DESIGN DATA - ND 13 West of Jct of ND 13 & ND 32				
Traffic	Average Daily			
Current 2015	Pass: 2,335	Trucks: 660	Total: 2,995	
Forecast 2035	Pass: 3,155	Trucks: 985	Total: 4,140	
Clear Zone Distance: 32 ft		Design Speed: 65 mph		
Minimum Sight Dist. for Stopping: 645 ft		Bridges: NA		
Sight Dist. for No Passing Zone: 1,100 ft				
Pavement Design Life 20 (years)				
Design Accumulated One-way Flexible ESALs: 1,241,596				

DESIGN DATA - ND 13 East of Jct of ND 13 & ND 32				
Traffic	Average Daily			
Current 2015	Pass: 1,805	Trucks: 350	Total: 2,155	
Forecast 2035	Pass: 2,440	Trucks: 525	Total: 2,965	
Clear Zone Distance: 32 ft		Design Speed: 65 mph		
Minimum Sight Dist. for Stopping: 645 ft		Bridges: NA		
Sight Dist. for No Passing Zone: 1,100 ft				
Pavement Design Life 20 (years)				
Design Accumulated One-way Flexible ESALs: 1,241,596				

DESIGN DATA - ND 32 South of Jct of ND 13 & ND 32				
Traffic	Average Daily			
Current 2015	Pass: 960	Trucks: 190	Total: 1,150	
Forecast 2035	Pass: 1,240	Trucks: 285	Total: 1,525	
Clear Zone Distance: 32 ft		Design Speed: 65 mph		
Minimum Sight Dist. for Stopping: 645 ft		Bridges: NA		
Sight Dist. for No Passing Zone: 1,100 ft				
Pavement Design Life 20 (years)				
Design Accumulated One-way Flexible ESALs: 1,241,596				

JOB # 34
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

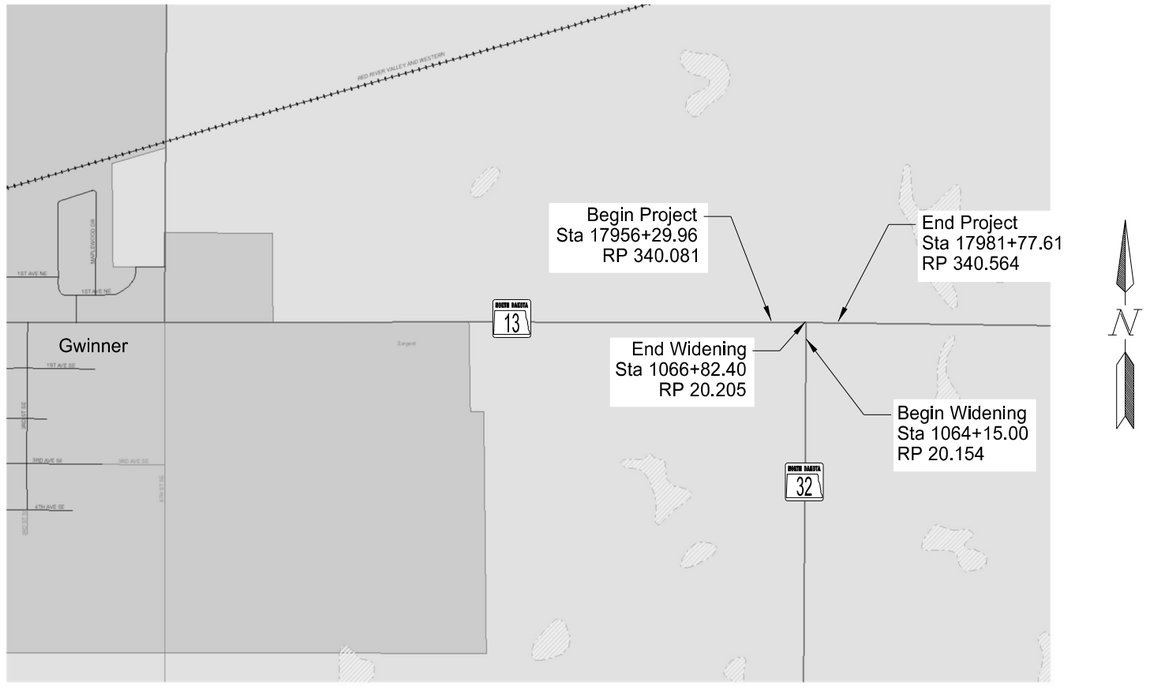
HEN-8-013(055)340

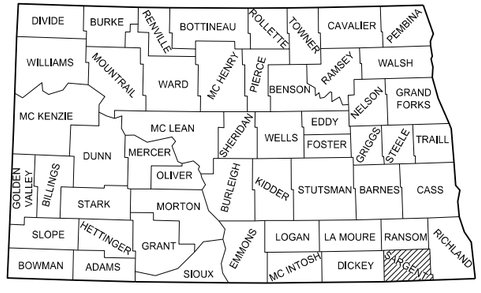
Sargent County
ND 13 - East Jct. of ND 13 & ND 32
East of Gwinner
Grading, HMA, and Signing

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	21041	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
HEN-8-013(055)340 - ND 13	0.483	0.483





STATE COUNTY MAP

DESIGNERS

Adam M. Ruud, PE

APPROVED DATE 3/22/16

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 3/21/16

Nancy E. Wills /s/
HOUSTON ENGINEERING INC.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	2	1

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PLAN SECTIONS

SPECIAL PROVISIONS

LIST OF STANDARD DRAWINGS

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Remove Ex Pavement / Widening

Obliterate Pavement Marking / Restripe Existing Pavement

Reconstruct Field Approach

Sec 24
T-132-N
R-56-W

Sec 19
T-132-N
R-55-W

Proposed Lane Configuration

Begin Project
Sta 17956+29.96
RP 340.081

End Project
Sta 17981+77.61
RP 340.564

Reconstruct Field Approach

Ex R/W

DICKEY R NET

DVELEC

HWY 13

End Widening
Sta 1066+82.40
RP 20.205

OTTR TL PWR

SEWU

Begin Widening
Sta 1064+15.00
RP 20.154

Proposed Lane Configuration

Proposed Lane Configuration

Sec 25
T-132-N
R-56-W

HWY 32

Sec 30
T-132-N
R-55-W

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Scope of Work

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	6	1

NOTES

100-P01 COORDINATION OF PROJECTS: Another project in the vicinity of this project is under contract during the 2016 construction season. The chip seal project is located adjacent to the project.

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 FEDERAL AVIATION ADMINISTRATION: Submit Federal Aviation Administration (FAA) Form 7460-2, Part 2 within 5 days of the start of construction at oeaaa.faa.gov. Forms are required for Aeronautical Study Numbers:

- 2015-AGL-17320-0E
- 2015-AGL-17321-0E
- 2015-AGL-17361-0E

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

203-010 SHRINKAGE: 25 percent additional volume is included for shrinkage in earth embankment.

203-360 COMPACTION AND DENSITY CONTROL: Compact material as specified in Section 203.04 E.2.b, "ND T-99".

Manipulate embankment material with disking equipment.

203-385 AVERAGE HAUL: No average haul has been computed for this project.

203-P01 EMBANKMENT CONSTRUCTION: Bench existing embankment when construction roadway widening in accordance with Section 203.04 E, Embankment Construction, regardless of slope.

203-P02 MATERIAL TESTING: Perform a minimum of one 5 point proctor for each type of soil encountered and aggregate base prior to placement of said material. Provide soil and aggregate samples in separate, sealed glass jars to the Engineer for the completion of “check” proctors to verify results. Include the cost of testing in the price bid for items “Borrow Excavation” and “Salvaged Base Course”.

704-P01 TRAFFIC CONTROL FOR SHOULDER DROP-OFF: If the shoulder and adjacent driving lane 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. W8-9a-48 "Shoulder Drop Off" and supplemental plate Sign No. W20-52-54 to identify the distance.

Locations:

- In advance of the drop off;
- Spaced at each mile from the advance sign; and
- At major intersections (CMC routes, state and US highways, and Interstate Ramps).

At the conclusion of the working day, install stackable vertical panels, at 60’ spacing, at the edge of the driving lane and reopen the roadway to two way, head to head traffic. Maintain tubular markers along the roadway centerline.

If the difference in elevation between the shoulder and the driving lane is 2" or greater during nonworking hours, construct a slough adjacent to the driving lane that is 4:1 or flatter. Flagging, at no additional cost to the Department, is required during nonworking hours until a 4:1 or flatter slough can be constructed.

If the difference in elevation between the shoulder and driving lane is less than 2", no slough is required.

Sign assemblies will be measured and paid for according to Section 704 "Temporary Traffic Control".

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

704-P02 TRAFFIC CONTROL FOR BITUMINOUS PAVEMENT: Provide traffic control consisting of a temporary road closure, and flagging.

Traffic control device quantities are based on the length of the project and the list below. Provide additional devices at no additional cost to the Department.

1. Standard D-704-12;
2. Standard D-704-15, layout A;
3. Standard D-704-20, layout G; Signing will be required at junction of ND 32 and ND 13.
4. Standard D-704-22, layouts K and L;
5. Standard D-704-26, layouts CC, EE, and GG.

Place flaggers and traffic control devices as shown on Standard D-704-15, layout A at the intersection of ND 32 and ND 13 when the lane closure spans across them.

704-P03 TRAFFIC CONTROL FOR PIPE INSTALLATION: Maintain a minimum 12’ wide driveway access at Sta 17969+13. Additional temporary widening may be required to install approach pipe conduit. Coordinate work in this location with the Gwinner Site Project Manager (CHS Inc.) at (320) 905-9404. Include all costs of additional temporary widening or other measures required to maintain access in the price bid for “Pipe Conduit-Approach”.

762-050 PAVEMENT MARKING: If the Engineer and Contractor agree, plan quantity will be used as the measurement for payment for pavement marking items.

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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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 at an NDDOT approved mitigation bank in accordance with the mitigation guidance[2, 3].

ACTION REQUIRED /TAKEN: 0.06 acre of permanent impacts to EO 11990 wetlands will require mitigation. The NDDOT proposes to mitigate by compensation: 0.06 acre at FHWA EO 11990 Mitigation Bank Vollrath 16/17 in the Red River Regional Service Area. 0.11 acre of temporary wetland impacts will result from construction activities. Temporary impact areas will be graded to preconstruction contours.

Wetland Impact Table

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size Ac.	Wetland Feature	USACE Jurisdictional Wetlands*	Wetland Impacts (acres)		USFWS Easement Impacts		Wetland Mitigation								
											Mitigation Required			Bank		Onsite			
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acres	Mitigation Location: Ratio	Acres	Constucted Site #	Constructed Size (Acres)
1	Sec.24, T132N, R56W	PEMCx	Ditch	0.36	Artificial	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
2	Sec.24, T132N, R56W	PEMC	Basin	0.02	Natural	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
3	Sec.19, T132N, R55W	PEMA	Basin	0.01	Natural	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
4	Sec.19, T132N, R55W	PEMC	Basin	0.03	Natural	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
5a	Sec.25, T132N, R56W	PEMA	Basin	0.21	Natural	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
5b	Sec.25, T132N, R56W	PEMAx	Ditch	0.01	Artificial	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
6a	Sec.25, T132N, R56W	PEMA	Basin	0.85	Natural	No	0.11	0.06	0.00	0.00	Y	N	N	Vollrath 16/17 11990	0.06	NA	NA	NA	NA
6b	Sec.25, T132N, R56W	PEMF	Basin	0.91	Natural	No	0.00	0.00	0.00	0.00	N	N	N	NA	NA	NA	NA	NA	NA
6c	Sec.30, T132N, R55W	PEMC	Basin	0.75	Natural	No	0.00	0.00	0.00	0.00	Y	N	N	NA	NA	NA	NA	NA	NA
			Totals	**3.15**			**0.11**	**0.06**	**0.00**	**0.00**					**0.06**		**0.00**		**0.00**

[1] A wetland Jurisdictional Determination was issued by the USACE on 11/9/2015; NWO-2015-1983-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.

ENVIRONMENTAL COMMITMENTS

Summary Impact Table			
Total Permanent Impact Summary		Temporary Impacts and additional informaton	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.00	Temporary JD	0.00
Natural/Non-JD	0.06	Non-JD Temporary	0.11
Artificial/JD	0.00	Permanent JD > 0.10	0.00
Artificial /Non-JD	0.00	Permanent OW	0.00 ac/0 ft.
Total	0.06	Temporary OW	0.00/0

NOTIFICATIONS TO BE FILED BY CONTRACTOR:

- Federal Aviation Administration Notice of Actual Construction or Alteration Form 7460-2 (online at http://oeaaa.faa.gov)

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SPEC	CODE	ITEM DESCRIPTION	UNIT	PARTICIPATING	NON-PARTICIPATING	TOTAL
103	0100	CONTRACT BOND	L SUM	0.75	0.25	1
202	0136	REMOVAL OF PAVEMENT	TON	3,836	841	4,677
202	0170	REMOVAL OF CULVERTS-ALL TYPES AND SIZES	LF	50		50
203	0101	COMMON EXCAVATION-TYPE A	CY	1,030	296	1,326
203	0109	TOPSOIL	CY	4,582	1,024	5,606
203	0121	TOPSOIL-WETLAND	CY	137		137
203	0140	BORROW-EXCAVATION	CY	3,546	2,321	5,867
216	0100	WATER	M GAL	288		288
251	0200	SEEDING CLASS II	ACRE	5.68	1.27	6.95
251	1000	WETLAND SEED	ACRE	0.06		0.06
251	2000	TEMPORARY COVER CROP	ACRE	5.53	1.27	6.80
253	0201	HYDRAULIC MULCH	ACRE	11.21	2.54	13.75
260	0200	SILT FENCE SUPPORTED	LF	254		254
260	0201	REMOVE SILT FENCE SUPPORTED	LF	254		254
261	0112	FIBER ROLLS 12IN	LF	3,565	650	4,215
261	0113	REMOVE FIBER ROLLS 12IN	LF	1,646	325	1,971
302	0100	SALVAGED BASE COURSE	TON	7,262	2,931	10,193
401	0050	TACK COAT	GAL	627	305	932
401	0060	PRIME COAT	GAL	1,747	807	2,554
401	0160	BLOTTER MATERIAL CL 44	TON	42	22	64
430	0044	SUPERPAVE FAA 44	TON	1,784	902	2,686
430	1000	CORED SAMPLE	EA	27		27
430	6428	PG 64-28 ASPHALT CEMENT	TON	107	55	162
702	0100	MOBILIZATION	L SUM	0.75	0.25	1
704	0100	FLAGGING	MHR	480		480
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1,678		1,678
704	1052	TYPE III BARRICADE	EA	5		5
704	1060	DELINEATOR DRUMS	EA	20		20
704	1067	TUBULAR MARKERS	EA	45		45
704	1080	STACKABLE VERTICAL PANELS	EA	45		45
704	1500	OBLITERATION OF PVMT MK	SF	3,055		3,055
706	0500	AGGREGATE LABORATORY	EA	1		1
706	0550	BITUMINOUS LABORATORY	EA	1		1
706	0600	CONTRACTOR'S LABORATORY	EA	1		1
714	4113	PIPE CONDUIT 30IN-APPROACH	LF	220		220
720	0125	ALIGNMENT MONUMENTS	EA	1		1
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	34		34
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	73		73
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	312		312
754	0592	RESET SIGN PANEL	EA	9		9
754	0805	OBJECT MARKERS - CULVERTS	EA	2		2
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	0.63		0.63
762	0112	EPOXY PVMT MK MESSAGE	SF	96	96	192
762	0113	EPOXY PVMT MK 4IN LINE	LF	10,943	2,425	13,368
762	0115	EPOXY PVMT MK 8IN LINE	LF	1,325	1,260	2,585
762	0117	EPOXY PVMT MK 24IN LINE	LF	12	21	33
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	10,943	2,425	13,368
762	0434	SHORT TERM 8IN LINE-TYPE NR	LF	1,325	1,260	2,585
762	0436	SHORT TERM 24IN LINE-TYPE NR	LF	12	21	33
762	0442	SHORT TERM MESSAGE-TYPE NR	SF	96	96	192

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BASIS OF ESTIMATE

Material	Unit	Stations 17956+29.96 Lt (Ex_ND13) to 17981+77.61 Lt (Ex_ND13) Distance = 25.48 Sta				Stations 17956+29.96 Rt (Ex_ND13) to 1064+71.37 Lt (Ex_ND32) Distance = 14.97 Sta				Stations 1064+15.00 Rt (Ex_ND32) to 17981+77.61 Rt (Ex_ND13) Distance = 15.29 Sta				Field Drive Sta 17956+29.96	Total
		Surface Area (sf)	Slough End Area (sf)	Slough Length (ft)	Subtotal	Surface Area (sf)	Slough End Area (sf)	Slough Length (ft)	Subtotal	Surface Area (sf)	Slough End Area (sf)	Slough Length (ft)	Subtotal	Subtotal	
ND 13 & ND 32 Widening															
Salvaged Base Course (15" Depth) @ 1.875 Ton/CY	Ton	38,628	9.30	2,601	5,033	22,662	9.30	1,410	2,878	15,381	9.30	1,451	2,272	10	**10,193**
Prime Coat @ 0.25 Gal/SY	Gal	45,781	---	---	1,272	26,540	---	---	737	19,371	---	---	538	7	**2,554**
Blotter Material CI 44 @ 15 lbs/SY	Ton	38,628	---	---	32	22,662	---	---	19	15,381	---	---	13	0	**64**
Tack Coat @ 0.05 Gal/SY (1st Lift)	Gal	43,180	---	---	240	25,130	---	---	140	17,920	---	---	100	2	**482**
Tack Coat @ 0.05 Gal/SY (2nd Lift)	Gal	40,579	---	---	225	23,720	---	---	132	16,469	---	---	91	2	**450**
Superpave FAA 44 (5.5" Depth) @ 2 Ton/CY	Ton	38,628	0.19	2,601	1,348	22,662	0.19	1,410	789	15,381	0.19	1,451	543	6	**2,686**
PG 64-28 Asphalt Cement @ 6.0%	Ton	---	---	---	81	---	---	---	47	---	---	---	33	1	**162**

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
ND 13 Lt							
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	1	EA
ND 13 Rt - West of ND 32							
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	1	EA
ND 13 Rt - East of ND 32							
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	1	EA
				Total	24	3	EA

Permanent Pavement Marking		
Type	Basis	Quantity
ND 13		
Epoxy Pvmt Mk 4IN Line	Double Barrier Centerline (Yellow) - 10,560 LF/Mi	7,280 LF
	Edge Line (White) - 5,280 LF/Mi	4,766 LF
Epoxy Pvmt Mk 8IN Line	Turn Lane Line (White) - 5,280 LF/Mi	2,520 LF
Epoxy Pvmt Mk Message	Turn Arrow - 16 SF/Ea	192 SF
ND 32		
Epoxy Pvmt Mk 4IN Line	Double Barrier Centerline (Yellow) - 10,560 LF/Mi	474 LF
	Chevron Line (White) - 5,280 LF/Mi	55 LF
	Edge Line (White) - 5,280 LF/Mi	793 LF
Epoxy Pvmt Mk 8IN Line	Turn Lane Line (White) - 5,280 LF/Mi	65 LF
Epoxy Pvmt Mk 24IN Line	Stop Bar (White) - 5,280 LF/Mi	33 LF
Obliteration of Pavement Markings		
4" White Edge Line	1,790 SF/Mi	1,818 SF
4" Centerline Barrier Line	1,790 SF/Mi	938 SF
4" Centerline Skip Line	440 SF/Mi	234 SF
24" Stop Bar	10,560 SF/Mi	40 SF

Water

25 MGal/Mile for Dust Palliative
25 MGal/Mile x 0.533 Mile = 13 MGal
20 Gal/Ton for Aggregates
20 Gal/Ton x 10,193 Ton = 203,860 Gal = 204 MGal
10 Gal/CY for Embankment
10 Gal/CY x 7,193 CY = 71,930 Gal = 71 MGal
Total 288 MGal

Rumble Strips

Shoulder:
ND 13 – Sta 17956+29.96 to Sta 17968+38.48 Lt = 1,208.52 Ft
ND 13 – Sta 17977+57.74 to Sta 17981+77.61 Lt = 419.87 Ft
ND 13 – Sta 17956+29.96 to Sta 17960+49.82 Rt = 419.86 Ft
ND 13 – Sta 17970+85.53 to Sta 17981+77.61 Rt = 1,092.08 Ft
ND 32 – Sta 1064+71.37 to Sta 1065+01.37 Lt = 30.00 Ft
ND 32 – Sta 1064+15.00 to Sta 1065+87.64 Rt = 172.64 Ft
Total 3,342.97 Ft = 0.63 Miles

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	10	2

BASIS OF ESTIMATE

Short Term Pavement Marking		
Type	Basis	Quantity
ND 13		
Short Term 4IN Line-Type NR	Double Barrier Centerline (Yellow) - 10,560 LF/Mi	7,280 LF
	Edge Line (White) - 5,280 LF/Mi	4,766 LF
Short Term 8IN Line-Type NR	Turn Lane Line (White) - 5,280 LF/Mi	2,520 LF
Short Term Message-Type NR	Turn Arrow - 16 SF/Ea	192 SF
ND 32		
Short Term 4IN Line-Type NR	Double Barrier Centerline (Yellow) - 10,560 LF/Mi	474 LF
	Chevron Line (White) - 5,280 LF/Mi	55 LF
	Edge Line (White) - 5,280 LF/Mi	793 LF
Short Term 8IN Line-Type NR	Turn Lane Line (White) - 5,280 LF/Mi	65 LF
Short Term 24IN Line-Type NR	Stop Bar (White) - 5,280 LF/Mi	33 LF

Salvaged Base Course Summary			
Location	Salvaged Material (Ton)	Required Material (Ton)	Virgin Aggregate (Ton)
ND 13 Turn Lane Improvement	8,187	10,193	2,006

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Earthwork Summary

Location	Common Excavation - Type A (CY) Pay Item	Embankment (CY)	Borrow - Excavation (CY) Pay Item
ND 13	1,253	6,631	5,378
ND 32	73	562	489
Totals	**1,326**	**7,193**	**5,867**

Notes:
1.This computation is not a balance sheet. The Contractor shall calculate its own balance of materials.
2.An additional volume of 25% to allow for shrinkange is included in all embankment volumes.

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Earthwork Summary

ND 13 - Turn Lane Improvements

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Earthwork - ND 13

Sta	Distance	Common Excavation - Type A Area (SF)	Common Excavation - Type A Volume (CY)	Common Excavation - Type A Accumulated Volume (CY)	Embankment Area (SF)	Embankment Adjusted Volume (CY)*	Embankment Accumulated Volume (CY)	Mass Ordinate
17956+29.96		18.81			2.62			
17957+00.00	70.04	13.05	41	41	16.96	32	32	9
17958+00.00	100.00	12.41	47	88	22.63	92	124	-36
17959+00.00	100.00	11.89	45	133	29.27	120	244	-111
17960+00.00	100.00	12.81	46	179	33.81	146	390	-211
17960+19.82	19.82	12.74	9	188	31.24	30	420	-232
17961+00.00	80.18	13.07	38	226	25.88	106	526	-300
17961+49.82	49.82	12.93	24	250	36.69	72	598	-348
17961+99.86	50.04	10.36	22	272	48.72	99	697	-425
17962+00.00	0.14	10.37	0	272	48.81	0	697	-425
17962+99.82	99.82	13.95	45	317	71.32	278	975	-658
17963+00.00	0.18	13.94	0	317	71.47	1	976	-659
17964+00.00	100.00	12.59	49	366	96.97	390	1,366	-1,000
17965+00.00	100.00	12.63	47	413	75.58	399	1,765	-1,352
17966+00.00	100.00	13.12	48	461	79.35	359	2,124	-1,663
17967+00.00	100.00	12.54	48	509	80.58	370	2,494	-1,985
17968+00.00	100.00	12.73	47	556	88.11	390	2,884	-2,328
17968+29.96	29.96	13.70	15	571	127.28	149	3,033	-2,462
17968+38.48	8.52	13.49	4	575	136.36	52	3,085	-2,510
17969+00.00	61.52	23.01	42	617	2.53	198	3,283	-2,666
17969+15.70	15.70	28.27	15	632	2.38	2	3,285	-2,653
17969+93.55	77.85	16.12	64	696	177.16	324	3,609	-2,913
17970+00.00	6.45	16.63	4	700	150.66	49	3,658	-2,958
17970+85.53	85.53	12.82	47	747	91.76	480	4,138	-3,391
17971+00.00	14.47	12.51	7	754	91.19	61	4,199	-3,445
17972+00.00	100.00	13.02	47	801	75.60	386	4,585	-3,784
17973+00.00	100.00	13.31	49	850	64.85	325	4,910	-4,060
17974+00.00	100.00	13.66	50	900	69.94	312	5,222	-4,322
17975+00.00	100.00	12.61	49	949	74.98	335	5,557	-4,608
17975+07.74	7.74	12.57	4	953	75.00	27	5,584	-4,631
17976+00.00	92.26	12.41	43	996	53.10	274	5,858	-4,862
17976+07.71	7.71	12.41	4	1,000	50.88	19	5,877	-4,877
17976+57.74	50.03	12.20	23	1,023	42.84	109	5,986	-4,963
17977+00.00	42.26	12.41	19	1,042	40.49	82	6,068	-5,026
17977+87.75	87.75	12.29	40	1,082	30.89	145	6,213	-5,131
17978+00.00	12.25	12.28	6	1,088	28.88	17	6,230	-5,142
17979+00.00	100.00	12.22	45	1,133	28.86	134	6,364	-5,231
17980+00.00	100.00	11.67	44	1,177	22.49	119	6,483	-5,306
17981+00.00	100.00	11.42	43	1,220	20.30	99	6,582	-5,362
17981+77.61	77.61	11.80	33	1,253	7.06	49	6,631	-5,378
Totals				**1,253**			**6,631**	

*An additional volume of 25% has been included to allow for shrinkage.

Earthwork - ND 32

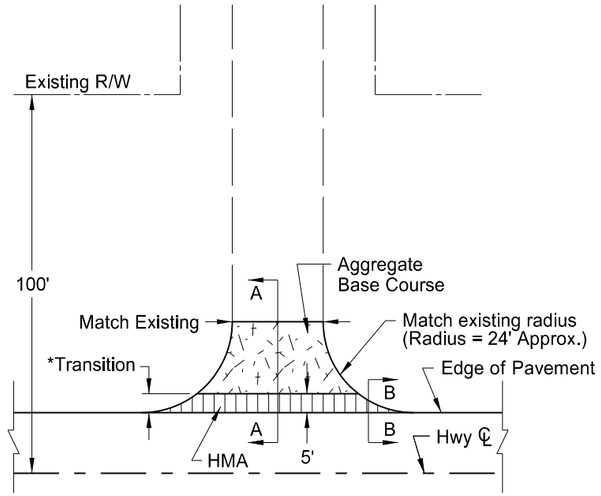
Sta	Distance	Common Excavation - Type A Area (SF)	Common Excavation - Type A Volume (CY)	Common Excavation - Type A Accumulated Volume (CY)	Embankment Area (SF)	Embankment Adjusted Volume (CY)*	Embankment Accumulated Volume (CY)	Mass Ordinate
1064+15.00		3.51			52.43			
1064+71.37	56.37	6.32	10	10	64.01	152	152	-142
1065+00.00	28.63	8.80	8	18	70.32	89	241	-223
1065+01.37	1.37	8.93	0	18	69.79	4	245	-227
1065+87.64	86.27	16.14	40	58	53.93	247	492	-434
1066+00.00	12.36	18.43	8	66	63.09	33	525	-459
1066+09.91	9.91	18.87	7	73	98.46	37	562	-489
Totals				**73**			**562**	

*An additional volume of 25% has been included to allow for shrinkage.

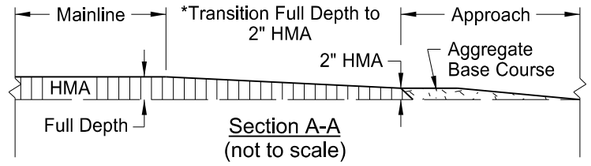
Earthwork – Average End Area Tables

ND 13 – Turn Lane Improvements

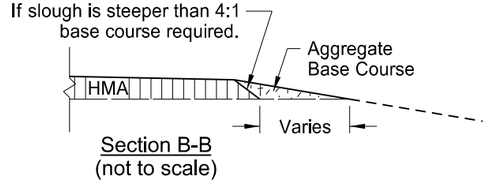
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	20	1



Gravel Field Drive Approach
Sta 17956+29.96



Section A-A
(not to scale)



Section B-B
(not to scale)

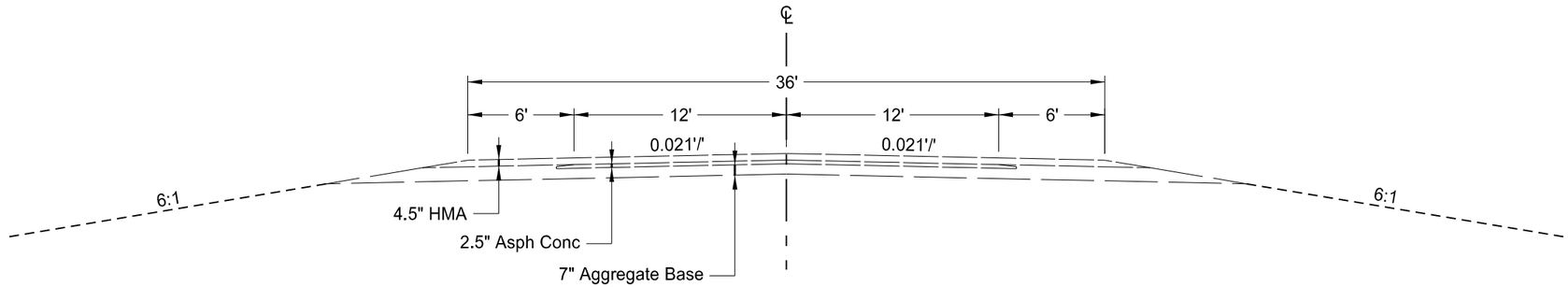
Notes:

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.
3. Aggregate base course has been provided in the quantities to fill in around the radii. This material will be required when sloughs are steeper than 4:1

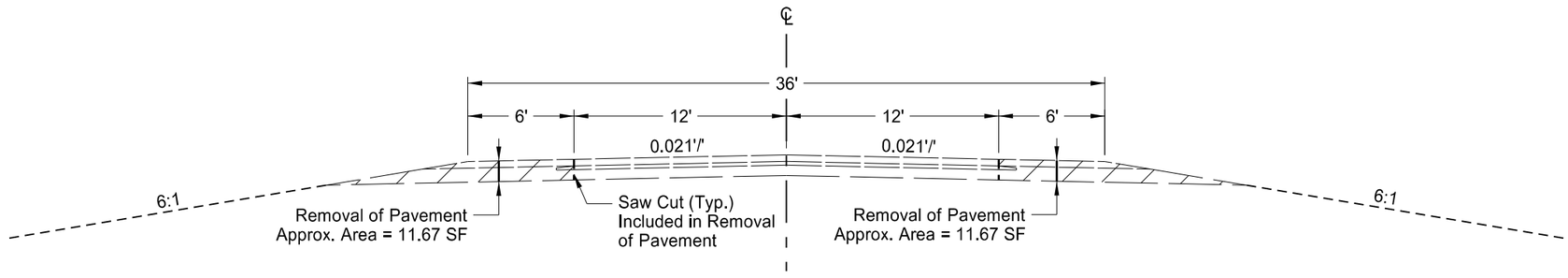
Approach Paving Details

ND 13 - Turn Lane Improvements

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	30	1



Existing Typical Section
Sta 17956+29.96 to Sta 17981+77.61 (Ex_ND13)



Removal Typical Section
Sta 17956+29.96 to Sta 17981+77.61 (Ex_ND13)

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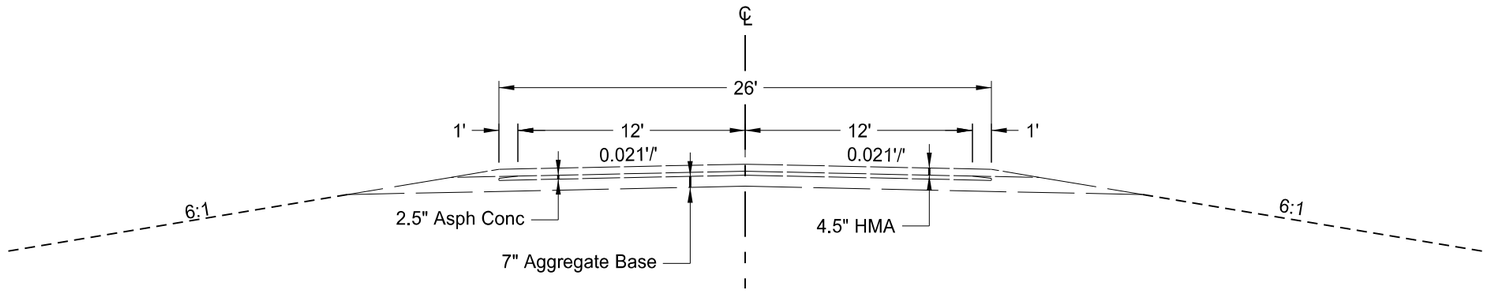
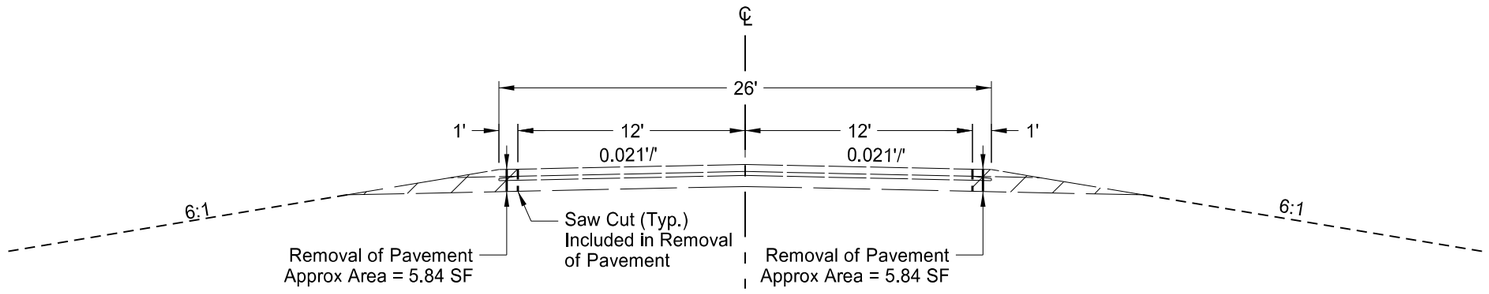
Existing Typical Section

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	30	2



Existing Typical Section
Sta 1064+15.00 to Sta 1066+82.40 (Ex_ND32)



Existing Typical Section
Sta 1064+15.00 to Sta 1066+82.40 (Ex_ND32)

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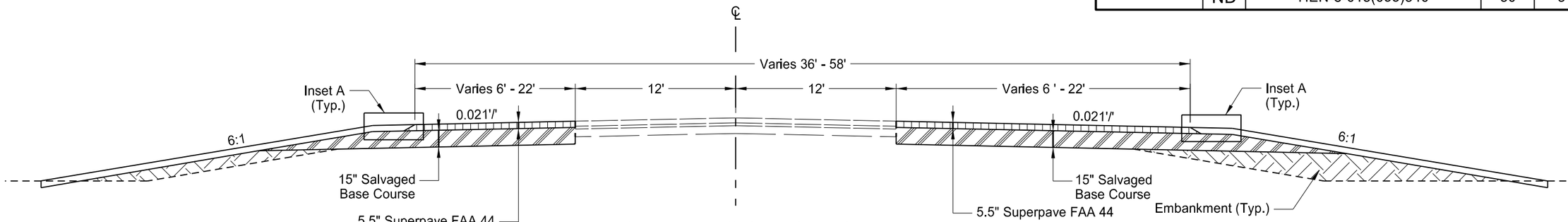
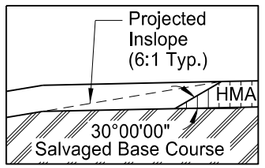
Existing Typical Section

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	30	3



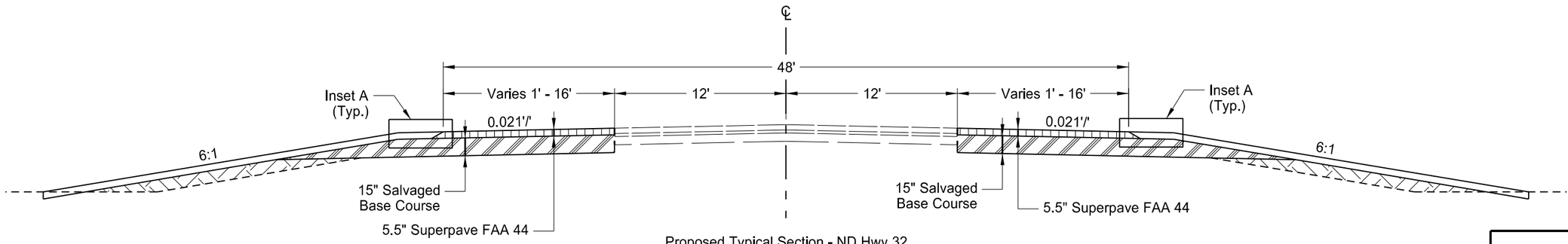
Proposed Typical Section - ND Hwy 13
Sta 17956+29.96 to Sta 17981+77.61 (Ex_ND13)



Inset A

Proposed Pavement Width							
Widening Lt				Widening Rt			
Begin Sta	Begin Width	End Sta	End Width	Begin Sta	Begin Width	End Sta	End Width
17956+29.96	6'	17961+99.86	12'	17956+29.96	6'	17960+19.82	12'
17961+99.86	12'	17968+38.48	12'	17960+19.82	12'	17961+49.82	12'
17969+93.55	22'	17975+07.74	22'	17961+49.82	12'	17962+99.82	22'
17975+07.74	22'	17976+57.74	12'	17962+99.82	22'	17968+29.96	22'
17976+57.74	12'	17977+87.75	12'	17970+85.53	12'	17976+07.71	12'
17977+87.75	12'	17981+77.61	6'	17976+07.71	12'	17981+77.61	6'

