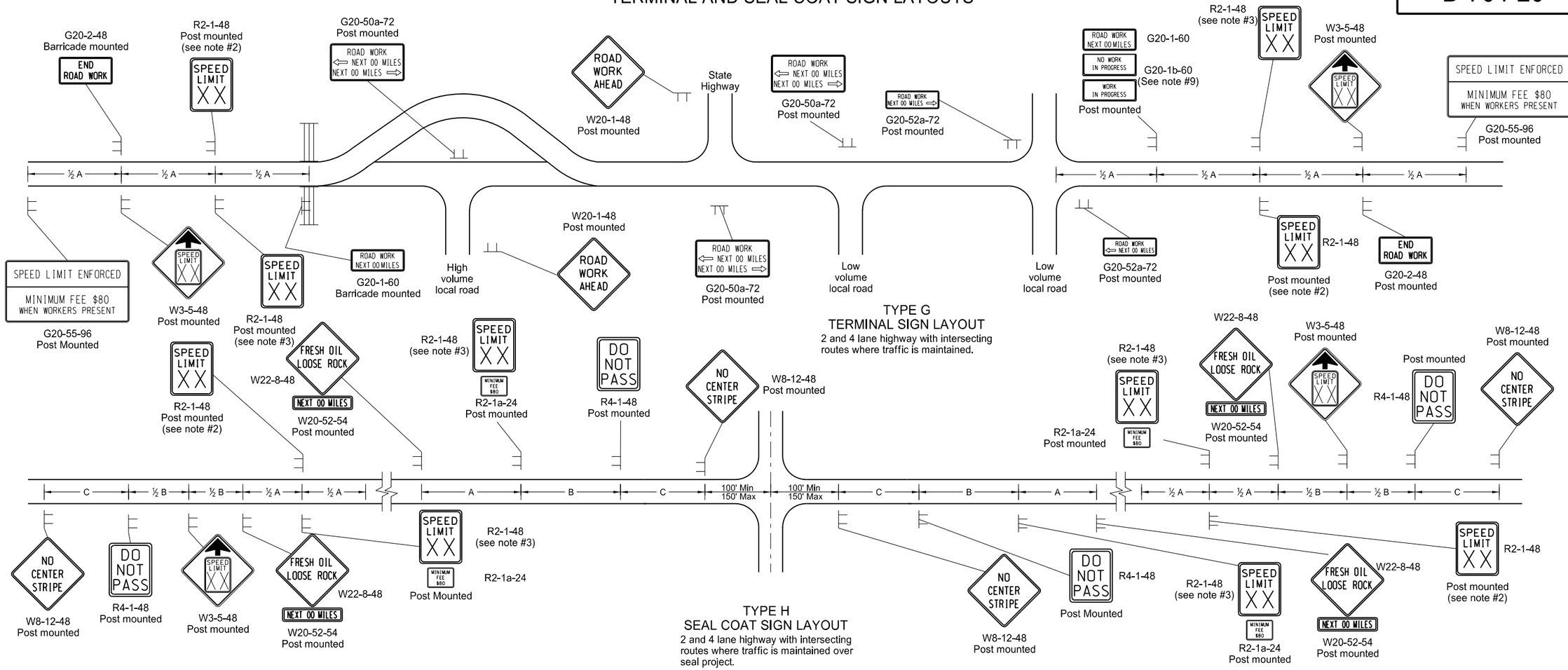
TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. 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 ½ B.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
9. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
10. Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
11. G20-55-96 sign is not required if work is less than 15 days.

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

KEY

Type III barricade

Sign

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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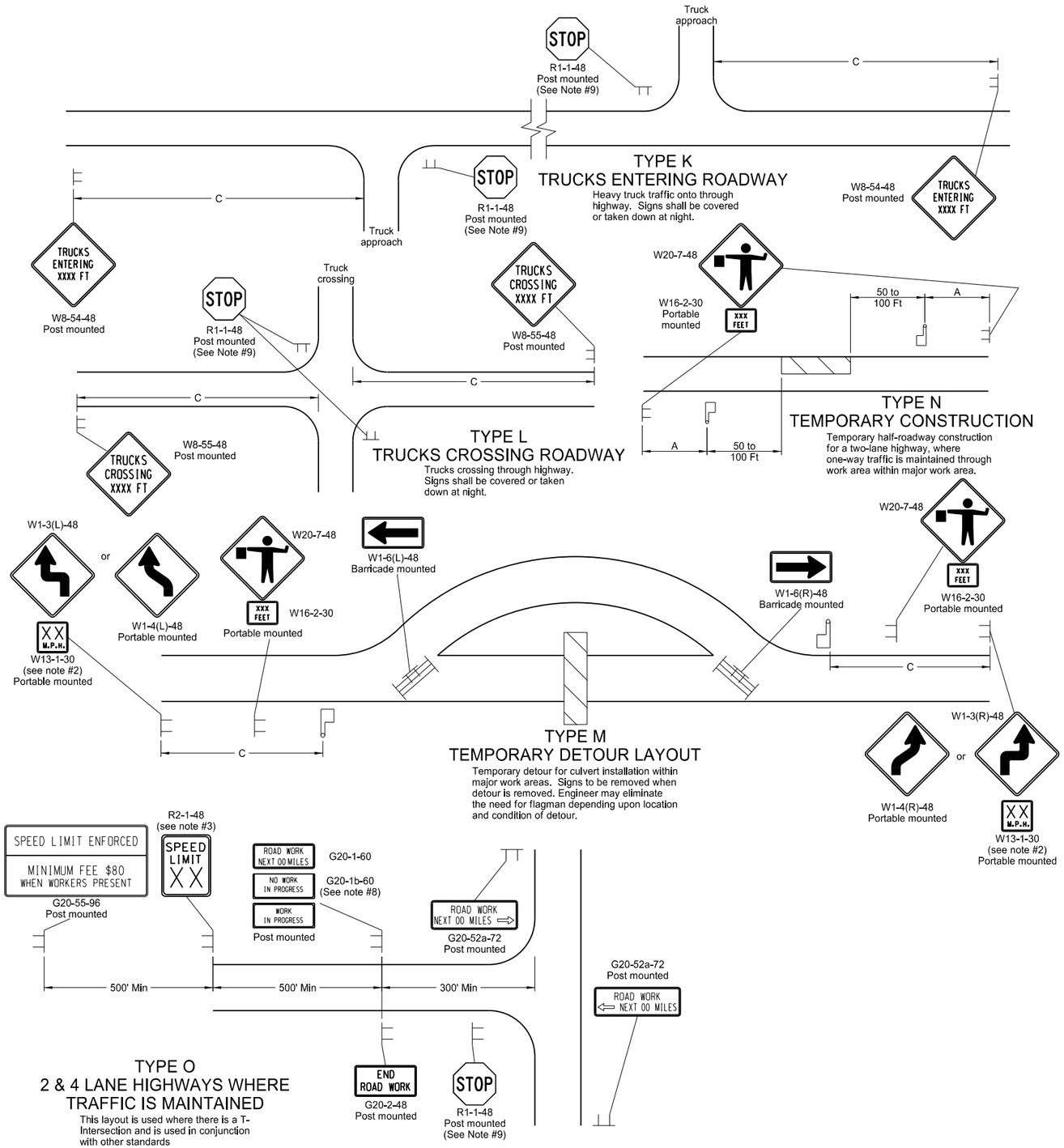
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

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.
2. Where necessary, safe speed to be determined by the Engineer.
3. 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 ½ B.
4. 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.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. 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.

KEY

Type III barricade — Work area

Sign — Flagger

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

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9-27-13	
REVISIONS	
DATE	CHANGE

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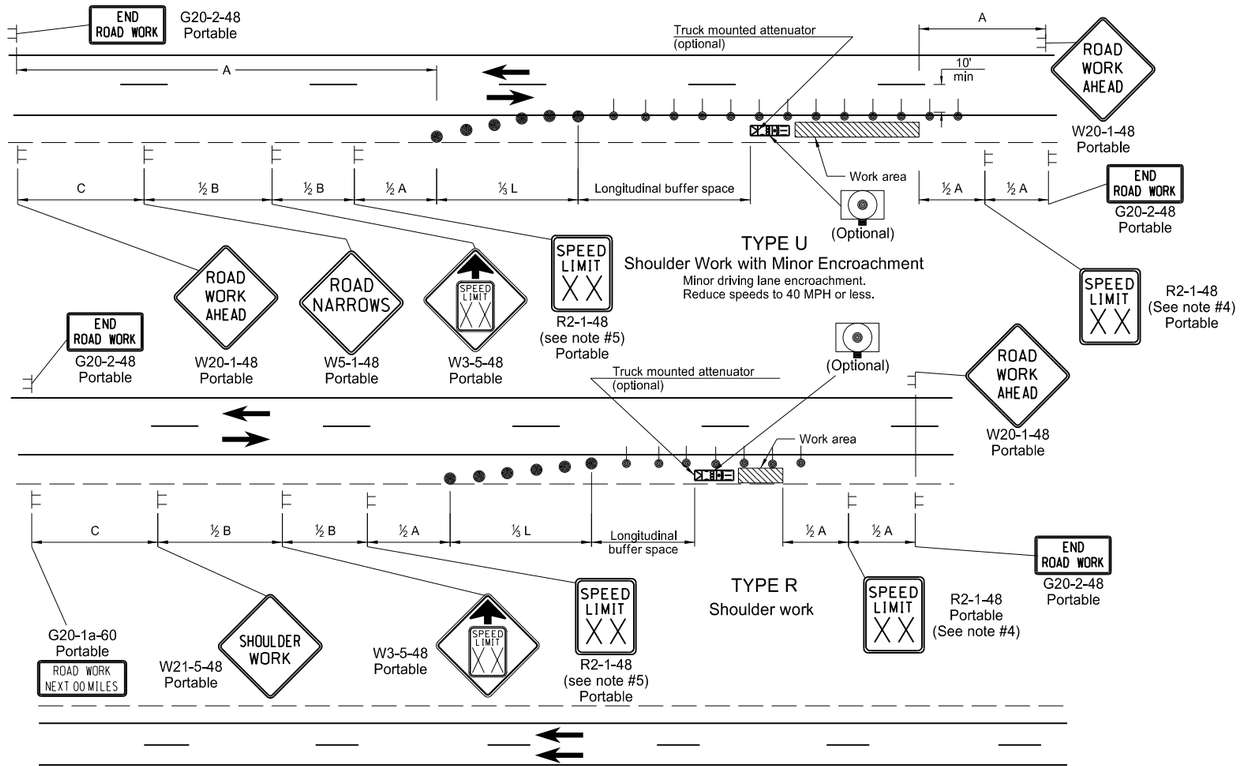
SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24



Notes

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Delineator drums used for tapering traffic shall be spaced at dimension "S".
   Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
3. Sequencing Arrow Panels
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. 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 ½B.
6. 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.
7. Existing speed limit signs within a reduced speed zone shall be covered.
8. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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 — Work area
Delineator Drum — Tubular Marker
Sequencing Arrow Panel (Caution Mode)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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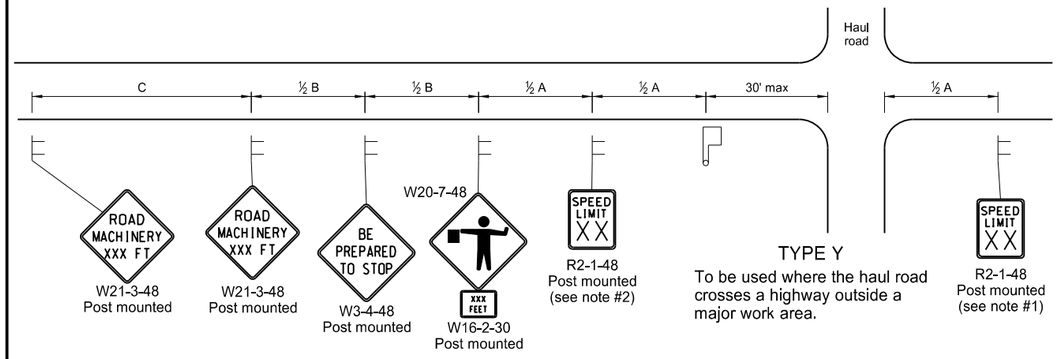
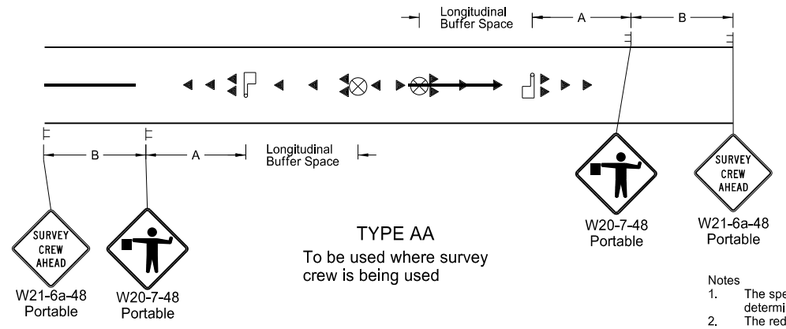
MISCELLANEOUS SIGN LAYOUTS

D-704-26



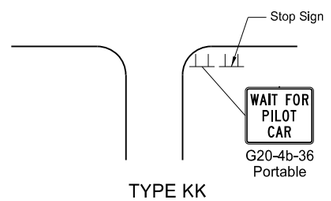
TYPE Y

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

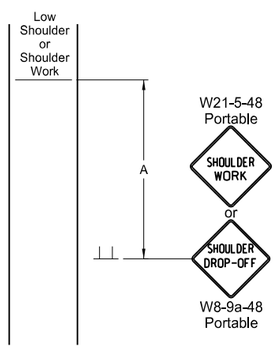


TYPE KK

To be used at major intersections within pilot car control area

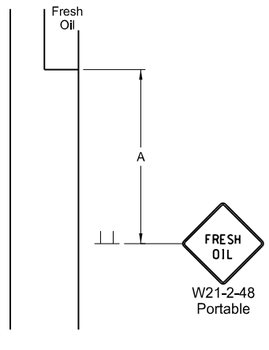
Notes

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 ½ 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.



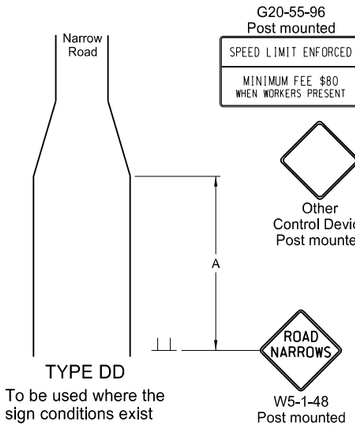
TYPE BB

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



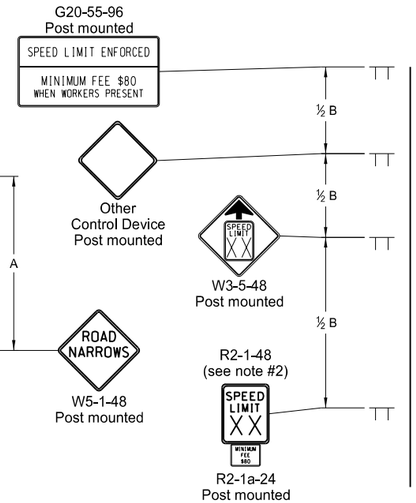
TYPE CC

To be used where the sign conditions exist



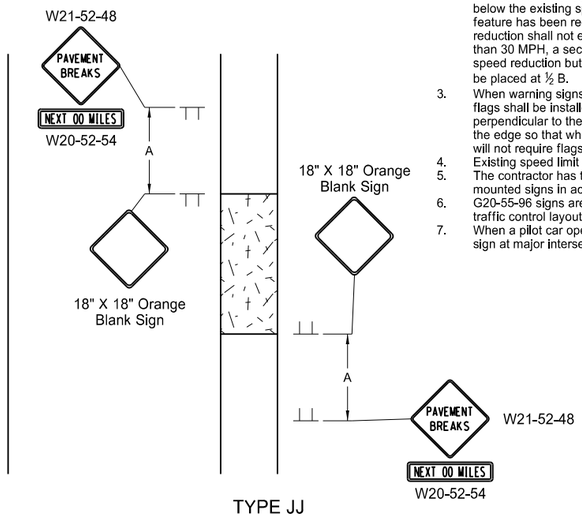
TYPE DD

To be used where the sign conditions exist



TYPE Z

To be used where speed zone is needed

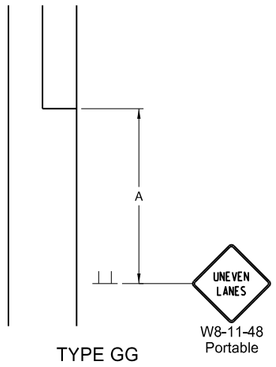


TYPE JJ

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.

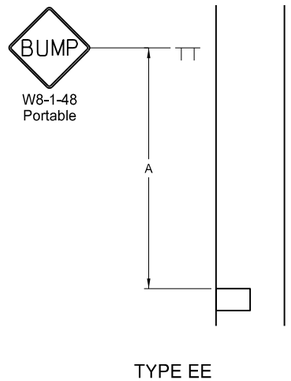
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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



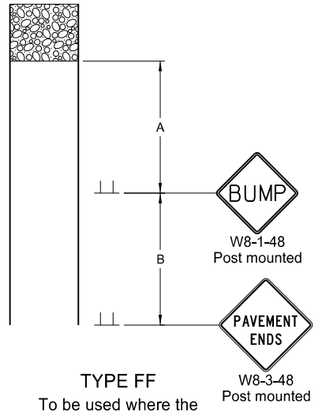
TYPE GG

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 — Flagger

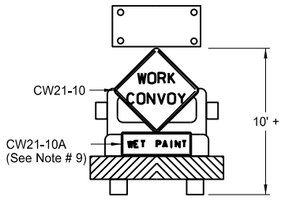
Cones

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

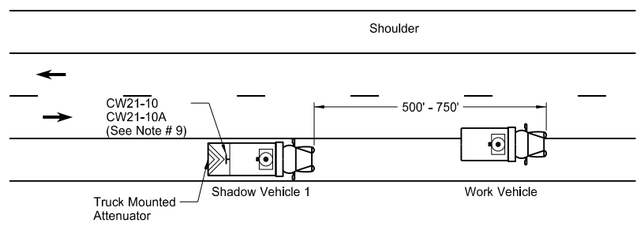
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 09/27/13 and the original document is stored at the North Dakota Department of Transportation

TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

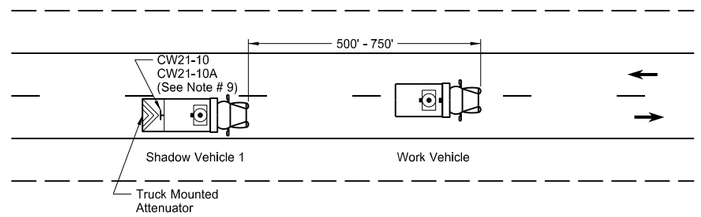
D-704-27



Typical Shadow Vehicle 1
Two-Way Roaday



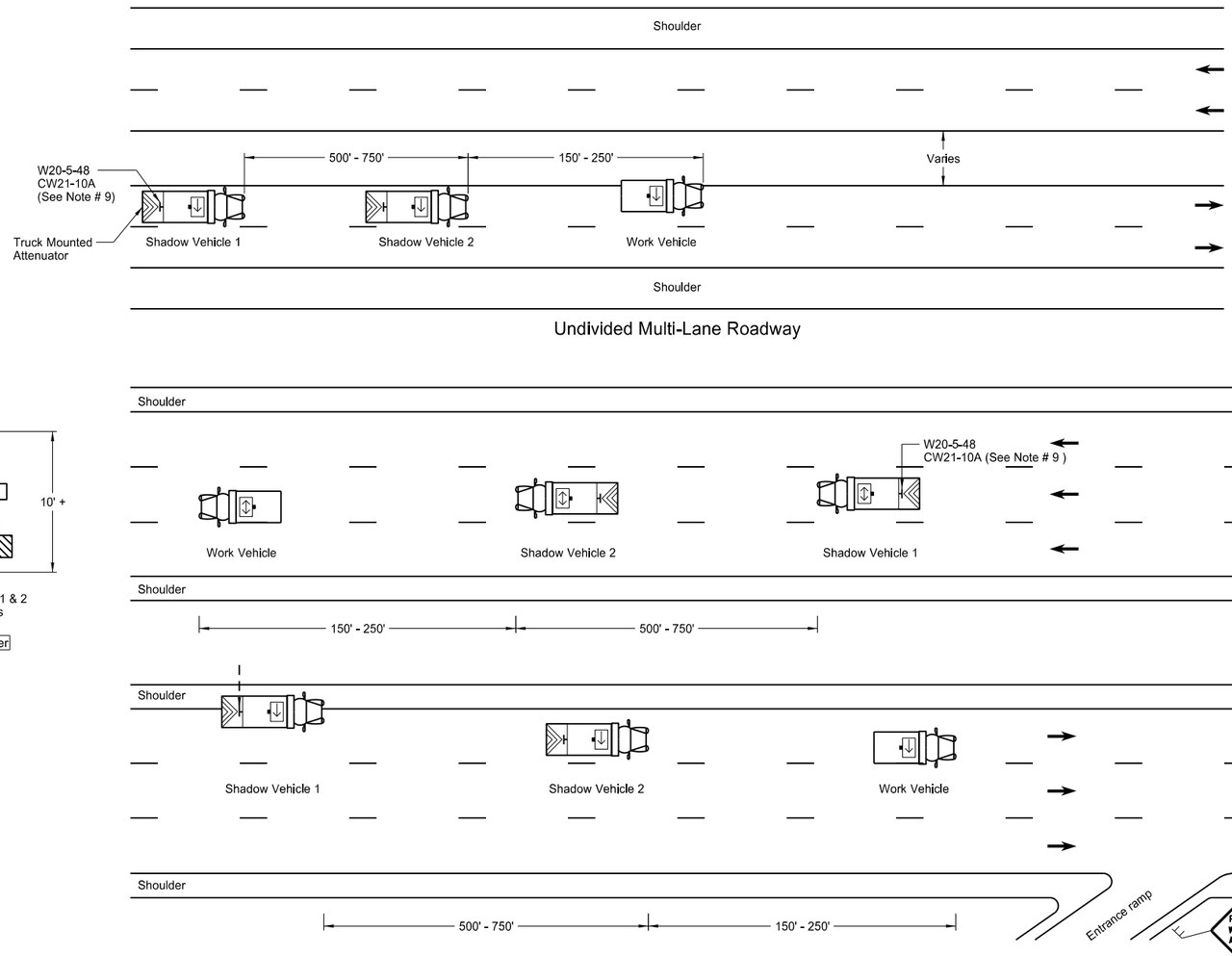
Two-Way Roadway with Paved Shoulders



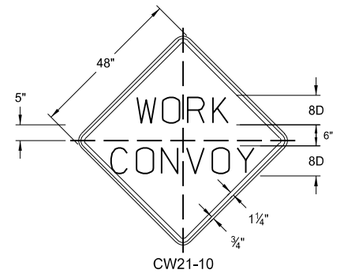
Two-Way Roadway without Paved Shoulders

Notes

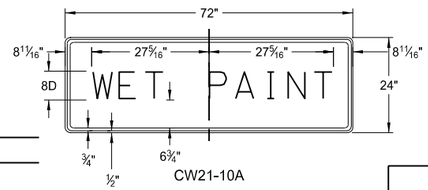
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
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. When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
6. 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.
7. Sign Colors
   Letters = Black
   Border = Black
   Background = Orange
8. Shadow vehicle 2 may be used as the paint tender vehicle.
9. Sign CW21-10A shall only be used during a painting operation.
10. On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.



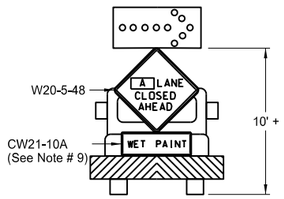
Sign Details



CW21-10



CW21-10A



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center

KEY

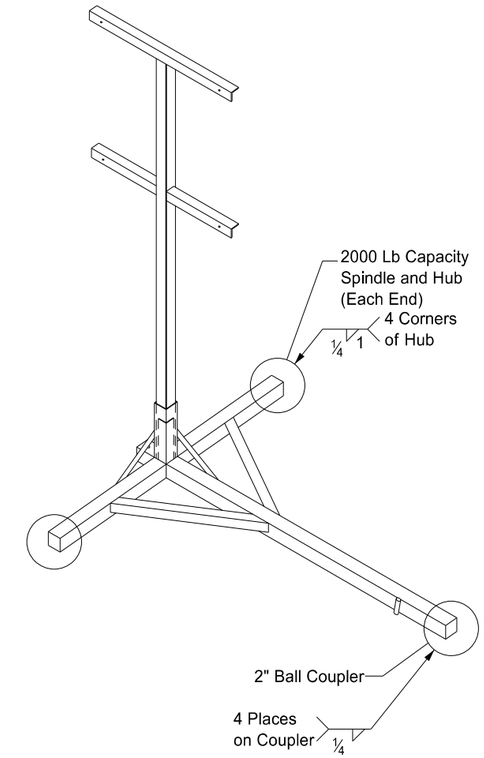
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

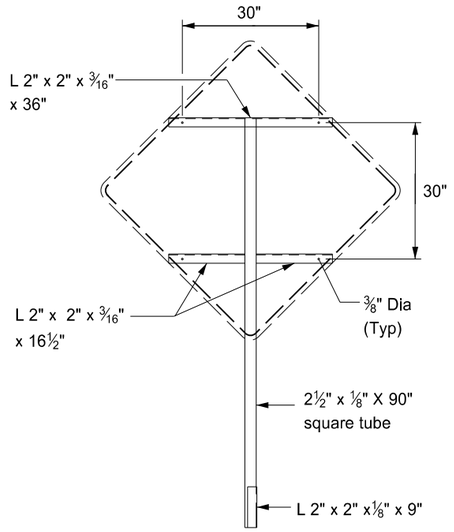
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 06/18/14 and the original document is stored at the North Dakota Department of Transportation

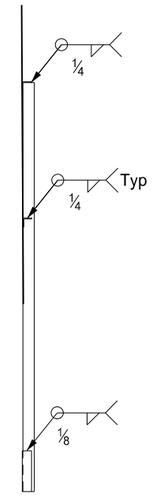
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



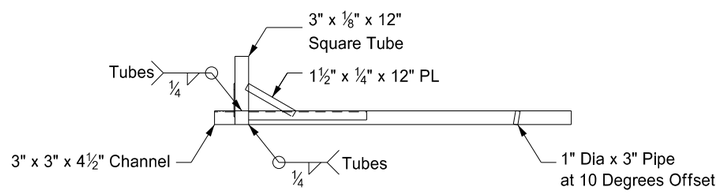


FRONT

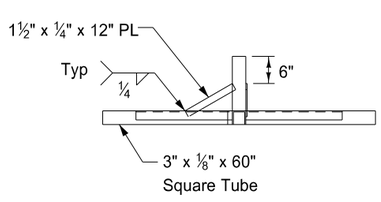


RIGHT

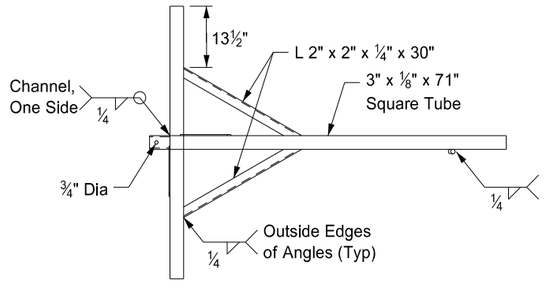
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

Notes:

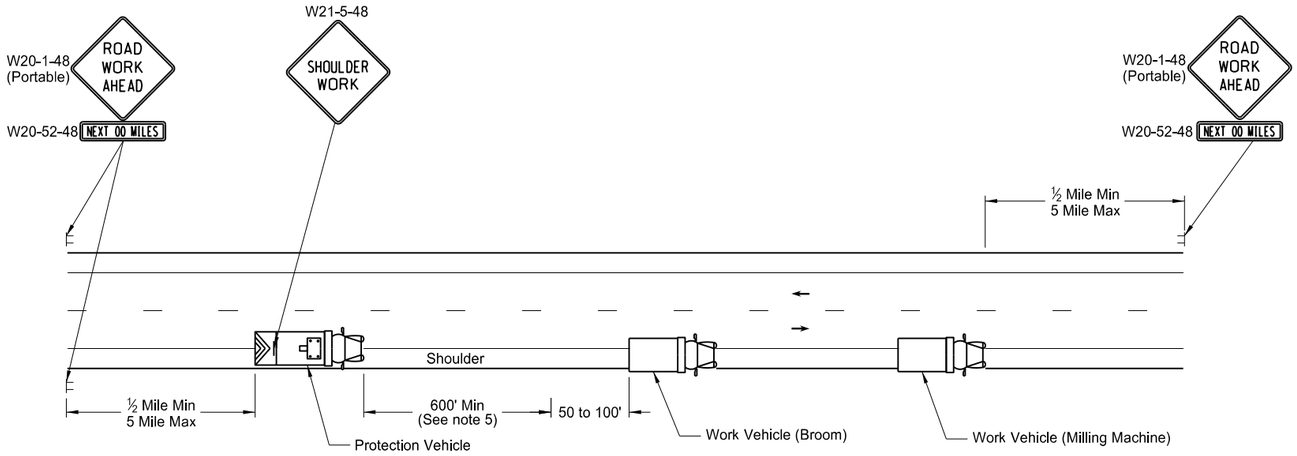
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

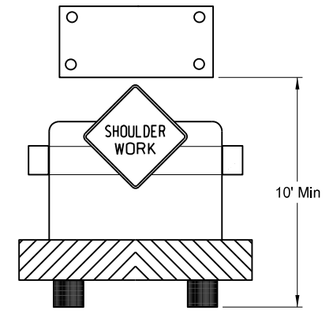
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

MOBILE OPERATION
Grinding Shoulder Rumble Strips

D-704-56



TWO LANE - TWO WAY ROADWAY

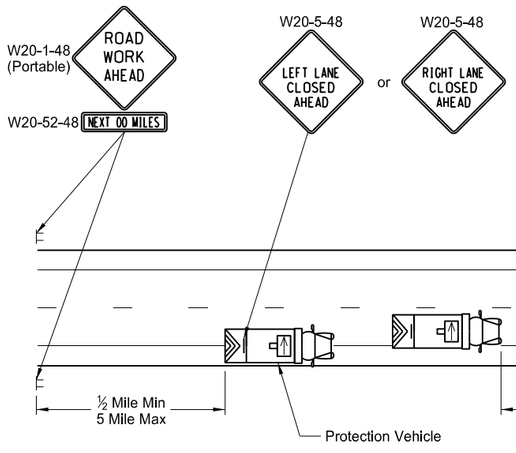


TWO LANE - TWO WAY ROADWAY

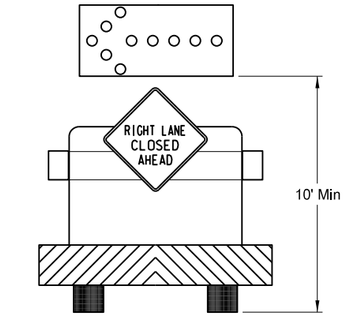
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

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.

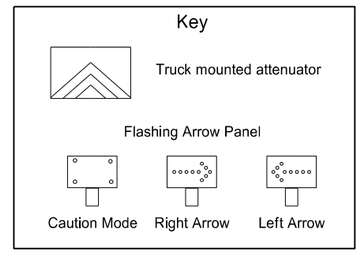


INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY

Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

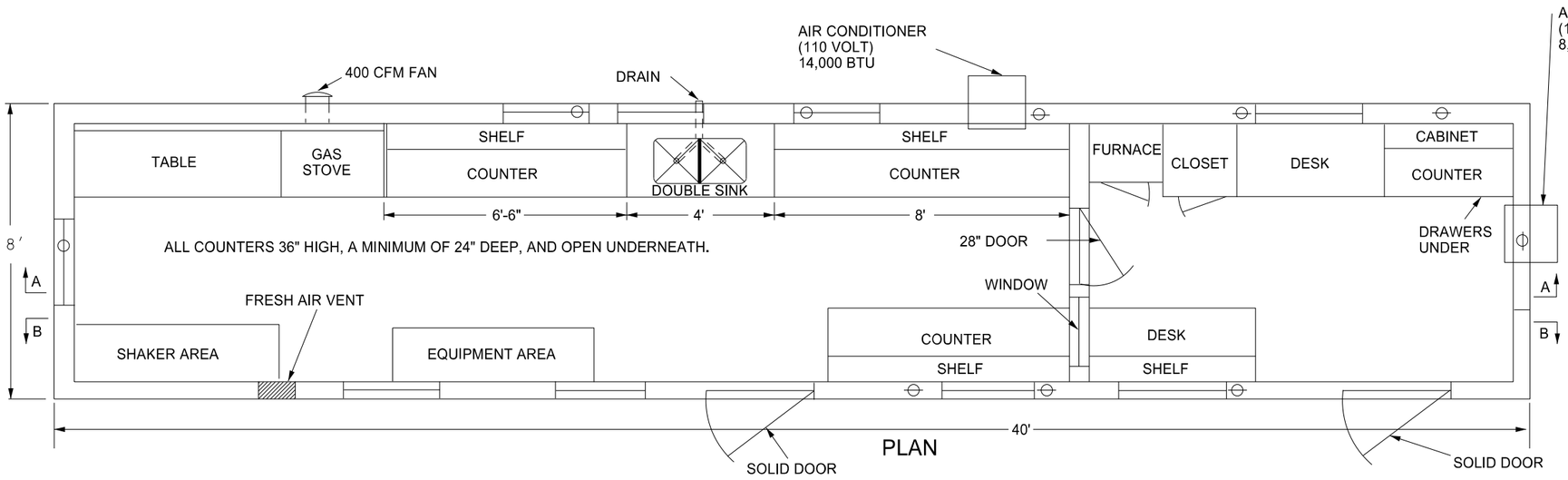


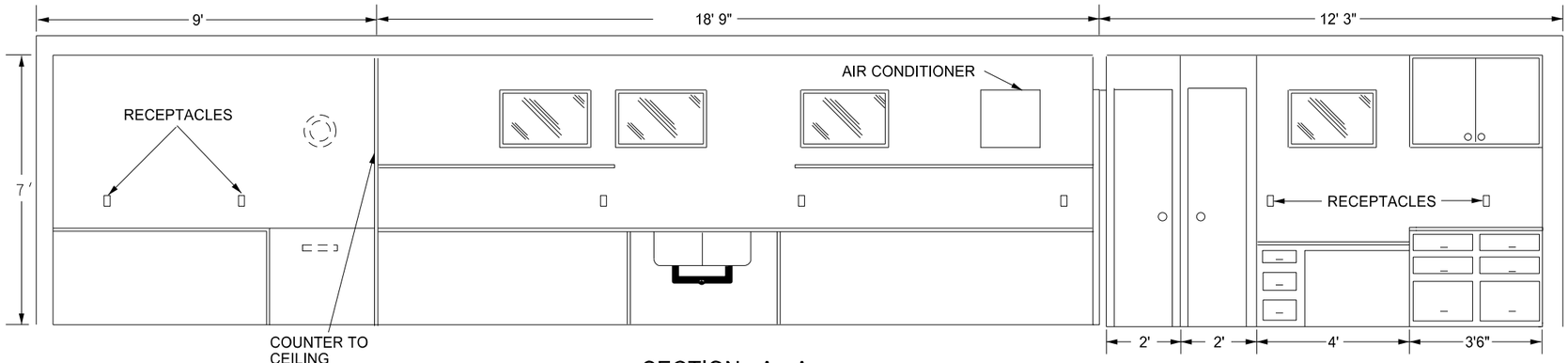
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 11/15/12 and the original document is stored at the North Dakota Department of Transportation

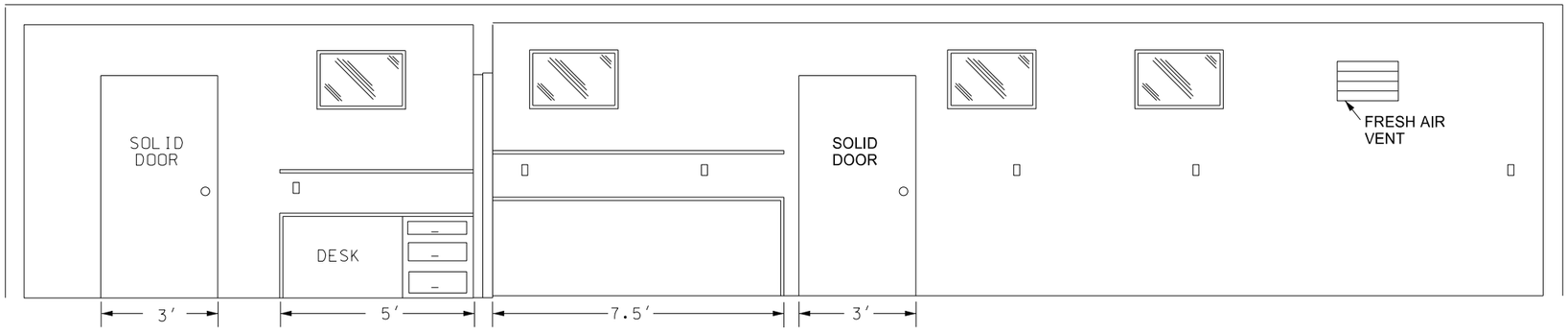
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

Provide a laboratory with the following:

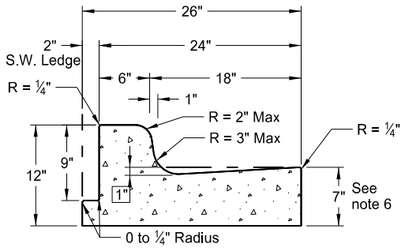
1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.

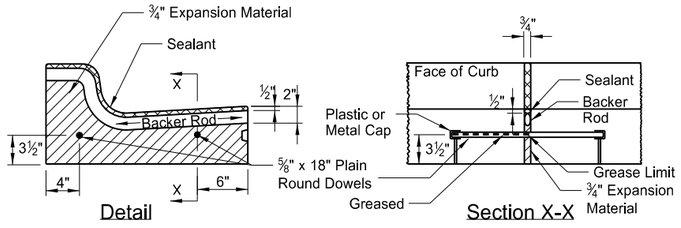
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 01/11/16 and the original document is stored at the North Dakota Department of Transportation

Curb & Gutter and Valley Gutter

D-748-1

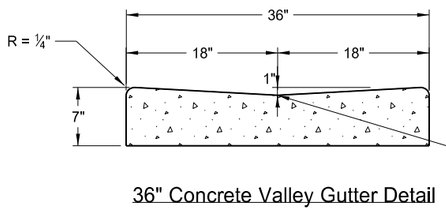


Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median, or Parking Lot.
(Sec. A shown. See Sec B for additional details.)