See Section 80 for Pavement Widths at Approach Roadways, Sta 17968+38.48 to Sta 17969+93.55 Lt & Sta 17968+29.96 to Sta 17970+85.53 Rt



Proposed Typical Section - ND Hwy 32
Sta 1064+15.00 to Sta 1066+82.40 (Ex_ND32)

Widening Lt				Widening Rt			
Begin Sta	Begin Width	End Sta	End Width	Begin Sta	Begin Width	End Sta	End Width
1064+71.37	1'	1065+01.37	4'	1064+15.00	1'	1064+45.00	4'
				1064+45.00	4'	1065+87.64	4'

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Proposed Typical Section

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	40	1

Item	Description	Quantity	Unit
202-0136	REMOVAL OF PAVEMENT		
	Aggregate Base		
	Sta 17956+29.96 Lt to 17981+77.61 Lt	1,509	Ton
	Sta 17956+29.96 Rt to 1064+71.37 Rt	1,003	Ton
	Sta 1064+15.00 Rt to 17981+77.61 Rt	998	Ton
	Subtotal	3,510	Ton
	Bituminous Pavement		
	Sta 17956+29.96 Lt to 17981+77.61 Lt	478	Ton
	Sta 17956+29.96 Rt to 1064+71.37 Rt	348	Ton
	Sta 1064+15.00 Rt to 17981+77.61 Rt	341	Ton
	Subtotal	1,167	Ton
	Total	4,677	Ton
202-0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES		
	Sta 17968+91.54 Lt to 17969+41.20 Lt	50	LF

17955+00 17960+00 17965+00 17970+00 17975+00 17980+00

Sec 24 T-132-N R-56-W

Sec 19 T-132-N R-55-W

Sec 25 T-132-N R-56-W

Sec 30 T-132-N R-55-W

ND 13 ND 32

1065+00 1060+00

17956+36 - 79' Lt
18" x 50' CSP (Fair)
1 CSES (W end, Fair)
1 CSES (E end, Poor)
TO REMAIN

Begin Removal of Pavement
Sta 17956+29.96 (Ex_ND13)
Offset 12' Lt (Ex_ND13)

Area = 1,549 SY
Length = 2,552 LF
4.5" HMA (Slough - 0.48 SF/LF)
9.5" Aggregate (Slough - 4.19 SF/LF)

17969+16 - 74' Lt
18" x 50' CSP (Fair)
2 CSES (Fair)
REMOVE

STA 17969+16.00 (Ex_ND13) =
STA 1066+82.40 (Ex_ND32)

End Removal of Pavement
Sta 17981+77.61 (Ex_ND13)
Offset 12' Lt (Ex_ND13)

Begin Removal of Pavement
Sta 17956+29.96 (Ex_ND13)
Offset 12' Rt (Ex_ND13)

17955+43 - 77' Rt
18" x 42' CSP (Fair)
2 CSES (Fair)
TO REMAIN

Area = 1,190 SY
Length = 1,425 LF
4.5" HMA (Slough - 0.48 SF/LF)
9.5" Aggregate (Slough - 4.19 SF/LF)

Sta 17968+65.92 (Ex_ND13)
Offset 12' Rt (Ex_ND13) =
Sta 1066+70.10 (Ex_ND32)
Offset 50' Lt (Ex_ND32)

Sta 17969+03.70 (Ex_ND13)
Offset 50' Rt (Ex_ND13) =
Sta 1066+32.32 (Ex_ND32)
Offset 12' Lt (Ex_ND32)

End Removal of Pavement
Sta 1064+71.37 (Ex_ND32)
Offset 12' Lt (Ex_ND32)

Sta 17969+66.06 (Ex_ND13)
Offset 12' Rt (Ex_ND13) =
Sta 1066+70.15 (Ex_ND32)
Offset 50' Rt (Ex_ND32)

Sta 17969+28.24 (Ex_ND13)
Offset 50' Rt (Ex_ND13) =
Sta 1066+32.34 (Ex_ND32)
Offset 12' Rt (Ex_ND32)

Begin Removal of Pavement
Sta 1064+15.00 (Ex_ND32)
Offset 12' Rt (Ex_ND32)

Area = 1,157 SY
Length = 1,464 LF
4.5" HMA (Slough - 0.48 SF/LF)
9.5" Aggregate (Slough - 4.19 SF/LF)

End Removal of Pavement
Sta 17981+77.61 (Ex_ND13)
Offset 12' Rt (Ex_ND13)

17969+21 - 771' Rt
24" x 54' RCP (Fair)
2 RCES (Fair)
TO REMAIN

Ex R/W

RW Mon GPS 1341 DICKEY R NET RW Mon Util Mkr RTK 101 Elec Ped FO Ped RW Mon DVELEC Ex R/W

Asph OTTR TL PWR 2 Util Mkrs S E W U DICKEY R NET

Range line Xing P.I. 17969+16.00

Removal of Pavement - HMA Surfacing & Agg Base

Saw Bituminous Surfacing - Full Depth

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Removals

ND 13 - Turn Lane Improvement

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	R1 Fabric (Pay Item)	(*) End Sections		Applicable Backfill Detail
				In	Bid Item	LF		In	Type		In	SY	Begin EA	End EA	
17968+70	65' Lt	17969+80	65' Lt	30	Pipe Conduit - Approach	110	Reinforced Concrete Pipe - Class III **(barrell length = 106 LF)**	30					FES	FES	D-203-8
							Corrugated Steel Pipe	30	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	30	Z, A, P	3/4, 1	0.064				
							High-Density Polyethylene	30							
17968+70	75' Lt	17969+80	75' Lt	30	Pipe Conduit - Approach	110	Reinforced Concrete Pipe - Class III **(barrell length = 106 LF)**	30					FES	FES	D-203-8
							Corrugated Steel Pipe	30	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	30	Z, A, P	3/4, 1	0.064				
							High-Density Polyethylene	30							

Coatings: **Z** = Zinc
A = Aluminum
P = Polymeric (over Zinc or Aluminum)

Corrugations: **2** = 2-2/3"x1/2"
3 = 3"x1"
5 = 5"x1"

Spiral Ribs: **3/4** = 3/4"x3/4"@7-1/2"
1 = 3/4"x1"@11-1/2"

(*) The price bid for "Pipe Conduit" bid items includes end sections. Pipe Extensions shall pay for end sections seperately.
FES = Flared End Section
TES = Traversable End Section

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Allowable Pipe List

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	75	1

N

PERMANENT WETLAND IMPACT

TEMPORARY WETLAND IMPACT

17955+00

17960+00

17965+00

Sec 24
T-132-N
R-56-W

17970+00

Sec 19
T-132-N
R-55-W

17975+00

17980+00

17956+36 - 79' Lt
18" x 50' CSP (Fair)
1 CSES (W end, Fair)
1 CSES (E end, Poor)

Wetland 1
No Impact

Ex R/W

Grading Tie Point

Wetland 2
No Impact

17969+16 - 74' Lt
18" x 50' CSP (Fair)
2 CSES (Fair)

Wetland 3
No Impact

Wetland 4
No Impact

ND 13

ND 13

17955+43 - 77' Rt
18" x 42' CSP (Fair)
2 CSES (Fair)

Wetland 5b
No Impact

Wetland 5a
No Impact

Ex R/W

Grading Tie Point

Sec 25
T-132-N
R-56-W

Wetland 6a
Permanent Impacts
Wetland = 0.06 Acres
Temporary Impacts
Wetland = 0.11 Acres

ND 32

Wetland 6c
No Impact

Sec 30
T-132-N
R-55-W

Wetland 6b
No Impact

1060+00

17969+21 - 771' Rt
24" x 54' RCP (Fair)
2 RCES (Fair)
TO REMAIN

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Wetland Impacts & Mitigation

ND 13 - Turn Lane Improvement

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	76	1

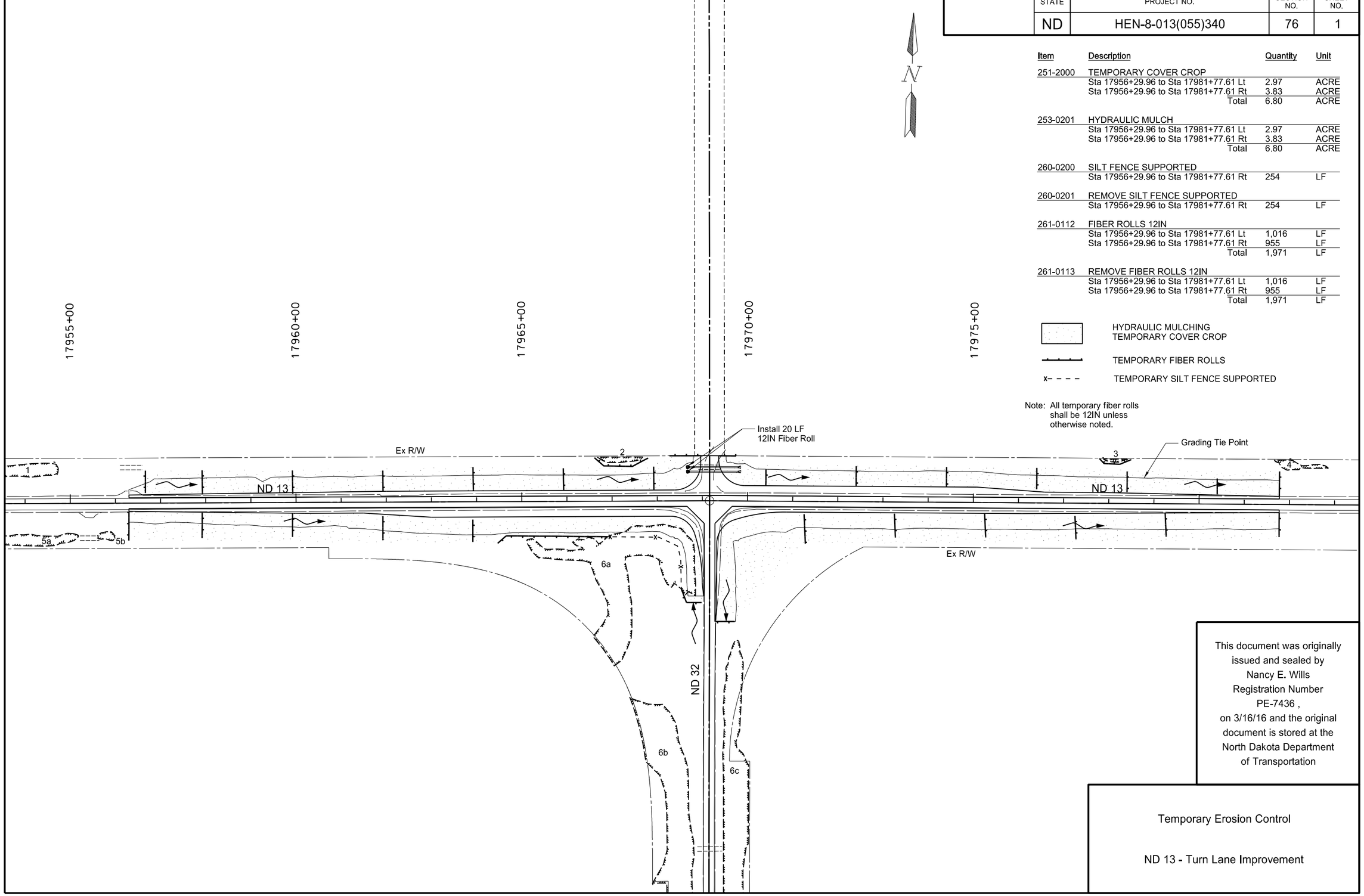
Item	Description	Quantity	Unit
251-2000	TEMPORARY COVER CROP		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	2.97	ACRE
	Sta 17956+29.96 to Sta 17981+77.61 Rt	3.83	ACRE
	Total	6.80	ACRE
253-0201	HYDRAULIC MULCH		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	2.97	ACRE
	Sta 17956+29.96 to Sta 17981+77.61 Rt	3.83	ACRE
	Total	6.80	ACRE
260-0200	SILT FENCE SUPPORTED		
	Sta 17956+29.96 to Sta 17981+77.61 Rt	254	LF
260-0201	REMOVE SILT FENCE SUPPORTED		
	Sta 17956+29.96 to Sta 17981+77.61 Rt	254	LF
261-0112	FIBER ROLLS 12IN		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	1,016	LF
	Sta 17956+29.96 to Sta 17981+77.61 Rt	955	LF
	Total	1,971	LF
261-0113	REMOVE FIBER ROLLS 12IN		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	1,016	LF
	Sta 17956+29.96 to Sta 17981+77.61 Rt	955	LF
	Total	1,971	LF

HYDRAULIC MULCHING
TEMPORARY COVER CROP

TEMPORARY FIBER ROLLS

TEMPORARY SILT FENCE SUPPORTED

Note: All temporary fiber rolls shall be 12IN unless otherwise noted.



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Temporary Erosion Control

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	76	2

Temporary 12IN Fiber Rolls				
Sheet 1 - Sta 17956+29.96 to Sta 17981+77.61				
Start Sta	Offset	End Sta	Offset	Length (LF)
17956+29	83' Rt	17956+30	20' Rt	63
17956+67	72' Lt	17956+67	22' Lt	49
17957+92	78' Rt	17957+92	22' Rt	56
17957+92	72' Lt	17957+93	19' Lt	53
17959+92	76' Rt	17959+92	24' Rt	52
17959+92	71' Lt	17959+93	19' Lt	52
17961+92	85' Rt	17961+92	31' Rt	53
17961+92	70' Lt	17961+93	23' Lt	47
17963+91	89' Rt	17963+92	40' Rt	49
17963+92	77' Lt	17963+93	24' Lt	53
17964+46	92' Rt	17964+65	76' Rt	25
17964+65	76' Rt	17966+89	79' Rt	224
17965+92	73' Lt	17965+93	24' Lt	49
17966+61	96' Lt	17967+80	95' Lt	130
17967+92	76' Lt	17967+93	24' Lt	52
17968+28	100' Lt	17968+97	100' Lt	69
17968+52	195' Rt	17968+64	225' Rt	32
17968+64	225' Rt	17968+97	225' Rt	33
17968+65	77' Lt	17968+71	75' Lt	20
17968+66	67' Lt	17968+71	65' Lt	20
17969+32	267' Rt	17969+73	267' Rt	41
17969+36	100' Lt	17969+74	100' Lt	39
17970+40	70' Lt	17970+40	35' Lt	35
17971+25	28' Rt	17971+29	94' Rt	65
17972+40	79' Lt	17972+40	35' Lt	44
17973+25	26' Rt	17973+28	79' Rt	53
17974+40	78' Lt	17974+40	34' Lt	44
17975+25	25' Rt	17975+28	77' Rt	52
17976+40	77' Lt	17976+40	30' Lt	47
17977+25	28' Rt	17977+28	80' Rt	52
17977+79	99' Lt	17978+49	97' Lt	77
17978+40	71' Lt	17978+40	25' Lt	46
17979+25	21' Rt	17979+28	73' Rt	52
17980+40	57' Lt	17980+40	21' Lt	35
17981+78	18' Lt	17981+78	73' Lt	55
17981+78	19' Rt	17981+78	72' Rt	53
			Total	1,971

Temporary Silt Fence				
Sheet 1 - Sta 17956+29.96 to Sta 17981+77.61				
Start Sta	Offset	End Sta	Offset	Length (LF)
17966+91	79' Rt	17968+52	195' Rt	254
			Total	254

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Temporary Fiber Roll Table

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	77	1

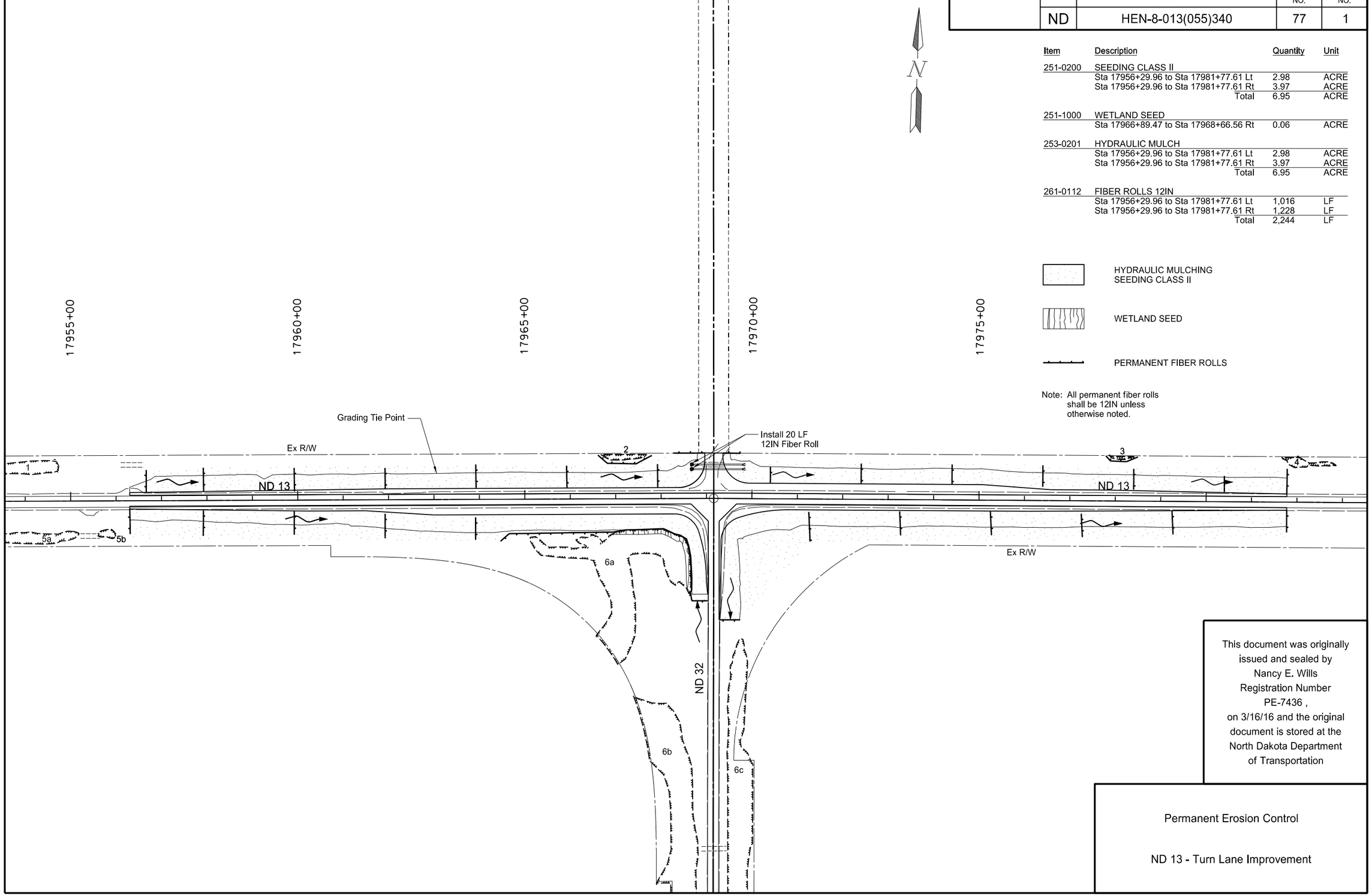
Item	Description	Quantity	Unit
251-0200	SEEDING CLASS II		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	2.98	ACRE
	Sta 17956+29.96 to Sta 17981+77.61 Rt	3.97	ACRE
	Total	6.95	ACRE
251-1000	WETLAND SEED		
	Sta 17966+89.47 to Sta 17968+66.56 Rt	0.06	ACRE
253-0201	HYDRAULIC MULCH		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	2.98	ACRE
	Sta 17956+29.96 to Sta 17981+77.61 Rt	3.97	ACRE
	Total	6.95	ACRE
261-0112	FIBER ROLLS 12IN		
	Sta 17956+29.96 to Sta 17981+77.61 Lt	1,016	LF
	Sta 17956+29.96 to Sta 17981+77.61 Rt	1,228	LF
	Total	2,244	LF

HYDRAULIC MULCHING
SEEDING CLASS II

WETLAND SEED

PERMANENT FIBER ROLLS

Note: All permanent fiber rolls shall be 12IN unless otherwise noted.



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Permanent Erosion Control

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	77	2

Permanent 12IN Fiber Rolls				
Sheet 1 - Sta 17956+29.96 to Sta 17981+77.61				
Start Sta	Offset	End Sta	Offset	Length (LF)
17956+30	18' Rt	17956+31	73' Rt	55
17956+67	68' Lt	17956+67	18' Lt	49
17957+92	78' Rt	17957+92	22' Rt	56
17957+92	72' Lt	17957+93	19' Lt	53
17959+92	76' Rt	17959+92	24' Rt	52
17959+92	71' Lt	17959+93	19' Lt	52
17961+92	85' Rt	17961+92	31' Rt	53
17961+92	70' Lt	17961+93	23' Lt	47
17963+91	89' Rt	17963+92	40' Rt	49
17963+92	77' Lt	17963+93	24' Lt	53
17964+46	92' Rt	17964+65	76' Rt	25
17964+65	76' Rt	17966+94	73' Rt	229
17965+92	73' Lt	17965+93	24' Lt	49
17966+61	96' Lt	17967+80	95' Lt	130
17966+94	73' Rt	17967+20	69' Rt	26
17967+20	69' Rt	17968+67	174' Rt	260
17967+92	76' Lt	17967+93	24' Lt	52
17968+28	100' Lt	17968+97	100' Lt	69
17968+64	206' Rt	17968+67	225' Rt	20
17968+65	67' Lt	17968+71	65' Lt	20
17968+65	77' Lt	17968+71	75' Lt	20
17968+67	225' Rt	17969+02	225' Rt	36
17969+32	267' Rt	17969+76	267' Rt	44
17969+36	100' Lt	17969+74	100' Lt	39
17970+40	70' Lt	17970+40	35' Lt	35
17971+25	28' Rt	17971+29	94' Rt	65
17972+40	79' Lt	17972+40	35' Lt	44
17973+25	26' Rt	17973+28	79' Rt	53
17974+40	78' Lt	17974+40	34' Lt	44
17975+25	25' Rt	17975+28	77' Rt	52
17976+40	77' Lt	17976+40	30' Lt	47
17977+25	28' Rt	17977+28	80' Rt	52
17977+79	99' Lt	17978+49	97' Lt	77
17978+40	71' Lt	17978+40	25' Lt	46
17979+25	21' Rt	17979+28	73' Rt	52
17980+40	57' Lt	17980+40	21' Lt	35
17981+78	67' Rt	17981+78	18' Rt	49
17981+78	18' Lt	17981+78	73' Lt	55
			Total	2,244

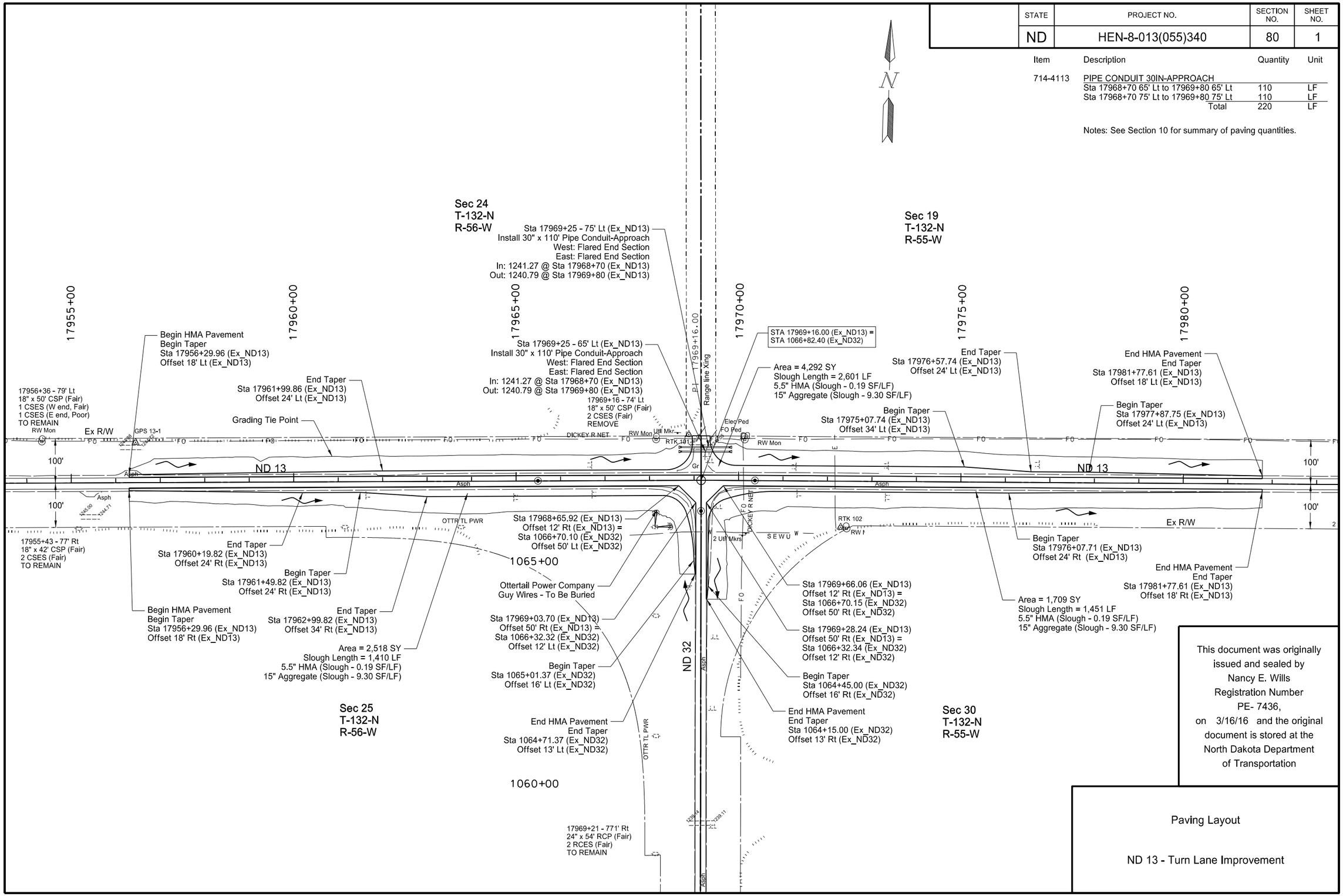
Permanent Fiber Roll Table

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	80	1

Item	Description	Quantity	Unit
714-4113	PIPE CONDUIT 30IN-APPROACH		
	Sta 17968+70 65' Lt to 17969+80 65' Lt	110	LF
	Sta 17968+70 75' Lt to 17969+80 75' Lt	110	LF
	Total	220	LF

Notes: See Section 10 for summary of paving quantities.



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Paving Layout

ND 13 - Turn Lane Improvement

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - TURN LANE IMPROVEMENTS - ND 13 & JCT ND 32

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
ND 13 (Chain: EX_ND13)			
BEG	17942+80.31	217016.70	2691569.59
PI	17969+16.00	217108.64	2694203.67
END	17995+56.61	217172.24	2696843.52
ND 32 (Chain: EX_ND32)			
BEG	1040+34.18	214461.53	2694280.27
END	1066+82.40	217108.64	2694203.67
ND32 (Chain: CURVE_ND32, Office created alignment)			
PC BEG	1061+05.93	216532.41	2694220.34
PI C21	1066+82.40	217108.64	2694203.67
PT END	1070+09.86	217122.52	2694779.97
ND32 (Chain: TN_LN_SPIRAL32, Office created alignment)			
TS BEG	1058+38.71	216265.30	2694228.07
SC	1063+38.71	216753.61	2694142.26
PI SCS41	1066+82.40	217108.64	2694203.67
CS	1067+43.28	217024.72	2693853.28
ST END	1066+82.40	217108.63	2694203.66

CURVE DATA

ARC DEFINITION

C21

PI STA = 1066+82.40
Delta = 90° 16' 38" RT
Da = 9° 59' 14"
R = 573.69'
T = 576.47'
L = 903.93'

SCS41

PI STA = 1066+82.40
Delta = 90° 20' 29" LT
Da = 9° 59' 14"
R = 573.69'
Ls = 500.00'
Sc = 24° 58' 05"
Ts = 843.69'
L = 404.57'

US PUBLIC LAND SURVEY DATA

DESC.	SEC-TWP-RGE	NORTHING	EASTING
NE SEC COR	SEC 24 T-132-N R-56-W	222397.59	2694037.48
S 1/4 COR	SEC 24 T-132-N R-56-W	217016.70	2691569.59
NW SEC COR	SEC 25 T-132-N R-56-W	216912.18	2688926.40
E 1/4 COR	SEC 25 T-132-N R-56-W	214461.53	2694280.27
SE SEC COR	SEC 25 T-132-N R-56-W	211823.02	2694357.35
NW SEC COR	SEC 30 T-132-N R-55-W	217108.64	2694203.67
N 1/4 COR	SEC 30 T-132-N R-55-W	217172.24	2696843.52
NE SEC COR	SEC 30 T-132-N R-55-W	217235.42	2699481.02

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET
CONTROL POINT DESCRIPTION					
PRIMARY CONTROL					
GPS 13-1	217154.73	2692930.00	1249.60	17956+45	90' Lt
#6 Rebar w/Alum Cap stamped "ND-DOT GPS CONTROL"					
GPS 13-2	217133.49	2699446.74	1235.09	NA	NA
#6 Rebar w/Alum Cap stamped "ND-DOT GPS CONTROL"					
SECONDARY CONTROL					
RTK 100	216904.03	2691373.28	1248.98	NA	NA
RTK 101	217210.40	2694172.78	1244.58	17968+89	103' Lt
RTK 102	217012.72	2694520.36	1242.07	17972+30	104' Rt
RTK 103	217253.61	2695945.10	1237.39	17986+60	103' Lt

REFERENCE MARKERS

R Mkr #	NORTHING	EASTING	STATION	O/S	ALIGMENT
20	216053.99	2694259.94	17969+47	1056' Rt	EX ND13

NOTES:

Date Survey Completed 8/5/2015

☐ Assumed Coordinates

☒ All coordinates on this sheet are Sargent County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9999595

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

INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88
☐ NGVD-29

☐ GEOID 09 ☐ _____
☒ GEOID 12A

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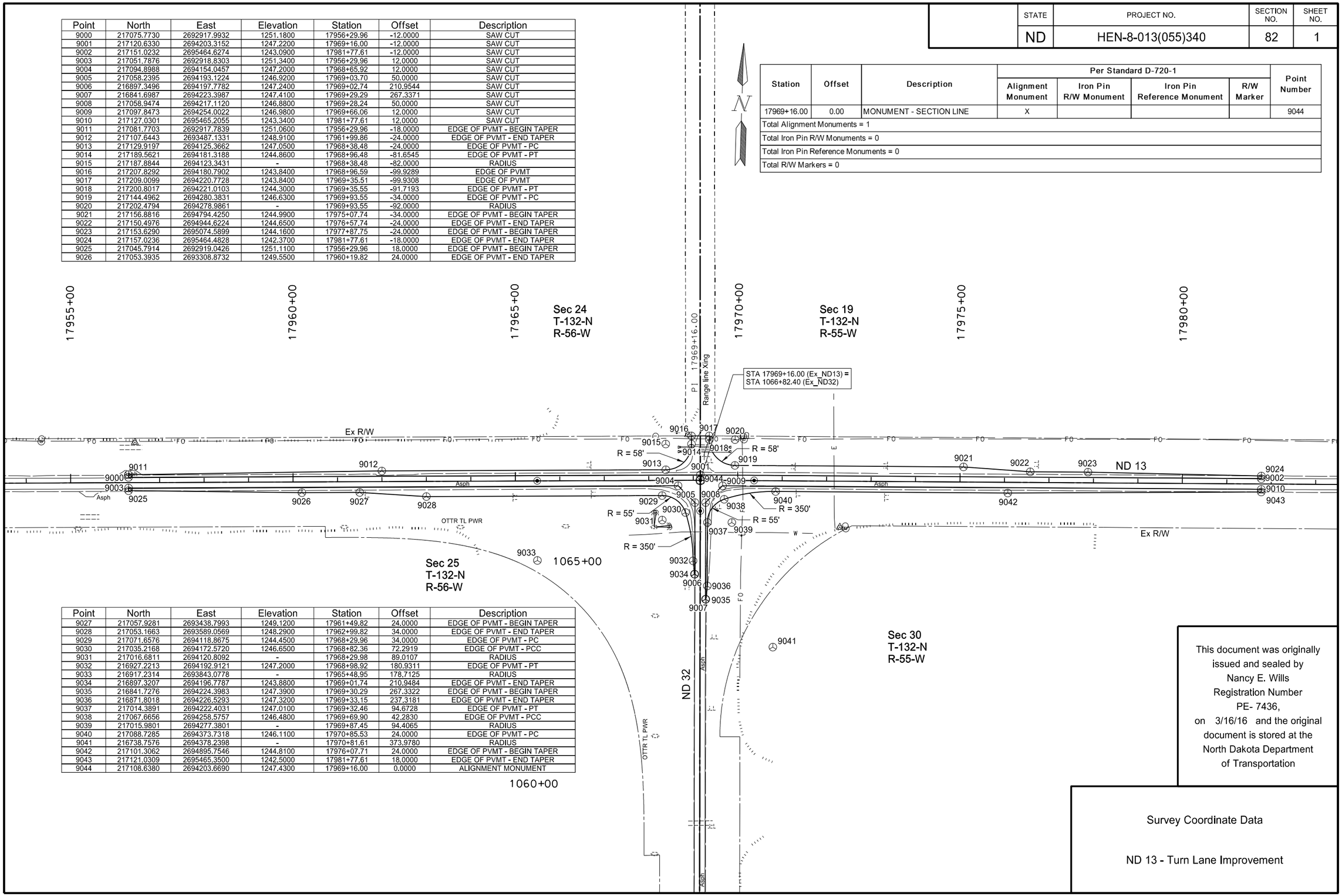
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	82	1

Point	North	East	Elevation	Station	Offset	Description
9000	217075.7730	2692917.9932	1251.1800	17956+29.96	-12.0000	SAW CUT
9001	217120.6330	2694203.3152	1247.2200	17969+16.00	-12.0000	SAW CUT
9002	217151.0232	2695464.6274	1243.0900	17981+77.61	-12.0000	SAW CUT
9003	217051.7876	2692918.8303	1251.3400	17956+29.96	12.0000	SAW CUT
9004	217094.8988	2694154.0457	1247.2000	17968+65.92	12.0000	SAW CUT
9005	217058.2395	2694193.1224	1246.9200	17969+03.70	50.0000	SAW CUT
9006	216897.3496	2694197.7782	1247.2400	17969+02.74	210.9544	SAW CUT
9007	216841.6987	2694223.3987	1247.4100	17969+29.29	267.3371	SAW CUT
9008	217058.9474	2694217.1120	1246.8800	17969+28.24	50.0000	SAW CUT
9009	217097.8473	2694254.0022	1246.9800	17969+66.06	12.0000	SAW CUT
9010	217127.0301	2695465.2055	1243.3400	17981+77.61	12.0000	SAW CUT
9011	217081.7703	2692917.7839	1251.0600	17956+29.96	-18.0000	EDGE OF PVMT - BEGIN TAPER
9012	217107.6443	2693487.1331	1248.9100	17961+99.86	-24.0000	EDGE OF PVMT - END TAPER
9013	217129.9197	2694125.3662	1247.0500	17968+38.48	-24.0000	EDGE OF PVMT - PC
9014	217189.5621	2694181.3188	1244.8600	17968+96.48	-81.6545	EDGE OF PVMT - PT
9015	217187.8844	2694123.3431	-	17968+38.48	-82.0000	RADIUS
9016	217207.8292	2694180.7902	1243.8400	17968+96.59	-99.9289	EDGE OF PVMT
9017	217209.0099	2694220.7728	1243.8400	17969+35.51	-99.9308	EDGE OF PVMT
9018	217200.8017	2694221.0103	1244.3000	17969+35.55	-91.7193	EDGE OF PVMT - PT
9019	217144.4962	2694280.3831	1246.6300	17969+93.55	-34.0000	EDGE OF PVMT - PC
9020	217202.4794	2694278.9861	-	17969+93.55	-92.0000	RADIUS
9021	217156.8816	2694794.4250	1244.9900	17975+07.74	-34.0000	EDGE OF PVMT - BEGIN TAPER
9022	217150.4976	2694944.6224	1244.6500	17976+57.74	-24.0000	EDGE OF PVMT - END TAPER
9023	217153.6290	2695074.5899	1244.1600	17977+87.75	-24.0000	EDGE OF PVMT - BEGIN TAPER
9024	217157.0236	2695464.4828	1242.3700	17981+77.61	-18.0000	EDGE OF PVMT - END TAPER
9025	217045.7914	2692919.0426	1251.1100	17956+29.96	18.0000	EDGE OF PVMT - BEGIN TAPER
9026	217053.3935	2693308.8732	1249.5500	17960+19.82	24.0000	EDGE OF PVMT - END TAPER

Point	North	East	Elevation	Station	Offset	Description
9027	217057.9281	2693438.7993	1249.1200	17961+49.82	24.0000	EDGE OF PVMT - BEGIN TAPER
9028	217053.1663	2693589.0569	1248.2900	17962+99.82	34.0000	EDGE OF PVMT - END TAPER
9029	217071.6576	2694118.8675	1244.4500	17968+29.96	34.0000	EDGE OF PVMT - PC
9030	217035.2168	2694172.5720	1246.6500	17968+82.36	72.2919	EDGE OF PVMT - PCC
9031	217016.6811	2694120.8092	-	17968+29.98	89.0107	RADIUS
9032	216927.2213	2694192.9121	1247.2000	17968+98.92	180.9311	EDGE OF PVMT - PT
9033	216917.2314	2693843.0778	-	17965+48.95	178.7125	RADIUS
9034	216897.3207	2694196.7787	1243.8800	17969+01.74	210.9484	EDGE OF PVMT - END TAPER
9035	216841.7276	2694224.3983	1247.3900	17969+30.29	267.3322	EDGE OF PVMT - BEGIN TAPER
9036	216871.8018	2694226.5293	1247.3200	17969+33.15	237.3181	EDGE OF PVMT - END TAPER
9037	217014.3891	2694222.4031	1247.0100	17969+32.46	94.6728	EDGE OF PVMT - PT
9038	217067.6656	2694258.5757	1246.4800	17969+69.90	42.2830	EDGE OF PVMT - PCC
9039	217015.9801	2694277.3801	-	17969+87.45	94.4065	RADIUS
9040	217088.7285	2694373.7318	1246.1100	17970+85.53	24.0000	EDGE OF PVMT - PC
9041	216738.7576	2694378.2398	-	17970+81.61	373.9780	RADIUS
9042	217101.3062	2694895.7546	1244.8100	17976+07.71	24.0000	EDGE OF PVMT - BEGIN TAPER
9043	217121.0309	2695465.3500	1242.5000	17981+77.61	18.0000	EDGE OF PVMT - END TAPER
9044	217108.6380	2694203.6690	1247.4300	17969+16.00	0.0000	ALIGNMENT MONUMENT

Station	Offset	Description	Per Standard D-720-1				Point Number
			Alignment Monument	Iron Pin R/W Monument	Iron Pin Reference Monument	R/W Marker	
17969+16.00	0.00	MONUMENT - SECTION LINE	X				9044
Total Alignment Monuments = 1							
Total Iron Pin R/W Monuments = 0							
Total Iron Pin Reference Monuments = 0							
Total R/W Markers = 0							



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Survey Coordinate Data

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2a	2b		TOTAL 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						34	
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**	**3**	**3**	**3**		**3**	**19**	**57**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)						18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**	**2**	**2**		**2**	**64**	**128**
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS						37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW						30	
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**3**	**3**	**3**		**3**	**59**	**177**
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**	**2**	**2**		**2**	**32**	**64**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**3**	**3**	**3**		**3**	**5**	**15**
R1-2-60	60"x60"	YIELD						29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**4**	**4**	**4**		**4**	**39**	**156**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**2**	**2**	**2**		**2**	**10**	**20**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT						35	
R4-1-48	48"x60"	DO NOT PASS						39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL						39	
R5-1-48	48"x48"	DO NOT ENTER						35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT						13	
R7-1-12	12"x18"	NO PARKING						11	
R10-6-24	24"x36"	STOP HERE ON RED						16	
R11-2-48	48"x30"	ROAD CLOSED						28	
R11-2a-48	48"x30"	STREET CLOSED						28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY						31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY						31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC						31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW						35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW						35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW						35	
W1-6-48	48"x24"	LARGE ARROW						26	
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**	**2**	**2**	**2**		**2**	**35**	**70**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**2**	**2**	**2**		**2**	**35**	**70**
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**	**2**	**2**	**2**		**2**	**35**	**70**
W8-3-48	48"x48"	PAVEMENT ENDS						35	
W8-7-48	48"x48"	LOOSE GRAVEL						35	
W8-9a-48	**48"x48"**	**SHOULDER DROP-OFF**	**3**	**3**	**3**		**3**	**35**	**105**
W8-11-48	**48"x48"**	**UNEVEN LANES**	**2**	**2**	**2**		**2**	**35**	**70**
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**	**2**	**2**		**2**	**35**	**70**
W8-55-48	**48"x48"**	**TRUCKS CROSSING AHEAD or __ FT.**	**2**	**2**	**2**		**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)						11	
W13-4-48	48"x60"	RAMP ARROW						39	
W14-3-48	48"x36"	NO PASSING ZONE						23	
W16-2-30	**30"x24"**	**XXX FEET**	**3**	**3**	**3**		**3**	**15**	**45**
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**3**	**3**	**3**		**3**	**35**	**105**
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.**	**3**	**3**	**3**		**3**	**35**	**105**
W20-5-48	48"x48"	RIGHT or LEFT LANE CLOSED AHEAD or __ FT.						35	
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**3**	**3**	**3**		**3**	**35**	**105**
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)**	**3**	**3**	**3**		**3**	**12**	**36**
W21-1a-48	48"x48"	WORKERS SYMBOL						35	
W21-2-48	**48"x48"**	**FRESH OIL**	**2**	**2**	**2**		**2**	**35**	**70**

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2a	2b		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT						35	
W21-5-48	**48"x48"**	**SHOULDER WORK**	**2**	**2**	**2**		**2**	**35**	**70**
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

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**1678**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY BY PHASE NO. 1	2a	2b		TOTAL QUANTITY
704-0100	**FLAGGING**	MHR	**240**	**120**	**120**		**480**
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	**5**	**5**	**5**		**5**
704-1060	**DELINEATOR DRUMS**	EACH	**20**	**10**	**10**		**20**
704-1065	TRAFFIC CONES	EACH					
704-1067	**TUBULAR MARKERS**	EACH	**45**	**25**	**25**		**45**
704-1070	DELINEATOR	EACH					
704-1072	FLEXIBLE DELINEATORS	EACH					
704-1080	**STACKABLE VERTICAL PANELS**	EACH	**45**	**25**	**25**		**45**
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					
704-1500	**OBLITERATION OF PVMT MK**	SF	**25**		**3030**		**3055**
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			**13368**		**13368**
762-0434	**SHORT TERM 8IN LINE - TYPE NR**	LF			**2585**		**2585**
762-0436	**SHORT TERM 24IN LINE - TYPE NR**	LF			**33**		**33**
762-0442	**SHORT TERM MESSAGE - TYPE NR**	SF			**192**		**192**
772-2110	FLASHING BEACON - POST MOUNTED	EACH					

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

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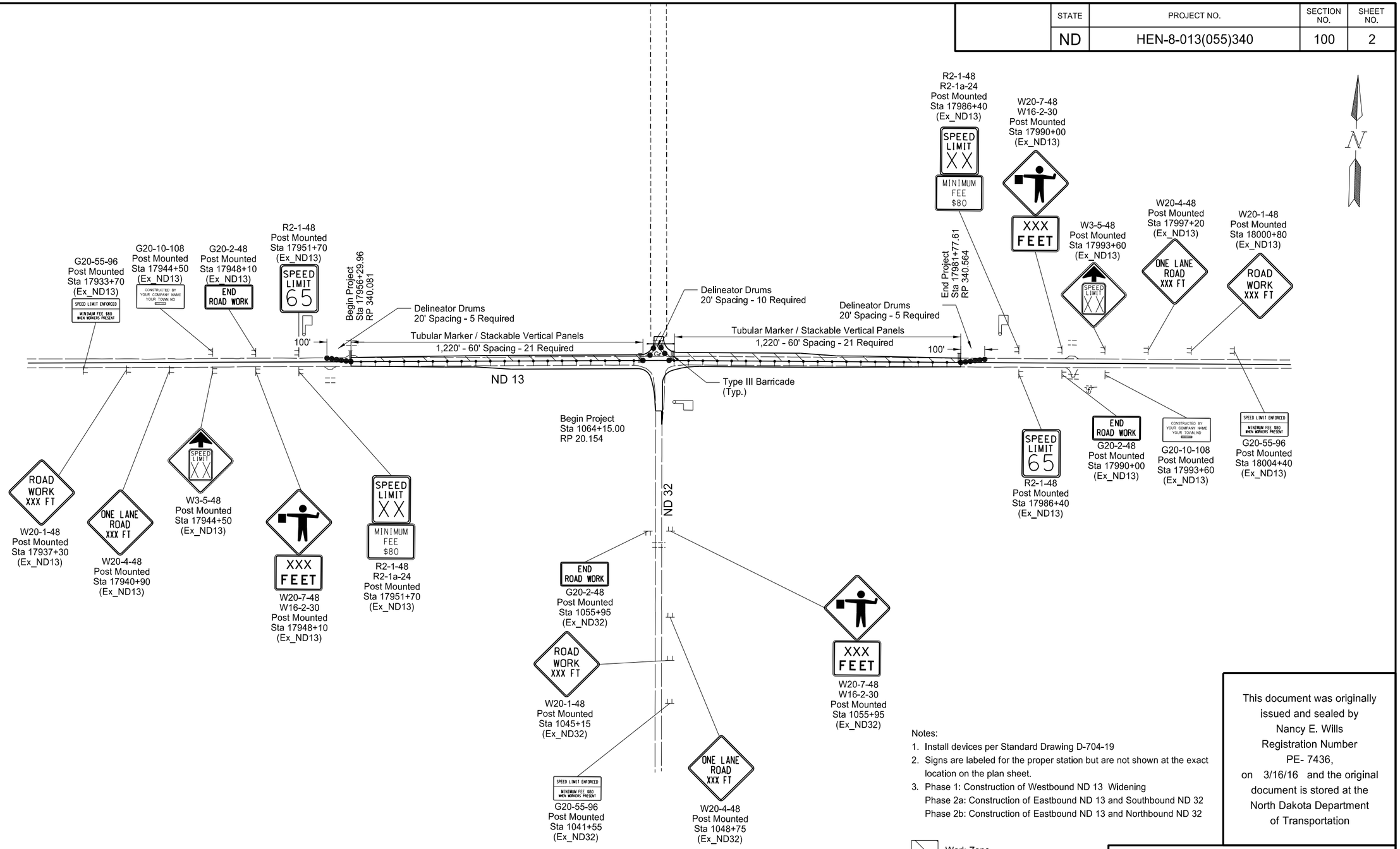
Traffic Control Devices List

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	100	2



Notes:
1. Install devices per Standard Drawing D-704-19
2. Signs are labeled for the proper station but are not shown at the exact location on the plan sheet.
3. Phase 1: Construction of Westbound ND 13 Widening
   Phase 2a: Construction of Eastbound ND 13 and Southbound ND 32
   Phase 2b: Construction of Eastbound ND 13 and Northbound ND 32

Work Zone
Flagger
Tubular Marker
Delineator Drum
Barricade Type III

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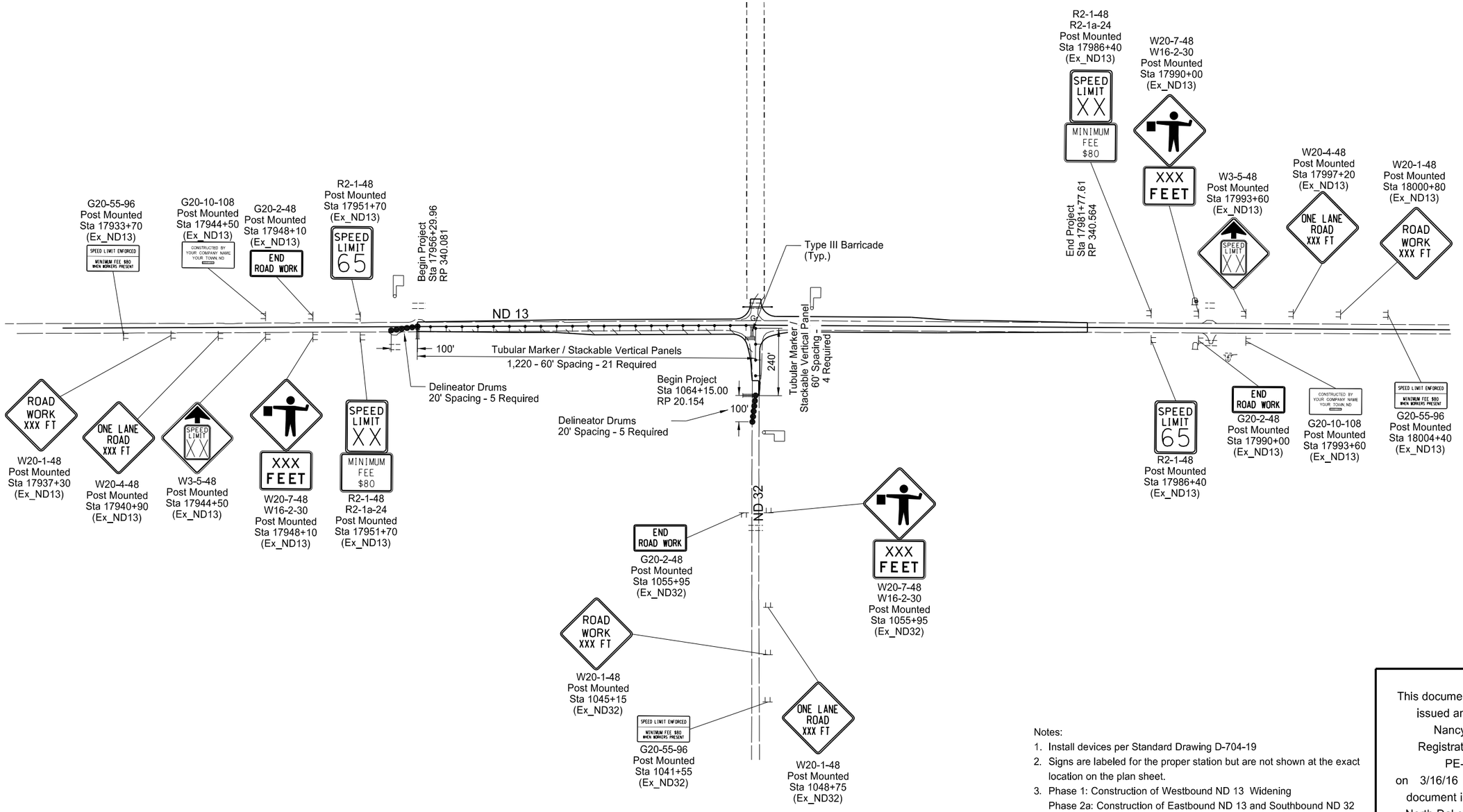
Construction Sign Layout Phase 1

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	100	3



Notes:
1. Install devices per Standard Drawing D-704-19
2. Signs are labeled for the proper station but are not shown at the exact location on the plan sheet.
3. Phase 1: Construction of Westbound ND 13 Widening
   Phase 2a: Construction of Eastbound ND 13 and Southbound ND 32
   Phase 2b: Construction of Eastbound ND 13 and Northbound ND 32

Work Zone
Flagger
Tubular Marker
Delineator Drum
Barricade Type III

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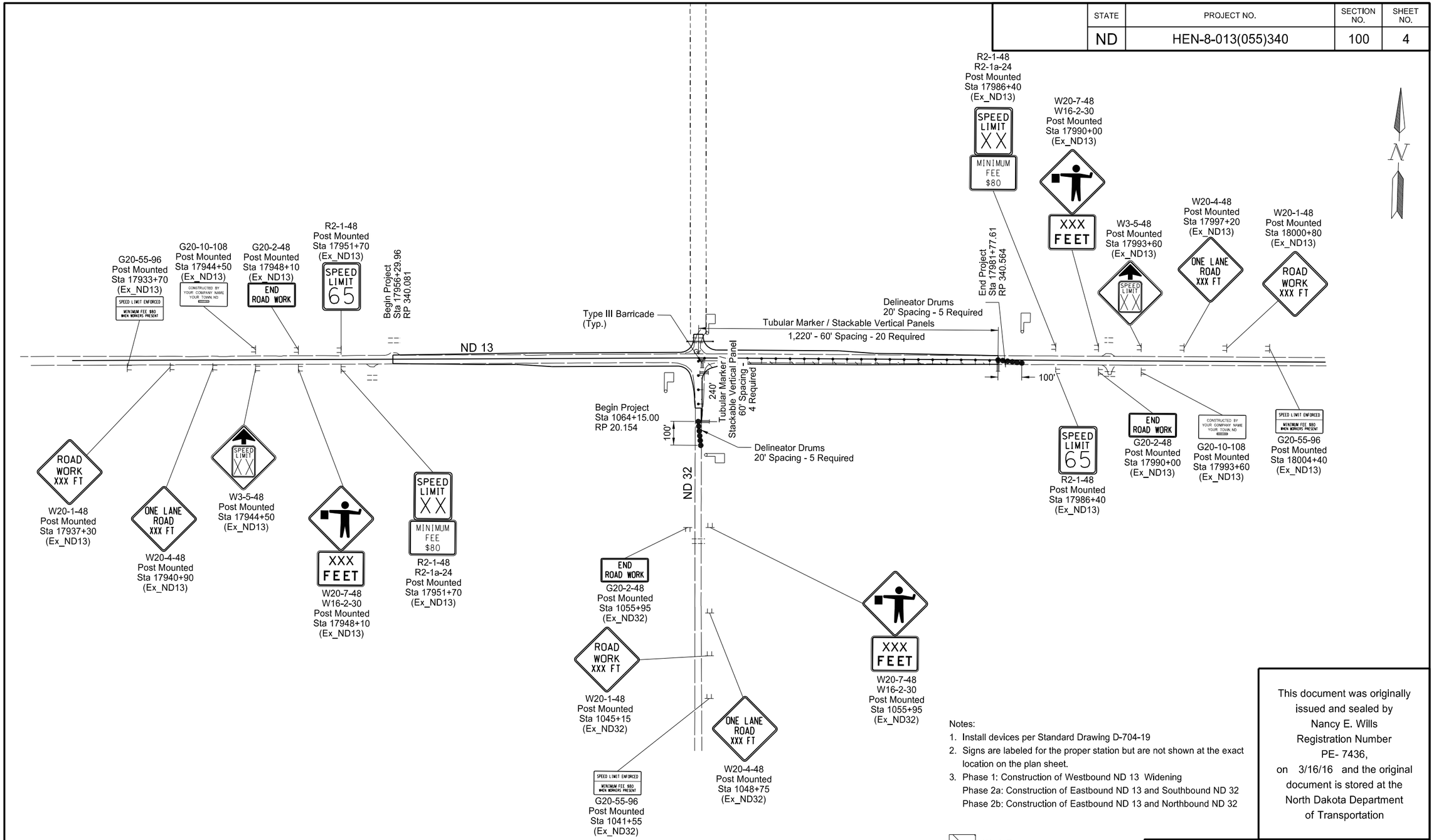
Construction Sign Layout Phase 2a

ND 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	100	4



Notes:

1. Install devices per Standard Drawing D-704-19
2. Signs are labeled for the proper station but are not shown at the exact location on the plan sheet.
3. Phase 1: Construction of Westbound ND 13 Widening
   Phase 2a: Construction of Eastbound ND 13 and Southbound ND 32
   Phase 2b: Construction of Eastbound ND 13 and Northbound ND 32

Work Zone
Flagger
Tubular Marker
Delineator Drum
Barricade Type III

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Construction Sign Layout Phase 2b

ND 13 - Turn Lane Improvement

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	HEN-8-013(055)340	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 13																						
17955+00 Rt			10.2		10.8				2.5 x 2.5 12 ga	13.5	2.5				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga	1		1	
17959+00 Rt					10.9	11.5			2.5 x 2.5 10 ga	12.3	3.3	4.0			2.19 x 2.19 10 ga	2	4	3 x 3 7 ga	1		2	
17962+40 Lt		9		5.0	10.5				2 x 2 12 ga	11.5						1	4	2.25 x 2.25 12 ga				
17963+00 Rt			8.0		11.1				2.5 x 2.5 12 ga	13.5	2.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga	1		1	
17966+40 Lt			8.0		10.7				2.5 x 2.5 12 ga	13.8	2.3				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga	1		1	
17968+70 Lt		1		5.2	9.7				2 x 2 12 ga	10.5						1	4	2.25 x 2.25 12 ga				
17969+64 Lt		405	12.4		10.8				2.5 x 2.5 12 ga	13.5	2.5				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
17972+15 Rt		371	6.0		11.1				2.25 x 2.25 12 ga	12.9						1	4	2.5 x 2.5 12 ga				
17975+05 Lt			8.0		11.1				2.5 x 2.5 12 ga	13.5	2.8				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga	1		1	
17976+15 Rt		9		5.0	10.5				2 x 2 12 ga	11.5						1	4	2.25 x 2.25 12 ga				
17979+05 Lt					11.0	11.4	11.8		2.25 x 2.25 12 ga	13.3	2.8	3.2	3.7		2 x 2 12 ga	3	4	3 x 3 7 ga	1		3	
17983+05 Lt			4.0		11.1				2.25 x 2.25 12 ga	12.7						1	4	2.5 x 2.5 12 ga	1			
Sub Total			56.6	15.2		**Total**	164.2									**Total**	60		7	0	10	
ND 32																						
1059+00 Rt			4.0																1			Mount on Existing Supports
1060+30 Lt		9		5.0	10.3				2 x 2 12 ga	11.5						1	4	2.25 x 2.25 12 ga				
1061+65 Rt		399	6.2																			Mount on Existing Supports
1064+00 Rt					10.6	11.0	11.4		2.25 x 2.25 12 ga	12.5	2.9	3.3	3.7		2 x 2 12 ga	3	4	3 x 3 7 ga	1		3	
1064+30 Lt		371	6.0		10.8				2.25 x 2.25 12 ga	12.9						1	4	2.5 x 2.5 12 ga				
1066+17 Rt		3		13.3	9.7				2.5 x 2.5 12 ga	12.4	2.2				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
Sub Total			16.2	18.3		**Total**	63.8									**Total**	24		2	0	4	
Grand Total			72.8	33.5		**Total**	227.9									**Total**	84		9	0	14	

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 13 - Turn Lane Improvement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	110	2

Sec 24
T-132-N
R-56-W

Sec 19
T-132-N
R-55-W

N

17955+00

17960+00

17965+00

17970+00

17975+00

17980+00

1065+00

1060+00

ND 13

ND 32

DICKEY R NET

DVELEC

SEWU

100'

125'

33'

45'

90'

R Mkr 20

Sta 17966+70 Lt
Remove Support
Remove & Reset
WEST
NORTH
Remove & Reset
Remove
Remove

Sta 17969+29 Lt
Remove Support
Remove

Sta 17969+35 Lt
Remove Support
Remove
Remove

Sta 17971+30 Lt
Remove Support
Remove
Remove & Reset
Remove & Reset
Remove

Sta 17973+35 Lt
Remove Support
Gwinner 1
Lisbon 16
Forman 8
Remove & Reset

Sta 17976+75 Lt
Remove Support
JCT
Remove & Reset
Remove

Sta 1066+19 Rt
Remove Support
STOP
Remove

Sta 17971+30 Rt
Remove Support
Remove
EAST
Remove

Sta 17973+30 Rt
Remove Support
SPEED LIMIT 65
Remove

Sta 17961+60 Rt
Remove Support
Remove
Remove & Reset

Sta 17966+70 Rt
Remove Support
Remove
Remove & Reset
Remove & Reset
Remove

Sta 1064+45 Lt
Remove Support
SOUTH
Remove
Remove

Sta 17964+95 Rt
Remove Support
Remove & Reset
Milnor 10
Wyndmere 25
Forman 8

Sta 1061+65 Rt
Support to Remain in Place
Remove
Remove

Sta 1063+25 Rt
Remove Support
Gwinner 1
Lisbon 16
Milnor 10
Remove & Reset

Sta 1059+00 Rt
Support to Remain in Place
JCT
Remove & Reset
Remove

Sec 25
T-132-N
R-56-W

Sec 30
T-132-N
R-55-W

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Signing
Removals

ND 13 - Turn Lane Improvement

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	110	3

Sec 24
T-132-N
R-56-W

Sec 19
T-132-N
R-55-W

Sec 25
T-132-N
R-56-W

Sec 30
T-132-N
R-55-W

Sta 17966+40 Lt
Install Signs on New Support
Reset Signs from Sta 17966+70 Lt
Assembly No. 375

Reset WEST NORTH Reset
M1-5-24 (Special) NORTH DAKOTA 13 NORTH DAKOTA 32 M1-5-24 (Special)

Sta 17969+64 Lt
Install Signs on New Support
Assembly No. 405

M1-5-24 (Special) NORTH DAKOTA 32 NORTH DAKOTA 13 M1-5-24 (Special)
M6-1L-21 M6-4-21

Sta 17975+05 Lt
Install Signs on New Support
Reset Signs from Sta 17971+30 Lt
Assembly No. 405

M1-5-24 (Special) NORTH DAKOTA 32 NORTH DAKOTA 13 M1-5-24 (Special)
Reset Reset

Sta 17979+05 Lt
Install Sign on New Support
Reset Sign from Sta 17973+35 Lt
Refer to Std. Drawing D-754-49

Gwinner 1
Lisbon 16
Forman 8
Reset

Sta 17983+05 Lt
Install Signs on New Support
Reset Sign from Sta 17976+75 Lt
Assembly No. 391

JCT Reset
NORTH DAKOTA 32 M1-5-24 (Special)

17955+00
17960+00
17965+00
17970+00
17975+00
17980+00

Sta 17962+40 Lt
Install Sign on New Support
Assembly No. 9

SPEED LIMIT 65 R2-1-24

Sta 17968+70 Lt
Install Sign on New Support
Assembly No. 1

R1-1-30 STOP

33'
33'

DICKEY R NET
DVELEC
SEWU

ND 13

100'
100'
125'
100'
100'

1065+00

Milnor 10
Wyndmere 25
Forman 8
Reset

Sta 17959+00 Rt
Install Sign on New Support
Reset Sign from Sta 17964+95 Rt
Refer to Std. Drawing D-754-48

M1-5-24 (Special) NORTH DAKOTA 13 NORTH DAKOTA 32 M1-5-24 (Special)
Reset Reset

Sta 17963+00 Rt
Install Signs on New Support
Reset Signs from Sta 17966+70 Rt
Assembly No. 405

STOP R1-1-48

Sta 1066+17 Rt
Install Signs on New Support
Assembly No. 3

EAST M3-2-24
NORTH DAKOTA 13 M1-5-24 (Special)

Sta 17972+15 Rt
Install Signs on New Support
Assembly No. 371

SPEED LIMIT 65 R2-1-24

Sta 17976+15 Rt
Install Sign on New Support
Assembly No. 9

M3-3-24 SOUTH
M1-5-24 (Special) NORTH DAKOTA 32

Sta 1064+30 Lt
Install Signs on New Support
Assembly No. 371

1060+00

45'
90'

NORTH DAKOTA 32 M1-5-24 (Special)
M5-1L-21

Sta 1061+65 Rt
Existing Support to Remain in Place
Install Signs on Existing Support
Assembly No. 399

Gwinner 1
Lisbon 16
Milnor 10
Reset

Sta 1064+00 Rt
Install Sign on New Support
Reset Sign from Sta 1063+25 Rt
Refer to Std. Drawing D-754-49

M1-5-24 (Special) NORTH DAKOTA 13 NORTH DAKOTA 32 M1-5-24 (Special)
M6-3-21 Reset

Sta 17955+00 Rt
Install Signs on New Support
Reset Sign from Sta 17961+60 Rt
Assembly No. 405

R2-1-24 SPEED LIMIT 65

Sta 1060+30 Lt
Install Sign on New Support
Assembly No. 9

125'
90'

ND 32

R Mkr 20

JCT Reset
NORTH DAKOTA 13 M1-5-24 (Special)

Sta 1059+00 Rt
Existing Support to Remain in Place
Install Signs on Existing Support
Assembly No. 391

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Signing
New or Reset

ND 13 - Turn Lane Improvement

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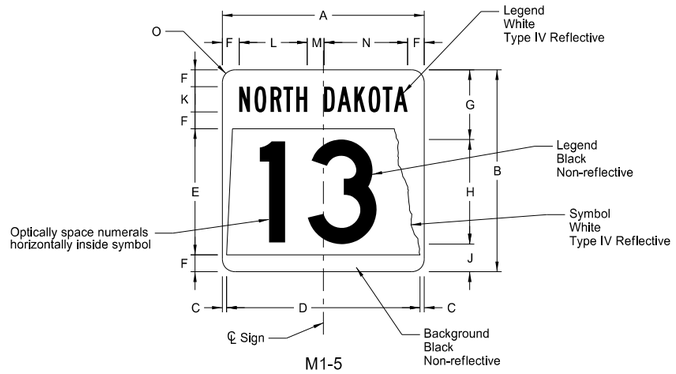
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	110	4

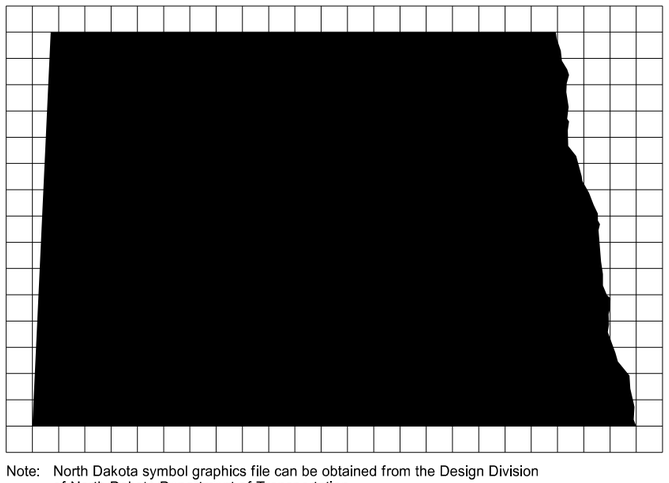


M1-5

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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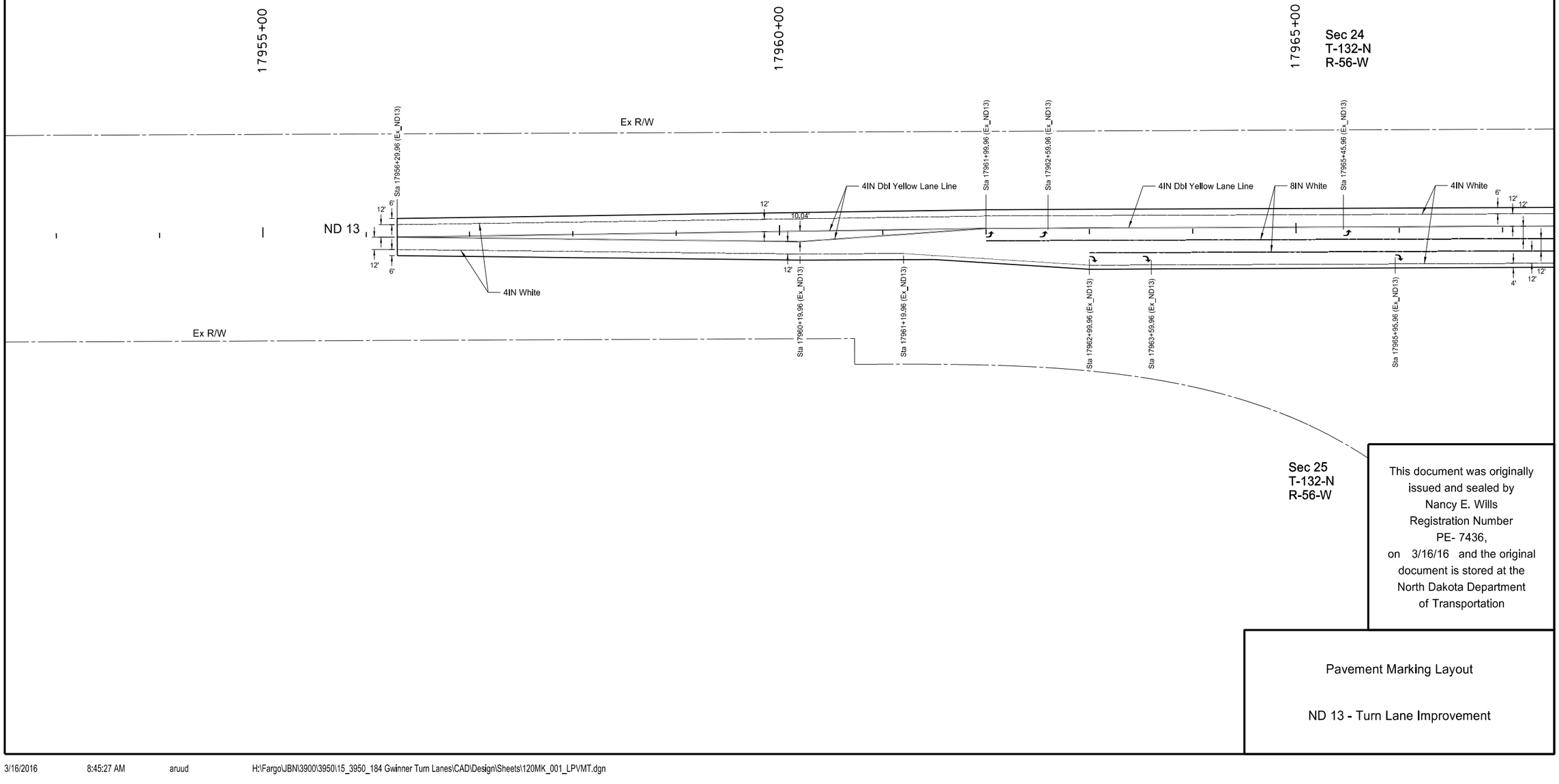
ND Highway Shield Details for Route Markers and Guide Signs

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	120	1

Item	Description	Quantity	Unit
762-0112	EPOXY PVMT MK MESSAGE		
	Sta 17961+99.96 Lt Turn Arrow	16	SF
	Sta 17962+59.96 Lt Turn Arrow	16	SF
	Sta 17962+99.96 Rt Turn Arrow	16	SF
	Sta 17963+59.96 Rt Turn Arrow	16	SF
	Total	64	SF
762-0113	EPOXY PVMT MK 4IN LINE		
	Sta 17956+29.96 to Sta 17965+00.00 (Yellow)	2,880	LF
	Sta 17956+29.96 to Sta 17965+00.00 (White)	1,741	LF
	Total	4,621	LF
762-0115	EPOXY PVMT MK 8IN LINE		
	Sta 17961+99.96 to Sta 17965+00.00 (White)	500	LF



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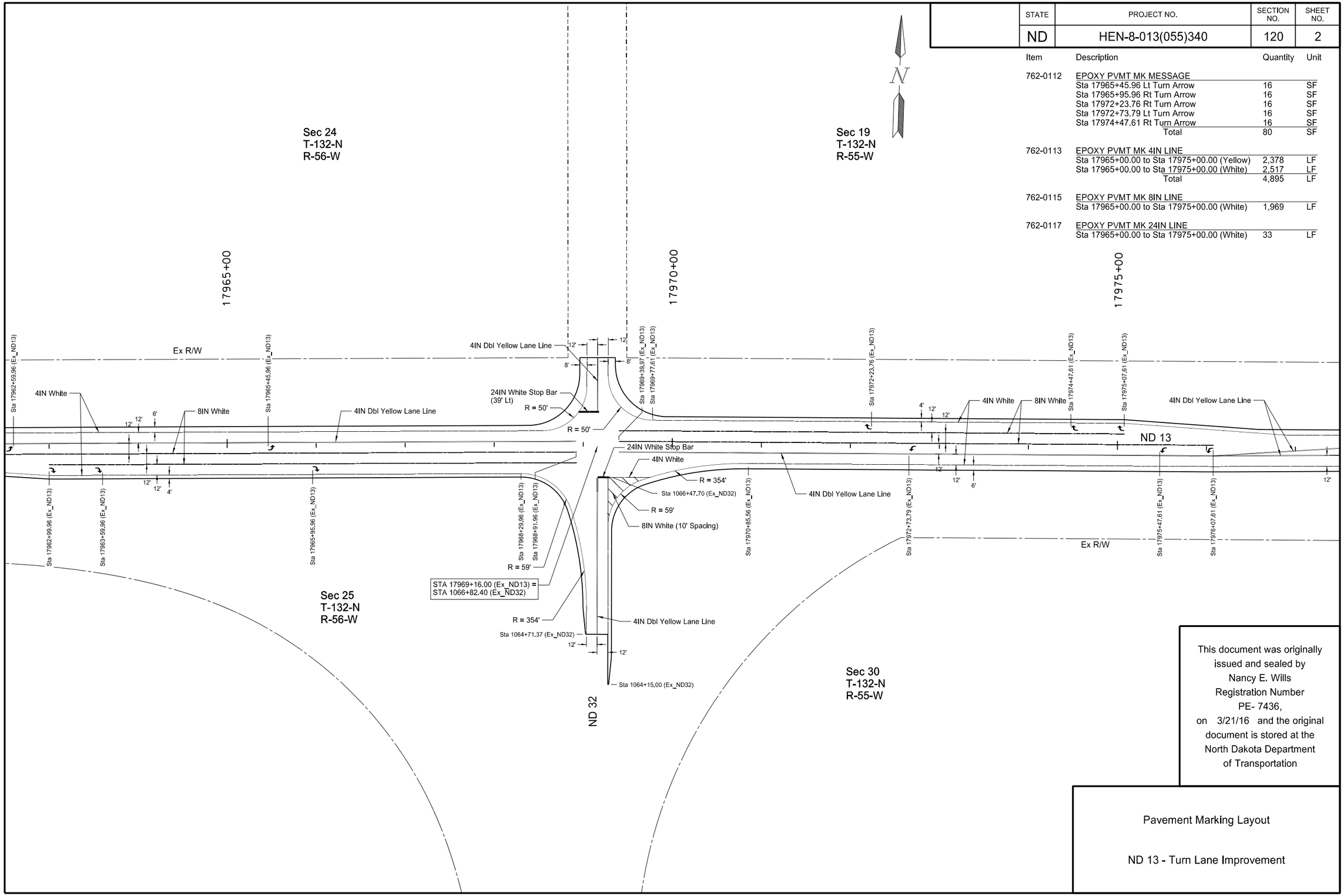
Pavement Marking Layout