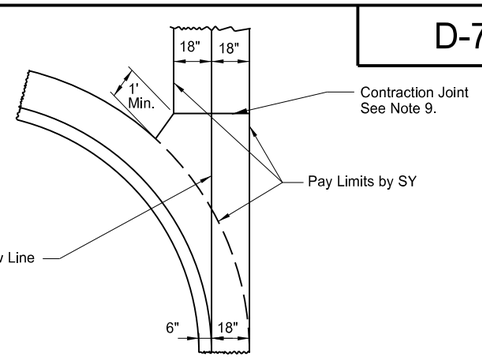


Detail — Section X-X

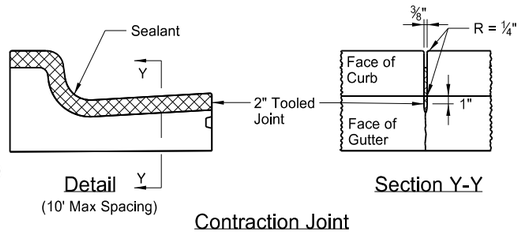
Isolation Joint



36" Concrete Valley Gutter Detail

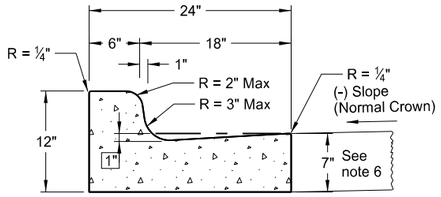


36" Concrete Valley Gutter Plan

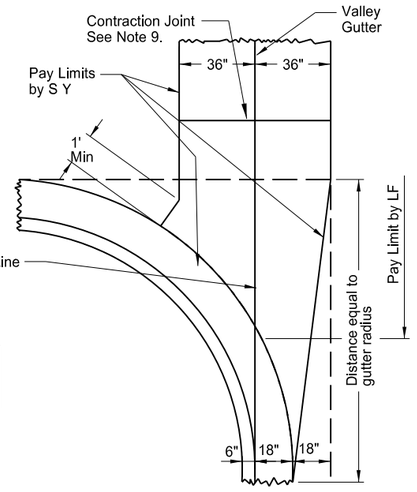


Detail (10' Max Spacing) — Section Y-Y

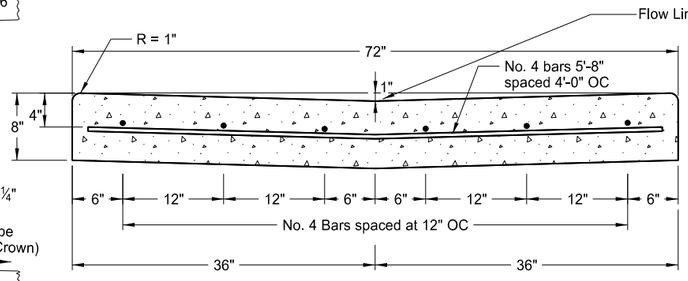
Contraction Joint



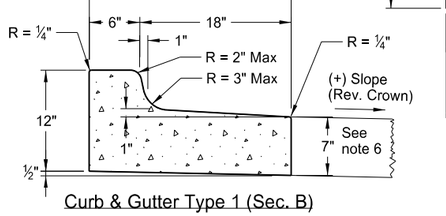
Curb & Gutter Type 1 (Sec. A)



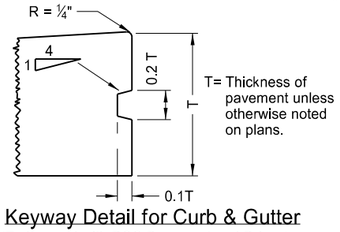
72" Concrete Valley Gutter Plan



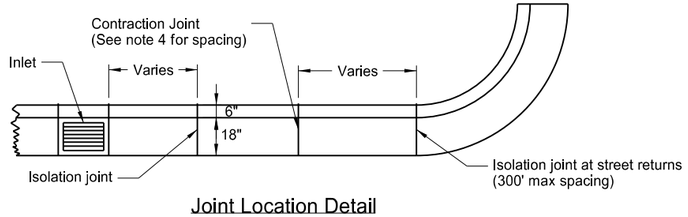
72" Concrete Valley Gutter Detail



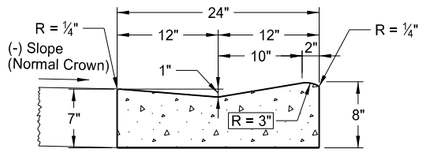
Curb & Gutter Type 1 (Sec. B)



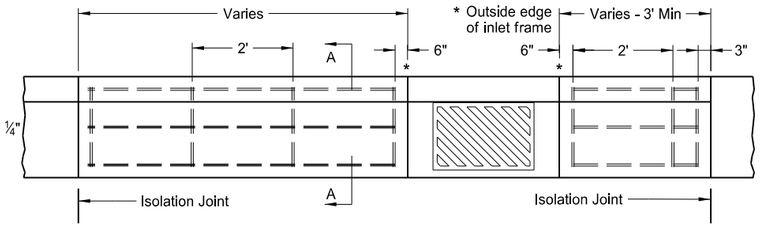
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



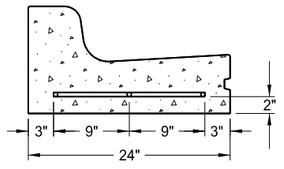
Joint Location Detail



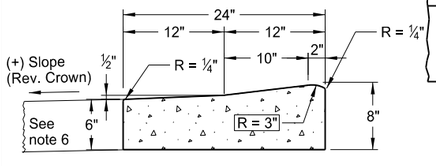
Mountable Curb & Gutter Type 1 (Sec. A)



Curb & Gutter Reinforcing at Inlets



Section A-A



Mountable Curb & Gutter Type 1 (Sec. B)

NOTES:

1. Curb and Gutter Type 1 (Sec. A & B) to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Isolation joint material shall be 3/4" preformed expansion joint filler conforming to the standard specifications. The opening for the backer rod and joint sealant shall be formed by a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint, plastic or metal caps and greased dowels shall be installed in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements the joint spacing for the curb and gutter shall be 10' max. with the panels on each side of the inlets. For concrete pavements the joint spacing for the curb and gutter shall match the pavement joint on PCC Pavements of approximately 15' spacing.
5. Joint sealing: All contraction and isolation joints shall be sealed as shown in the details. The joint sealant for contraction joints shall conform to section 826.02B.The sealant for expansion joints shall be as specified in note 3 above. The sealant shall be tooled and installed in accordance with the manufacturer's recommendations.
6. Depth of Face of Gutter: For hot bituminous pavement the depth of gutter shall be 7" as shown. For PCC pavements, the Contractor has the option to match the depth of gutter to the depth of the adjacent PCC pavement or to construct a 7" depth as shown.
7. When the curb and gutter abuts PCC pavement, it shall be tied to the PCC pavement. The tie bar shall consist of a No. 3 bar, 1'-6" in length spaced 4' center to center.
8. On street returns and other locations where the new curb and gutter ends and does not abut existing curb and gutter, the end two (2) feet of the curb shall be tapered from 6" in height to 0". A 1/2" premolded isolation joint which is full depth and the same shape as the curb and gutter shall be installed just ahead of the taper. An 18" tie bar shall be installed across the joint.
9. Valley Gutter Joints: Contraction joints are required at approx. 10' intervals. The contraction joints shall be ⅛" min. to ⅜" max. in width. The joints shall be formed by sawing or scoring to a minimum depth of 2". The joint sealant shall be a hot poured elastic type joint sealer in accordance with Section 826.02A.2 of the Standard Specifications. The joint and sealant shall be included in the price bid for Valley Gutter.

NOTE: All bars shall be #4 deformed reinforcing bars. Splices will not be permitted. Reinforcing bars at inlet locations will not be paid for separately, but shall be included in the price bid for "Curb and Gutter - Type 1." This includes inlets located on radii. The reinforcement shall be extended to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE

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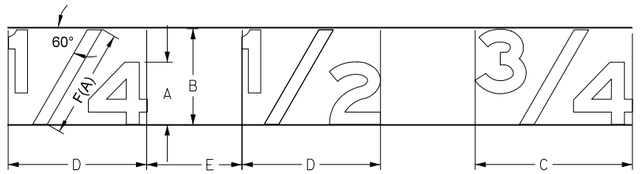
LETTER AND ARROW DETAILS FOR VARIABLE LENGTH SIGNS

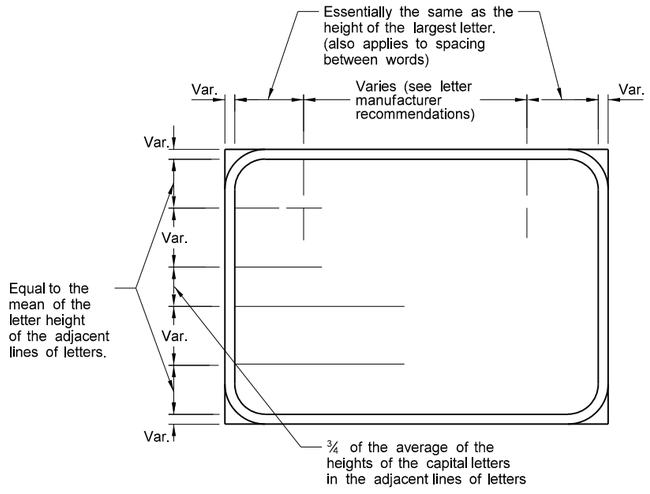
D-754-9



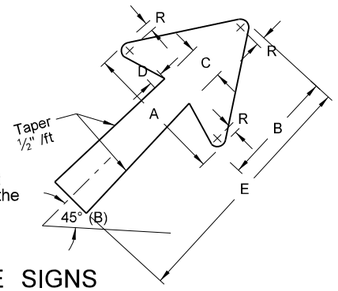
SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

(A) Diagonal stroke of fraction is to be centered optically.



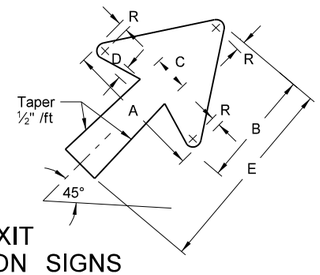
TYPICAL SPACING



(B) When there is no exit number in the sign face, the arrow shall be at 30°

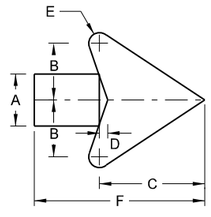
GORE SIGNS

"EXIT" LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15⅛"	11⁹⁄₁₆"	3¾"	1⁵⁄₁₆"	25"	¹³⁄₁₆"
10" - 13⅓"	18¼"	14"	4½"	1½"	30"	¾"



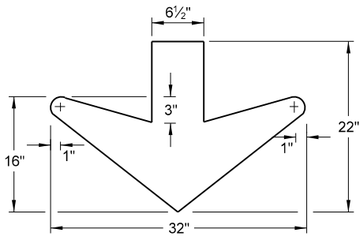
EXIT DIRECTION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15⅛"	11⁹⁄₁₆"	3¾"	1⁵⁄₁₆"	17"	¹³⁄₁₆"
10" - 13⅓"	18¼"	14"	4½"	1½"	20"	¾"
16" - 20"	22¼"	17"	5⅜"	1¾"	25"	1"



DISTANCE AND DESTINATION SIGNS

LETTER SIZE (Upper Case)	A	B	C	D	E	F
4"	1¾"	2"	3⁹⁄₁₆"	⁵⁄₁₆"	⅜"	6"
6"	2¾"	3"	5⁹⁄₁₆"	⁷⁄₁₆"	⁹⁄₁₆"	9"
8"	3½"	4"	7⅛"	⁹⁄₁₆"	¹¹⁄₁₆"	12"
12"	5¼"	6"	10⅝"	¹³⁄₁₆"	1¹⁄₁₆"	18"



DOWN ARROW

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow

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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.

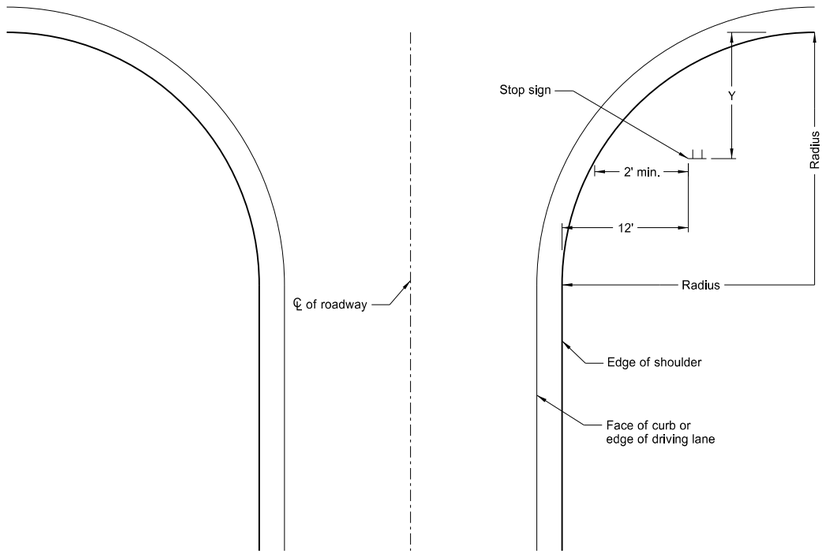
   Signs on expressways shall be installed with a minimum height of 7'.

   Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.

   The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.

3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.

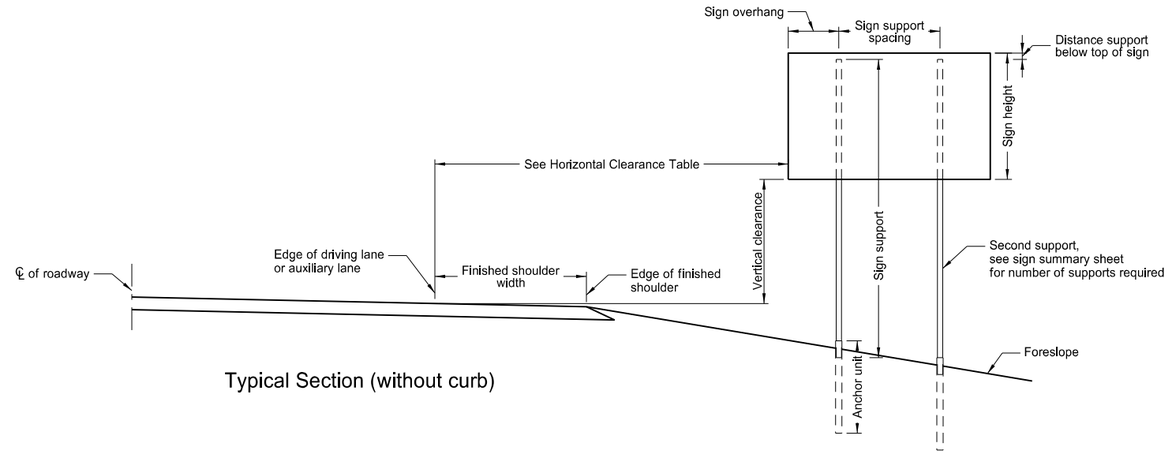
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.



Stop Sign Location
Wide Throat Intersection

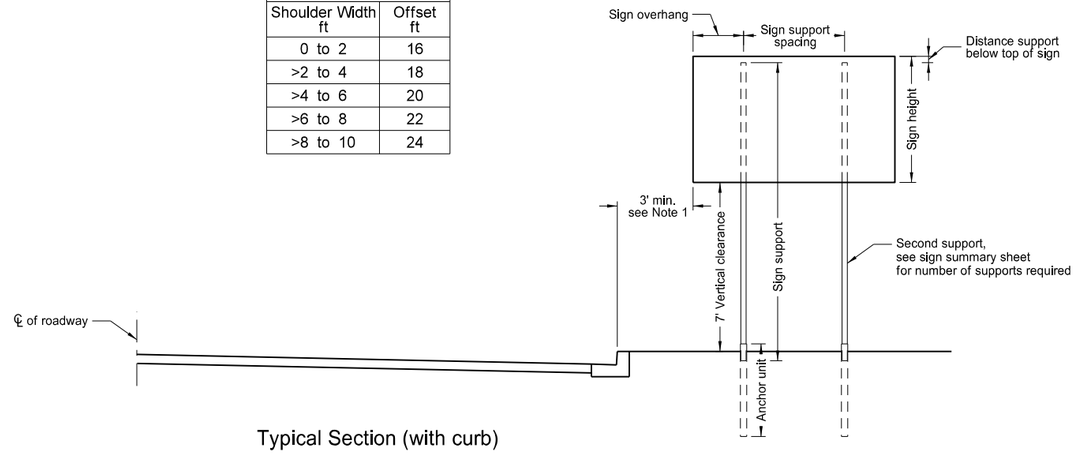
This layout is to be used for the placement of "Stop" signs.

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



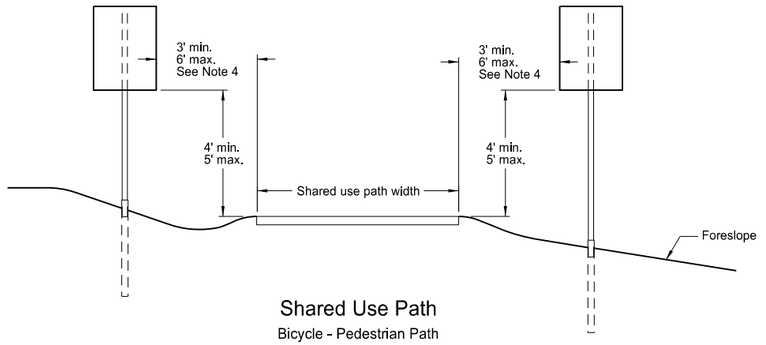
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.

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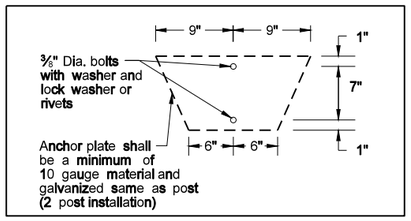
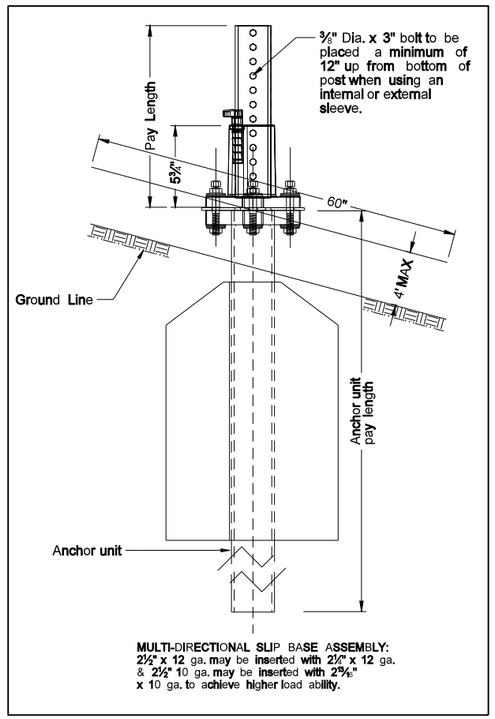
Mounting Details Perforated Tube

D-754-24

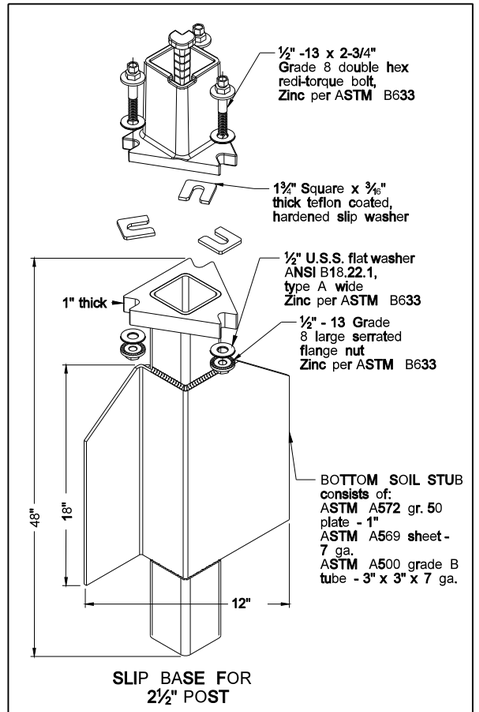
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2½	12
1	2½	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2½	12	2⅛(D)	12	Yes		7
1	2½	12	2½	12	Yes		7
2	2½	10			Yes		7
2	2½	12	2⅛(D)	12	Yes		7
2	2½	12	2½	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2½	12	Yes		7
3 & 4	2½	12	2⅛(D)	12	Yes		7
3 & 4	2½	10	2⅜	10	Yes		7

(B) - The 2½", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

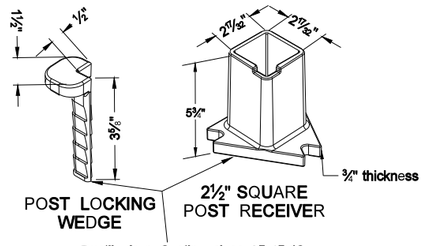




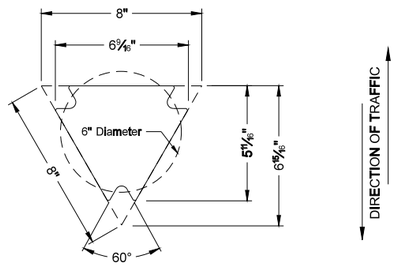
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY: 2½" x 12 ga. may be inserted with 2½" x 12 ga. & 2½" 10 ga. may be inserted with 2⅜" x 10 ga. to achieve higher load ability.