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	120	2

Item	Description	Quantity	Unit
762-0112	EPOXY PVMT MK MESSAGE		
	Sta 17965+45.96 Lt Turn Arrow	16	SF
	Sta 17965+95.96 Rt Turn Arrow	16	SF
	Sta 17972+23.76 Rt Turn Arrow	16	SF
	Sta 17972+73.79 Lt Turn Arrow	16	SF
	Sta 17974+47.61 Rt Turn Arrow	16	SF
	Total	80	SF
762-0113	EPOXY PVMT MK 4IN LINE		
	Sta 17965+00.00 to Sta 17975+00.00 (Yellow)	2,378	LF
	Sta 17965+00.00 to Sta 17975+00.00 (White)	2,517	LF
	Total	4,895	LF
762-0115	EPOXY PVMT MK 8IN LINE		
	Sta 17965+00.00 to Sta 17975+00.00 (White)	1,969	LF
762-0117	EPOXY PVMT MK 24IN LINE		
	Sta 17965+00.00 to Sta 17975+00.00 (White)	33	LF



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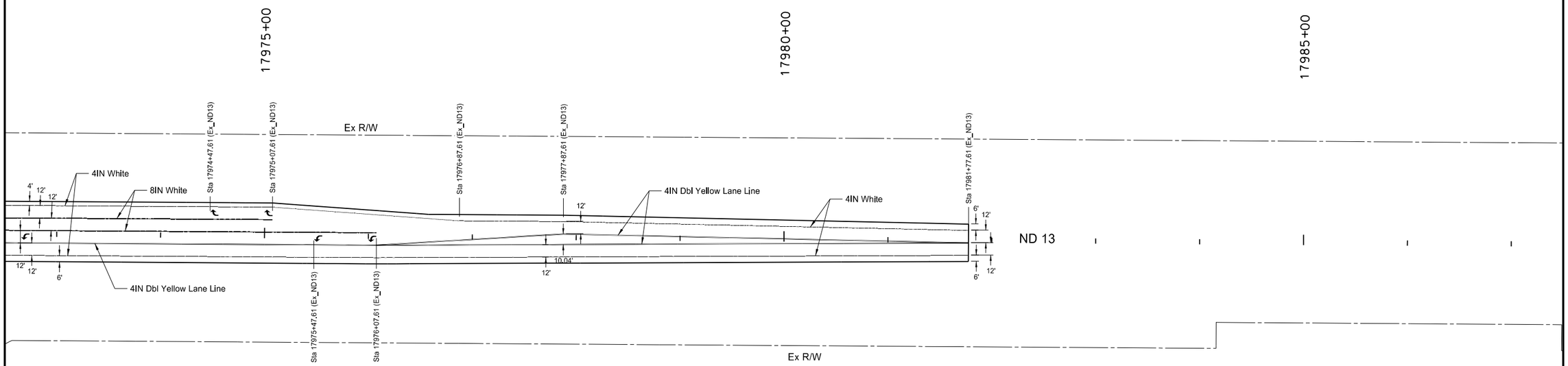
Pavement Marking Layout

ND 13 - Turn Lane Improvement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-8-013(055)340	120	3

Item	Description	Quantity	Unit
762-0112	EPOXY PVMT MK MESSAGE		
	Sta 17975+07.61 Rt Turn Arrow	16	SF
	Sta 17975+47.61 Lt Turn Arrow	16	SF
	Sta 17976+07.61 Lt Turn Arrow	16	SF
	Total	48	SF
762-0113	EPOXY PVMT MK 4IN LINE		
	Sta 17975+00.00 to Sta 17981+77.61 (Yellow)	2,496	LF
	Sta 17975+00.00 to Sta 17981+77.61 (White)	1,356	LF
	Total	3,852	LF
762-0115	EPOXY PVMT MK 8IN LINE		
	Sta 17975+00.00 to Sta 17976+07.61 (White)	116	LF

Sec 19
T-132-N
R-55-W



ND 13

Sec 30
T-132-N
R-55-W

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Pavement Marking Layout

ND 13 - Turn Lane Improvement

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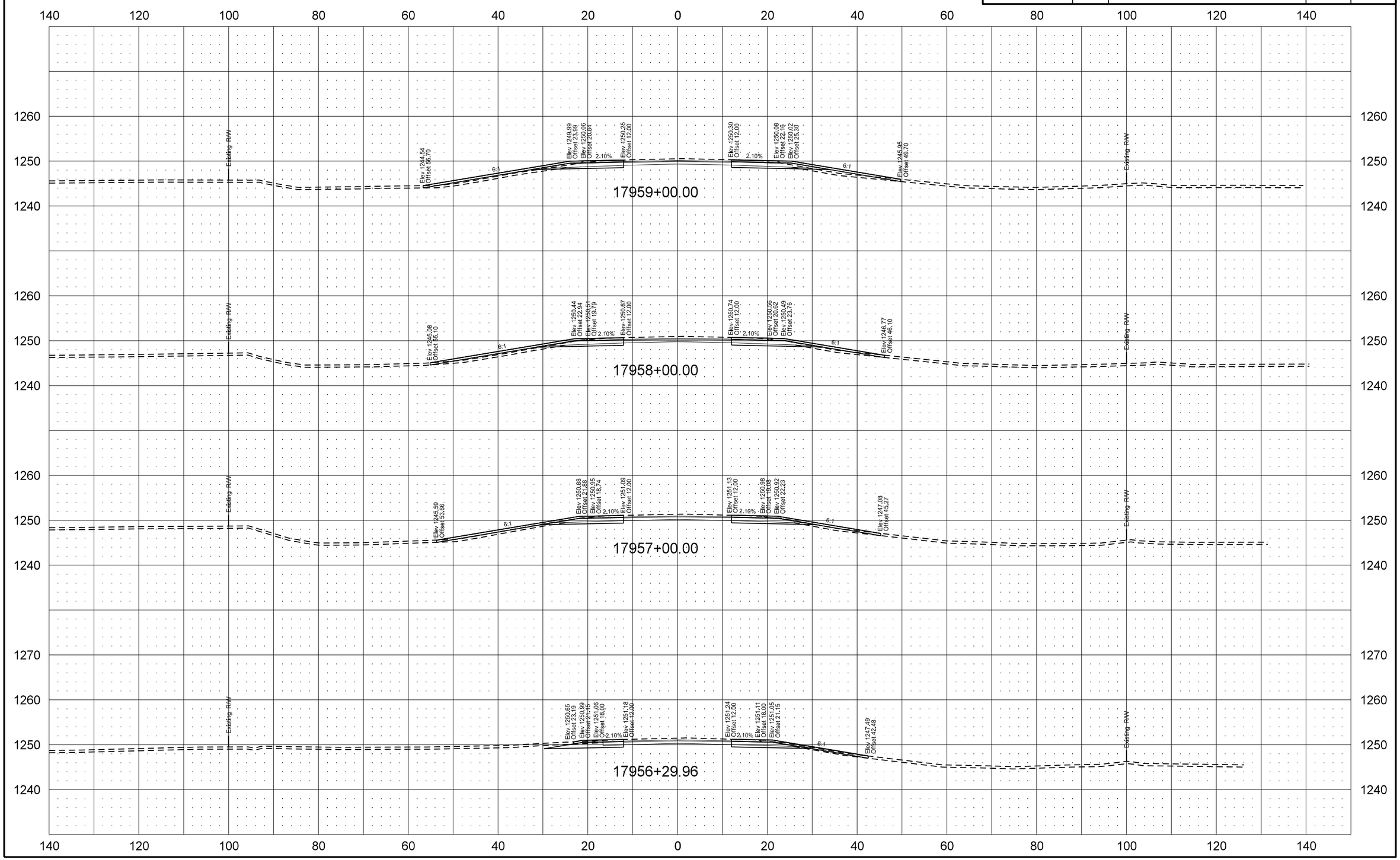
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-8-013(055)340	200	1

ND 13



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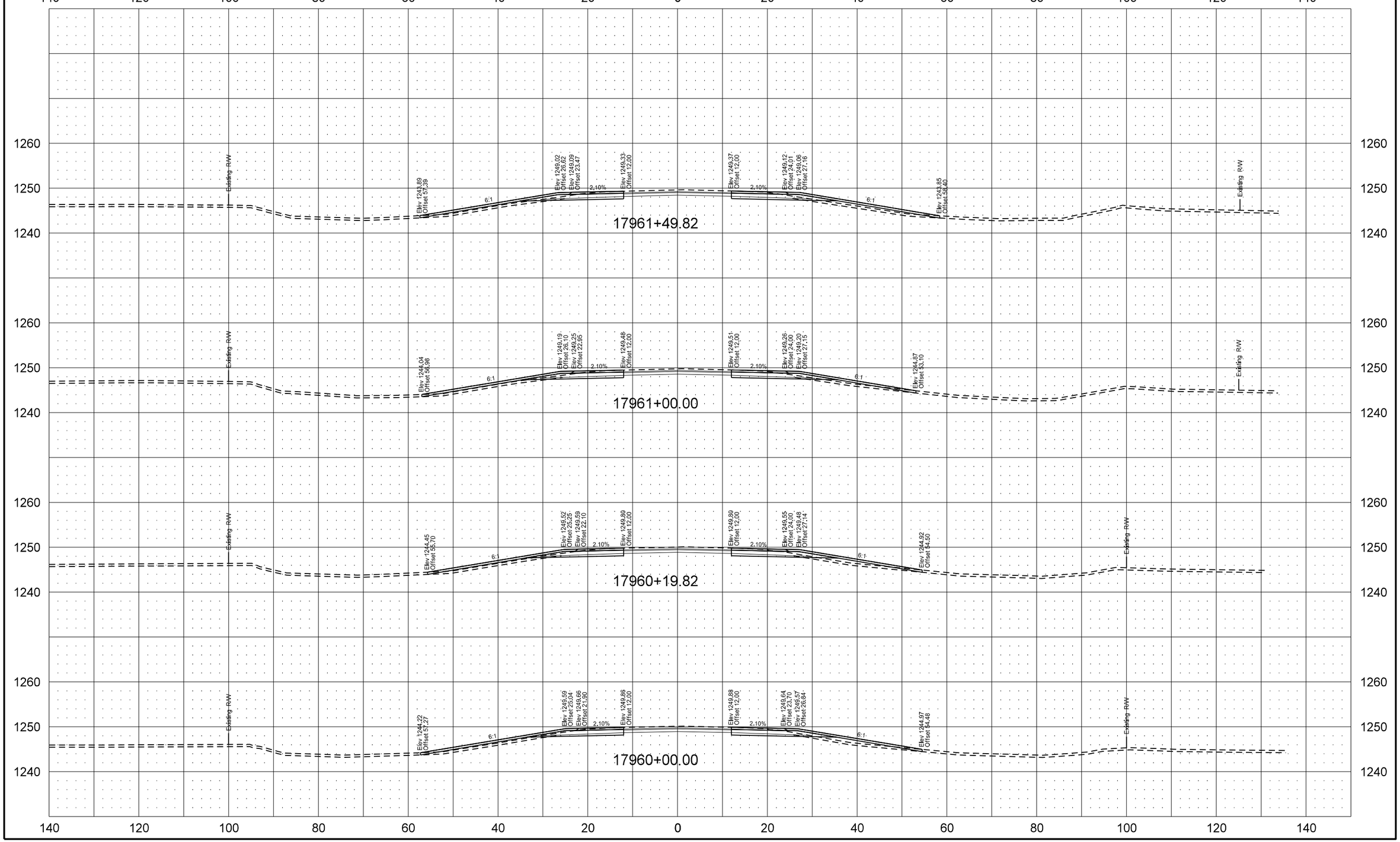
ND 13



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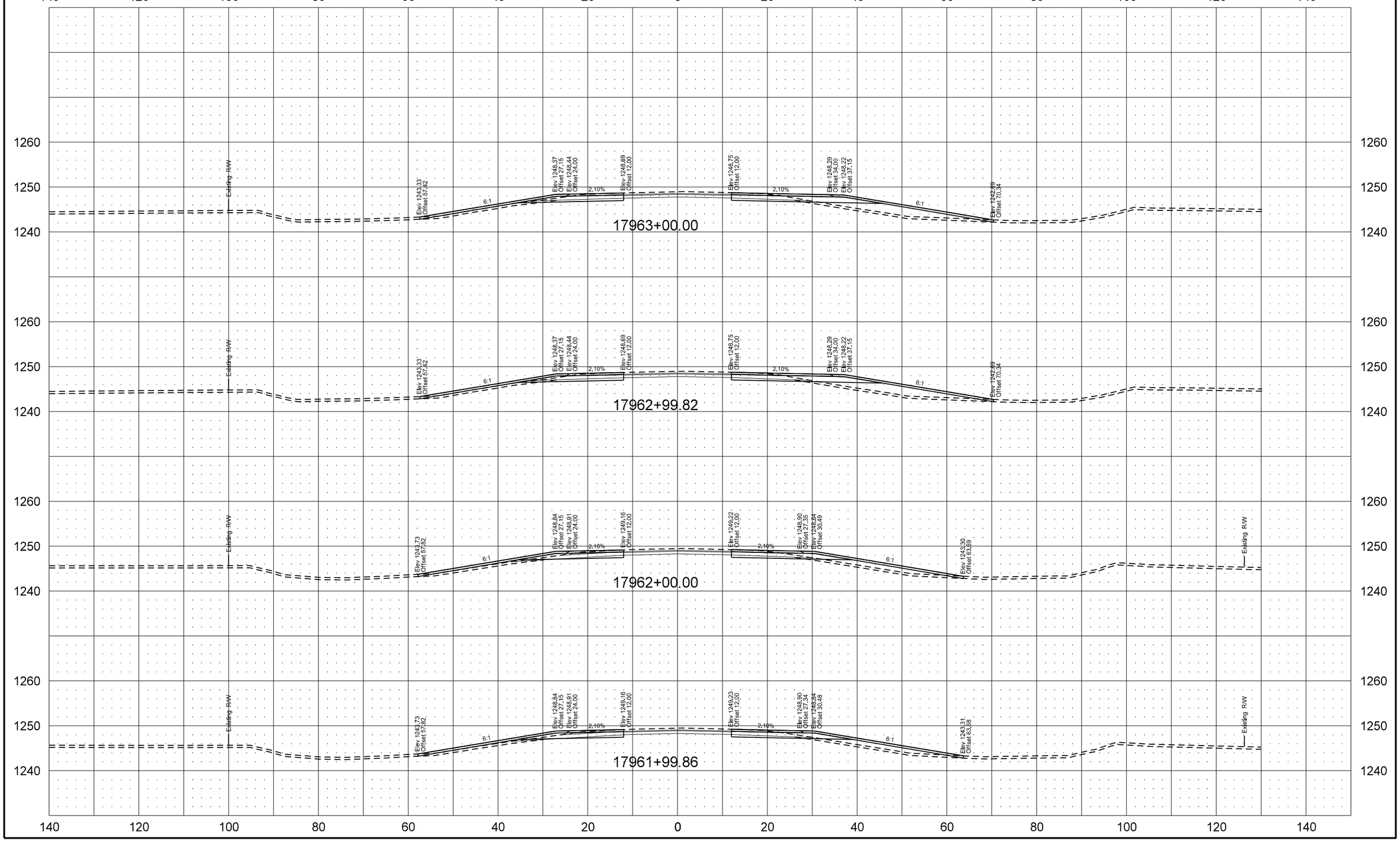
ND 13



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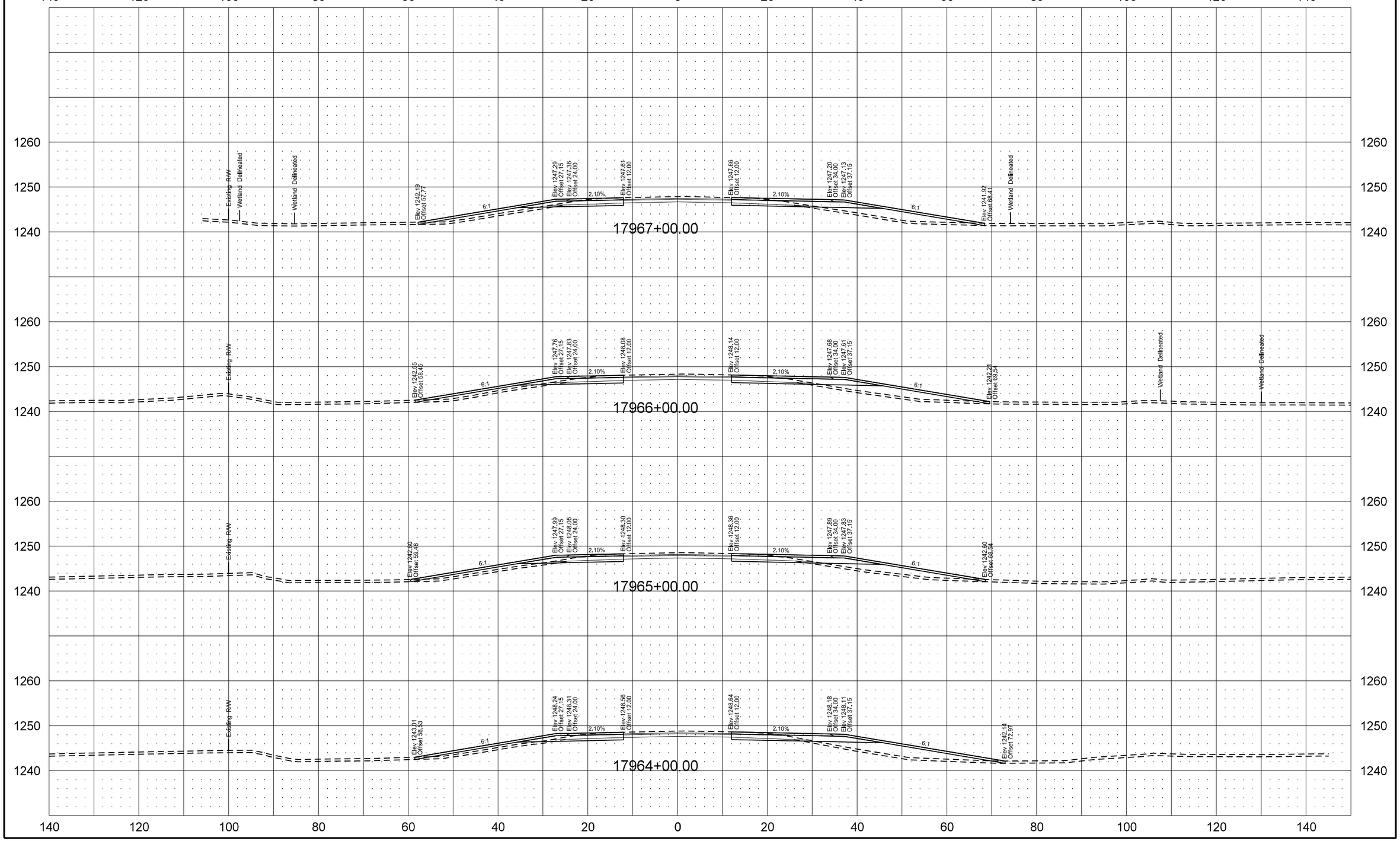
ND 13



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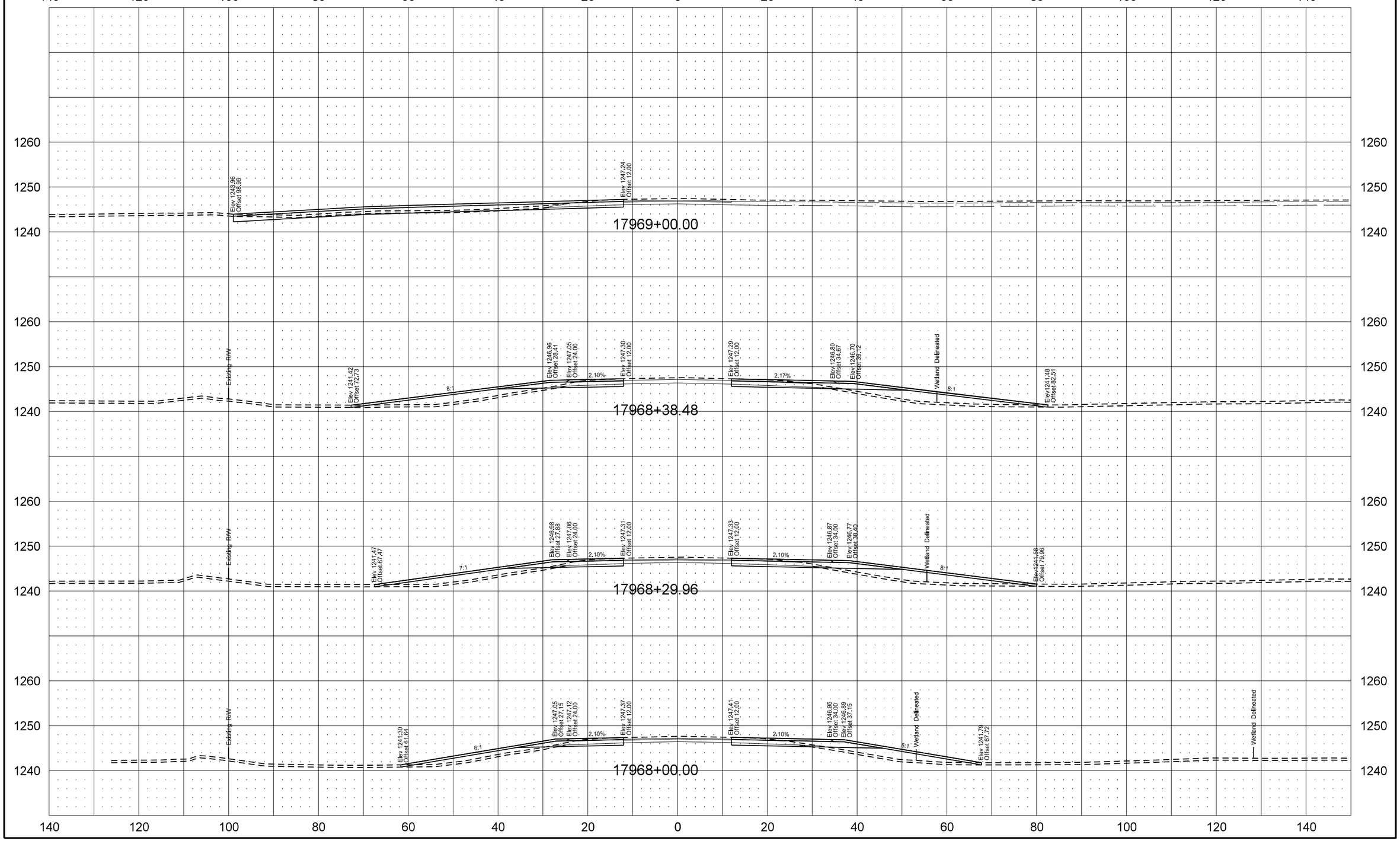
ND 13



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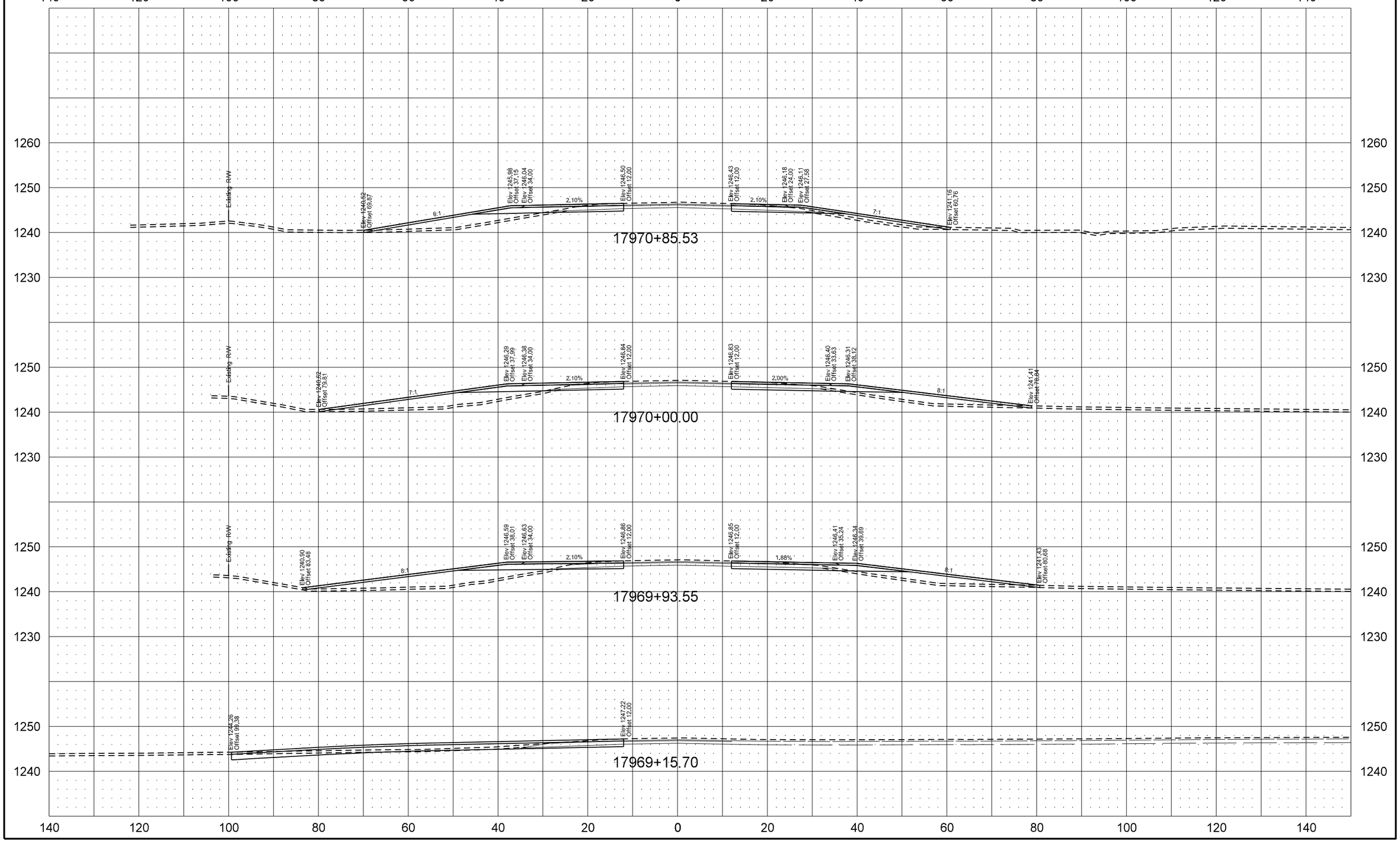
ND 13



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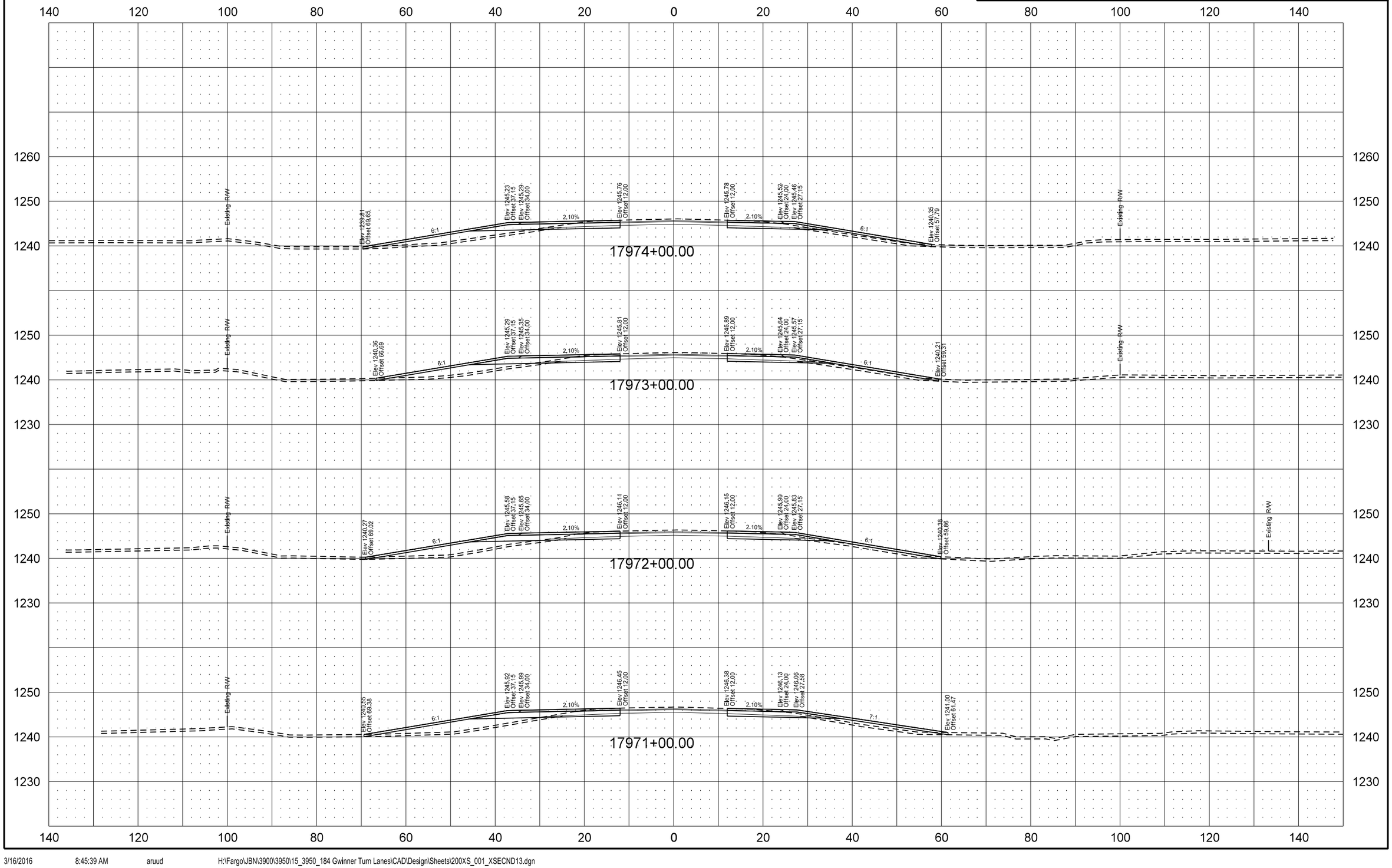
ND 13



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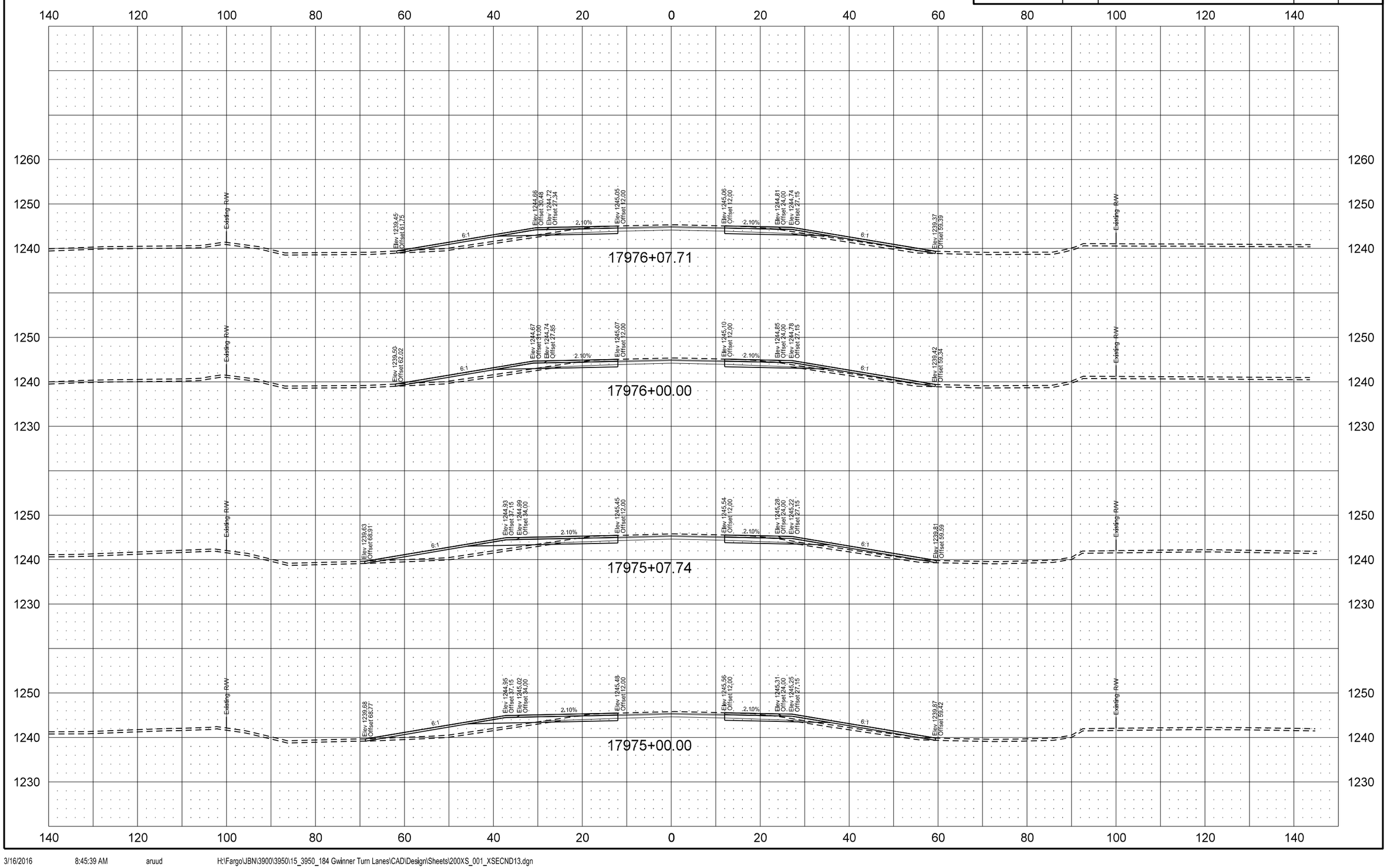
ND 13



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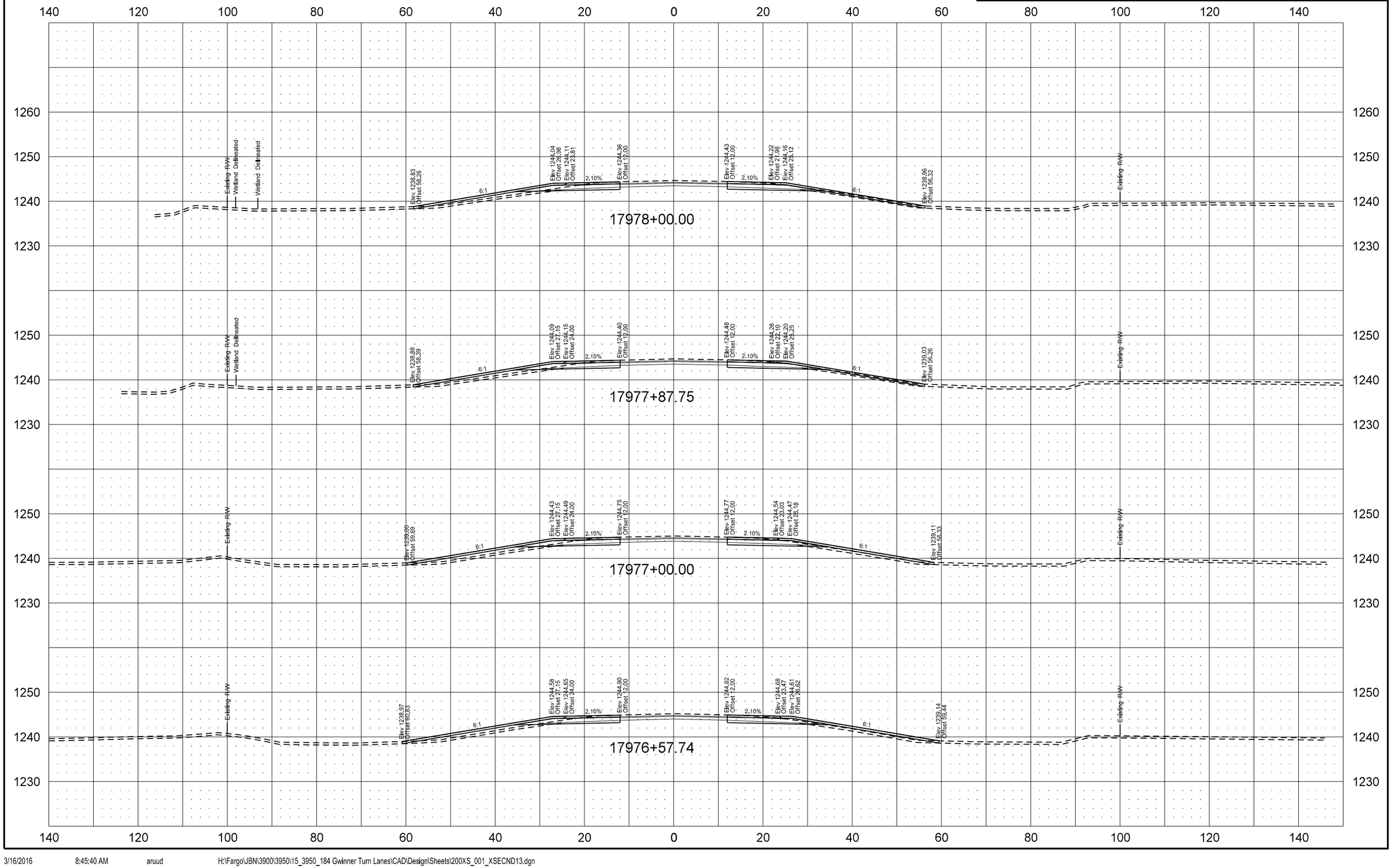
ND 13