SLIP BASE FOR 2½" POST



Ductile Iron Casting class 65-45-12. Hot Dip Galvanize ASTM A153



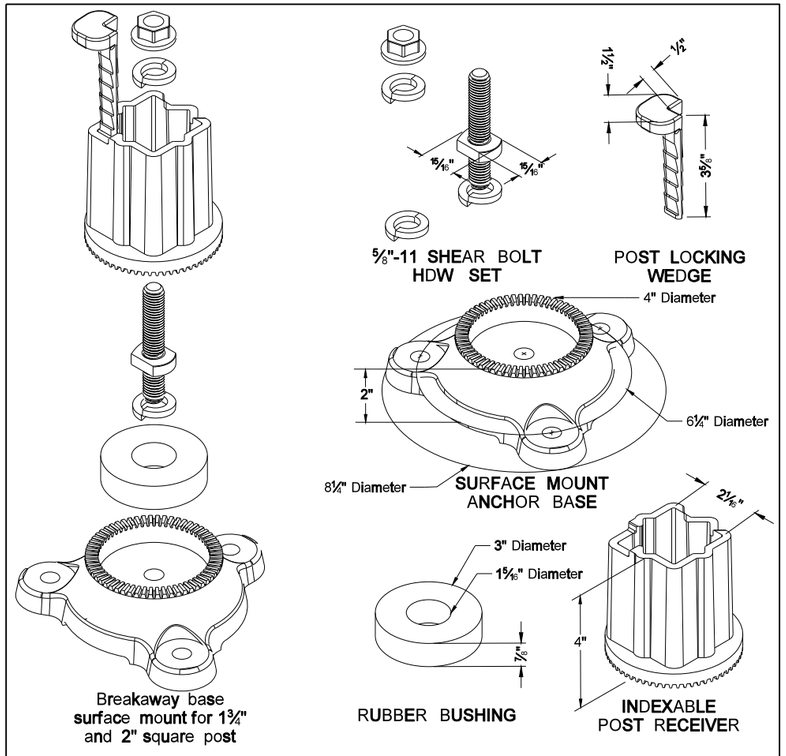
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia in.⁴	Cross Sect. Area in.²	Section Modulus in.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜ x 2⅜	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ⅜" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

NOTE:

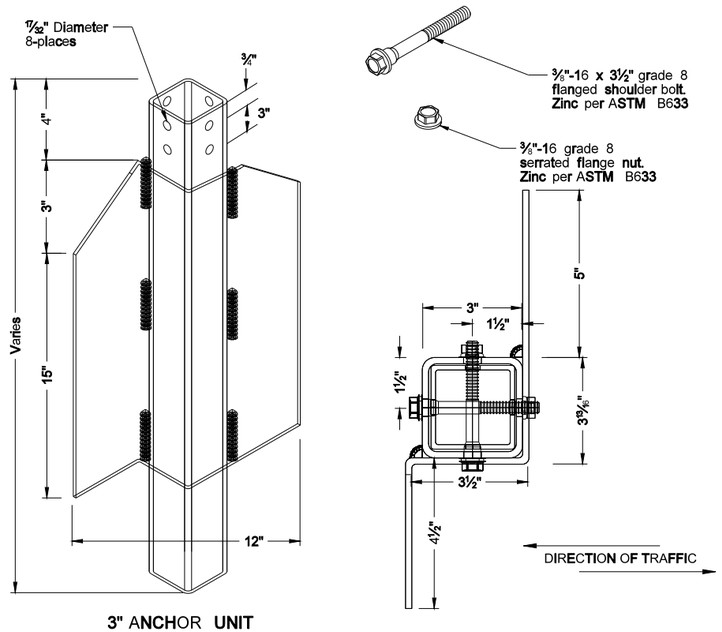
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
2. Anchor material shall be 7 guage H.R.P.O. Commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B. Anchor shall have a yield strength 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/153. All tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
3. When used in concrete sidewalk, anchor shall be the same concept without the wings
4. Four post signs shall have over 8' between the first and fourth posts.
5. Installation procedures as per manufacturers recommendation.
6. Concrete fasteners for surface mount breakaway base shall be a minimum ½" diameter x 4" grade 8.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post. (standard ⅜" diameter grade 8 bolt may be used with proper shim)



3" ANCHOR UNIT

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

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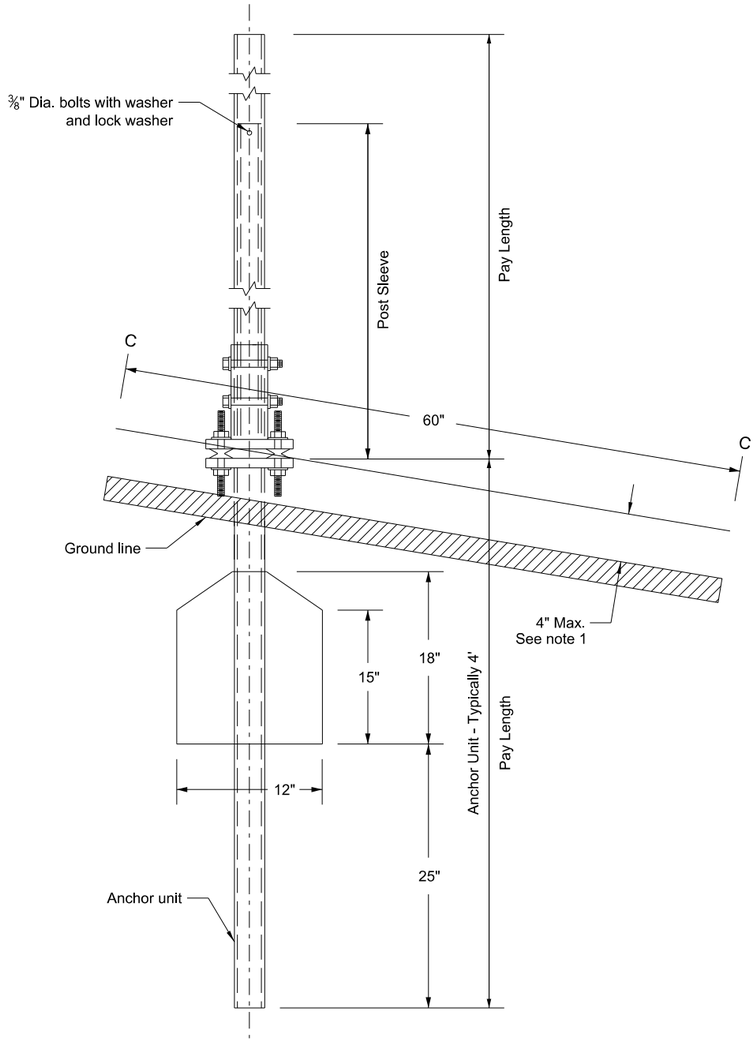
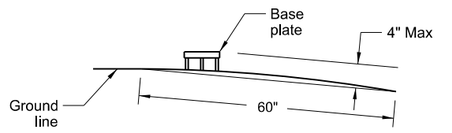
D-754-24A

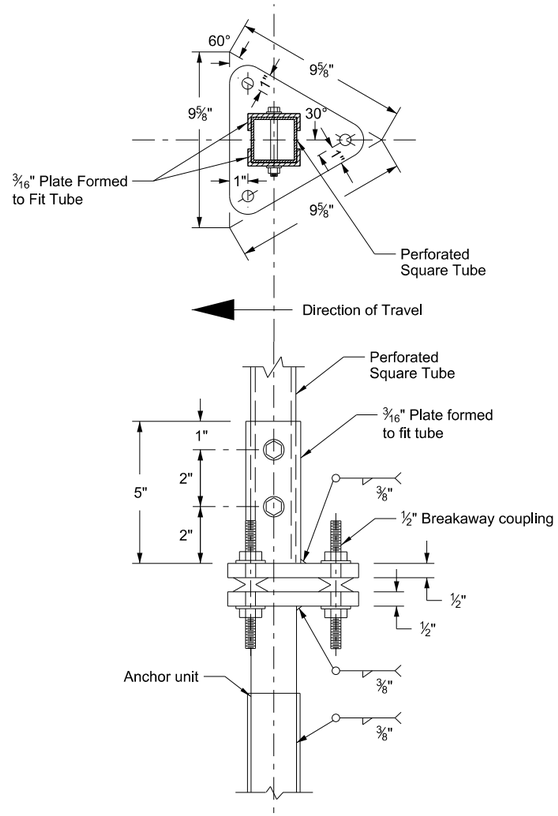
Breakaway Coupler System for Perforated Tubes



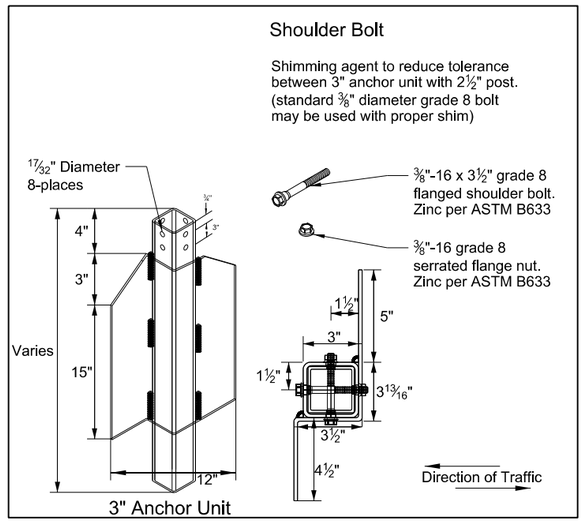


Section C-C

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



Base Plate with Breakaway Coupler



3" Anchor Unit

Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
2. Anchor unit shall be the same size as the post and shall have the same specification as the post.
3. Four post signs shall have over 8' between the first and fourth post.
4. In lieu of the breakaway base system on standard D-754-24 the breakaway coupling system may be used. The breakaway coupler system shall be manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

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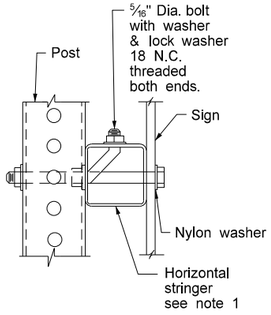
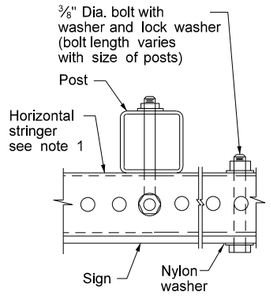
Mounting Details Perforated Tube

D-754-25

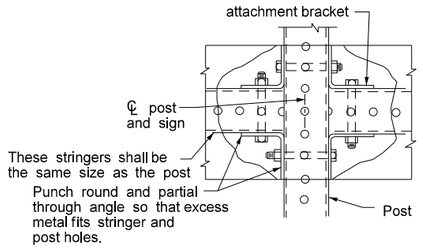


Side View



Top View

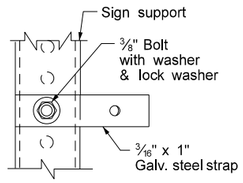
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



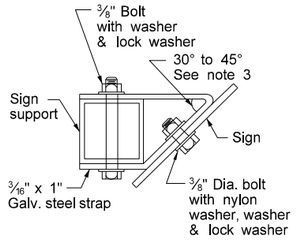
STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
2. Metal washers used on sign face shall have a minimum outside diameter of 15/16" ± 1/16" and 10 gauge thickness.
3. No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers.
4. In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

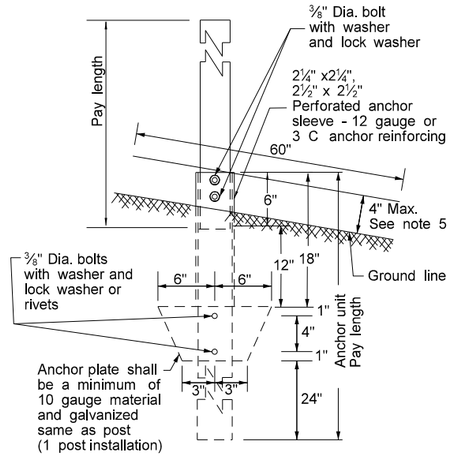


Side View



Top View

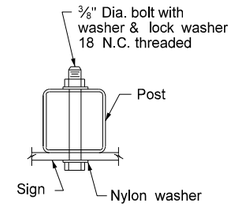
STRAP DETAIL



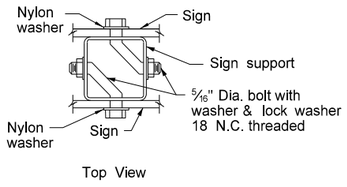
ANCHOR UNIT AND
POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - The 2½", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

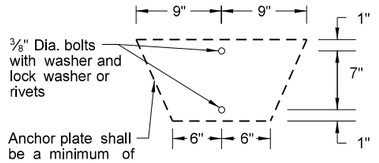


BOLT MOUNTING



Top View

BACK TO BACK
MOUNTING



Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia $In.^4$	Cross Sect. area $In.^2$	Section Modulus $In.^3$
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

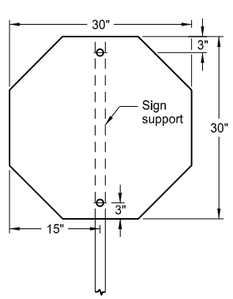
8-6-09

REVISIONS

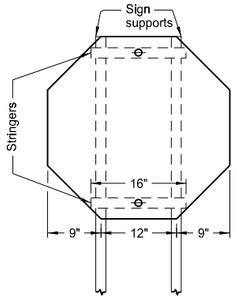
DATE	CHANGE
7-8-14	Revised Note 3

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 7/8/14 and the original document is stored at the North Dakota Department of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

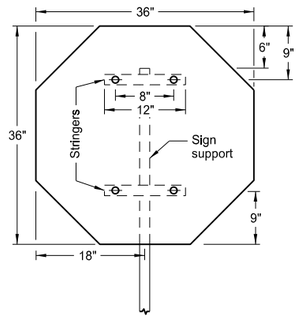


1 Post

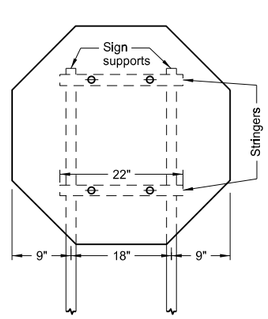


2 Posts

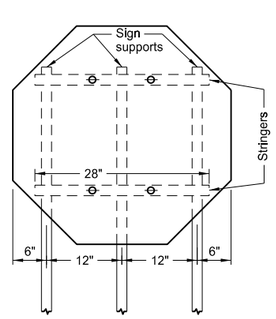
Assembly No. 1



1 Post



2 Posts



3 Posts

Assembly No. 2

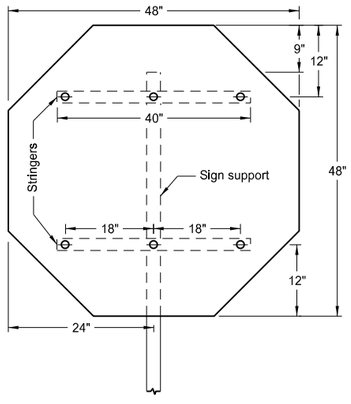
Notes:

1. See Standard D-754-25 for mounting details.

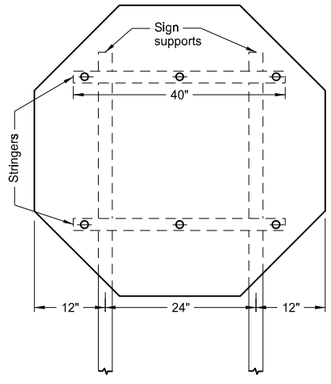
2. The minimum sign backing material thickness shall be 0.100 inch.

3. Perforated square tube stringer shall be 1½" x 1½".

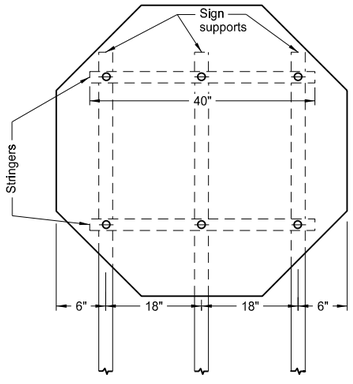
4. All holes shall be punched round for ⅜" bolt.



1 Post

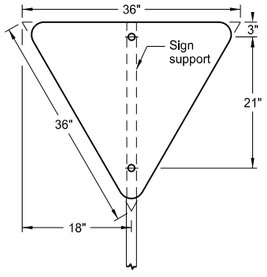


2 Posts

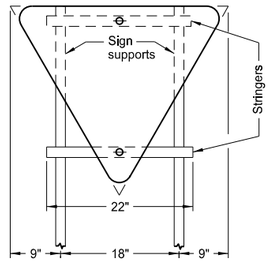


3 Posts

Assembly No. 3

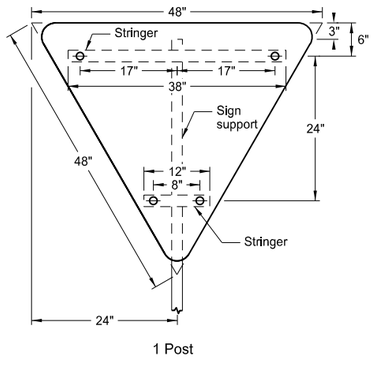


1 Post

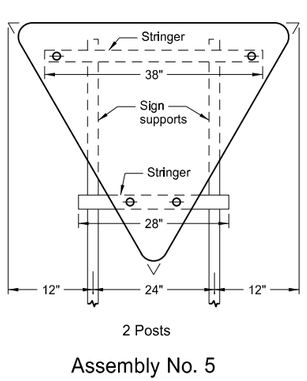


2 Posts

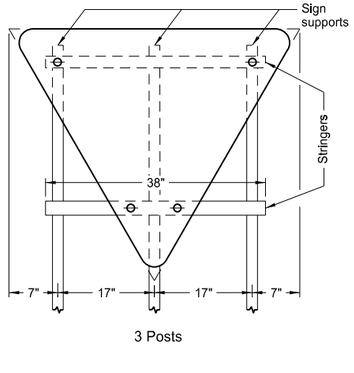
Assembly No. 4



1 Post



2 Posts



3 Posts

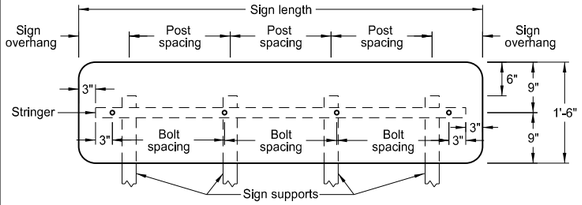
Assembly No. 5

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

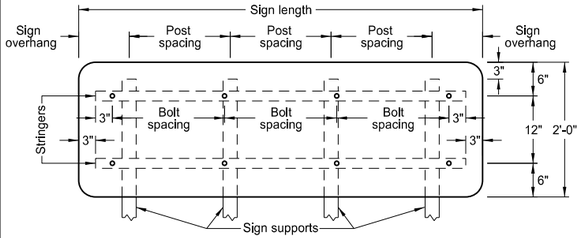
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 12-1-10 and the original document is stored at the North Dakota Department of Transportation

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

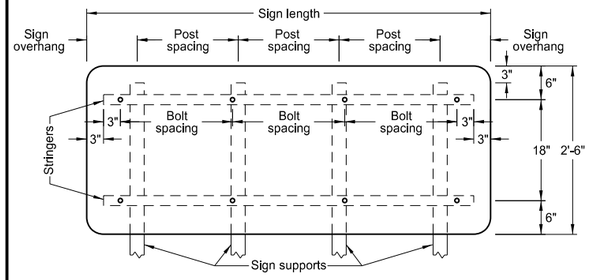
D-754-50



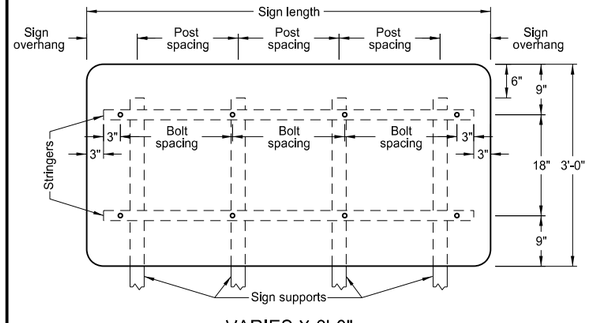
VARIES X 1'-6"