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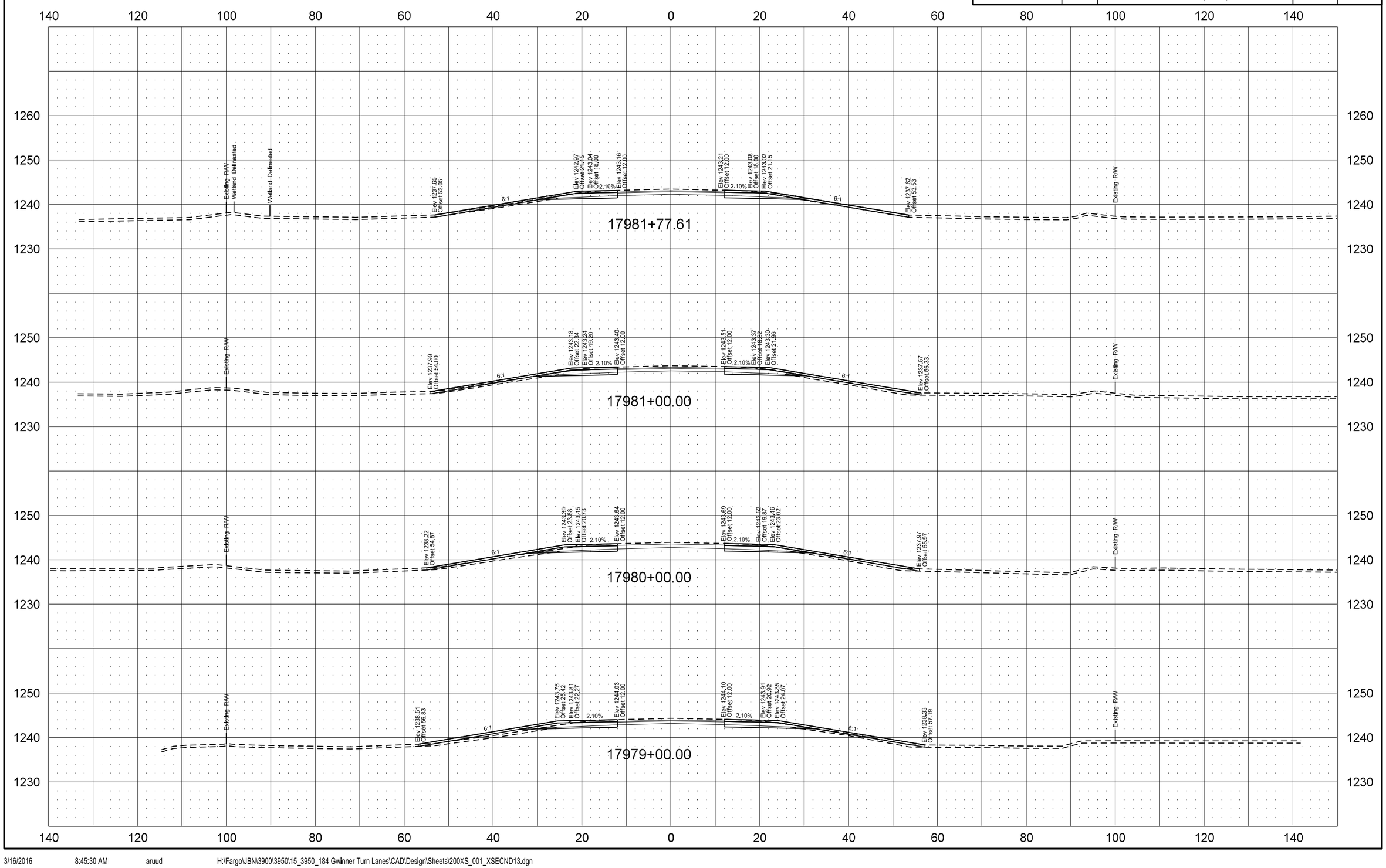
ND 13



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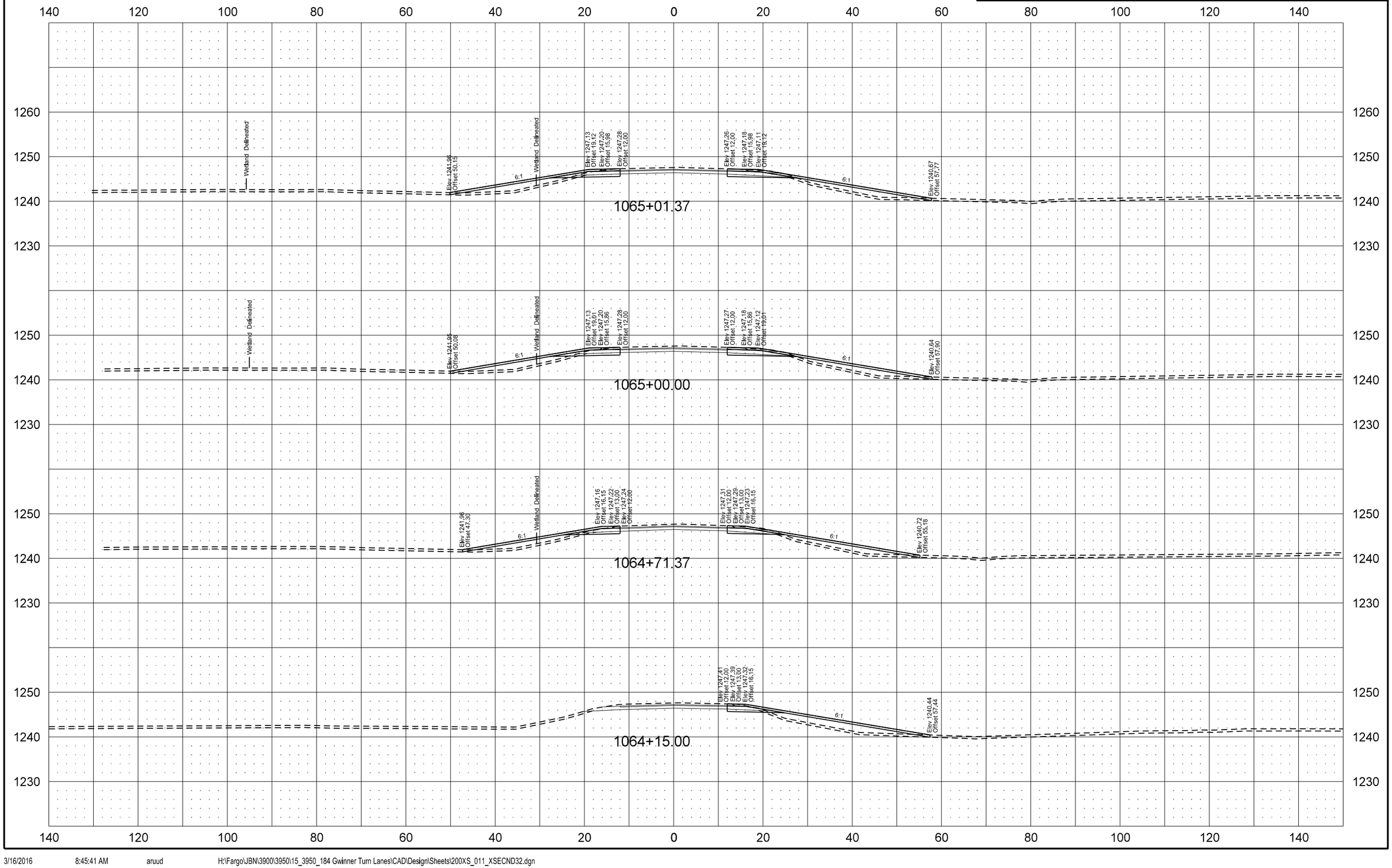
	ND	HEN-8-013(055)340	200	11

ND 32



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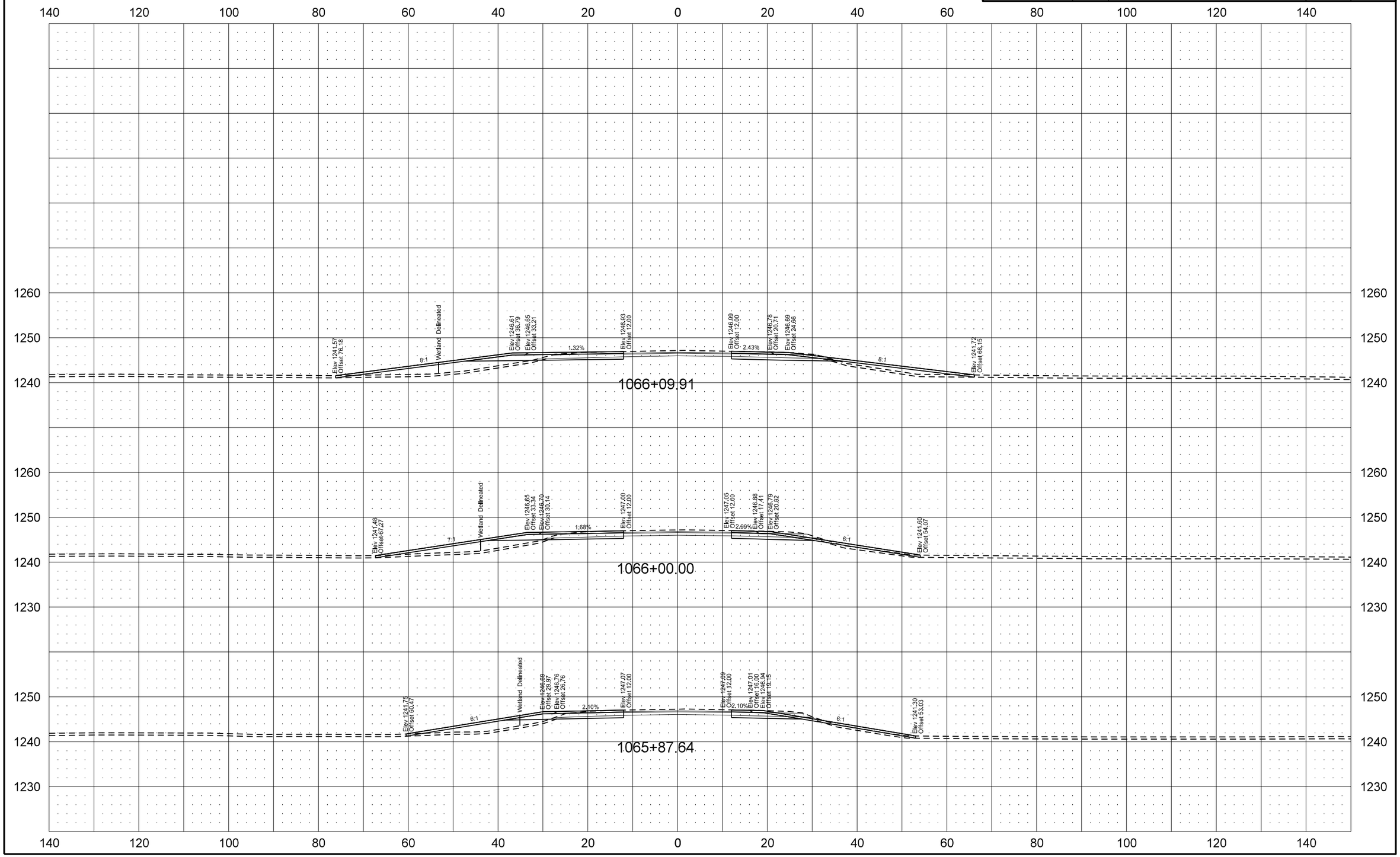
ND 32



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	
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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	
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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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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	
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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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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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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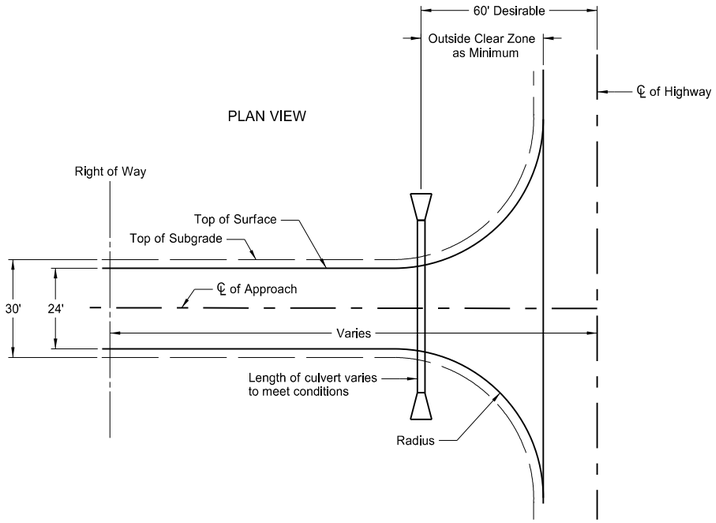
STANDARD RURAL APPROACHES

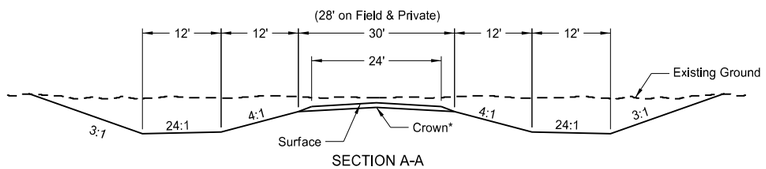
D-203-8

PLAN VIEW



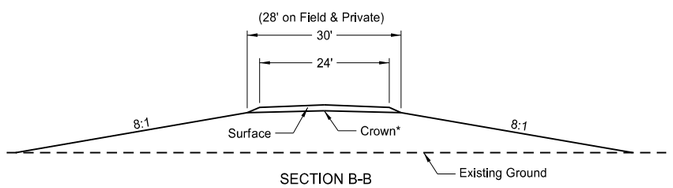
CRITERIA FOR RURAL APPROACH TYPES

	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)

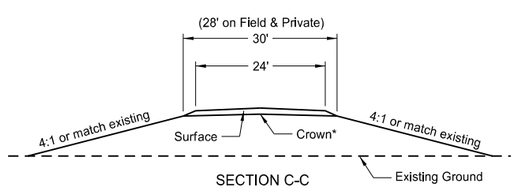


SECTION A-A

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

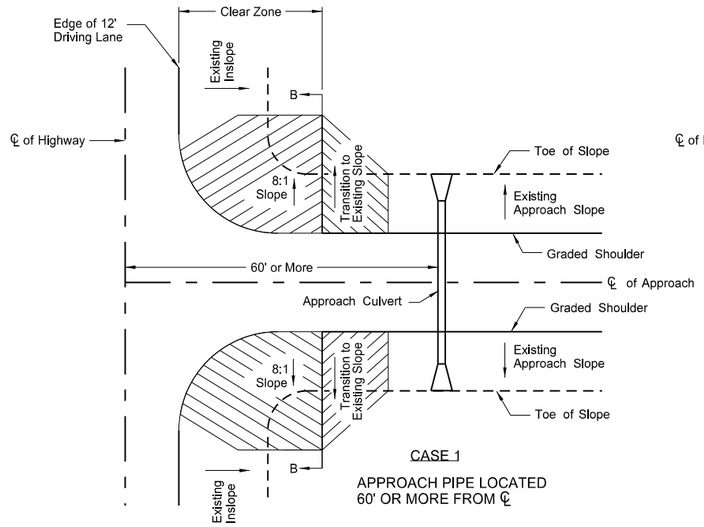


SECTION B-B



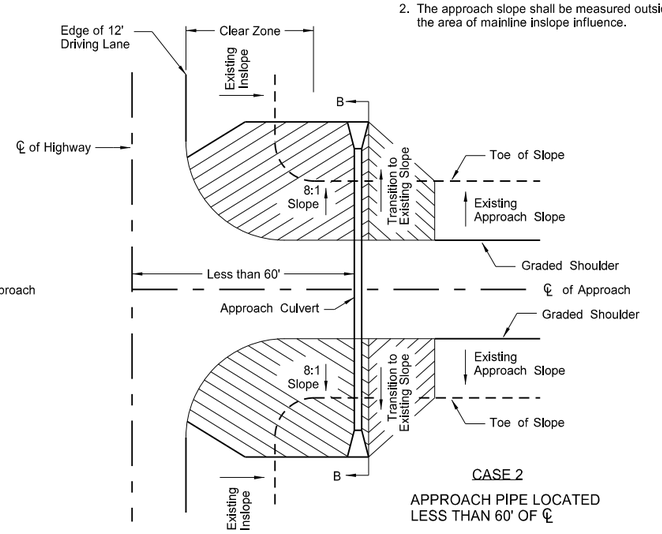
SECTION C-C

APPROACH INSLOPES



CASE 1

APPROACH PIPE LOCATED 60' OR MORE FROM ℄

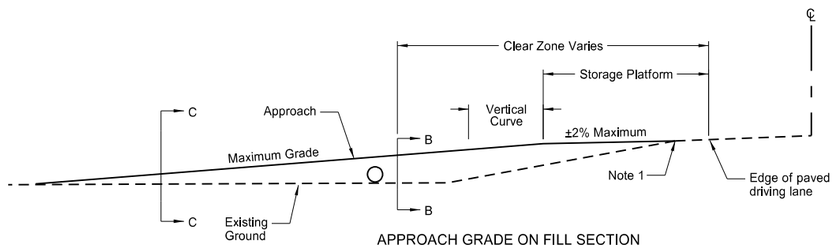


CASE 2

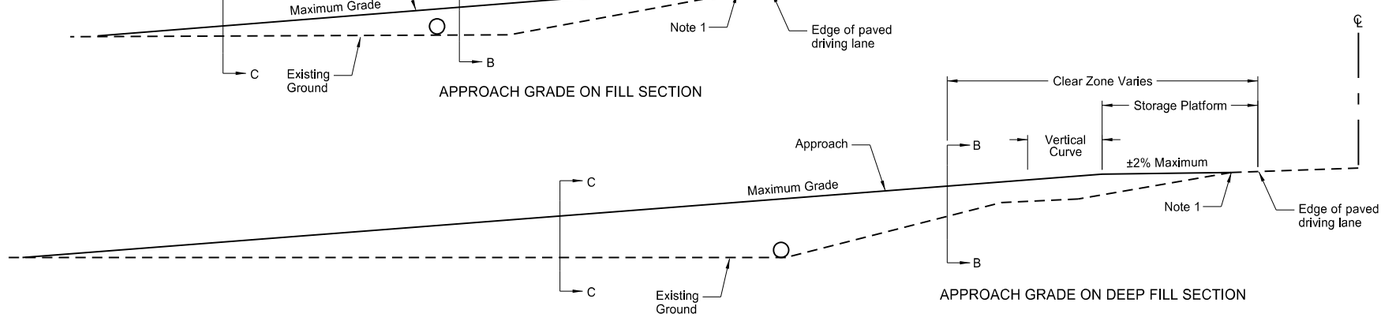
APPROACH PIPE LOCATED LESS THAN 60' OF ℄

NOTES:

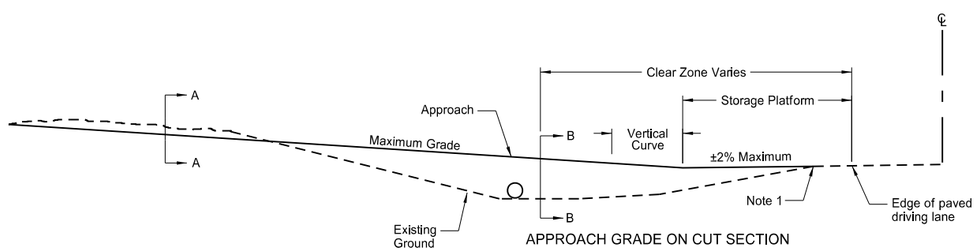
1. Max breakover between approach storage platform and highway shall not exceed 5%.
2. The approach slope shall be measured outside the area of mainline inslope influence.



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION



APPROACH GRADE ON CUT SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
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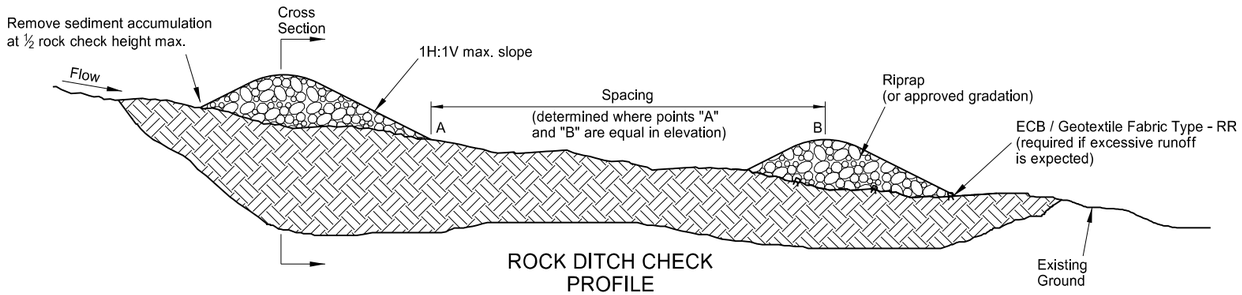
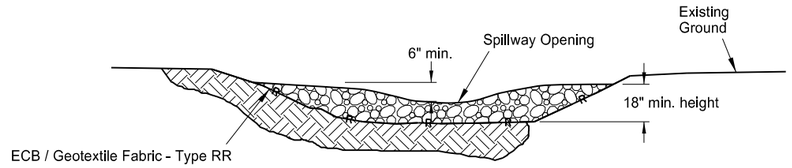
EROSION AND SILTATION CONTROLS

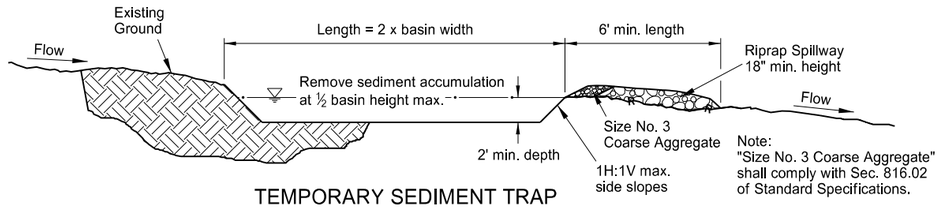
D-256-1



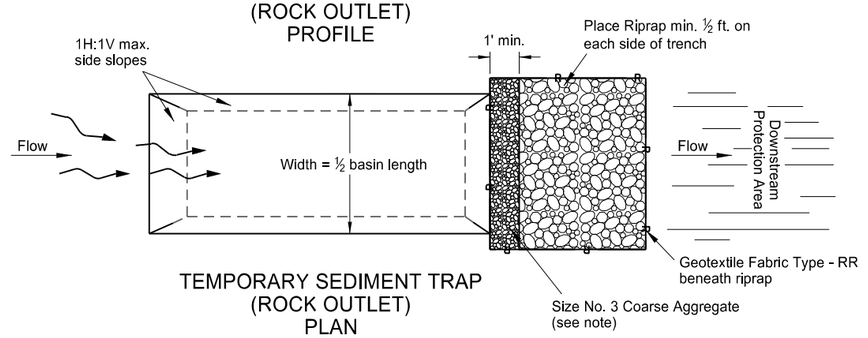
ROCK DITCH CHECK
PROFILE



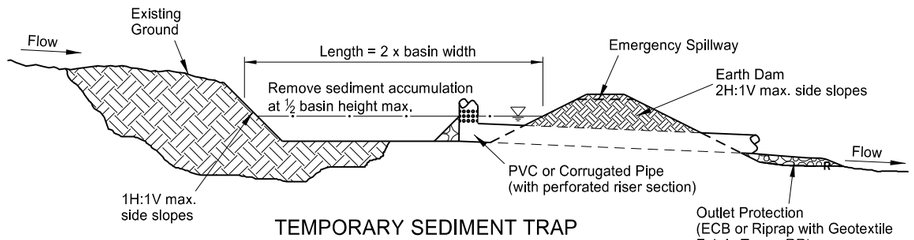
ROCK DITCH CHECK
CROSS SECTION



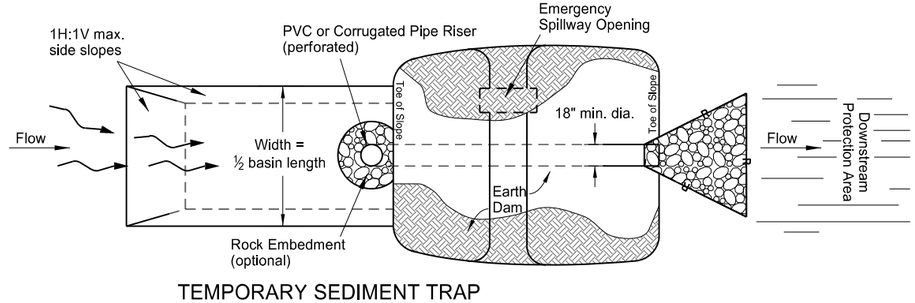
TEMPORARY SEDIMENT TRAP
(ROCK OUTLET)
PROFILE



TEMPORARY SEDIMENT TRAP
(ROCK OUTLET)
PLAN



TEMPORARY SEDIMENT TRAP
(RISER PIPE OUTLET)
PROFILE



TEMPORARY SEDIMENT TRAP
(RISER PIPE OUTLET)
PLAN

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-2 to D-256-1. Deleted silt fence details.

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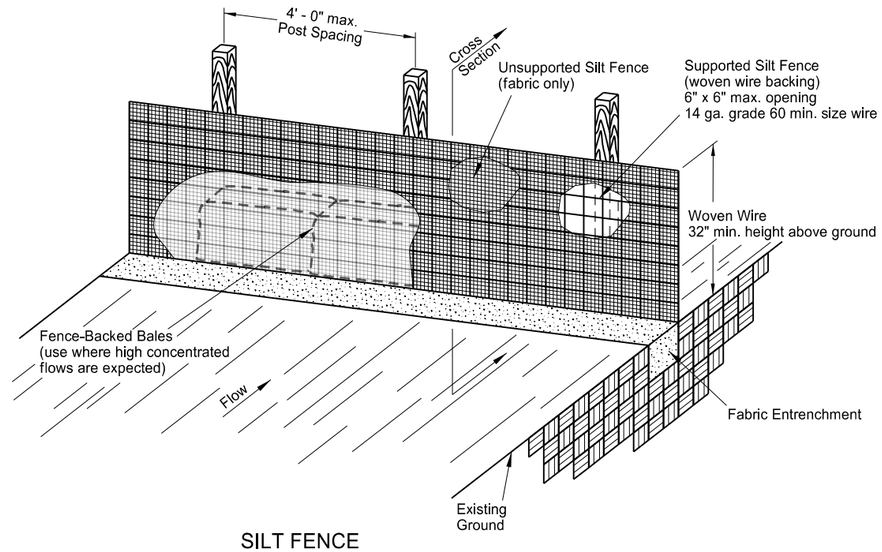
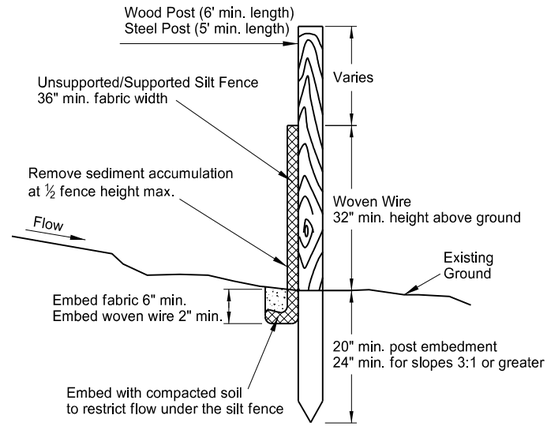
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1



SILT FENCE
SUPPORTED AND UNSUPPORTED



SILT FENCE
CROSS SECTION

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

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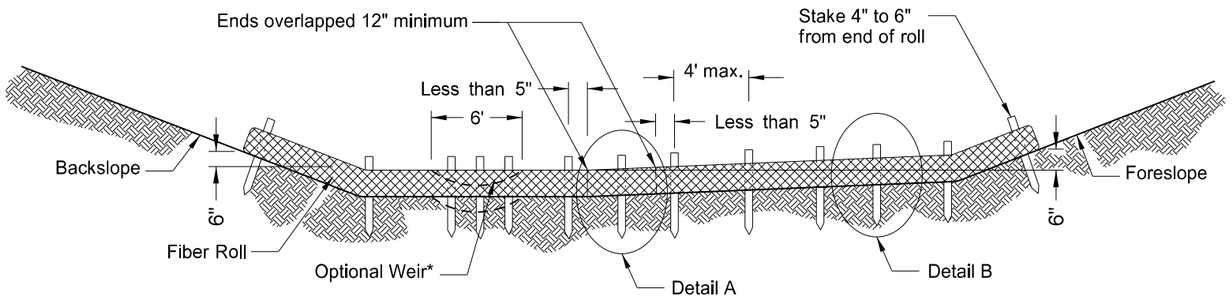
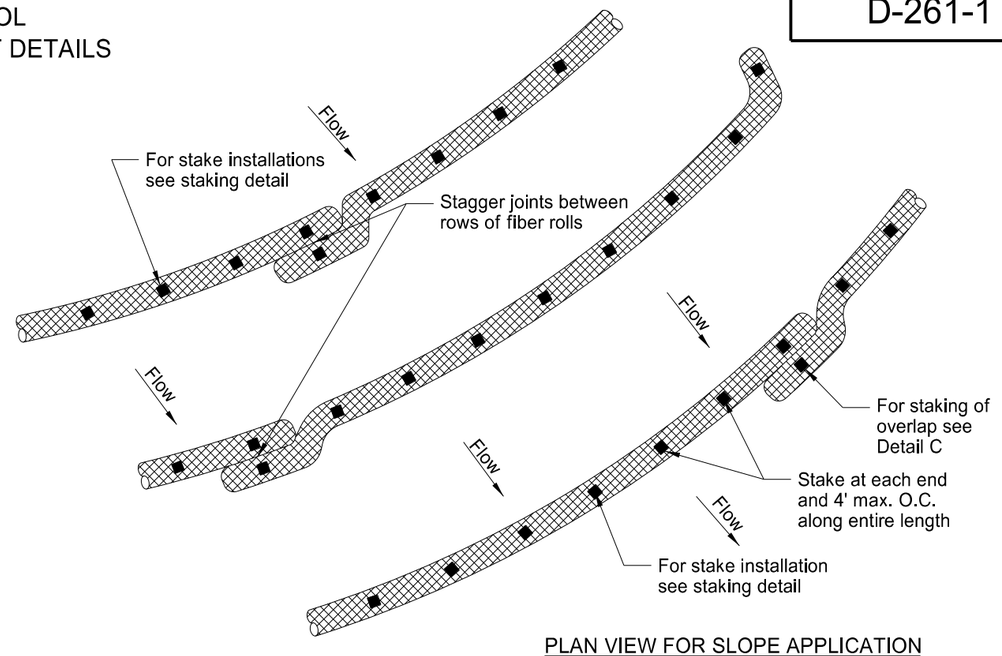
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

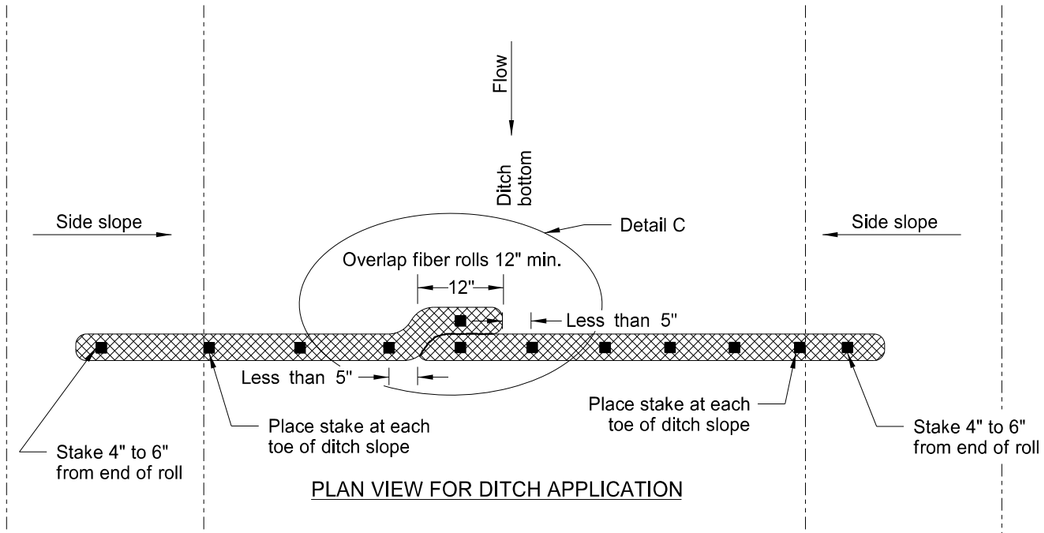


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

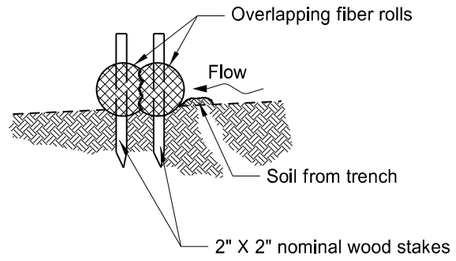
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

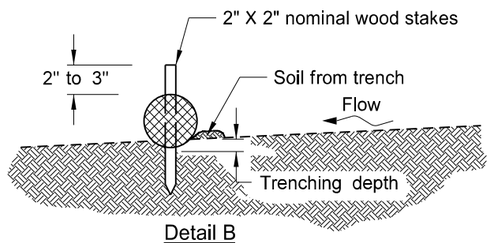


PLAN VIEW FOR DITCH APPLICATION



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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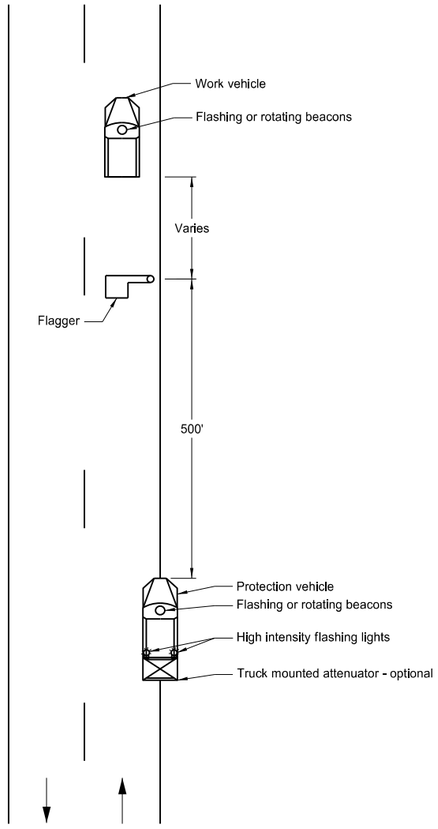
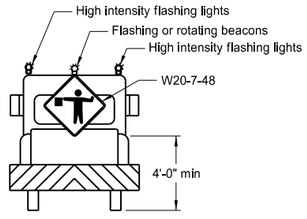
TRAFFIC CONTROL FOR CORING OF HOT BITUMINOUS PAVEMENT

D-704-2

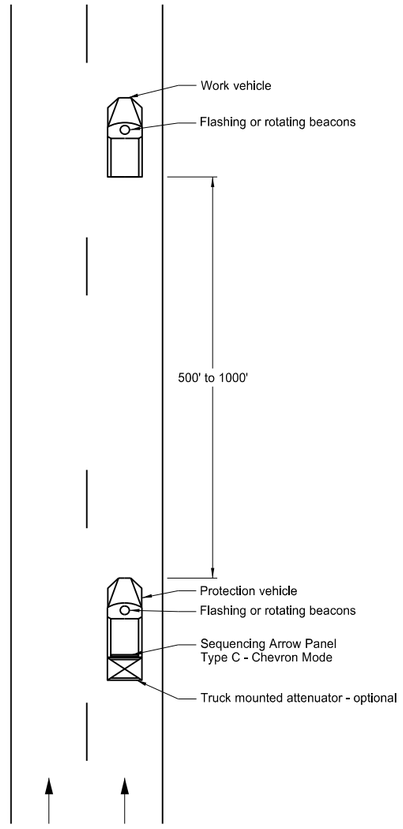
Two Lane, Two Way Roadways

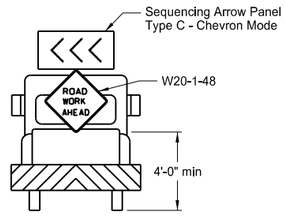




Typical Protection Vehicle

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

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

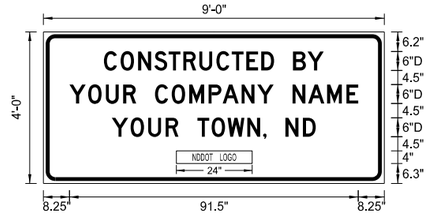
CONSTRUCTION SIGN DETAIL

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.

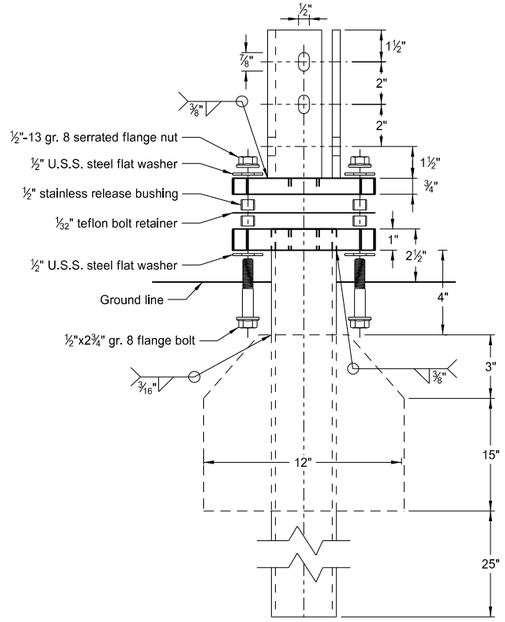
Advance Warning Sign Spacing (A)			
Road Type	Distance between signs min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban 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

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation

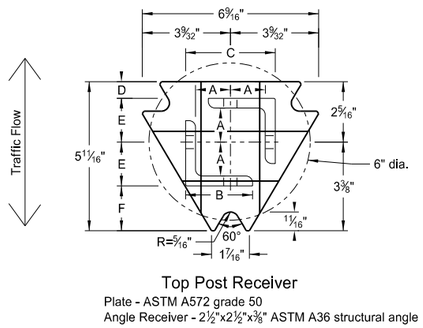
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

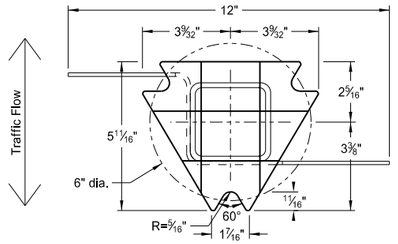


Multi-Directional
Slip Base Assembly

Perforated Tube



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



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

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.