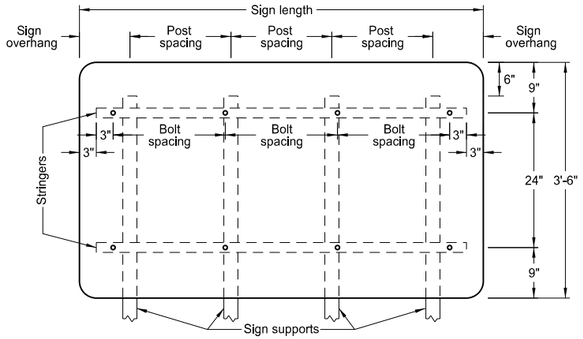
VARIES X 2'-0"



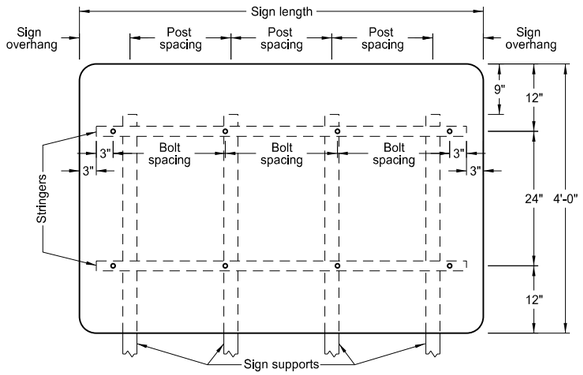
VARIES X 2'-6"



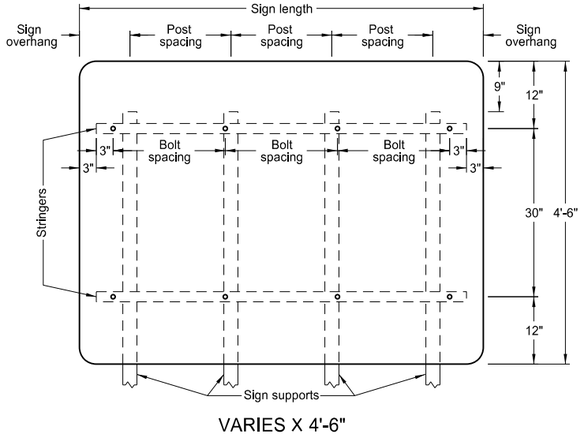
VARIES X 3'-0"



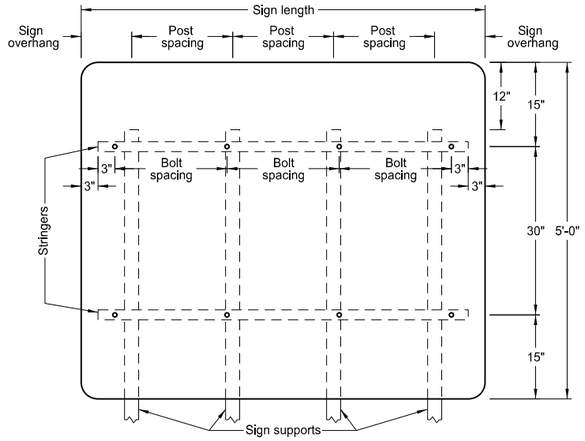
VARIES X 3'-6"



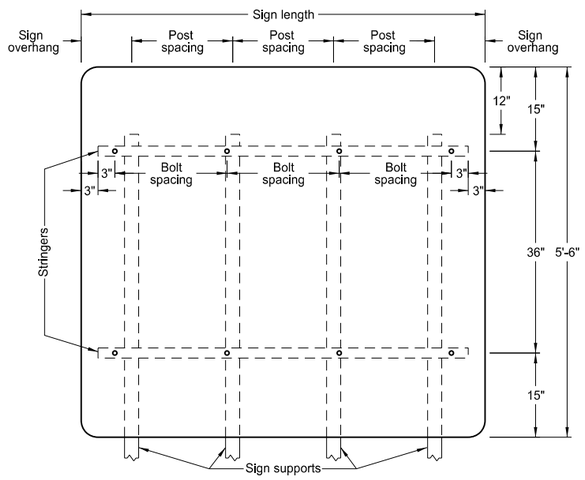
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

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

Notes:

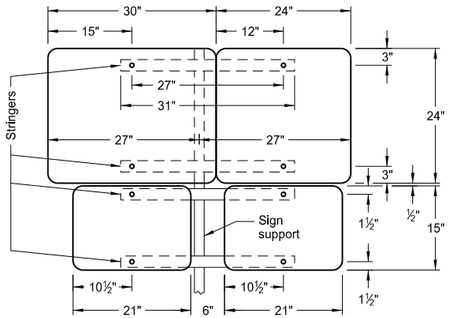
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½" x 1½".
3. All holes shall be punched round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE

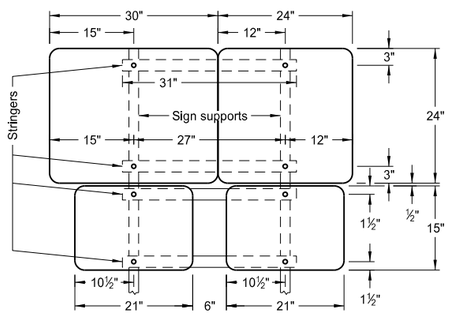
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 9/25/2012 and the original document is stored at the North Dakota Department of Transportation

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

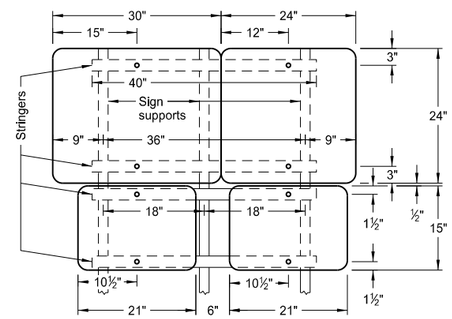
D-754-61



1 Post



2 Posts

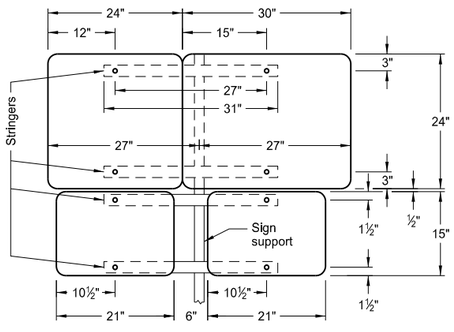


3 Posts

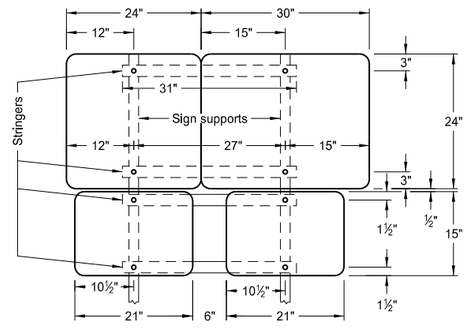
ASSEMBLY 406

Notes:

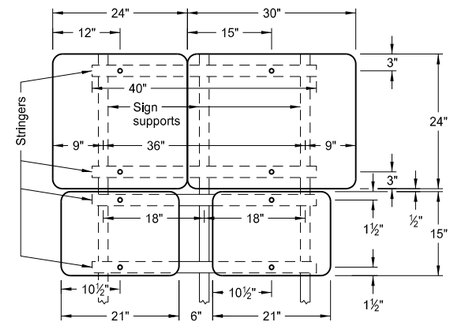
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ⅜" bolt.



1 Post

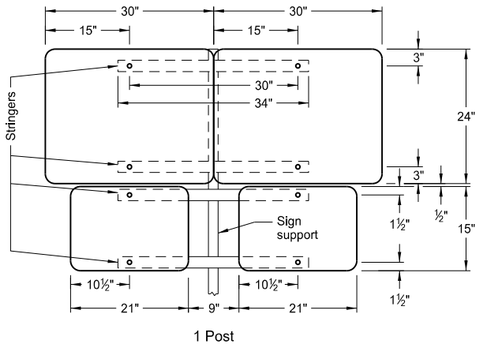


2 Posts

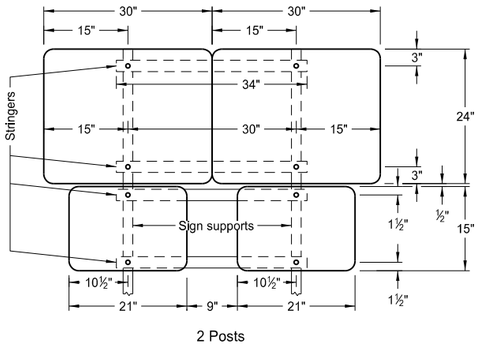


3 Posts

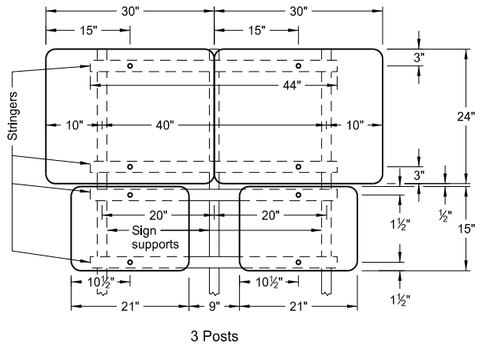
ASSEMBLY 407



1 Post



2 Posts



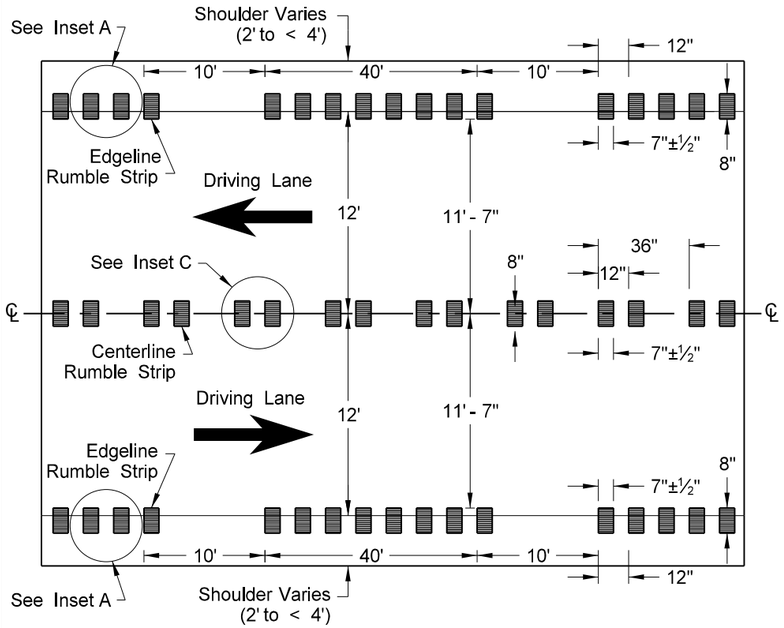
3 Posts

ASSEMBLY 408

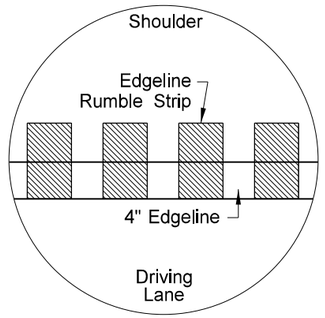
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

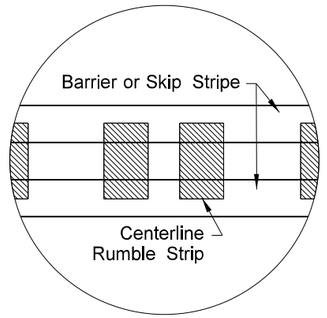
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')



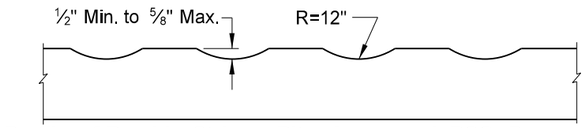
Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')



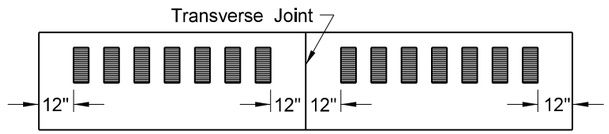
Inset A - Edgeline Rumble Strip



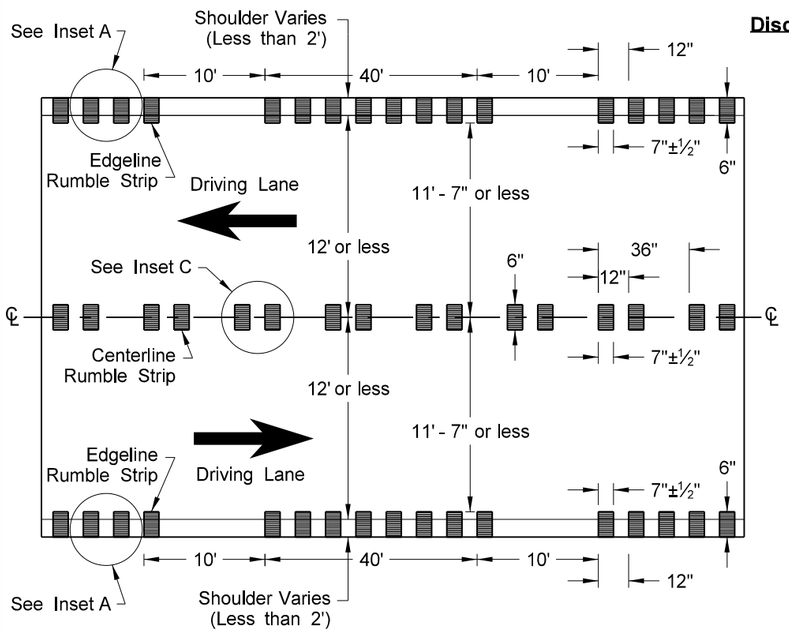
Inset C - Centerline Rumble Strip



Profile of Rumble Strips - Bituminous and PCC Pavements



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

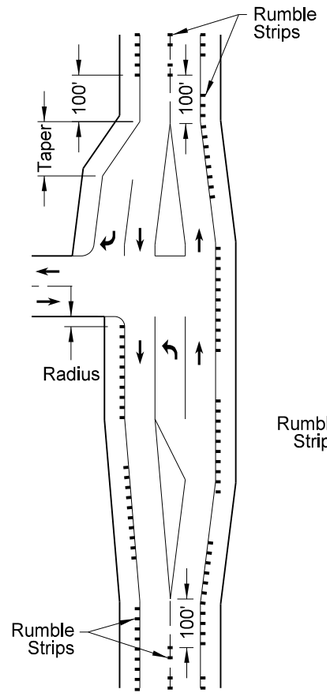


Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')

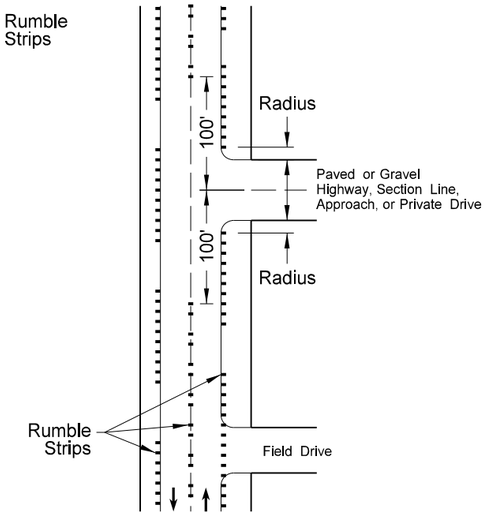
NOTES:

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.



Turn Lane
(Right & Left)



Entrance Roadways

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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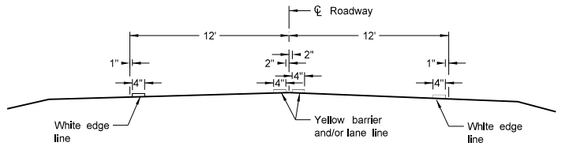
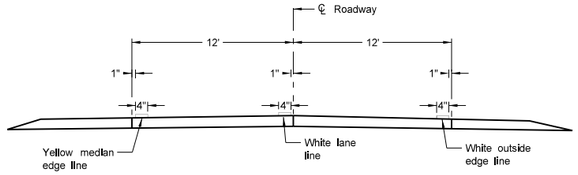
PAVEMENT MARKING

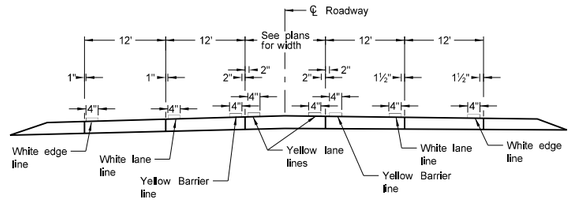
D-762-4



Two Lane Two Way
RURAL ROADWAY



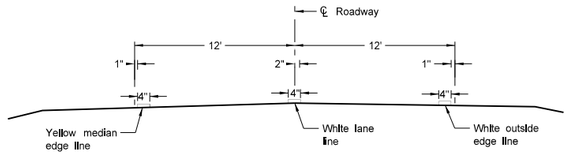
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



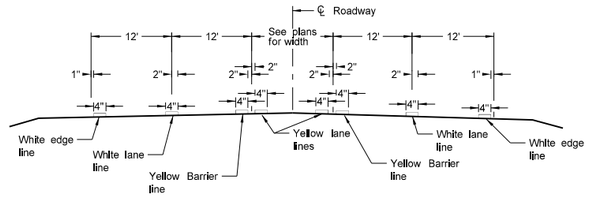
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

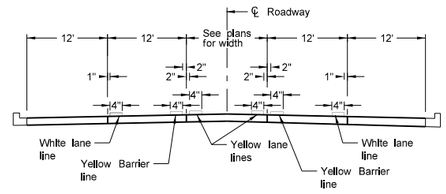
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



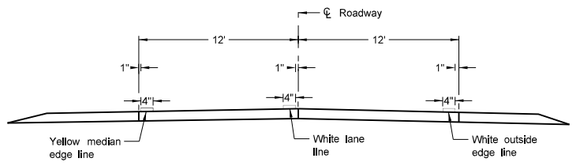
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



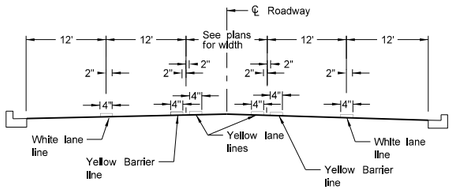
RURAL FIVE LANE ROADWAY
Asphalt Section



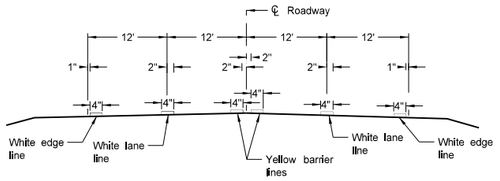
URBAN FIVE LANE SECTION
Concrete Section



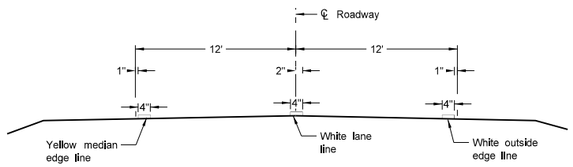
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



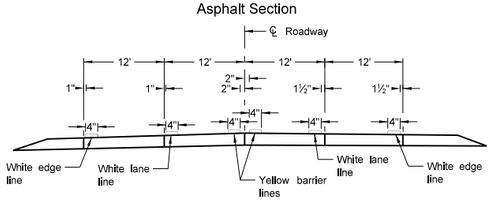
URBAN FIVE LANE SECTION
Asphalt Section



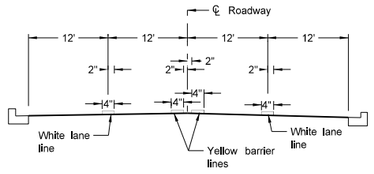
RURAL FOUR LANE ROADWAY
Asphalt Section



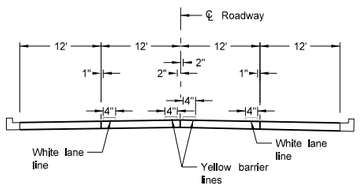
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



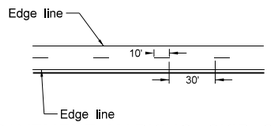
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