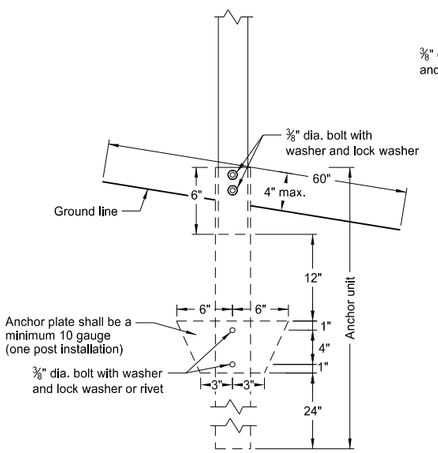
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½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

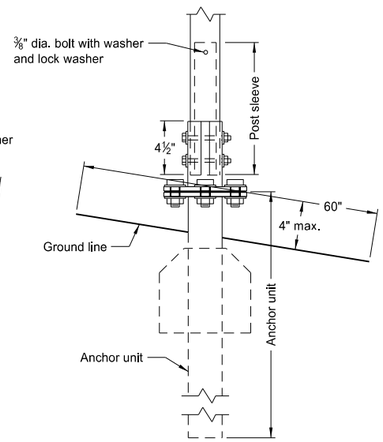
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⁵⁄₁₆"	⅝"	1²¹⁄₃₂"	1¾"

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

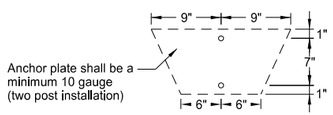
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

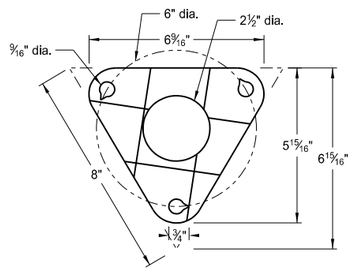


Anchor Unit and Post Assembly



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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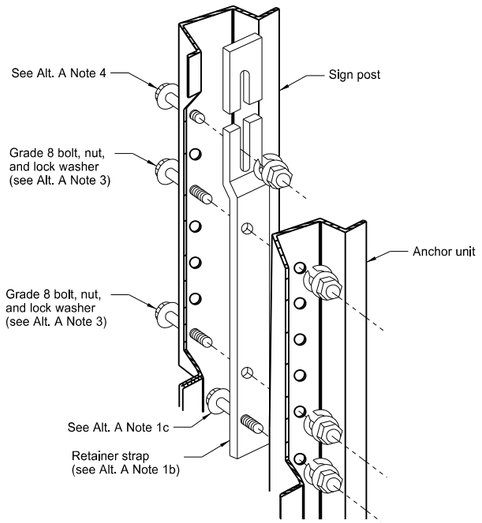
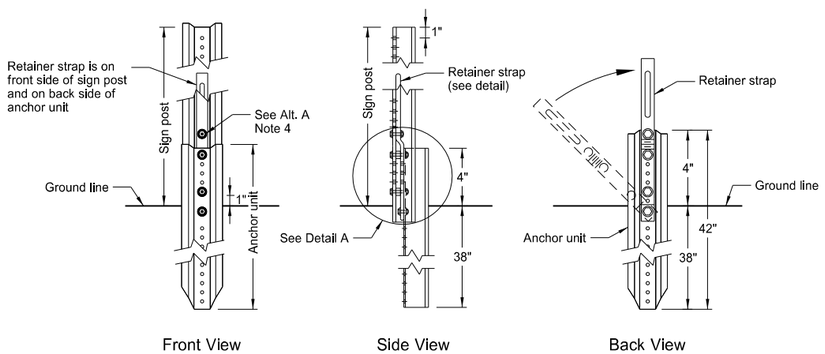
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



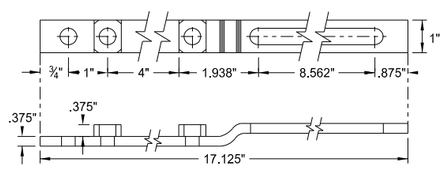
Detail A



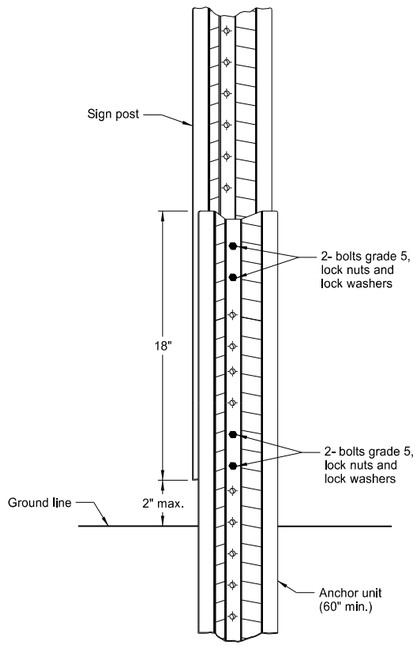
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

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

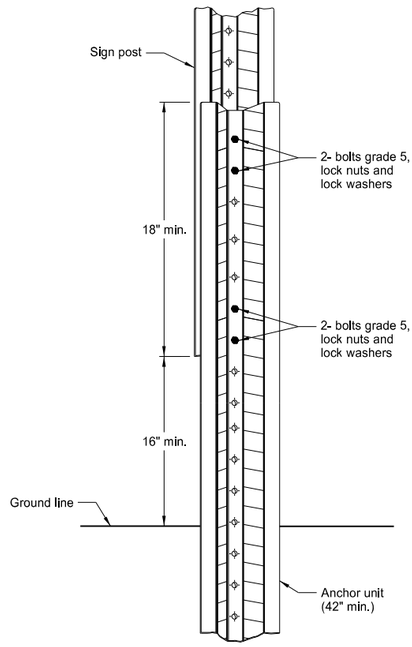


Retainer Strap Detail



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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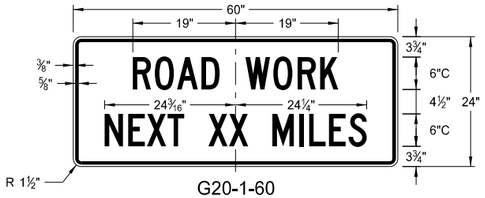
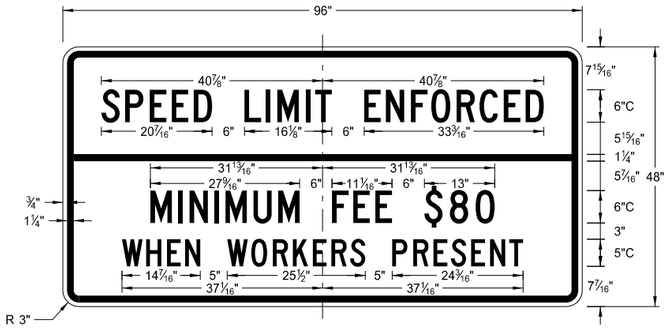
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

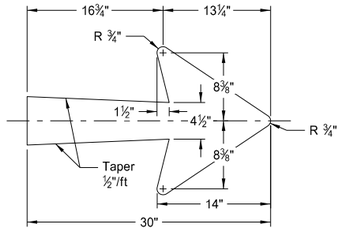


G20-1-60
Legend: black (non-refl)
Background: orange

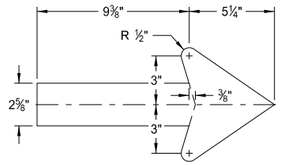
G20-4b-36
Legend: black (non-refl)
Background; orange



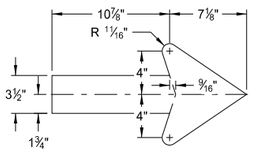
G20-55-96
Legend: black (non-refl)
Background: orange



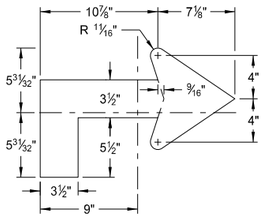
E5-1-48



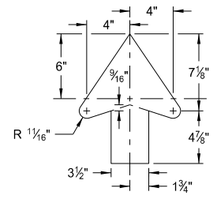
G20-50a-72
G20-52a-72



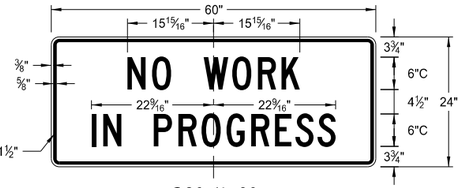
M4-9(L or R)-30
Right or Left



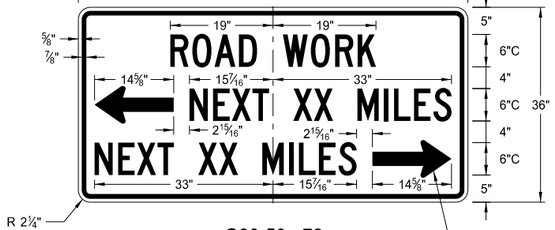
M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight



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



G20-50a-72
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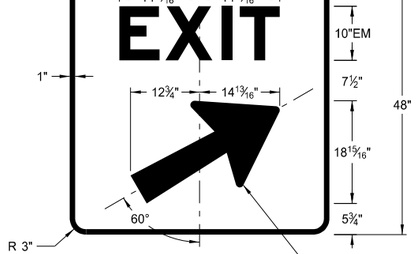
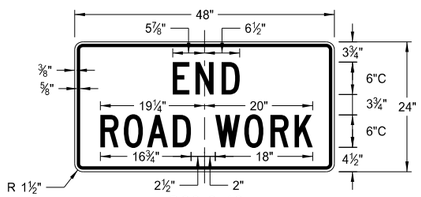
Background: orange



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



G20-2-48
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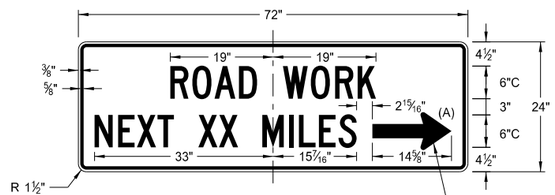
Background: orange



G20-52a-72
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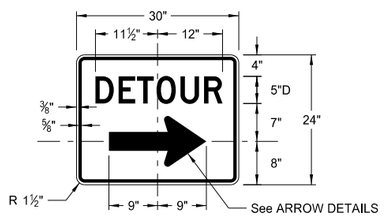
Background: orange



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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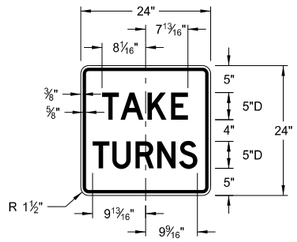
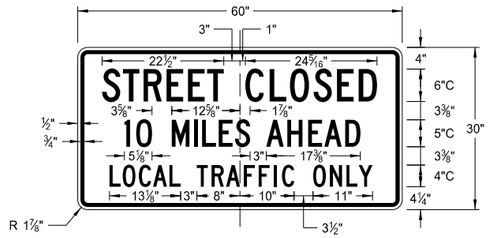
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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



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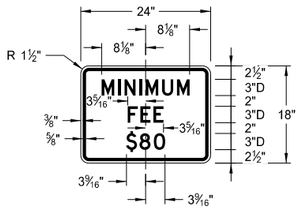

R2-1a-24
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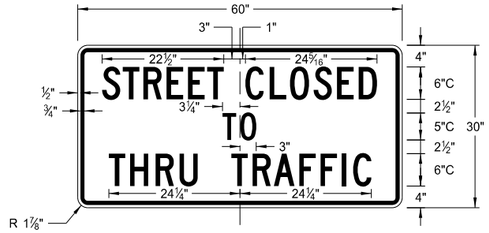

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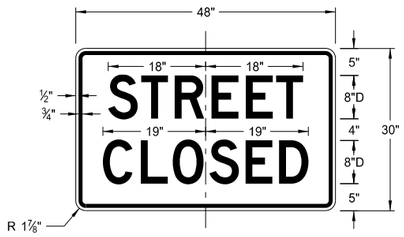

R11-2a-48
Legend: black (non-refl)
Background: white

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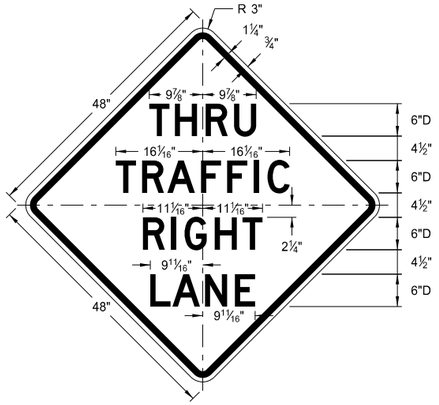
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
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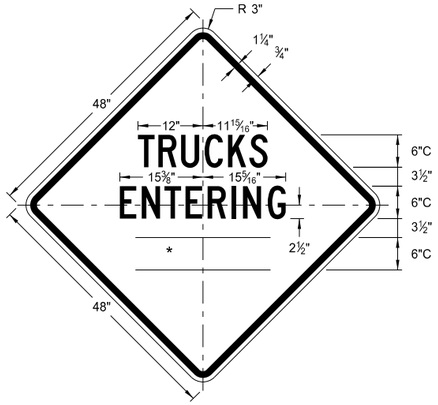
Background: orange



W8-54-48
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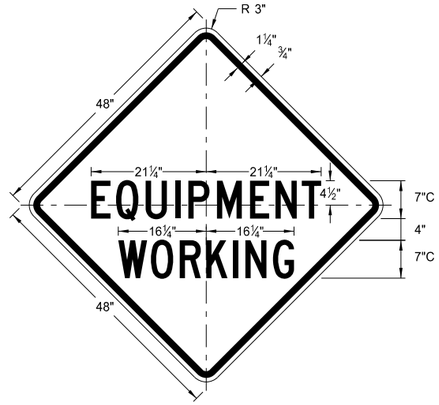
Background: orange



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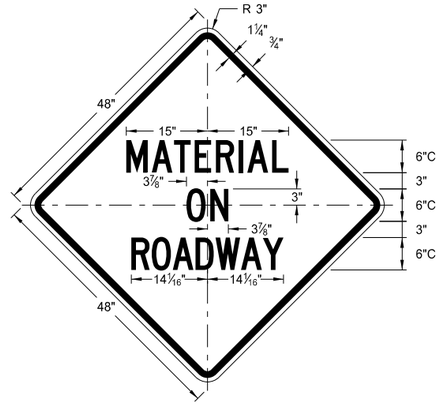
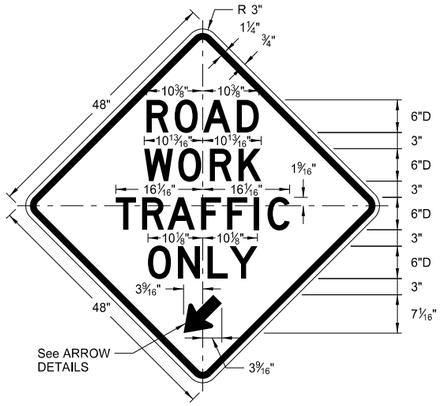
Background: orange



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



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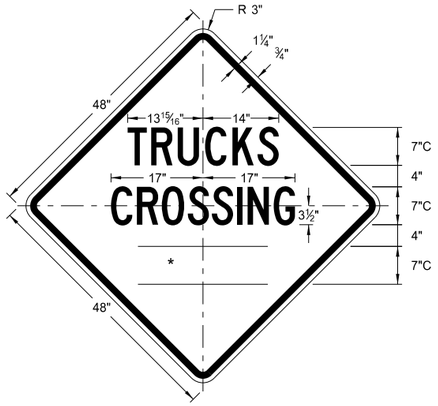

W8-55-48
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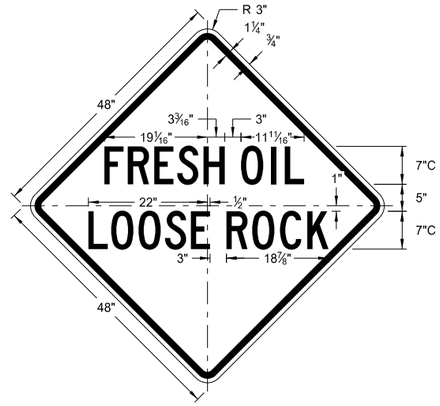
Background: orange

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



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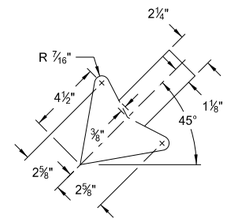
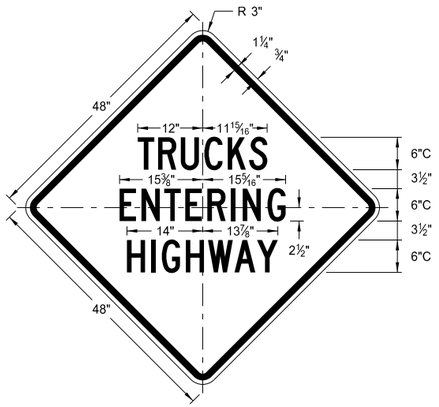
Background: orange



W5-9-48

ARROW DETAILS



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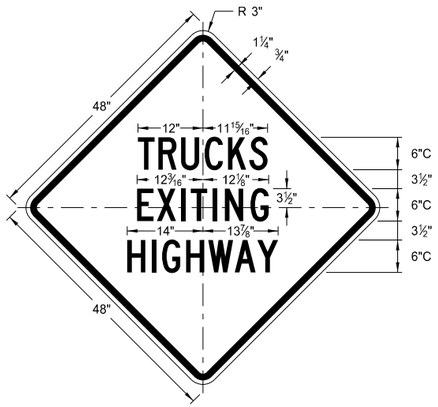

W8-56-48
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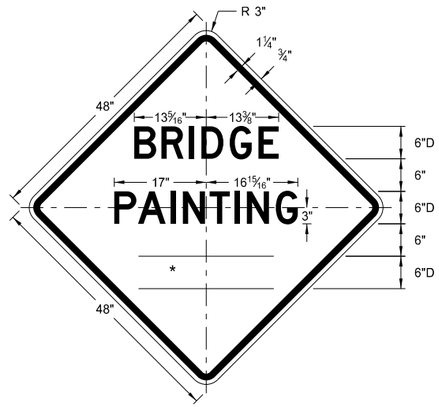
Background: orange



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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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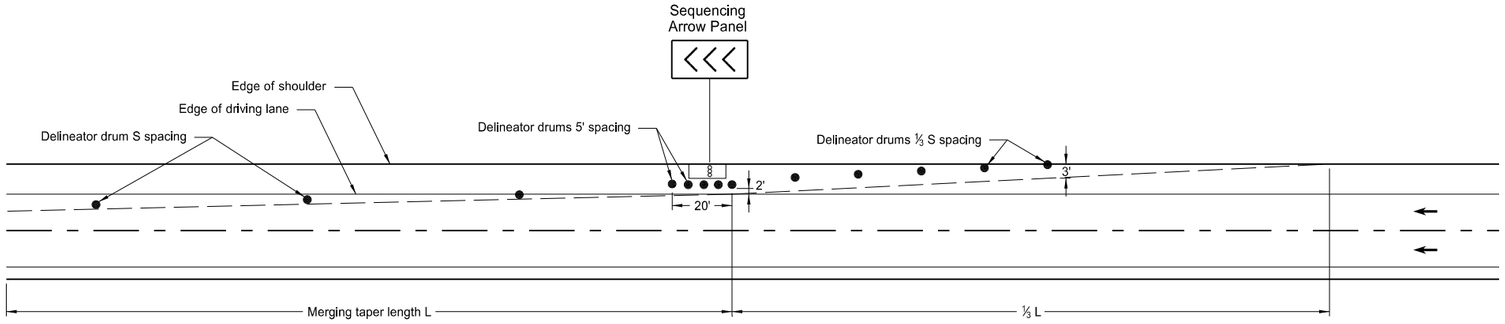
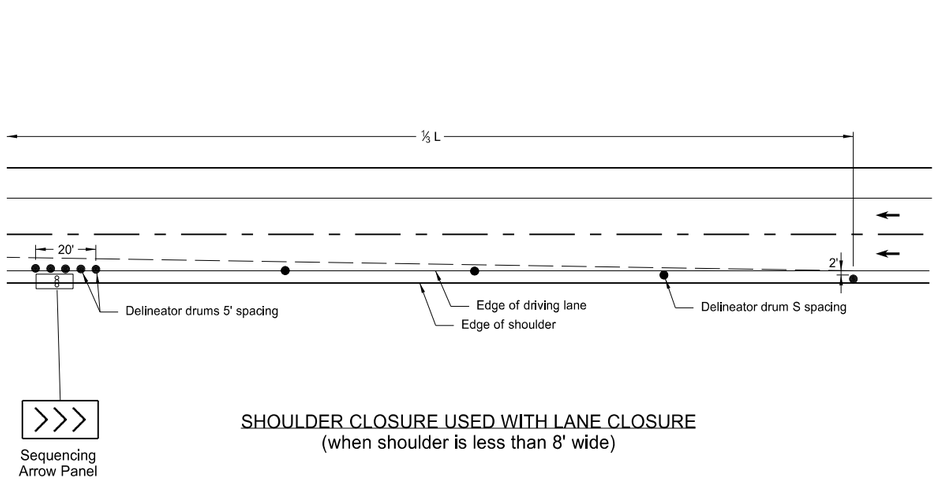
SHOULDER CLOSURE TAPERS

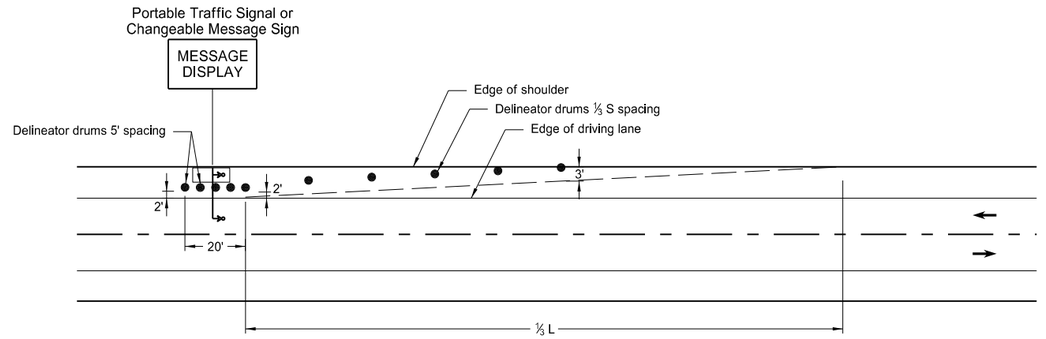
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

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

Notes:

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

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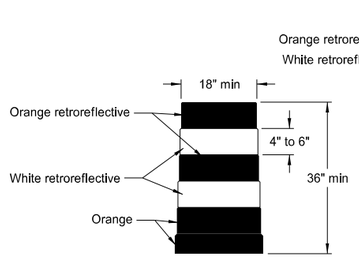
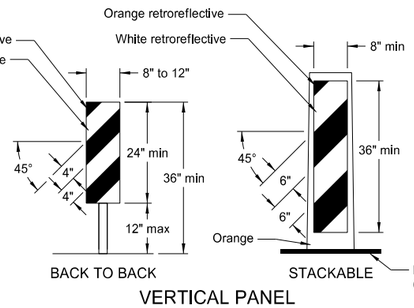
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



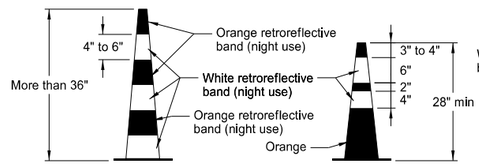
DELINEATOR DRUM

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.



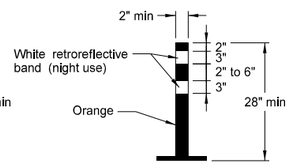
VERTICAL PANEL

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.



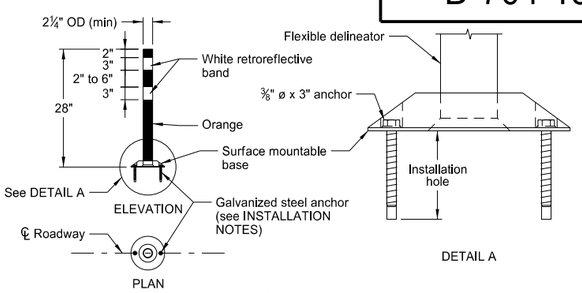
TRAFFIC CONE

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

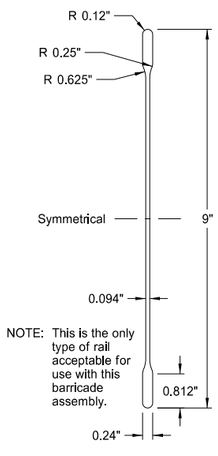
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



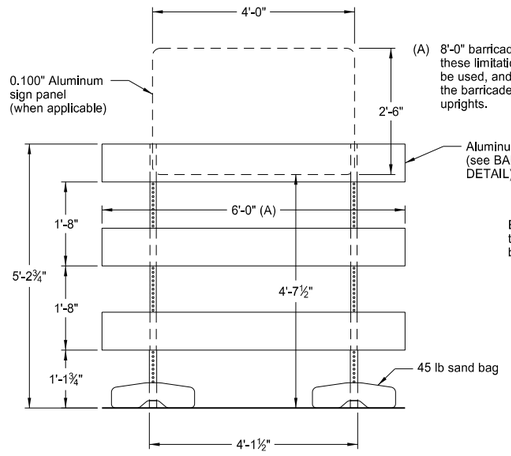
FLEXIBLE DELINEATOR

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.

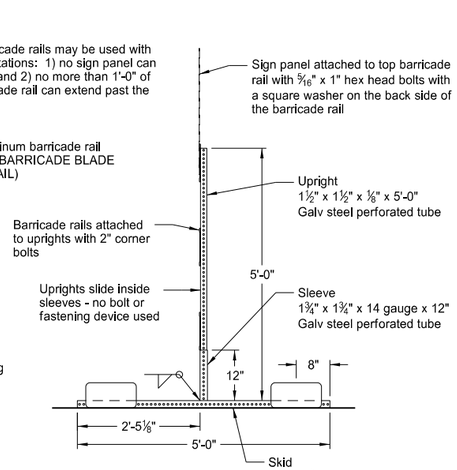


BARRICADE BLADE DETAIL



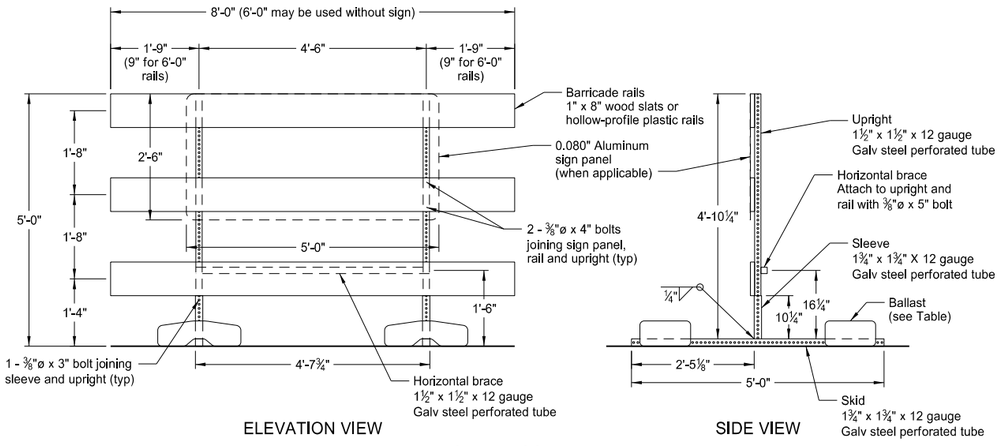
ELEVATION VIEW

(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)

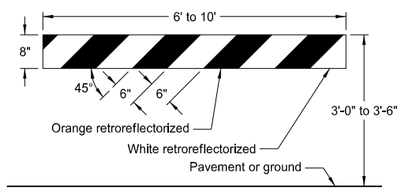


ELEVATION VIEW

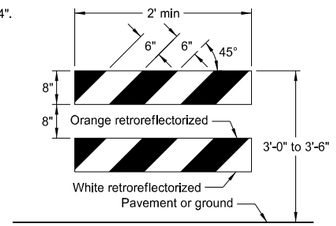
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

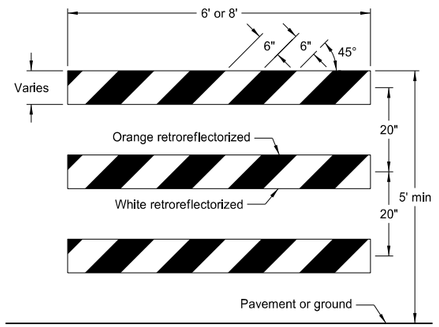
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

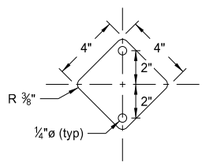


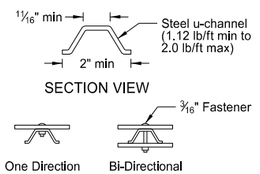
TYPE II BARRICADE

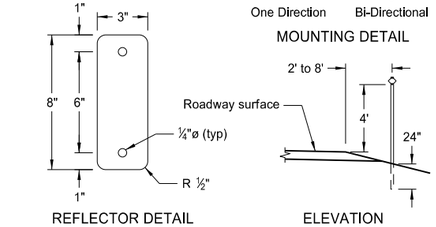


TYPE III BARRICADE

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.

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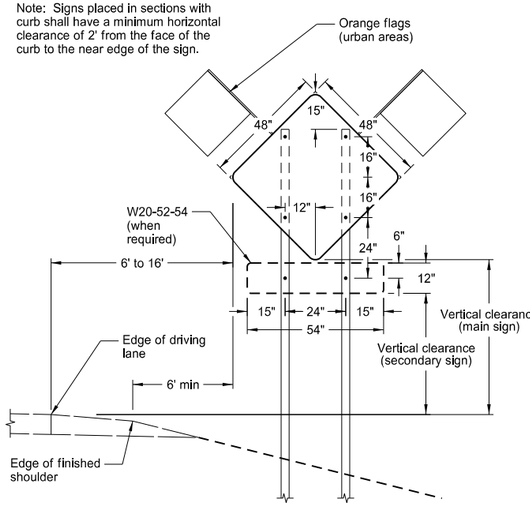
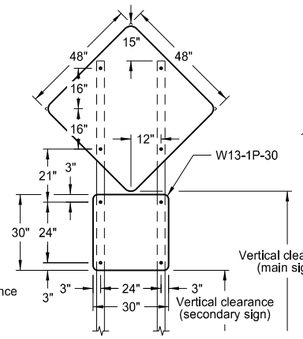
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

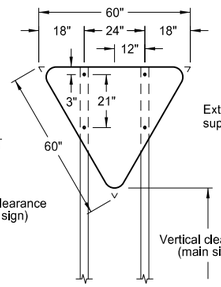
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



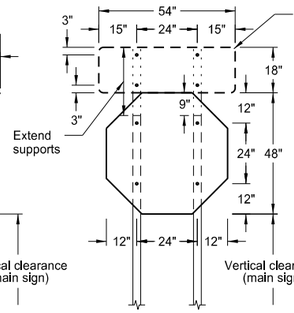
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



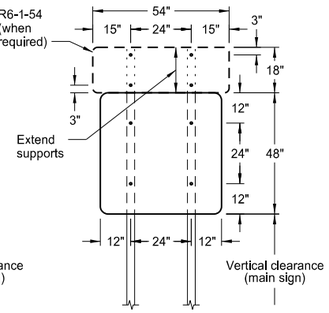
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



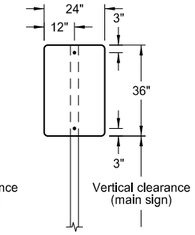
R1-2-60 - YIELD SIGN



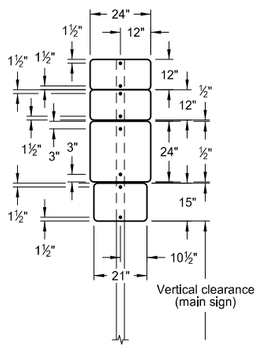
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



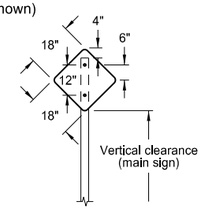
48" x 48" SIGN
(with R6-1-54 sign as required)



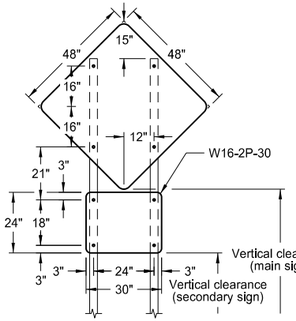
24" x 36" SIGN



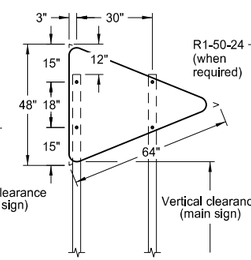
24" x 24"
ROUTE MARKER
ASSEMBLY



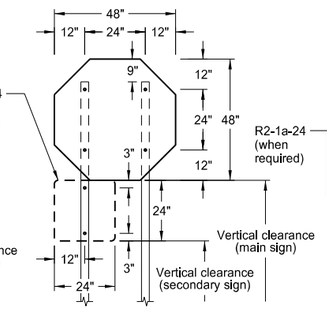
18" x 18"
DIAMOND SIGN



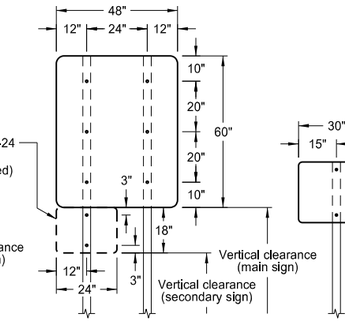
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



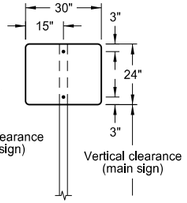
W14-3-64 - PENNANT SIGN



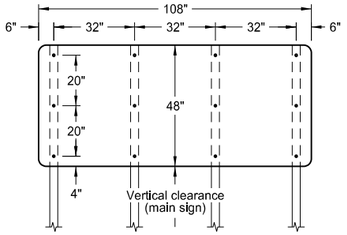
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



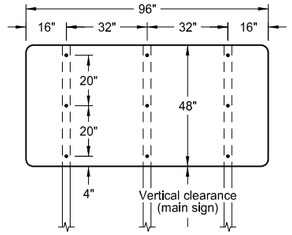
48" x 48" SIGN
(with R2-1a-24 sign as required)