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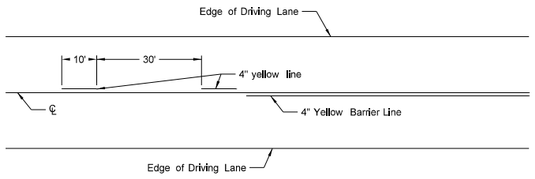
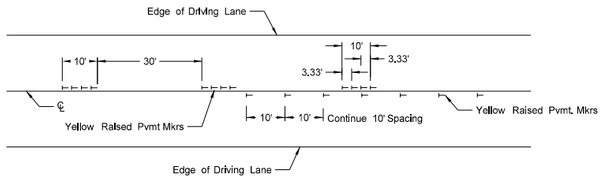
SHORT-TERM PAVEMENT MARKING

D-762-6

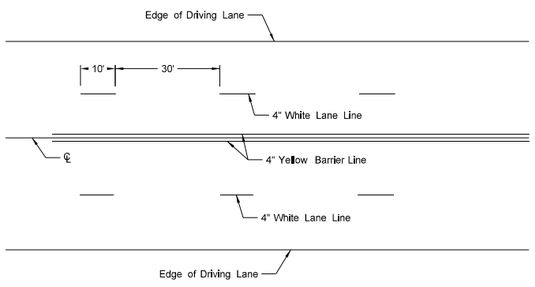


Painted or Tape Lines

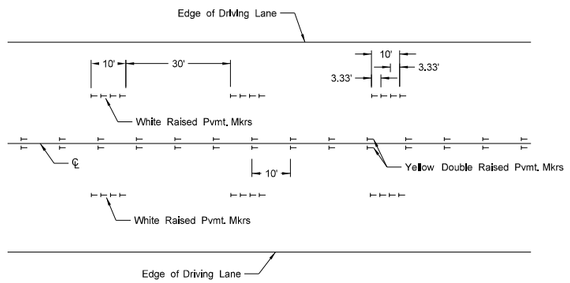


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

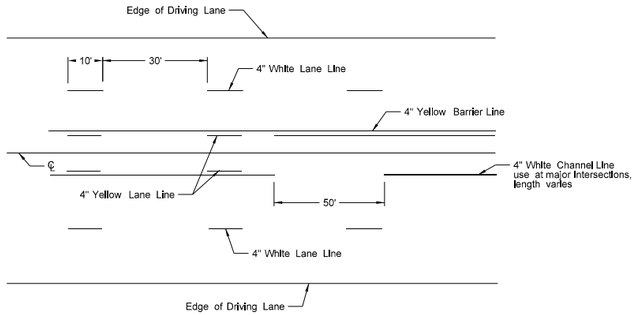


Painted or Tape Lines

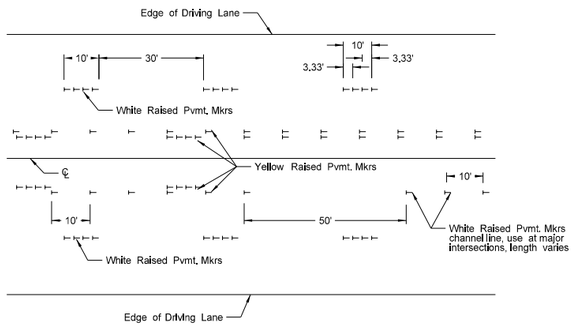


Raised Pavement Markers

FOUR LANE ROADWAY

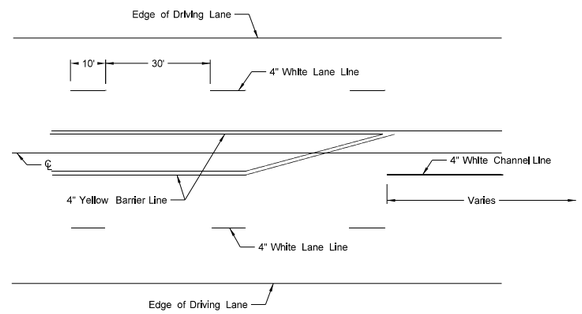


Painted or Tape Lines

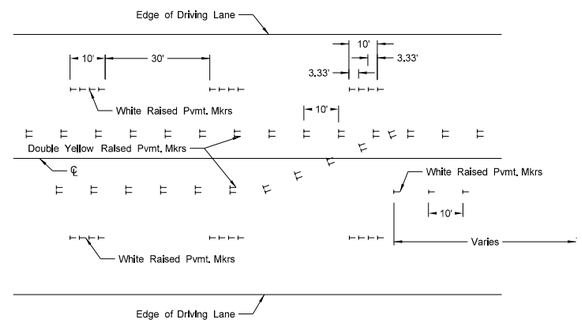


Raised Pavement Markers

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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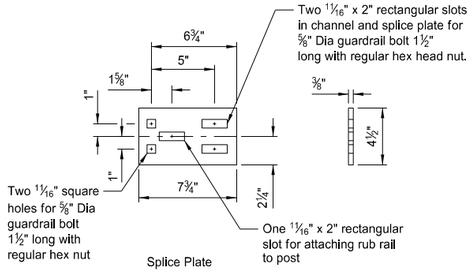
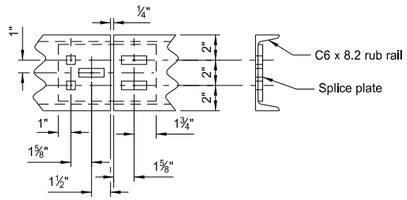
W-BEAM GUARDRAIL GENERAL DETAILS

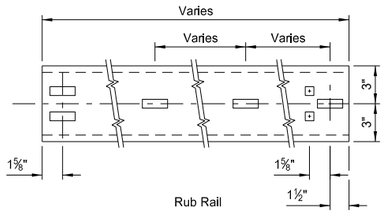
D-764-1



Splice Plate

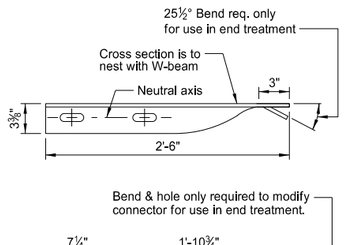


Splice Detail

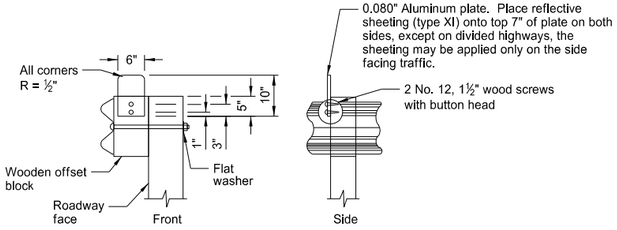


Rub Rail

C6x8 RUB RAIL AND SPLICE PLATE

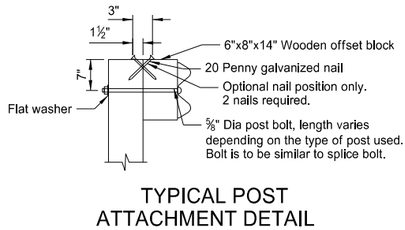


W BEAM TERMINAL CONNECTOR

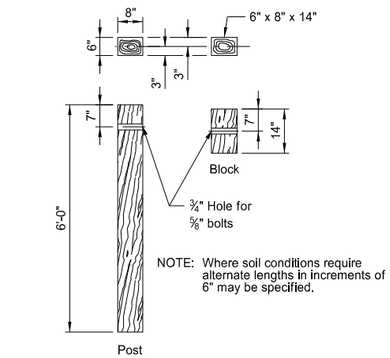


REFLECTORIZED PLATE DETAIL

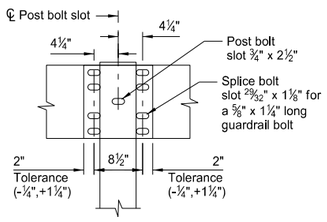
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



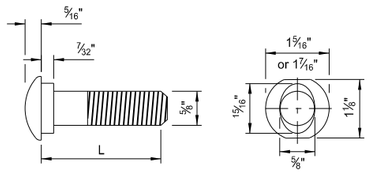
TYPICAL POST ATTACHMENT DETAIL



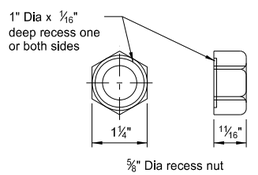
6"x8" TIMBER POST & BLOCK



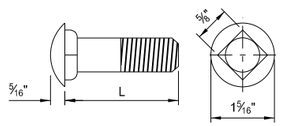
SPLICE DETAIL



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

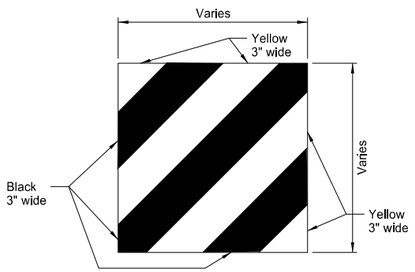


5/8" GUARDRAIL BOLT & RECESS NUT

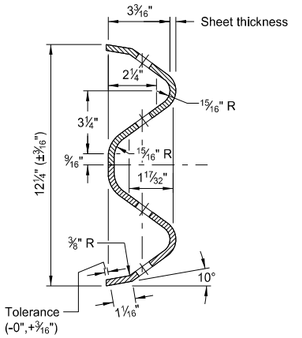


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length

5/8" CARRIAGE BOLT & NUT



IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION

NOTES:

1. Reflectorized plates: Reflector plates shall begin at the first post and be spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. The reflector shall be the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
2. Manner of replacing bituminous material at guardrail post: All excess earth from excavations for guard posts shall be disposed of as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. The Object Marker shall fit within the vertical edges of the Impact Plate. The retroreflective sheeting shall be type XI sheeting meeting the requirements of Section 894.02.B of the standard specifications. The sheeting shall be applied to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. The Object Marker shall attach to the Impact Head Plate with rivets or some other attachment device. The rivets or attachment device shall be non-rust. The stripes shall slope downward toward the roadway side.
4. Guardrail installation height tolerance = - 1/4" , + 1".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE

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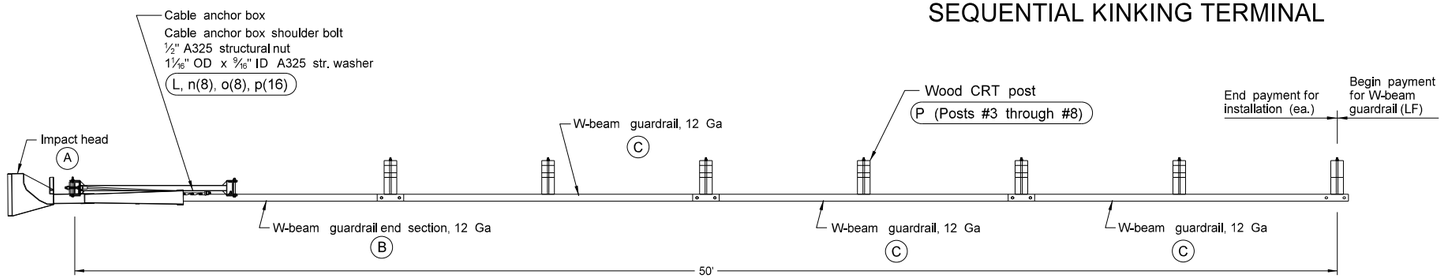
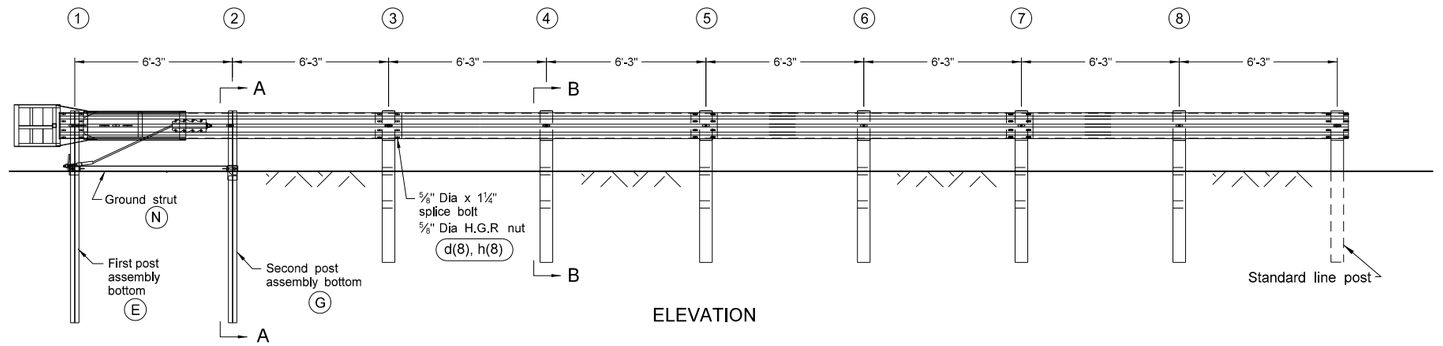
SEQUENTIAL KINKING TERMINAL

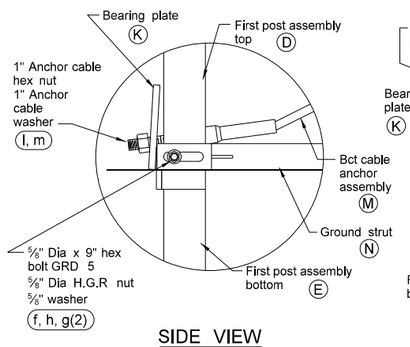
D-764-5



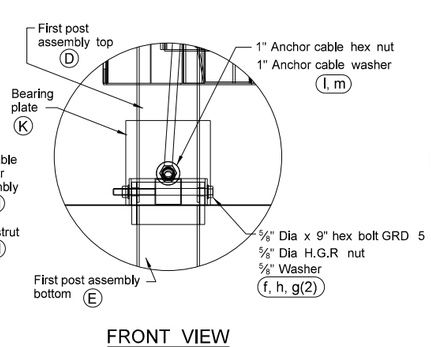
PLAN



ELEVATION

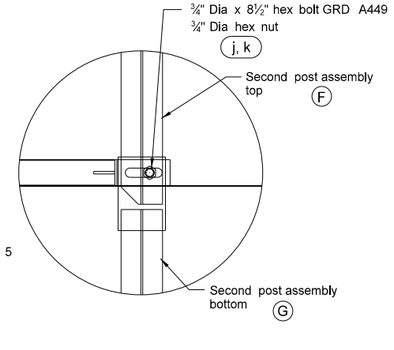


SIDE VIEW

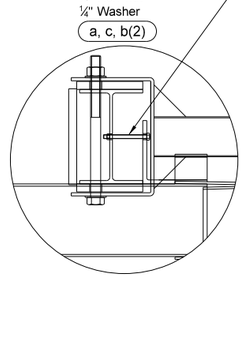


FRONT VIEW

POST #1 CONNECTION DETAILS



SIDE VIEW DETAIL OF POST #2

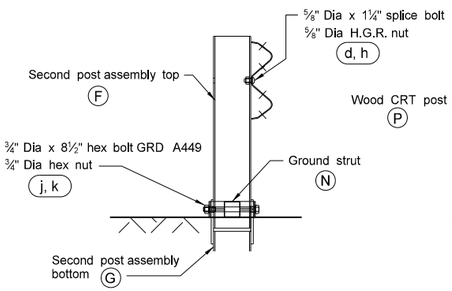


IMPACT HEAD CONNECTION DETAIL

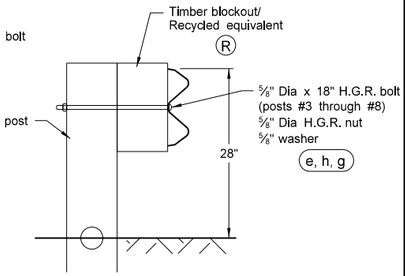
GENERAL NOTES:

1. Breakaway posts are required with the SKT.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The SKT can be flared at a rate of up to 25:1 to prevent the impact head from encroaching on the shoulder.
4. The lower sections of the posts shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
5. The lower section of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
6. When rock is encountered, a 10" diameter post hole, 20" into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 2 1/2" deep to provide drainage. Posts 1 & 2 can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
7. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
8. The wood blockouts on post #3 through post #8 should be "toe nailed" with two 20 penny galvanized nails into each rectangular post, to prevent them from turning when the wood shrinks.

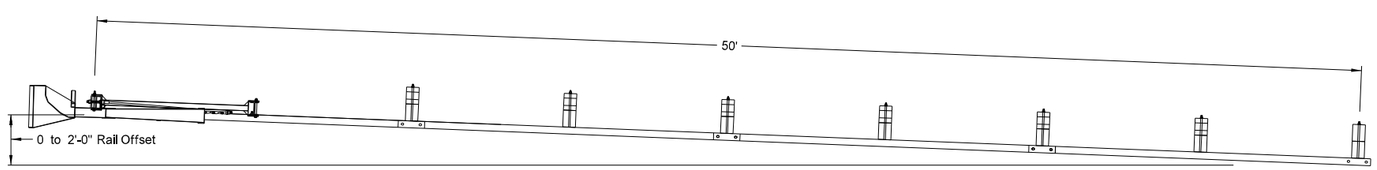
ITEM	QTY	BILL OF MATERIALS
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
		HARDWARE
a	2	¼" x 4" HEX BOLT Grade 5
b	4	¼" WASHER
c	2	¼" HEX NUT
d	25	⅝" Dia x 1¼" SPLICE BOLT, POST #2
e	6	⅝" Dia x 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	⅝" Dia x 9" HEX BOLT GRD 5
g	8	⅝" WASHER
h	32	⅝" Dia H.G.R NUT
j	1	¾" Dia x 8½" HEX BOLT GRD A449
k	1	¾" Dia HEX NUT
l	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	CABLE ANCHOR BOX SHOULDER BOLT
o	8	½" A325 STRUCTURAL NUT
p	16	1⅛" OD x ⅝" ID A325 STR. WASHER



SECTION A-A
Post #2



SECTION B-B
Posts #3 through #8



FLARED INSTALLATION
25:1 maximum flare rate

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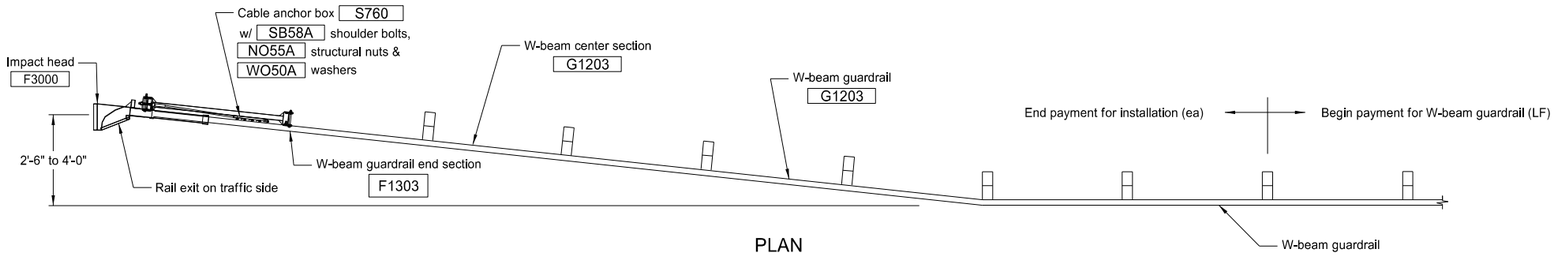
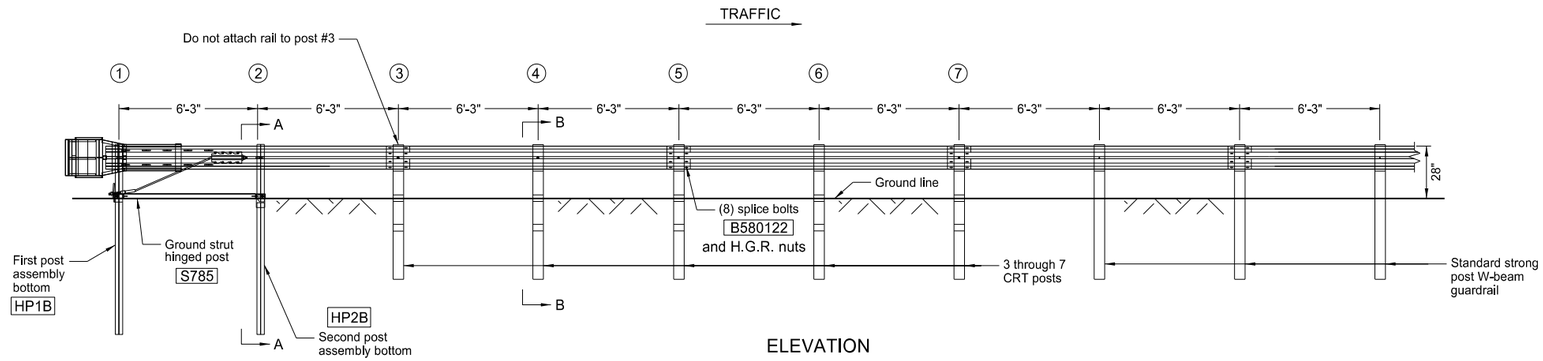
FLARED ENERGY ABSORBING TERMINAL