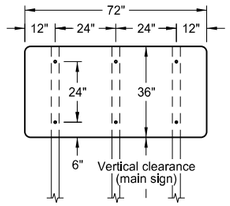
30" x 24" SIGN



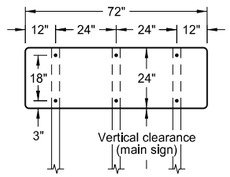
108" x 48" SIGN



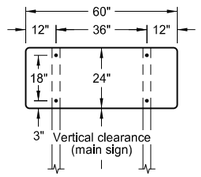
96" x 48" SIGN



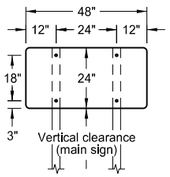
72" x 36" SIGN



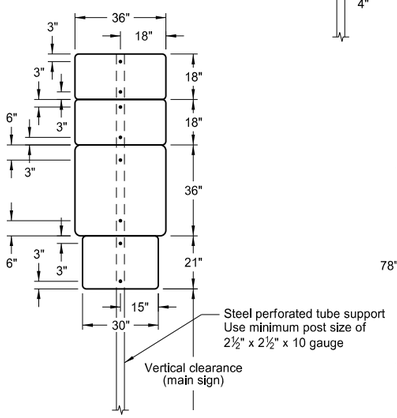
72" x 24" SIGN



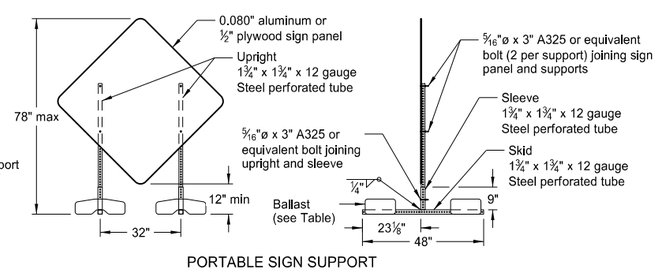
60" x 24" SIGN



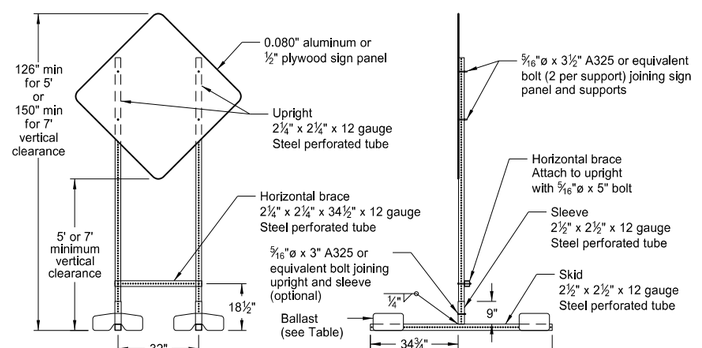
48" x 24" SIGN



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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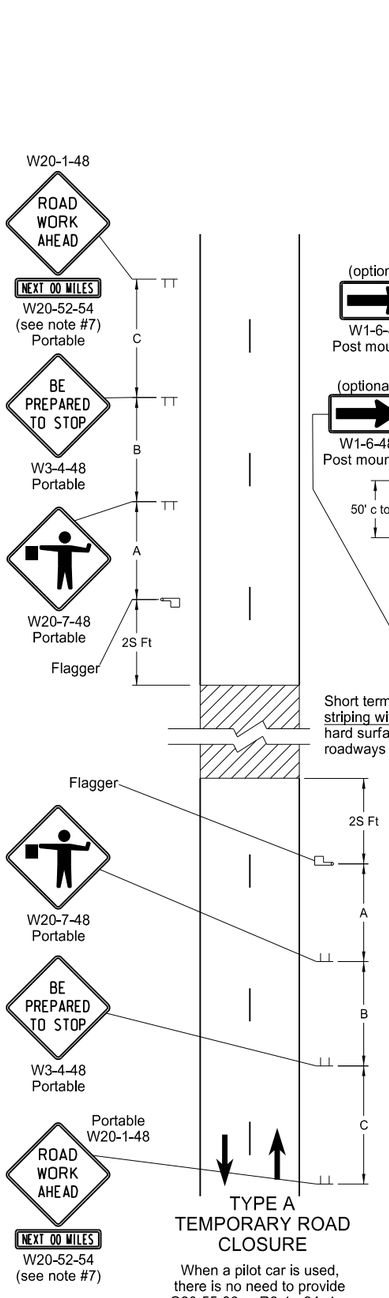
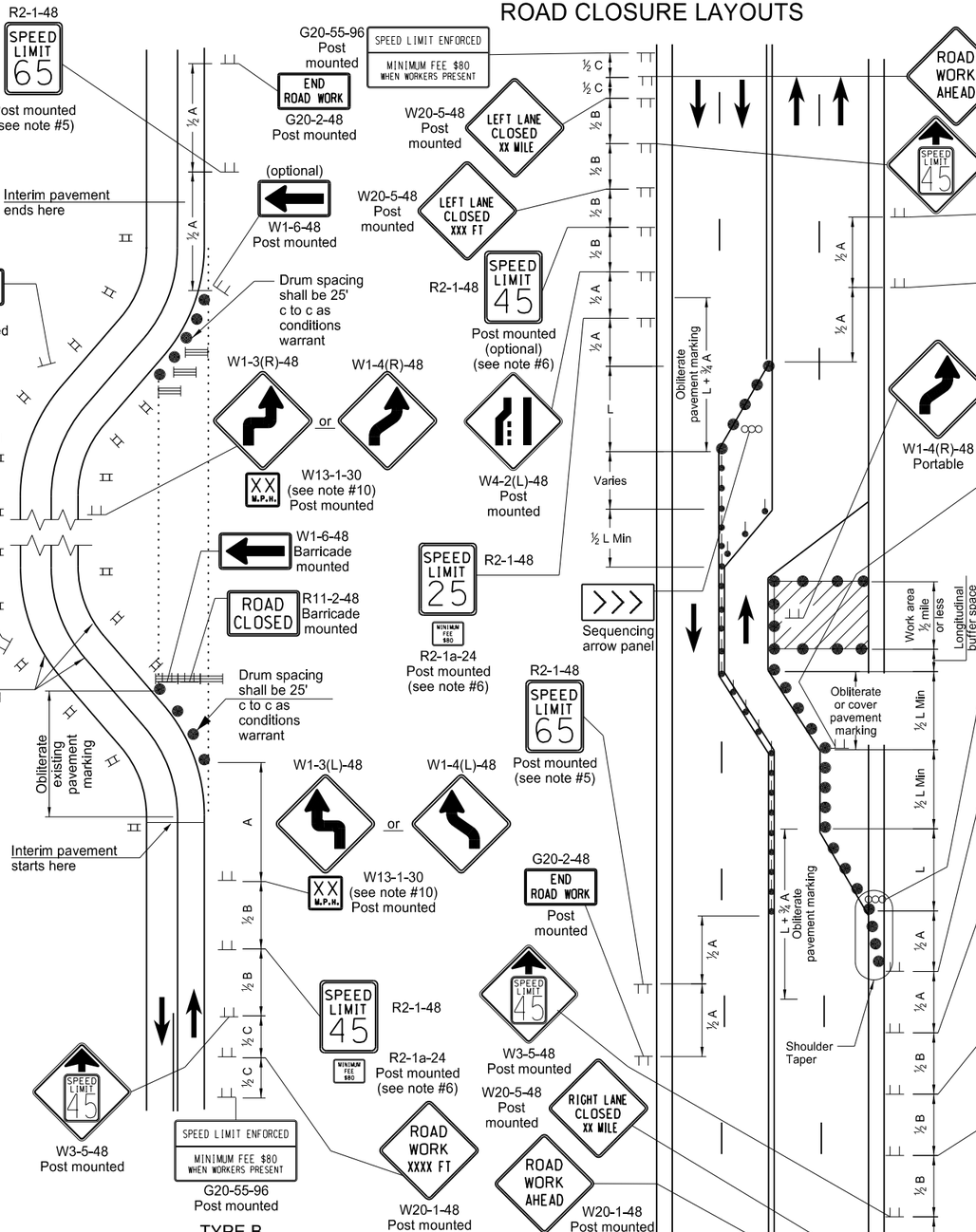
ROAD CLOSURE LAYOUTS

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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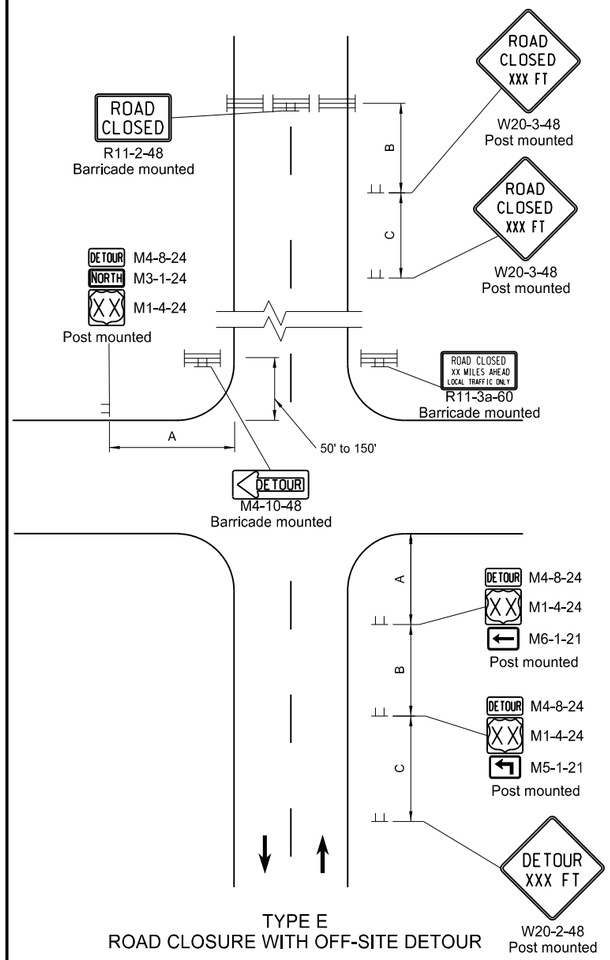
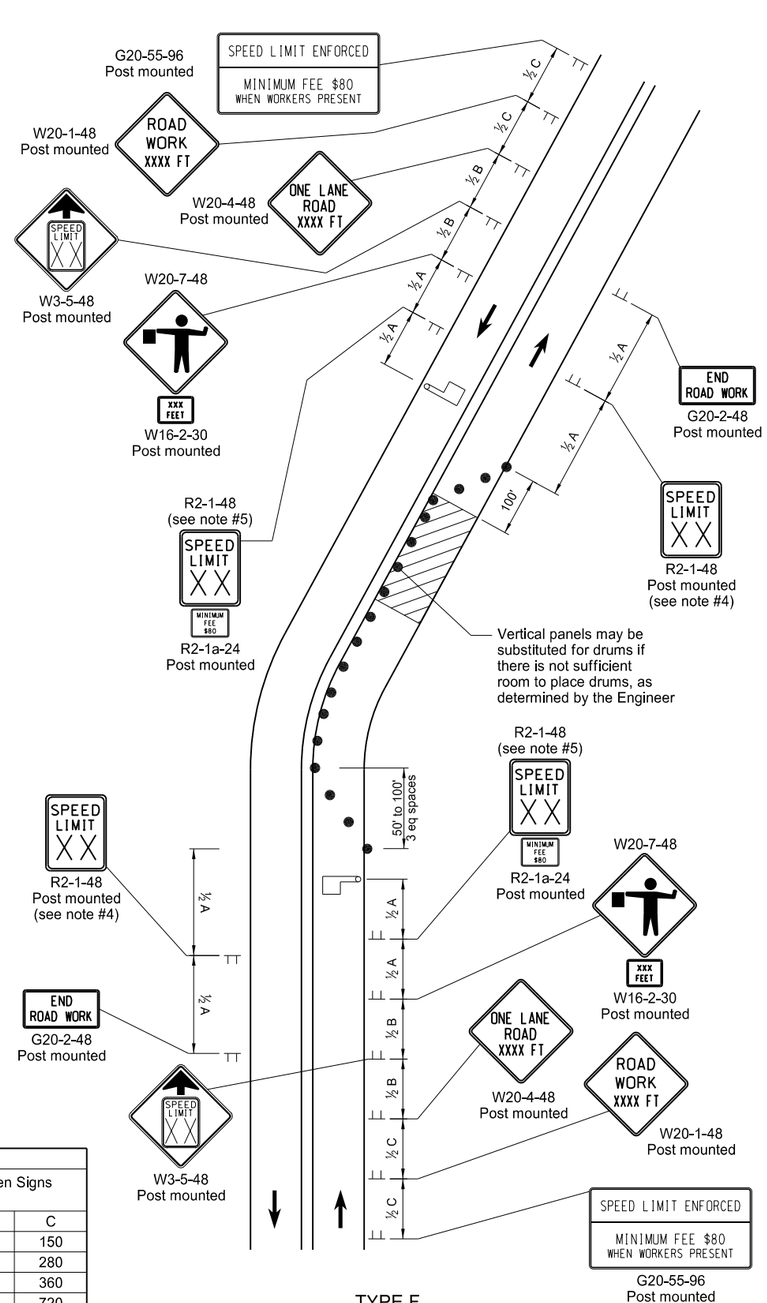
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

Used where a road is closed beyond a detour point. Signing shown for one direction only. Sign not shown on detour shall be shown in plans and installed and maintained by the contractor.



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

Two lane highway with one lane closed. Flagger is at a point where it is visible to approaching traffic.

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

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 the roadway shall be placed on skid mounted assemblies.
3. Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
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 1/2 B.
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. Where necessary, safe speed to be determined by the Engineer.
9. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
10. G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used, if this standard is part of other traffic control layouts, or the work is less than 15 days.
11. When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
    a. Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
    b. A "Do Not Stop on Tracks" sign (R8-8-24) should be placed near the cross buck in each direction while the lane closure is in the vicinity of the tracks.
    c. A buffer space between the work zone and the lane closure transition should be extended upstream of the highway-rail grade crossing so a queue created by the flagging operation will not extend across the highway-rail grade crossing.
    d. If the queuing of vehicles across active rail tracks cannot be avoided, a flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing, even if automatic warning devices are in place.

KEY

- Delineator Drum
- Type III Barricade
- Flagger
- Sign
- Work/Hazard Area

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
3-13-14	Revised Sign Cell "ROAD WORK XXX FT"

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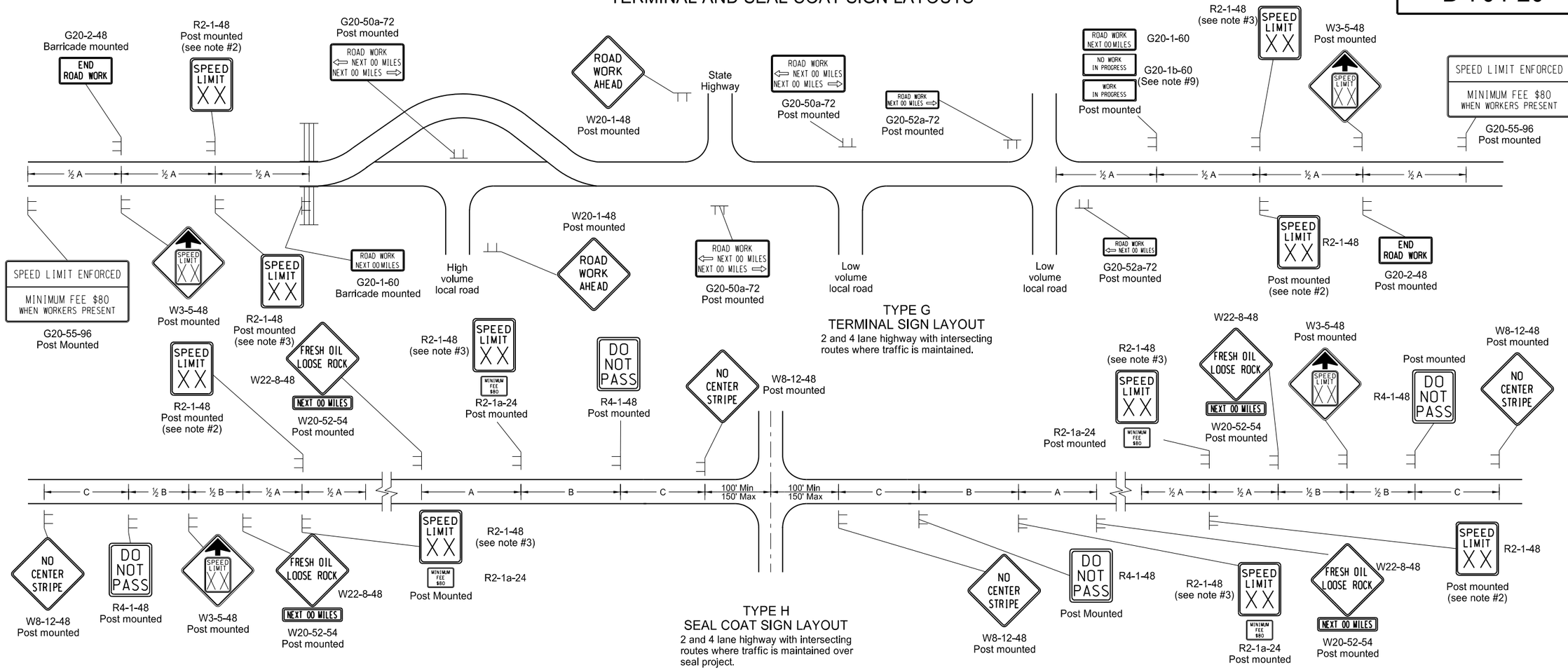
TERMINAL AND SEAL COAT SIGN LAYOUTS

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	
REVISIONS	
DATE	CHANGE

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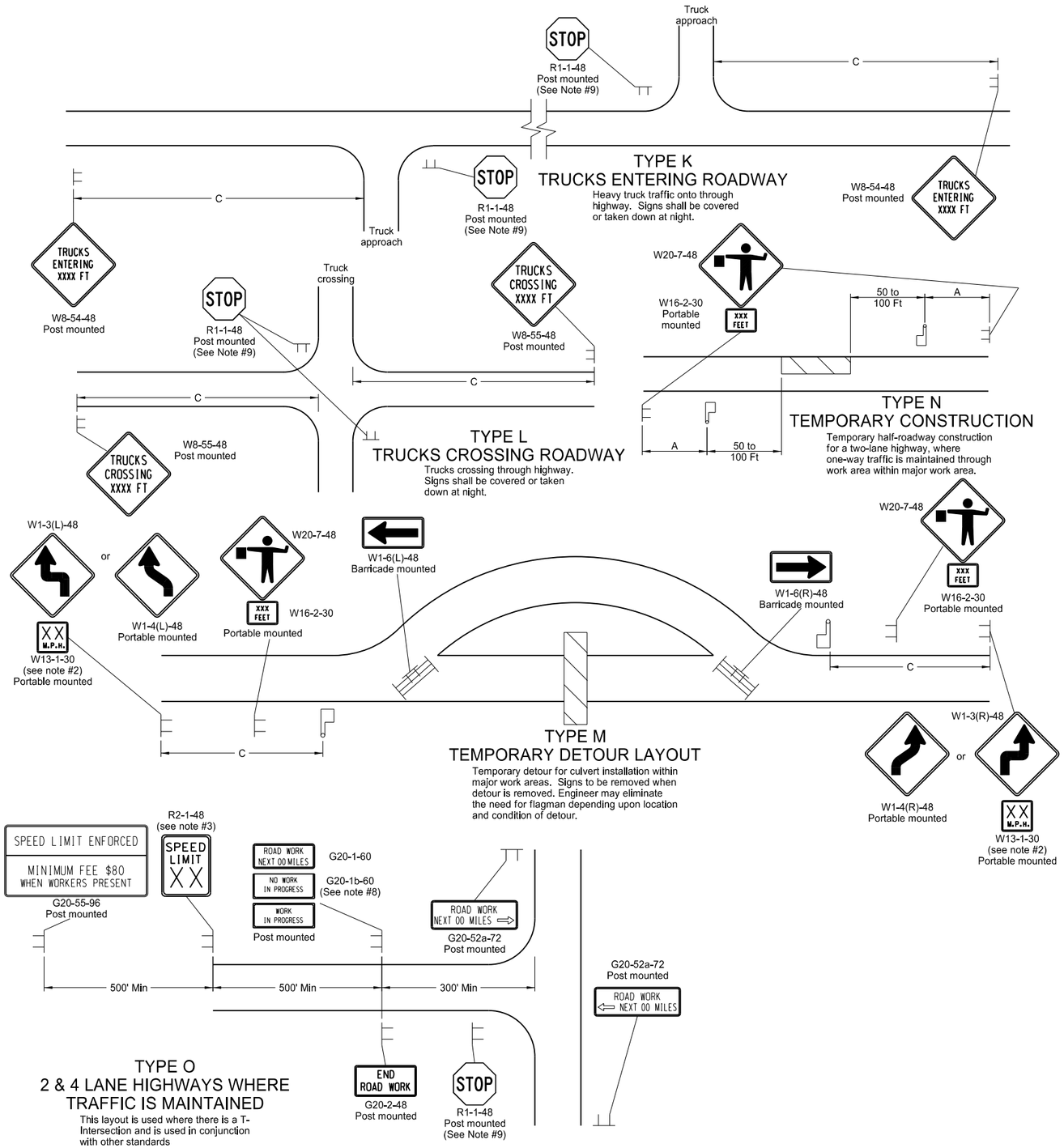
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

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

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

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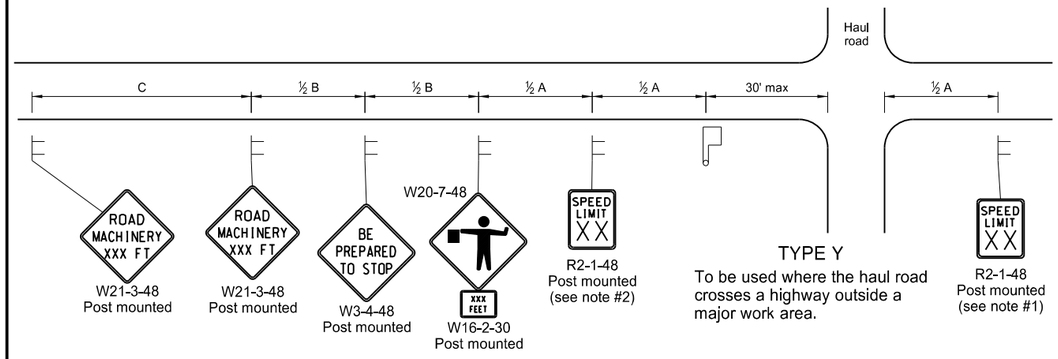
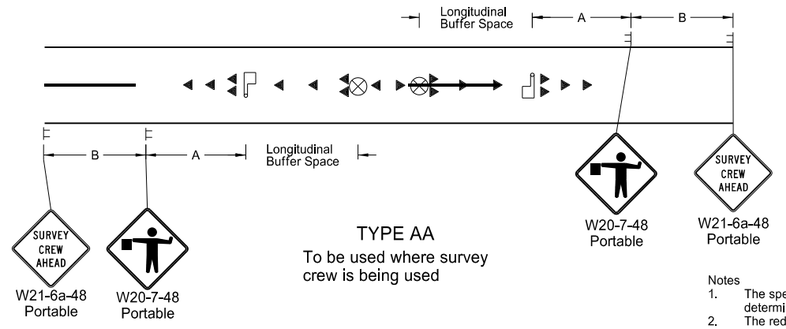
MISCELLANEOUS SIGN LAYOUTS

D-704-26



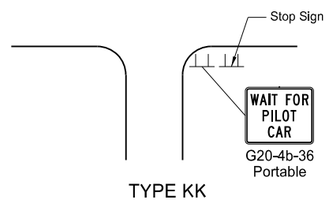
TYPE Y

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



TYPE AA

To be used where survey crew is being used

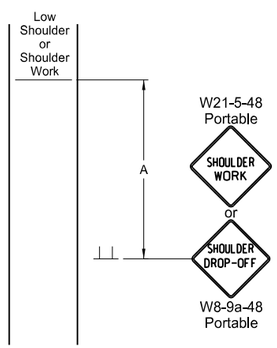


TYPE KK

To be used at major intersections within pilot car control area

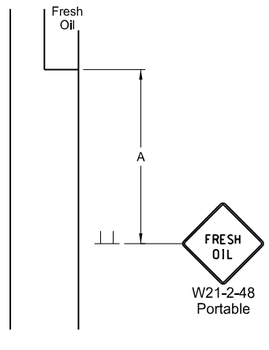
Notes

1. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
2. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 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.



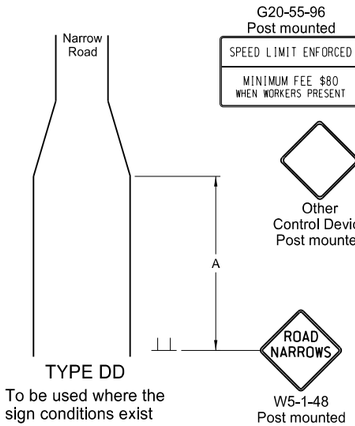
TYPE BB

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



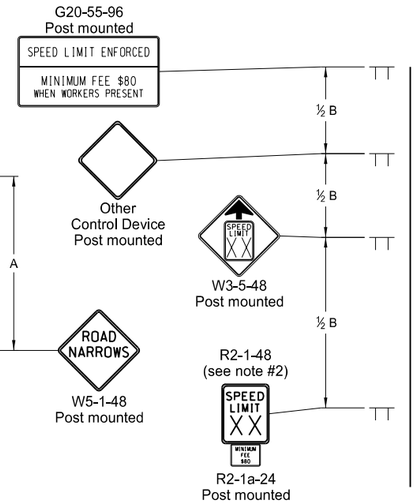
TYPE CC

To be used where the sign conditions exist



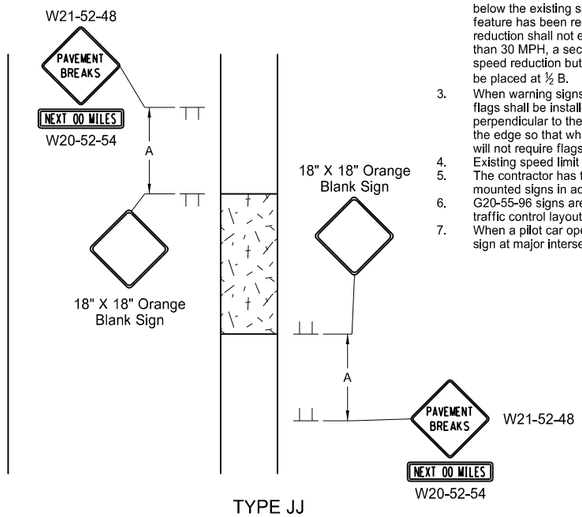
TYPE DD

To be used where the sign conditions exist



TYPE Z

To be used where speed zone is needed

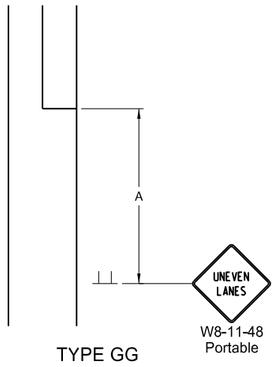


TYPE JJ

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.

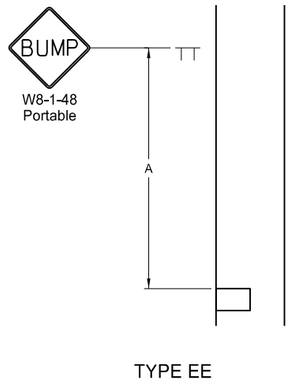
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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



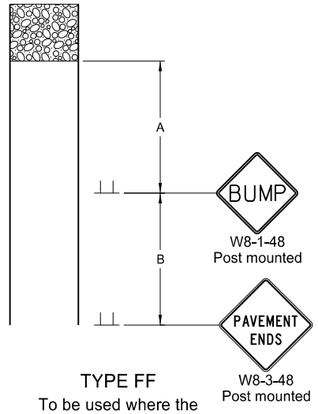
TYPE GG

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

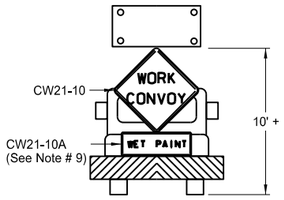
Cones

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

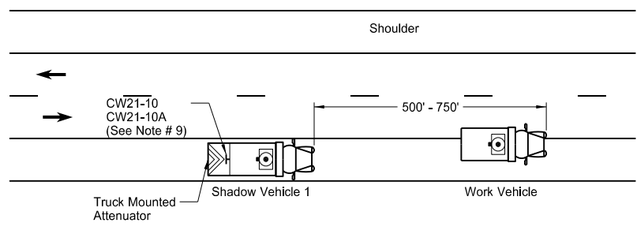
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 09/27/13 and the original document is stored at the North Dakota Department of Transportation

TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

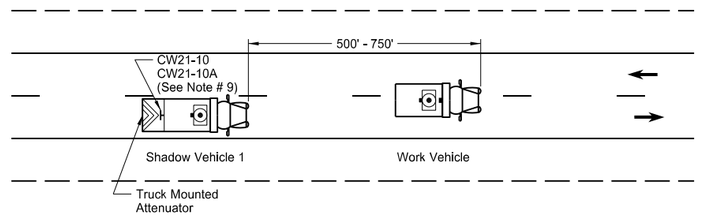
D-704-27



Typical Shadow Vehicle 1
Two-Way Roaday



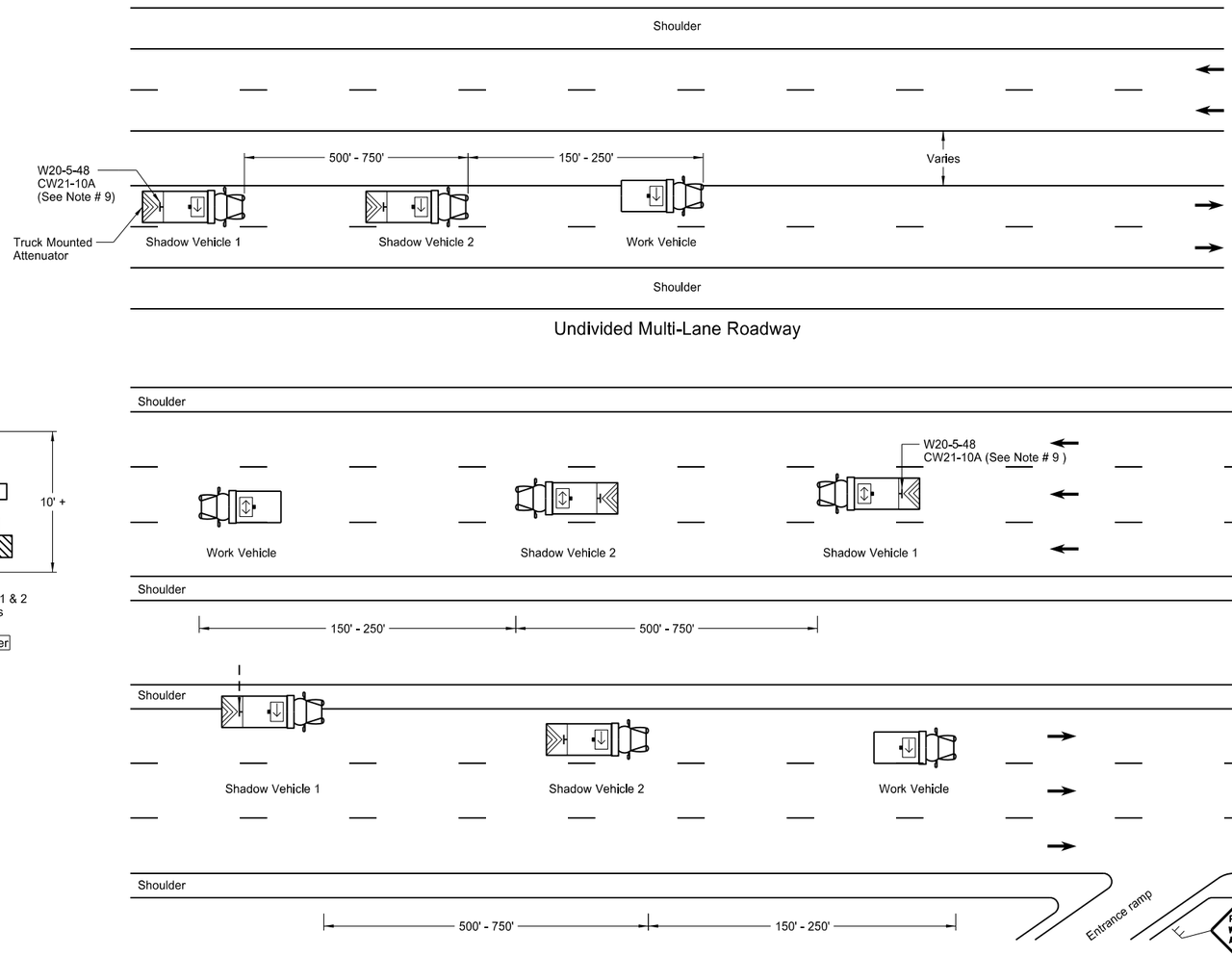
Two-Way Roadway with Paved Shoulders



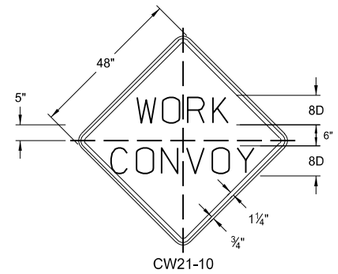
Two-Way Roadway without Paved Shoulders

Notes

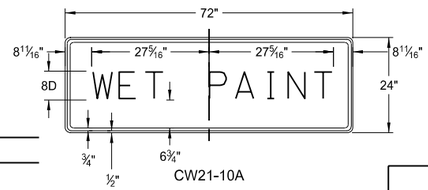
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the 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.



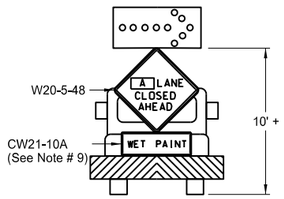
Sign Details



CW21-10



CW21-10A



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center

KEY

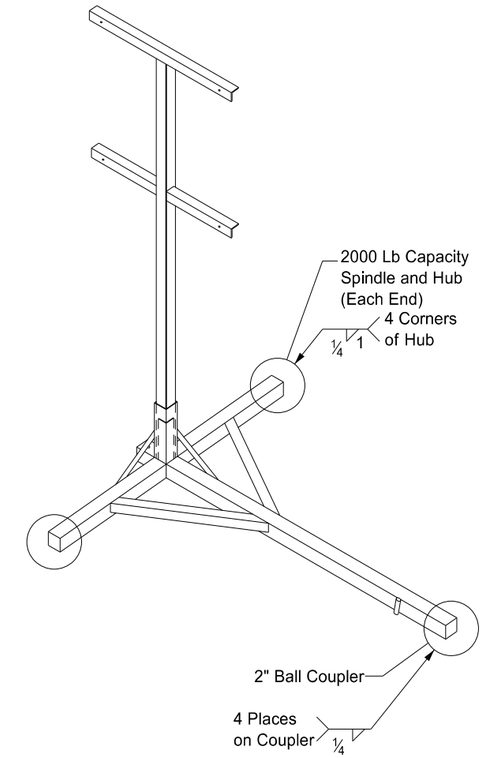
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

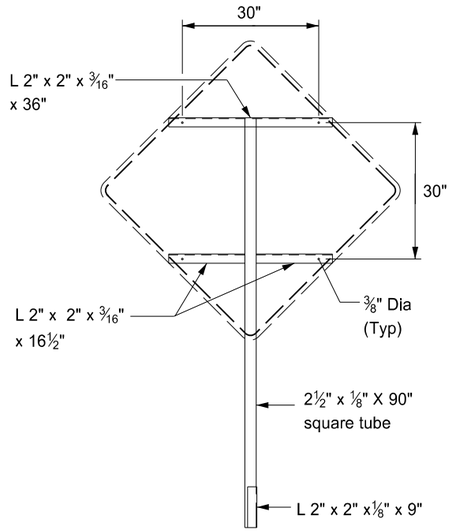
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

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

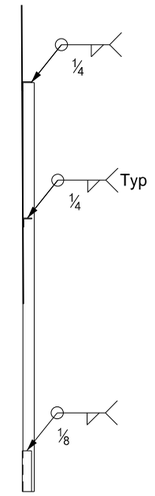
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



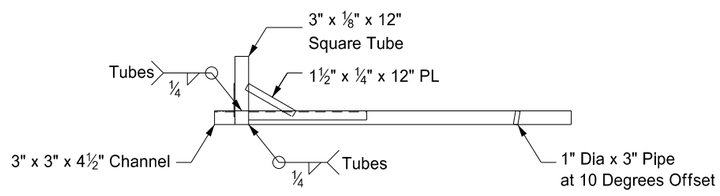


FRONT

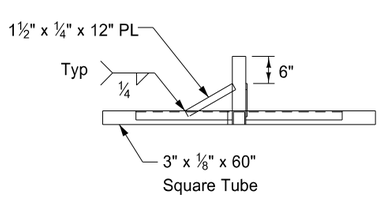


RIGHT

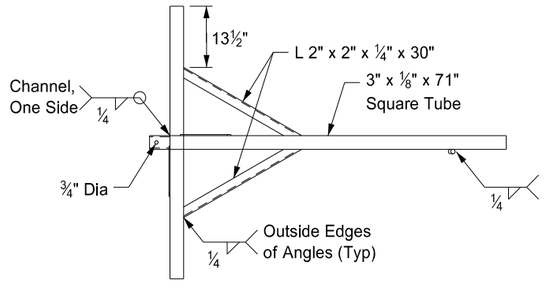
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

Notes:

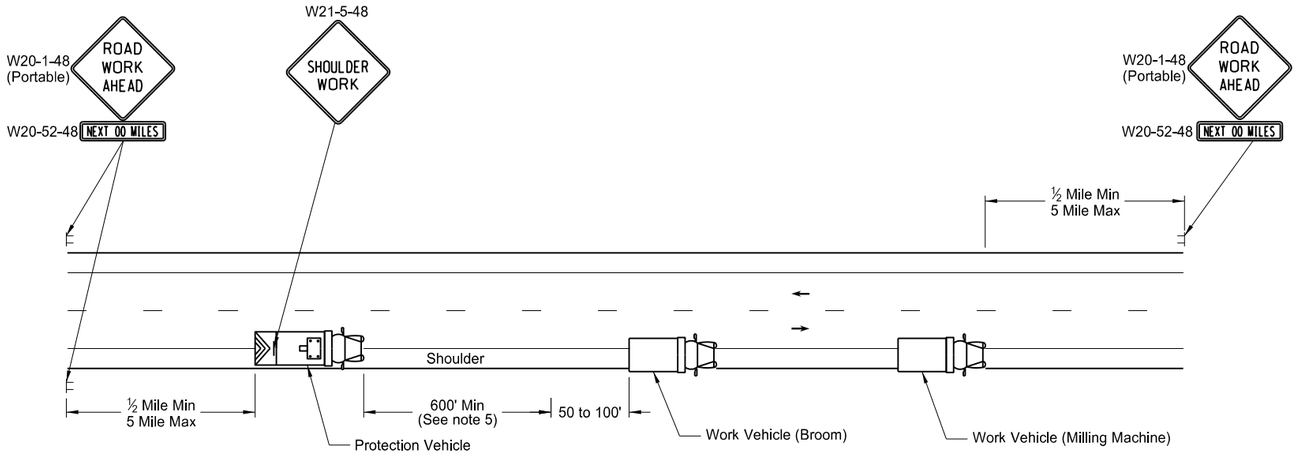
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

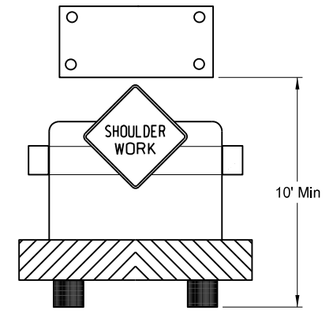
This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

MOBILE OPERATION
Grinding Shoulder Rumble Strips

D-704-56



TWO LANE - TWO WAY ROADWAY

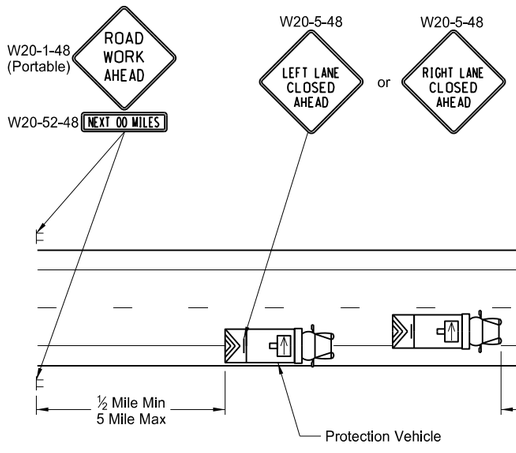


TWO LANE - TWO WAY ROADWAY

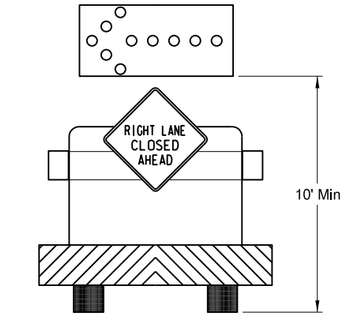
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

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.