D-764-6



PLAN

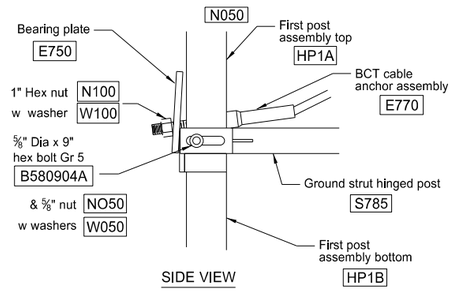


ELEVATION

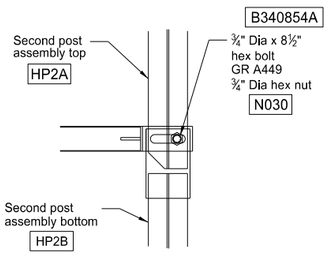
ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
		HARDWARE (ALL DIMENSIONS IN INCHES)
B140404	2	¼ Dia x 4 HEX BOLT
WO14	4	¼ WASHER
N014	2	¼ HEX NUT
B580122	17	⅝ Dia x 1¼ SPLICE BOLT
B581802	4	⅝ Dia x 10 H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	⅝ Dia x 9 HEX BOLT GR 5
W050	5	⅝ WASHER
N050	22	⅝ Dia H.G.R. NUT
B340854A	1	¾ Dia x 8½ HEX BOLT GR A449
NO30	1	¾ Dia HEX NUT
N100	2	1 ANCHOR CABLE HEX NUT
W100	2	1 ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	½ A325 STRUCTURAL NUT
W050A	16	1 1/16 OD x 9/16 ID A325 STR. WASHER

GENERAL NOTES

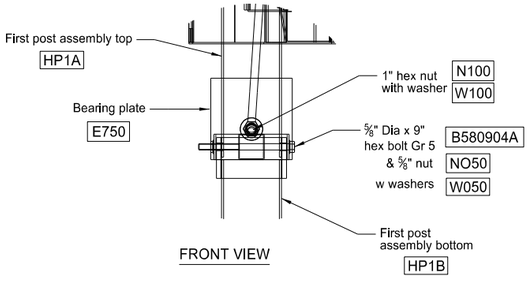
1. Wood posts are required with the Flared Energy Absorbing Terminal except posts #1 and #2.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The lower sections of the posts shall not protrude more than 4 inches above the ground (measured along a 60 inch cord). Site grading may be necessary to meet this requirement.
4. Lower post sections shall not be driven with the upper post attached. If the the post is placed in a drilled hole, the backfill material must be satisfactory compacted to prevent settlement.
5. When rock is encountered during excavation, a 12" diameter post hole 20" deep may be used if approved by the Engineer. Granular material will be placed in the bottom of the hole approximately 2½" deep to provide drainage. The soil tubes shall be field cut to length, placed in the hole and back filled with adequately compacted material excavated from the hole.
6. The breakaway cable assembly shall be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
7. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The nail shall be 20 penny and galvanized.
8. The Flared Energy Absorbing Terminal shall be flared only when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, the Flared Energy Absorbing Terminal shall have only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, the Flared Energy Absorbing Terminal shall be turned parallel to the roadway.



SIDE VIEW

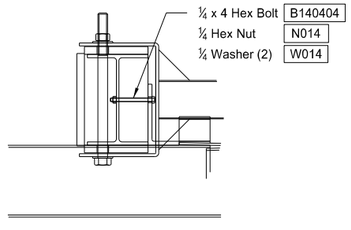


SIDE VIEW DETAIL OF POST #2

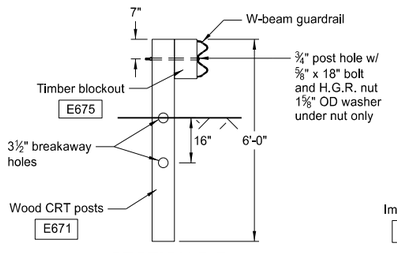


FRONT VIEW

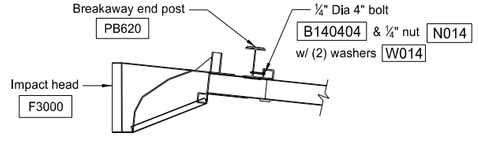
POST #1 CONNECTION DETAILS



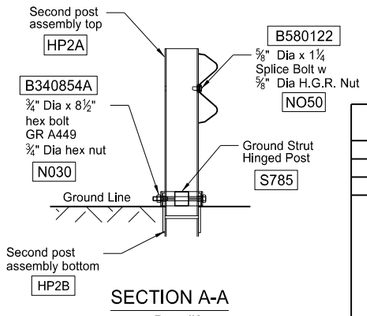
IMPACT HEAD CONNECTION DETAIL



SECTION B-B
POST 3 THRU 7



IMPACT HEAD CONNECTING DETAIL



SECTION A-A
at Post #2

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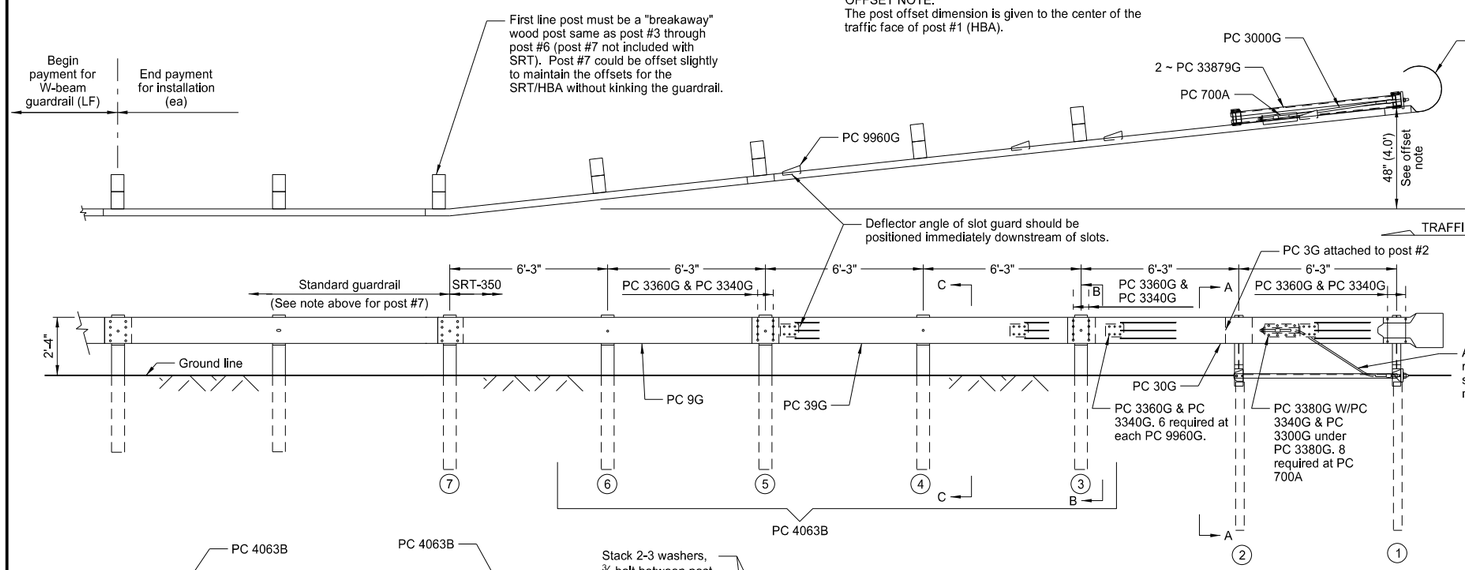
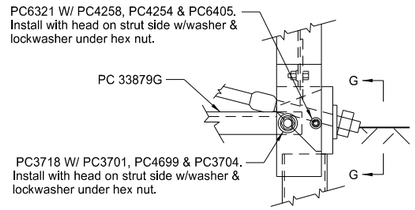
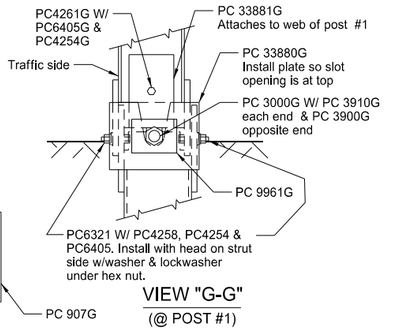
SLOTTED RAIL TERMINAL

D-764-7

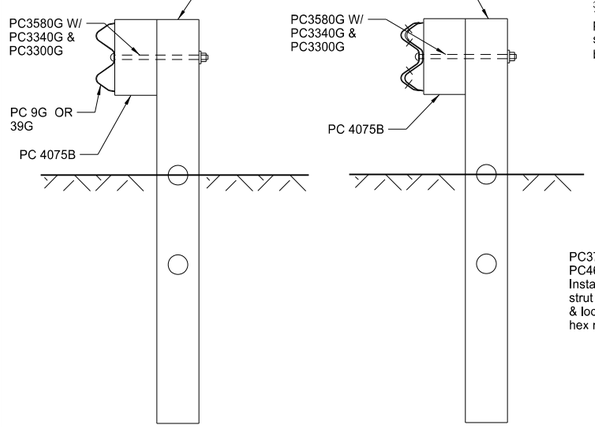




DETAIL "G"
(@ POST #1)

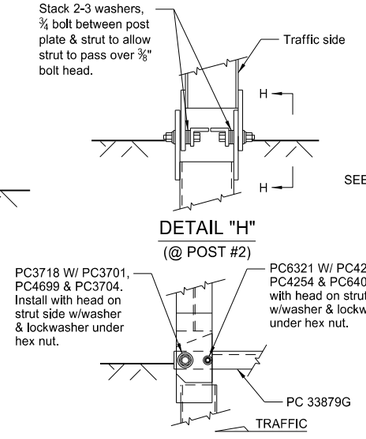


VIEW "G-G"
(@ POST #1)



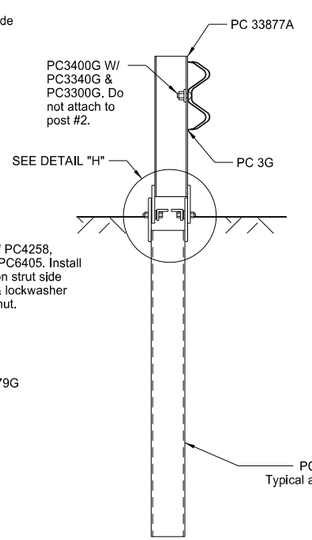
SECTION "C-C"
(@ POST #4 & #6)

SECTION "B-B"
(@ POST #3 & #5)

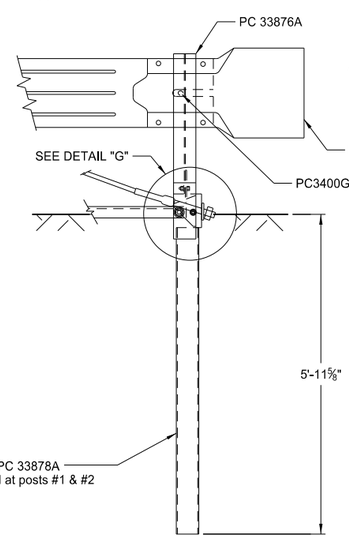


DETAIL "H"
(@ POST #2)

VIEW "H-H"
(@ POST #2)



SECTION "A-A"



ENLARGED VIEW @ POST #1

BILL OF MATERIAL		
PC	QTY	DESCRIPTION
3G	1	12/12"/BACKUP (GUARDRAIL)
9G	1	12/12'6/6'3/S (GUARDRAIL)
30G	1	12/12'6/S SRT-1 (GUARDRAIL)
39G	1	12/12'6/S SRT-2 (GUARDRAIL)
700A	1	CABLE ANCHOR BRACKET
907G	1	12/BUFFER/ROLLED (TERMINAL)
3000G	1	3/4 x 6'6" CABLE
3300G	14	5/8" WASHER
3340G	58	5/8" HEX NUT
3360G	44	5/8"ø x 1 1/4" SPLICE BOLT
3380G	8	5/8"ø x 1 1/2" HEX HD BOLT
3400G	2	5/8"ø x 2" POST BOLT
3580G	4	5/8"ø x 18" POST BOLT
3701G	10	3/4" WASHER
3704G	4	3/4" HEX NUT
3718G	4	3/4"ø x 3" HEX HD BOLT (A325)
3900G	1	1" WASHER
3910G	2	1" HEX NUT
4063B	4	6' POST 6" x 8"
4075B	4	14" BLOCK 6" x 8"
4254G	5	3/8" WASHER
4258G	4	3/8" LOCKWASHER
4261G	1	3/8"ø x 1 1/2" HEX HD BOLT (GR 5)
4699G	4	3/4" LOCKWASHER
6321G	4	3/8"ø x 2" HEX HD BOLT (GR 5)
6405G	5	3/8" HEX NUT
9960G	4	SLOT GUARD
9961G	1	3/8" x 3" x 4" PLATE WASHER
33876A	1	HBA POST 1 TOP (W6 x 8.5)
33877A	1	HBA POST 2 TOP (W6 x 8.5)
33878A	2	HBA POST 1 & 2 BOT (TS 6 x 4)
33879G	2	ANGLE STRUT 2" x 2" x 3/8"
33880G	1	1" x 6" x 8" BEARING PLATE
33881G	1	CABLE WEB PL 4" x 1/4" x 6 1/2"

GENERAL NOTES:

1. Wood posts are required with the slotted rail terminal except posts #1 and #2.
2. All bolts, nuts, cable assemblies, cable anchors, bearing plates, slot guards, struts, nails, pipes soil tubes and soil plates shall be galvanized.
3. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent cable from twisting when tightening nuts.
4. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when wood shrinks. The 2 nails required per blockout shall be 20 penny and galvanized.
5. For curb installation, the curb must end prior to post #7. Where the curb is extended beyond post #7, the flared SRT can not be used. A straight end treatment shall be used at the end of the straight guardrail that is placed at the face of the curb.
6. For details not shown, see the manufacturer's installation manual.
7. Minimum length of rail, including end terminal, in advance of fixed objects shall be 175 feet when the slotted rail terminal is used as the end terminal.

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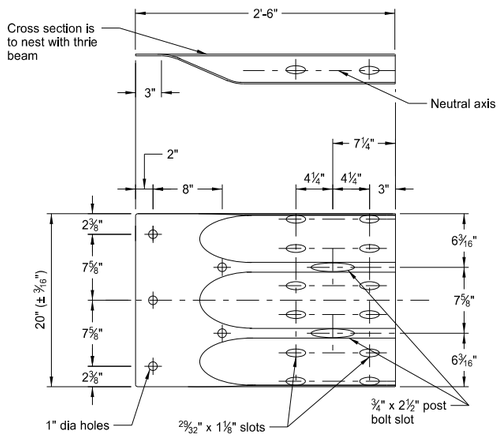
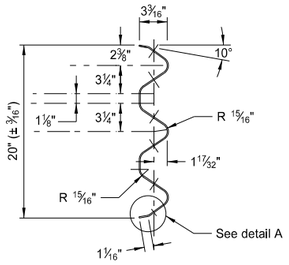
THRIE BEAM TRANSITION TO DOUBLE BOX BEAM RETROFIT

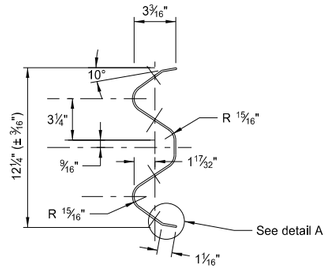
D-764-10



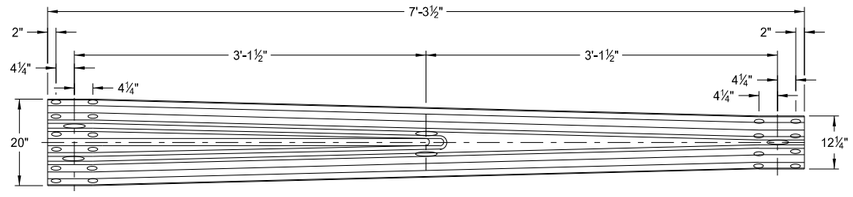
THRIE BEAM TERMINAL CONNECTOR



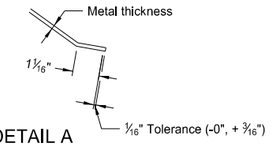
THRIE BEAM END VIEW



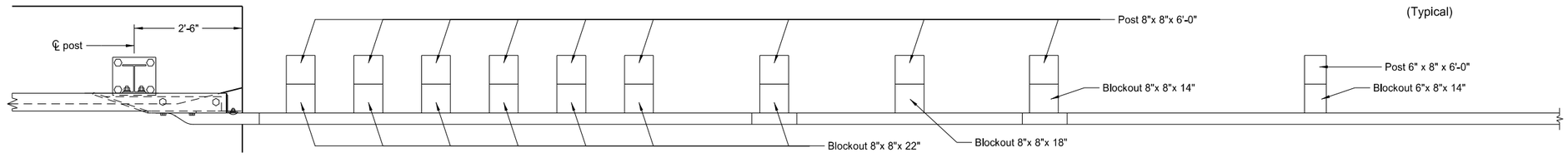
W-BEAM END VIEW



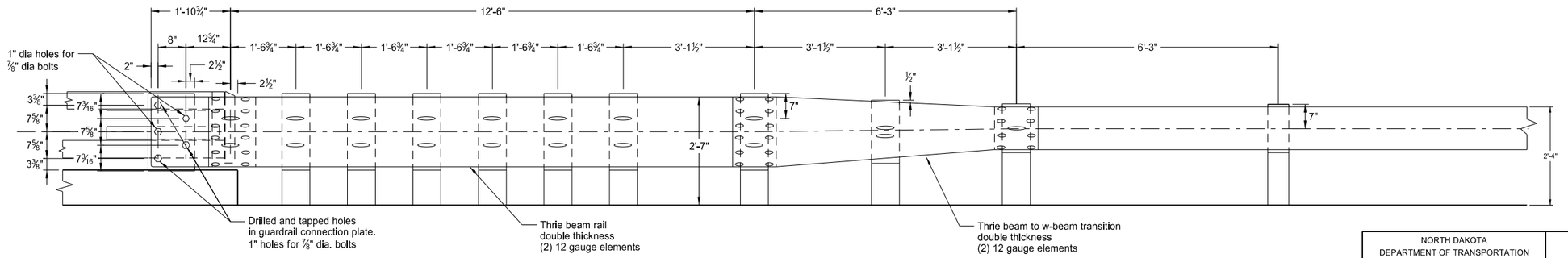
THRIE BEAM TO W-BEAM TRANSITION SECTION



DETAIL A
(Typical)



PLAN



ELEVATION

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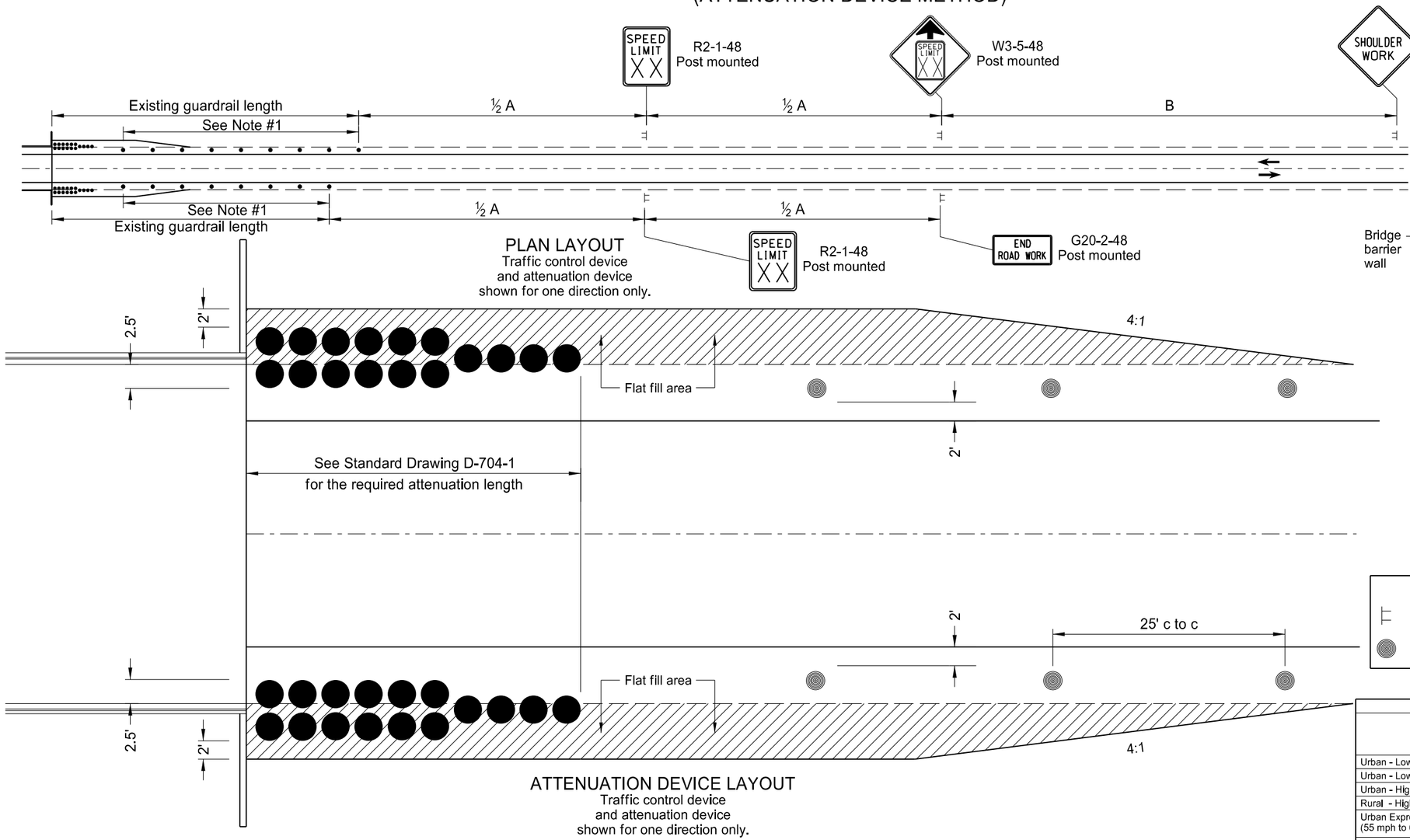
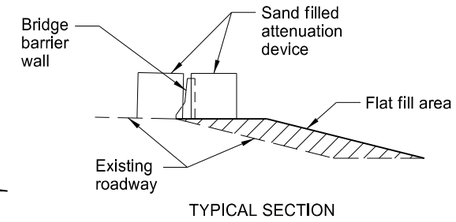
D-764-20

SHORT TERM END TREATMENT FOR BRIDGES
(ATTENUATION DEVICE METHOD)





KEY

- Sign
- Attenuation Module
- Delineator drum

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

Notes

1. If the shoulder width is less than 3', the vertical panels shall be used and placed as far from the driving lane as possible and still be on the finished shoulder. When there is no shoulder, the vertical panels shall be placed as near as possible to the driving lane on the foreslope of the shoulder.
2. If the bridge is within construction zone signing, the reduced speed ahead sign can be eliminated.
3. 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 shall be placed at ½ B.
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. Existing speed limit signs within a reduced speed zone shall be covered.

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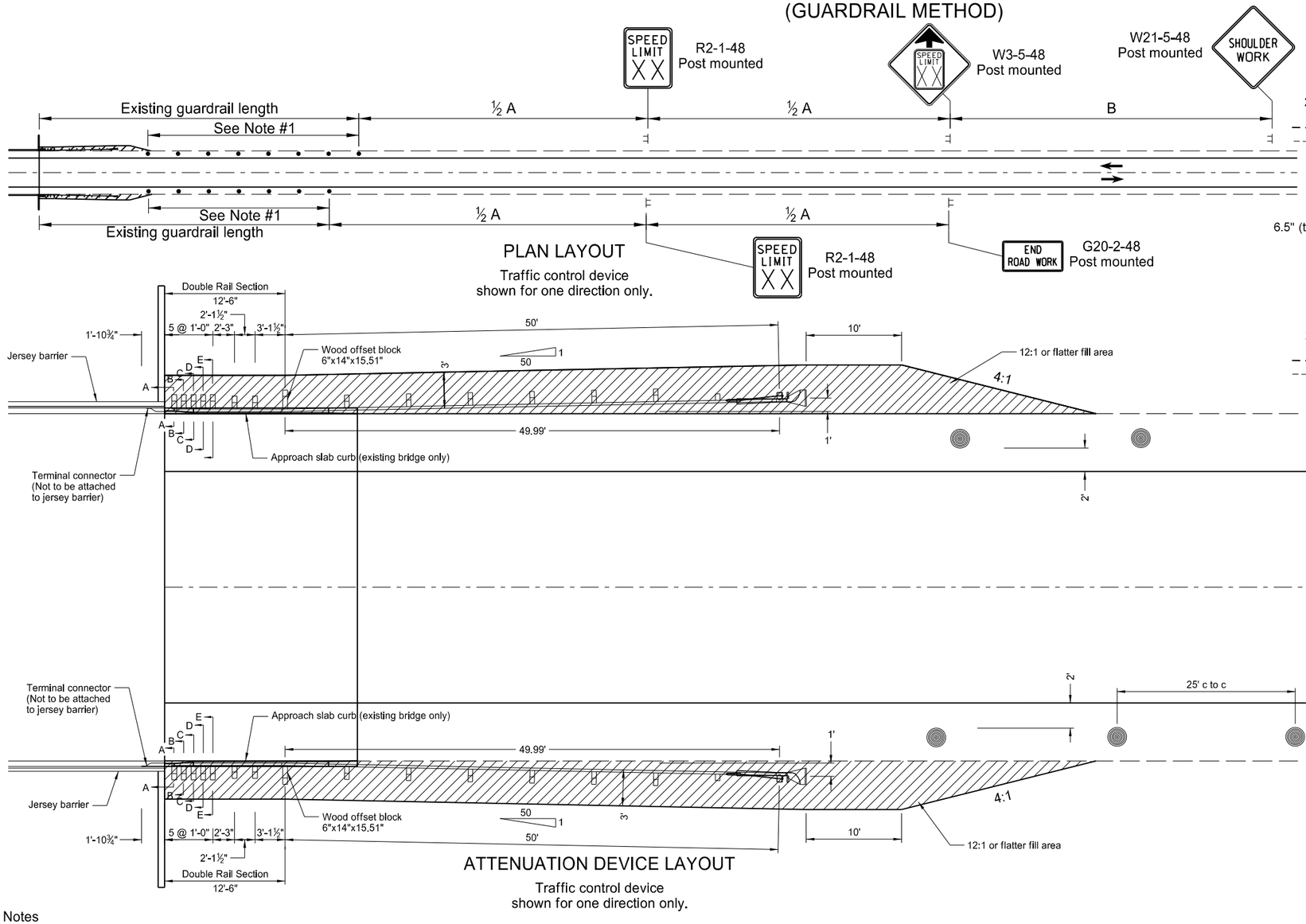
SHORT TERM END TREATMENT FOR BRIDGES (GUARDRAIL METHOD)

D-764-21

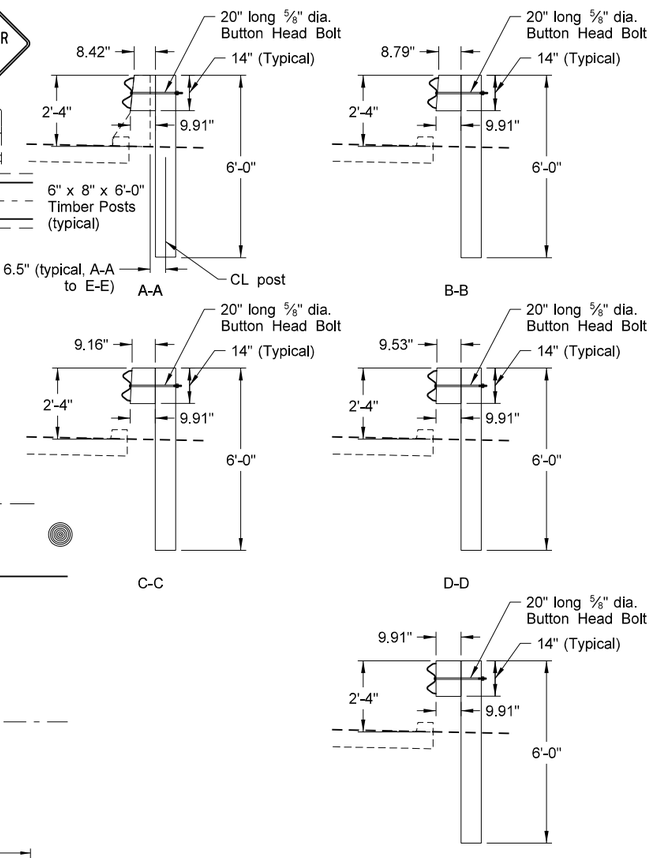


PLAN LAYOUT

Traffic control device shown for one direction only.

ATTENUATION DEVICE LAYOUT

Traffic control device shown for one direction only.



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

Notes

1. If the shoulder width is less than 3', vertical panels shall be used in place of delineator drums and placed as far from the driving lane as possible and still be on the finished shoulder. When there is no shoulder, the vertical panels shall be placed as near as possible to the driving lane on the foreslope of the shoulder.
2. If the bridge is within construction zone signing, the reduced speed ahead sign can be eliminated.
3. 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 shall be placed at ½ B.
4. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
5. Existing speed limit signs within a reduced speed zone shall be covered.

KEY

Sign — Delineator drum

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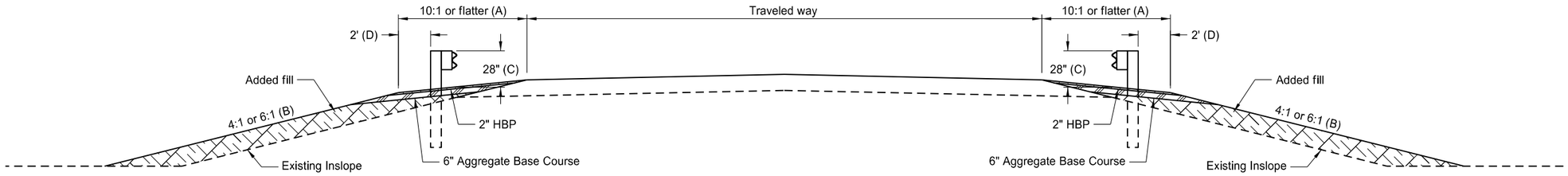
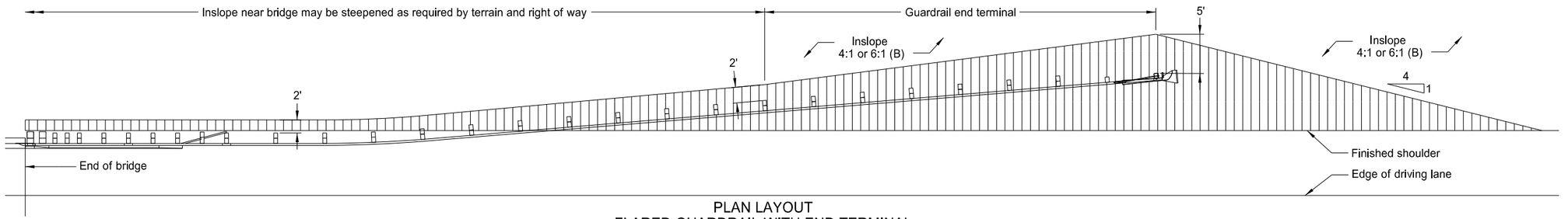
D-764-22

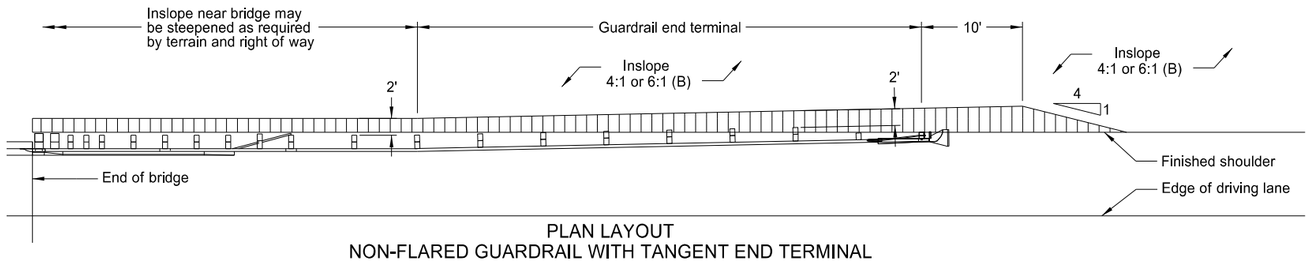
TYPICAL GRADING AT BRIDGE ENDS WITH W-BEAM GUARDRAIL



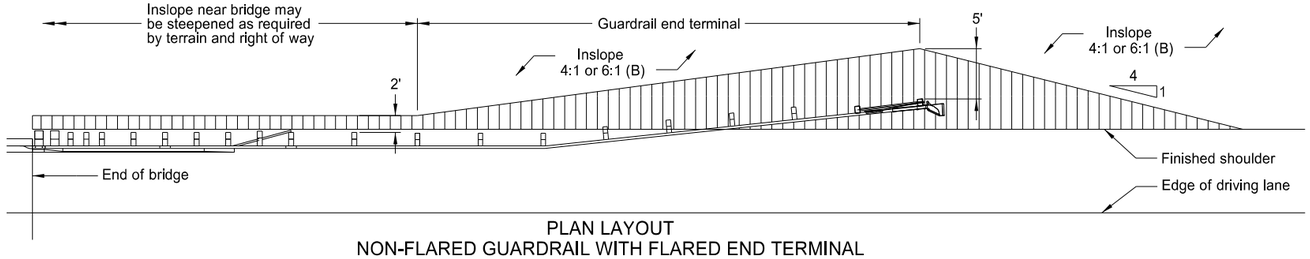
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

(A) Slope flatter than 10:1 may be required to provide proper guardrail height.

(B) Where normal inslope is 4:1 the added fill shall be 4:1. Where normal inslope is 6:1 the added fill shall be 6:1.

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

(D) Dimension at end terminals may vary per Plan Layouts shown on this sheet.

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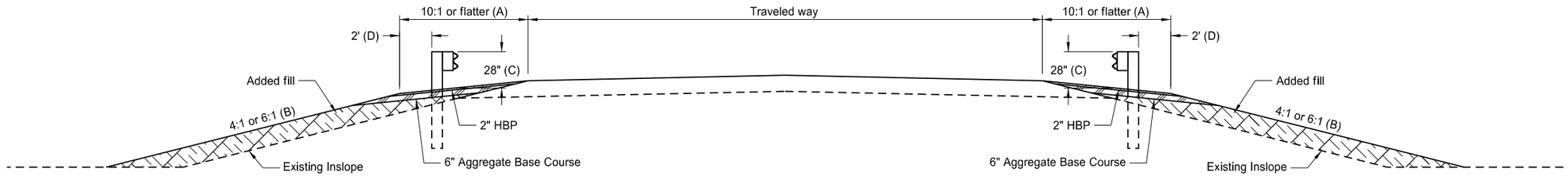
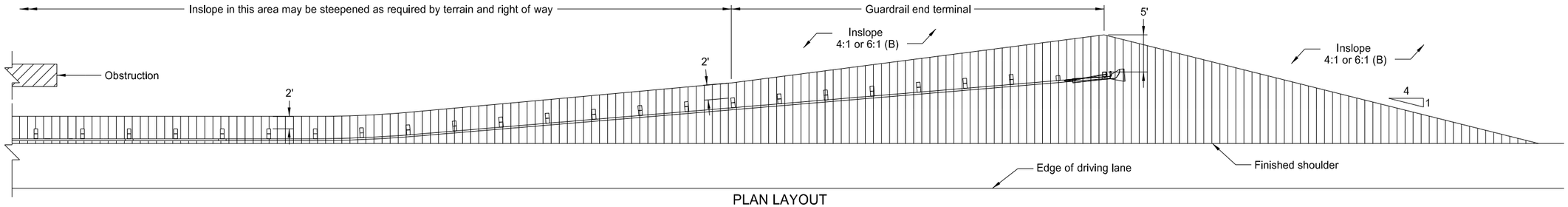
D-764-23

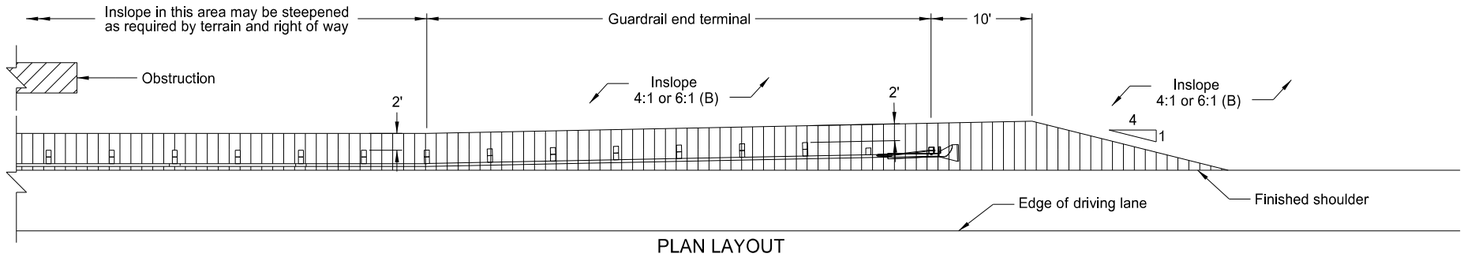
TYPICAL GRADING AT OBSTRUCTIONS WITH W-BEAM GUARDRAIL



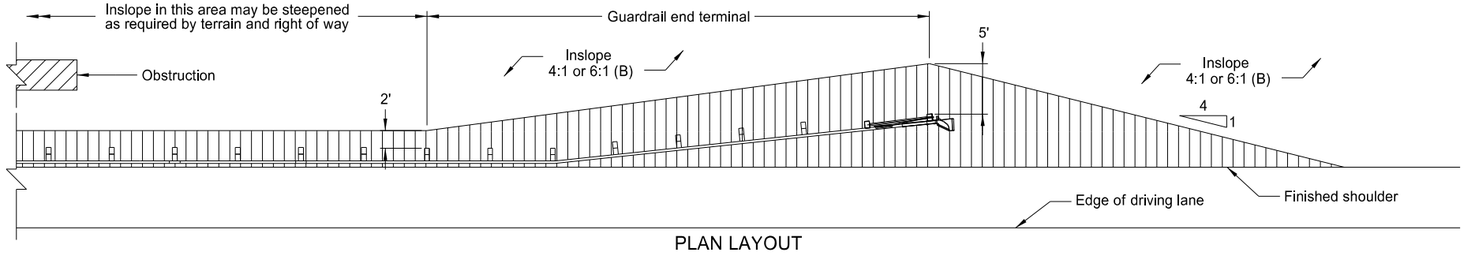
TYPICAL SECTION



PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL TANGENT END TERMINAL



PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

(A) Slope flatter than 10:1 may be required to provide proper guardrail height.

(B) Where normal inslope is 4:1 the added fill shall be 4:1. Where normal inslope is 6:1 the added fill shall be 6:1.

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

(D) Dimension at end terminals may vary per Plan Layouts shown on this sheet.

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