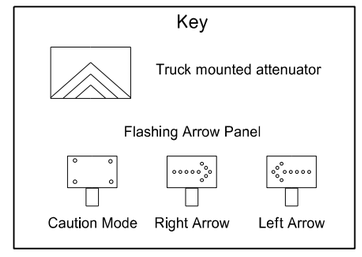


INTERSTATE & 4 LANE DIVIDED HIGHWAY



INTERSTATE & 4 LANE DIVIDED HIGHWAY

Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

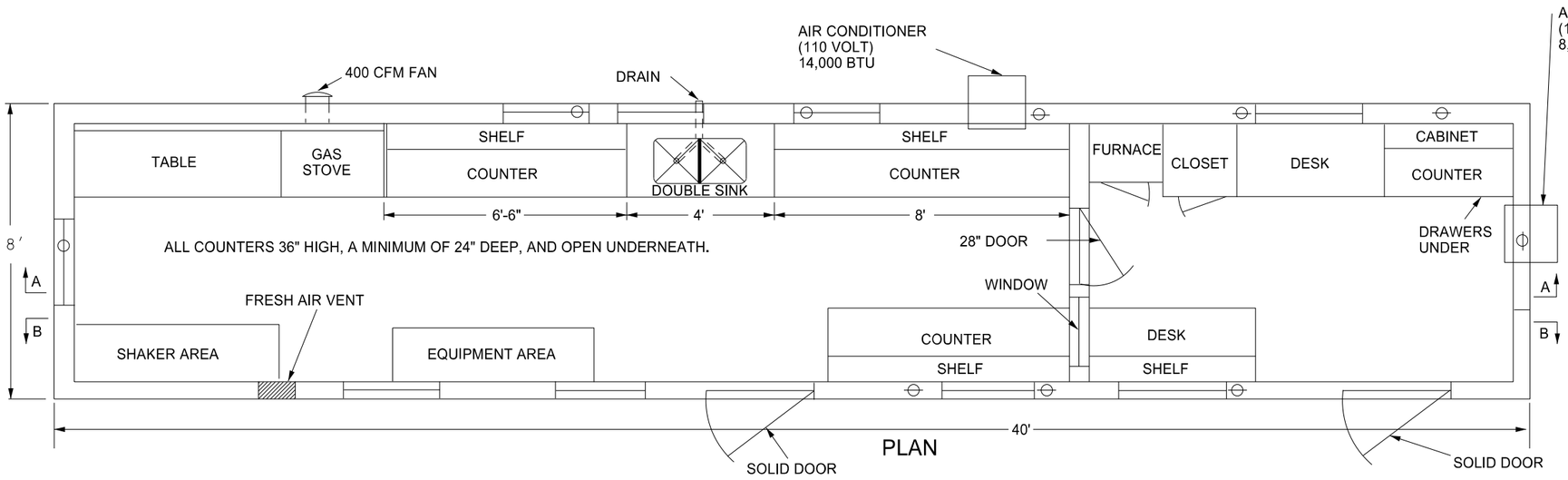


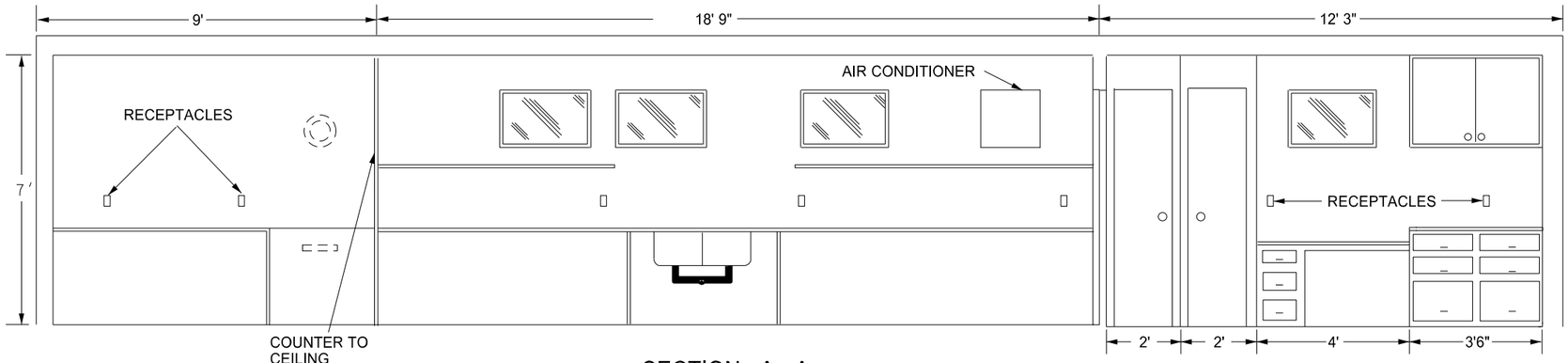
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE

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

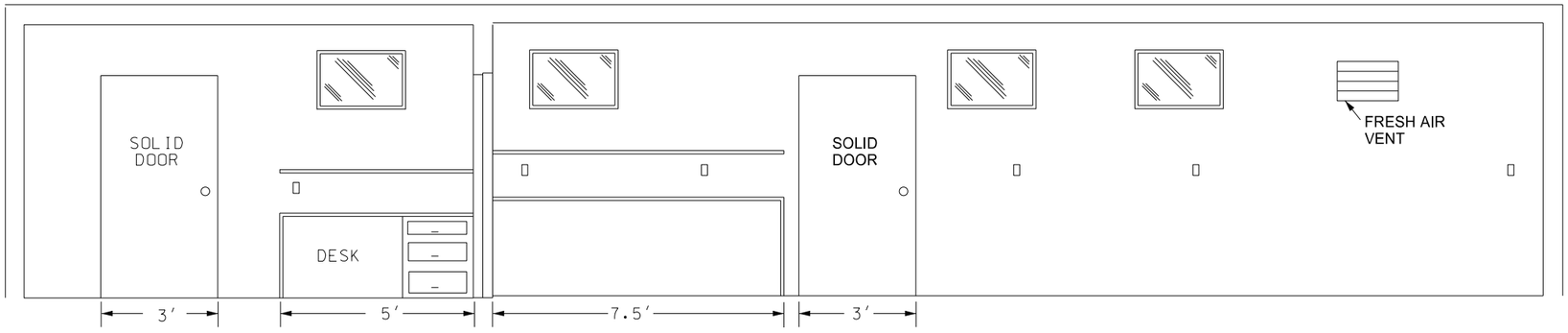
BITUMINOUS LABORATORY

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.

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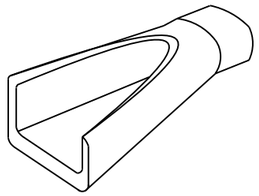
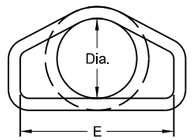
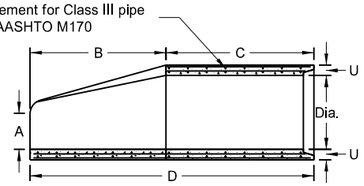
REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)



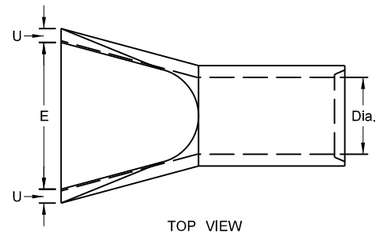
PERSPECTIVE



END VIEW



SIDE VIEW



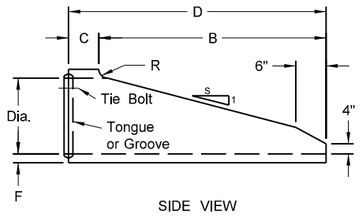
TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION

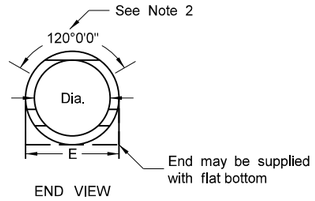
Reinforcement to be equivalent to Class III RCP

FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"

TRAVERSABLE END SECTION							
DIA	B	C	D	E	F	R	S
15"	4'	9"	4'-9"	1'-7½"	2¼"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	2½"	3"	6
24"	6'	1'	7'	2'-6"	3"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	4"	3"	4



SIDE VIEW



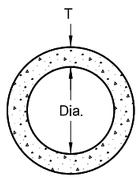
END VIEW

NOTES (Traversable End Section):

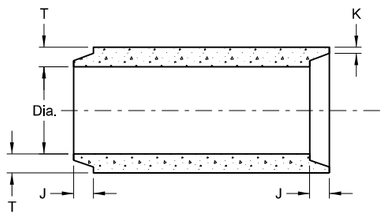
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

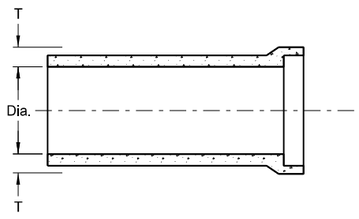
Reinforcement to be equivalent to Class III RCP



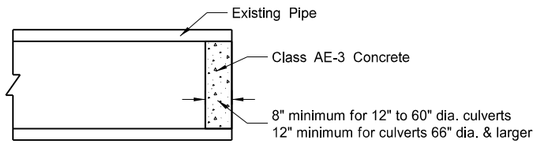
END VIEW



TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT



CONCRETE PIPE PLUG

CIRCULAR PIPE

JOINTS FOR REINFORCED CONCRETE PIPE

All Classifications of Round Concrete Pipe					
Internal Dia. of pipe in Inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)
Dia	Sq. ft.	Lbs.	In.	In.	In.
12	0.79	92	1⅛-2⅛	¾	2
15	1.23	127	1¾-2¾	⅞	2¼
18	1.77	168	1⅞-2⅞	1	2½
21	2.40	214	1⅞-3⅛	1⅛	2¾
24	3.14	265	2⅛-3¼	1⅛	3
27	3.98	322	2¾-4	1¼	3¼
30	4.91	384	3⅛-4¼	1¼	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3½-4¼	1½	4
42	9.62	685	3¾-4¾	1¾	4½
48	12.57	685	3⅞-4¾	1⅞	5
54	15.90	1070	4⅛-5½	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2⅝	6½
72	28.27	1810	5⅝-6¾	2⅝	7
78	33.18	2098	6¼-7¼	2⅝	7½
84	38.48	2410	5⅝-7¾	3⅜	8
90	44.18	2793	6¾-8½	3⅛	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

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

NOTES:

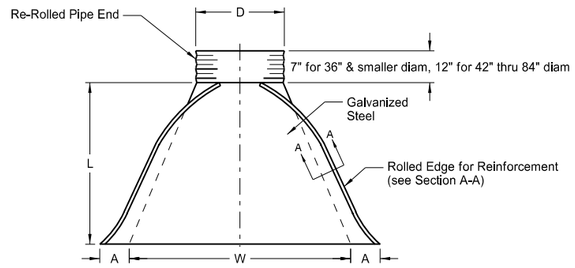
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66"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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5

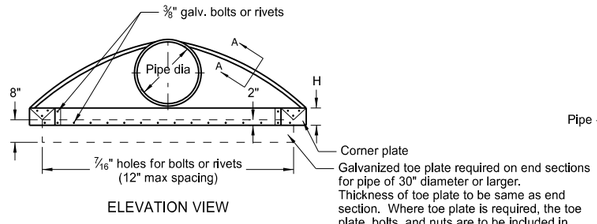
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 01/21/15 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4

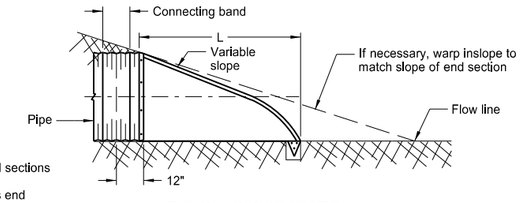


PLAN VIEW



ELEVATION VIEW

Galvanized toe plate required on end sections for pipe of 30" diameter or larger. Thickness of toe plate to be same as end section. Where toe plate is required, the toe plate, bolts, and nuts are to be included in price bid for end sections.



TYPICAL CROSS SECTION
(showing connector section)

* * PIPE DIA. IN	GALV. THICK. IN	END SECTION DIMENSIONS A IN	B IN	H IN	L IN	W IN	APPROX. SLOPE RATE	BODY PIECE
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2½:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1¾:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1¼:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

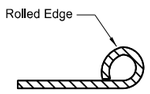
* These sizes have 0.109" sides and 0.138" center panels.

* * Pipe diameter is equal to dimension "D" of end section.

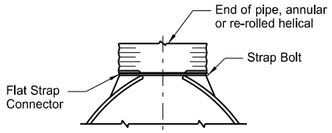
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

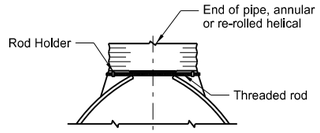
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



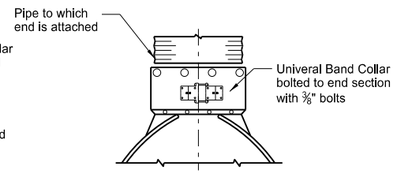
SECTION A-A



TYPE #1
For circular pipes with diameter 24" & smaller



TYPE #2
For circular pipes with diameter 30" through 36"

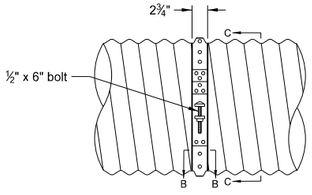


TYPE #3
For all pipe sizes

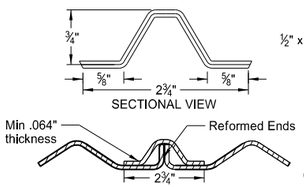
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"	.052"
		78" - 84"	10½"	.079"
	3" x 1" Rerolled End	48" - 120"	10½"	.052"
	5" x 1" Rerolled End	48" - 120"	12"	.064"

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".

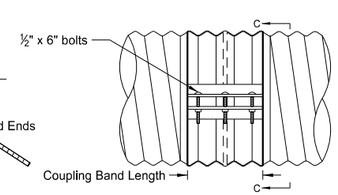


SIDE VIEW

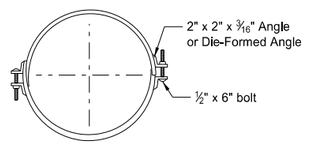


SECTION B-B

HAT BAND FOR FLANGED END PIPE

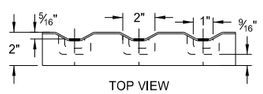


SIDE VIEW



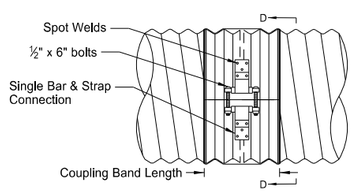
SECTION C-C
Angle Connection

ANNULAR BAND

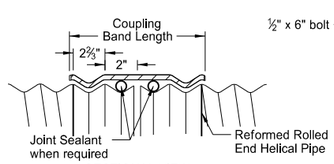


TOP VIEW

Die-Formed Angle Connector

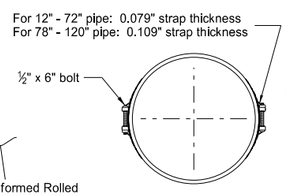


SIDE VIEW

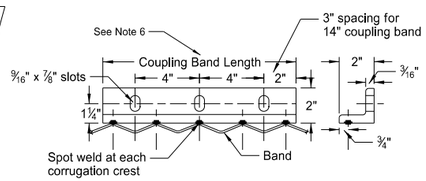


SECTIONAL VIEW

HUGGER COUPLING BAND



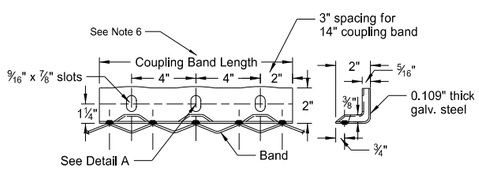
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

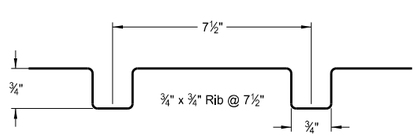
2" x 2" x 3/16" Angle Connector

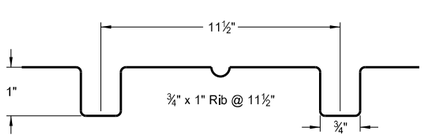


SIDE VIEW

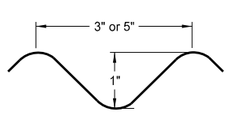
END VIEW

Die-Formed Angle Connector

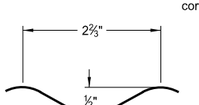




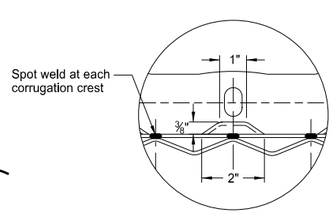
SPIRAL RIB CORRUGATIONS



3" x 1" CORRUGATIONS or
5" x 1" CORRUGATIONS



2⅔" x ½" CORRUGATIONS



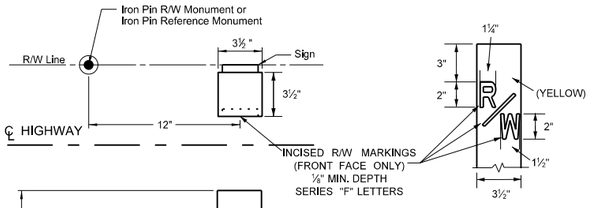
Detail A

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

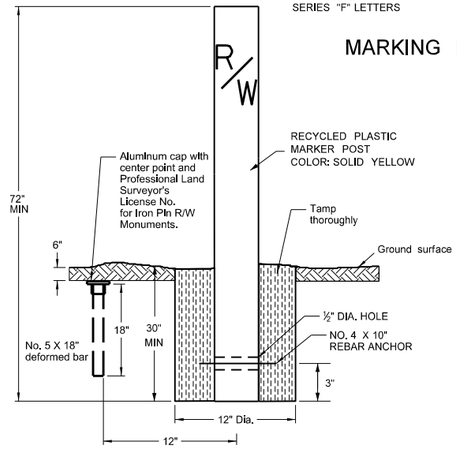
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674 , on 02/27/2014 and the original document is stored at the North Dakota Department of Transportation

STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

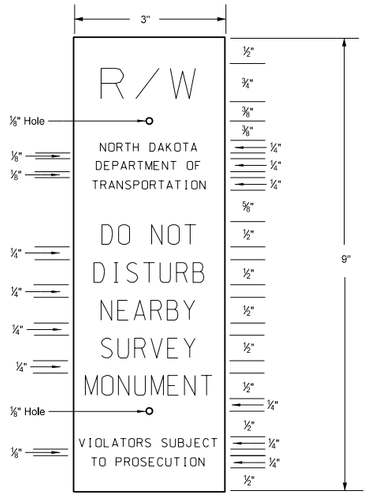
D-720-1



MARKING DETAIL



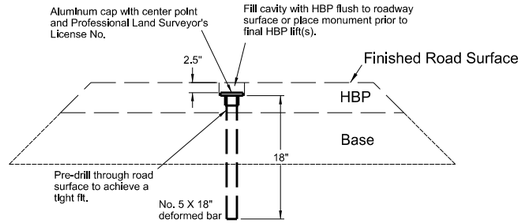
RECYCLED PLASTIC RIGHT OF WAY MARKER (WITNESS POST) DETAILS & IRON PIN REFERENCE AND R/W MONUMENT DETAILS



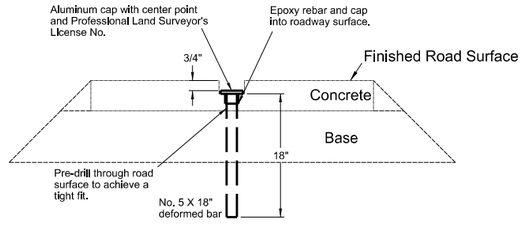
SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Sign shall be attached by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Sign shall be installed 2" from top of post.

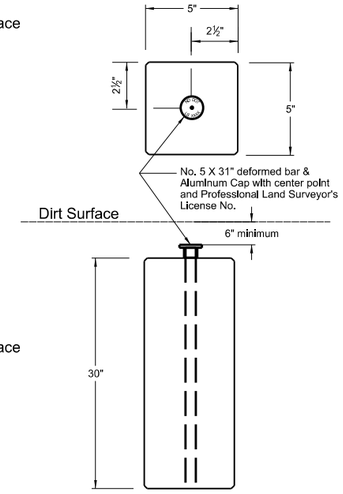
ALIGNMENT MONUMENT DETAILS



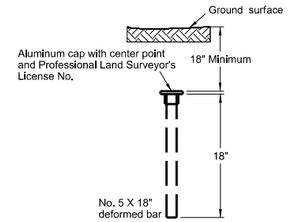
IRON PIN
(Within Finished Roadway Surface)



IRON PIN
(Within Finished Roadway Surface)



PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)



IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)

NOTES:

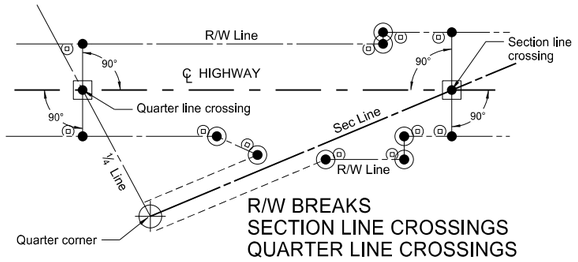
The construction and installation of Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) shall conform to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS:
Iron Pin or Precast Concrete Alignment Monuments with aluminum caps will be placed on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

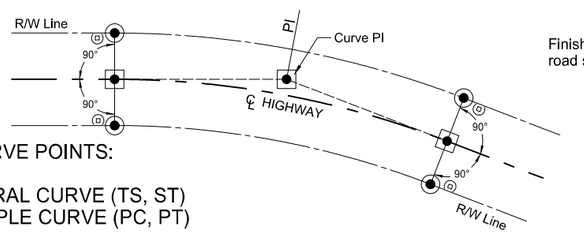
IRON PIN R/W MONUMENT:
Iron pins with aluminum caps (No. 5 X 18") will be placed at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

IRON PIN REFERENCE MONUMENT:
Iron Pins without aluminum caps (No. 5 X 18") will be placed as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

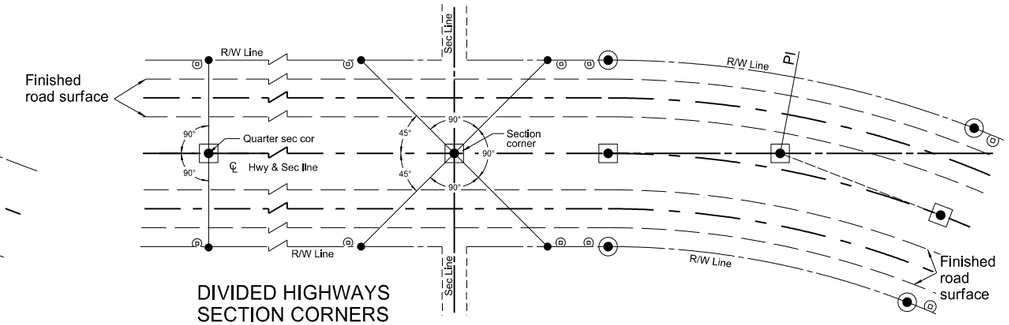
VARIOUS MONUMENT AND MARKER PLACEMENTS



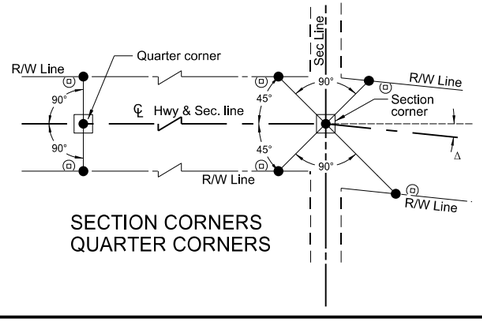
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



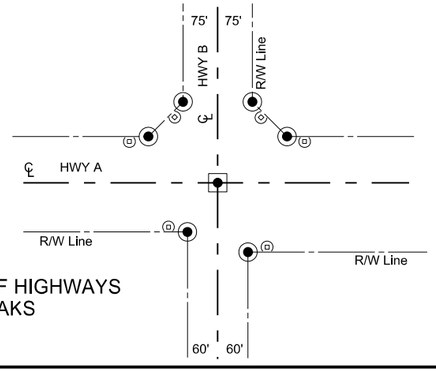
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS



SECTION CORNERS
QUARTER CORNERS



INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38

LEGEND
- Iron Pin Reference Monument
- R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930 , on 11/12/13 and the original document is stored at the North Dakota Department of Transportation

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'.

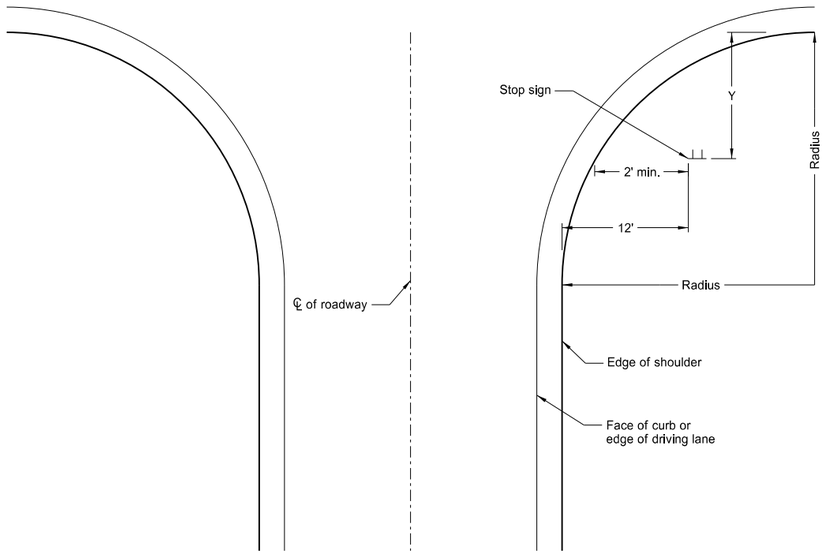
   Signs on expressways shall be installed with a minimum height of 7'.

   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.

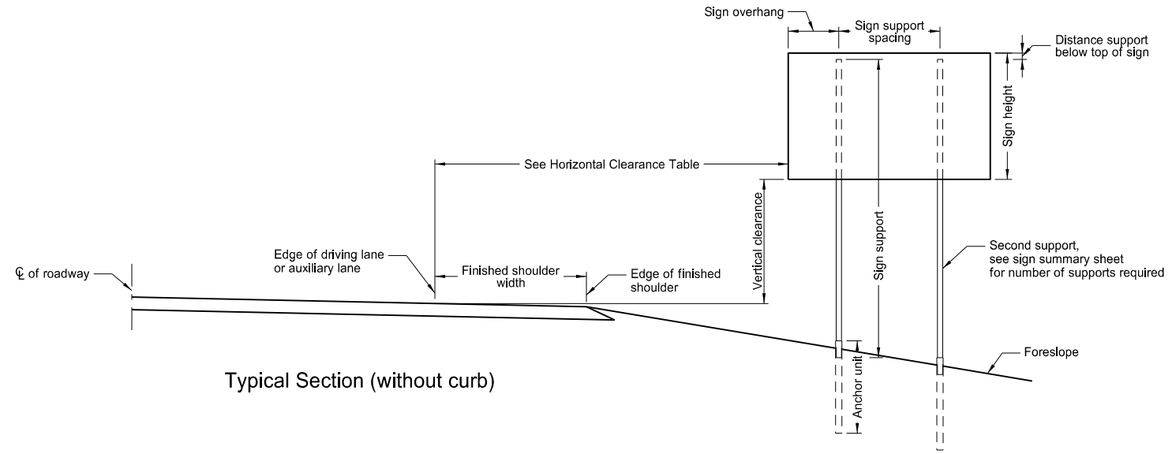
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.



Stop Sign Location
Wide Throat Intersection

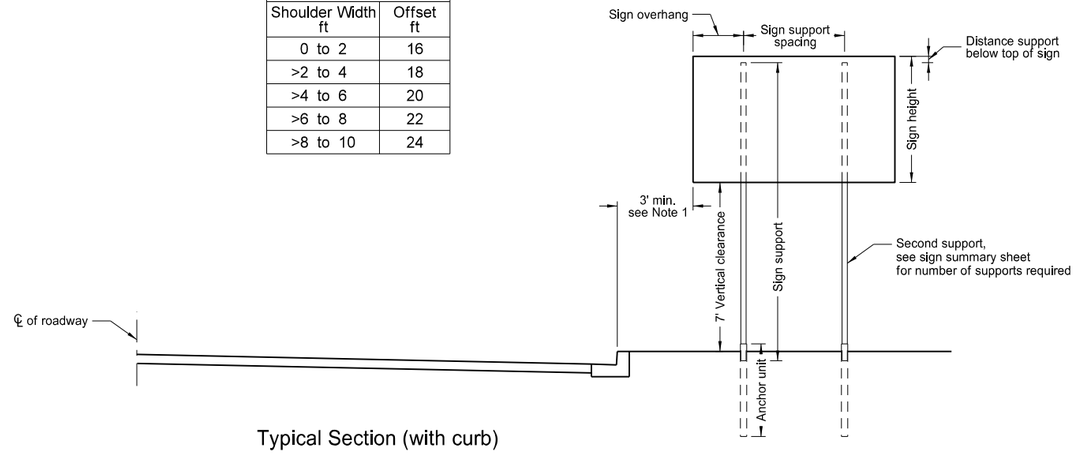
This layout is to be used for the placement of "Stop" signs.

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



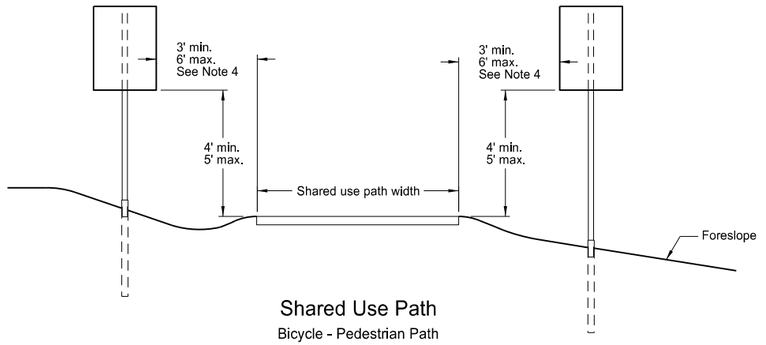
Typical Section (without curb)

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.

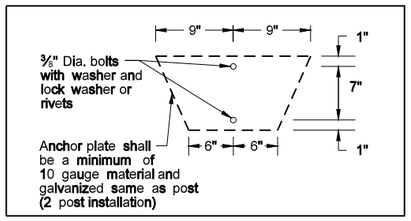
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 7/8/14 and the original document is stored at the North Dakota Department of Transportation

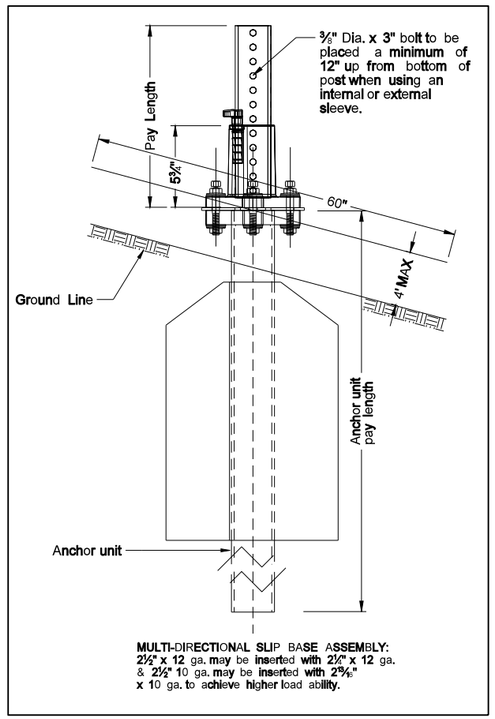
Mounting Details Perforated Tube

D-754-24

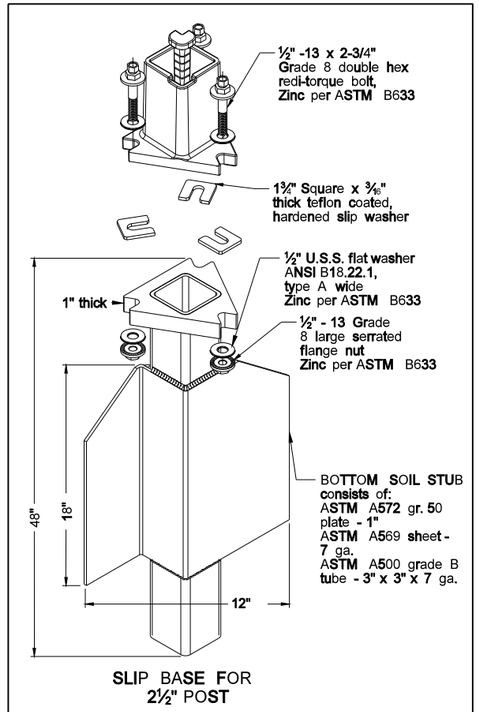
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2½	12
1	2½	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2½	12	2⅛(D)	12	Yes		7
1	2½	12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

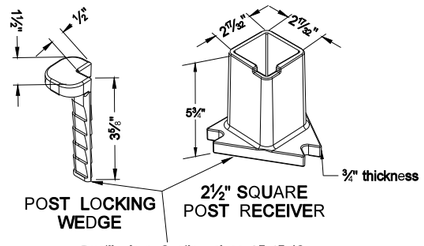




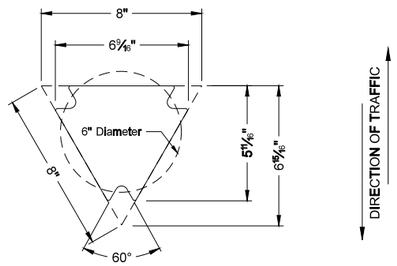
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY: 2½" x 12 ga. may be inserted with 2½" x 12 ga. & 2½" 10 ga. may be inserted with 2⅜" x 10 ga. to achieve higher load ability.



SLIP BASE FOR 2½" POST



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



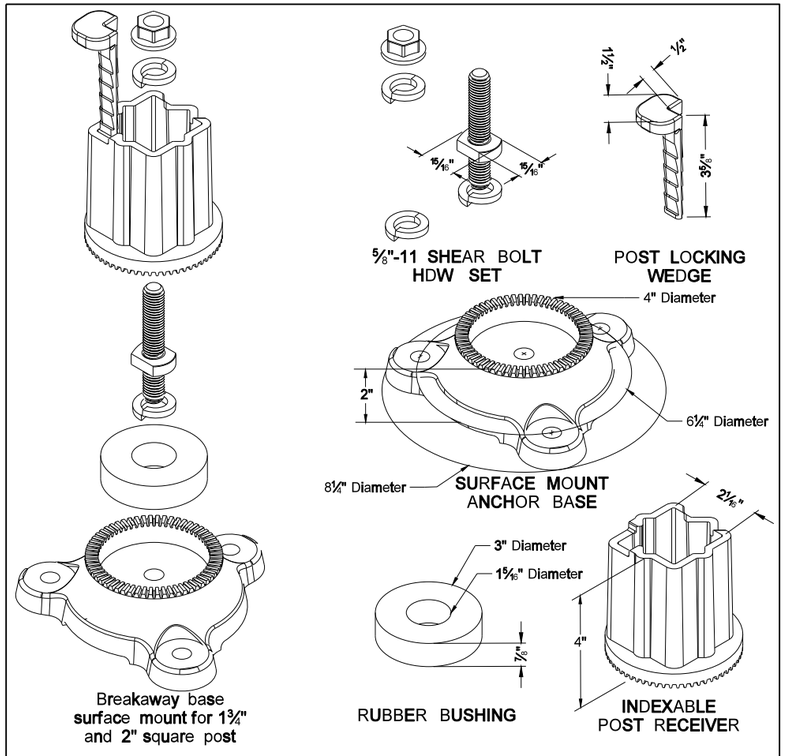
SLIP BASE DETAIL

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:

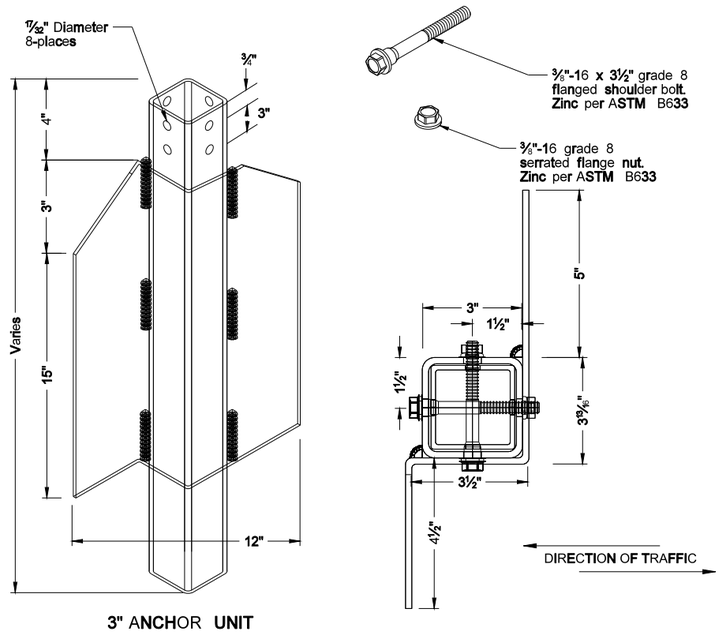
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
2. Anchor material shall be 7 guage H.R.P.O. Commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B. Anchor shall have a yield strength 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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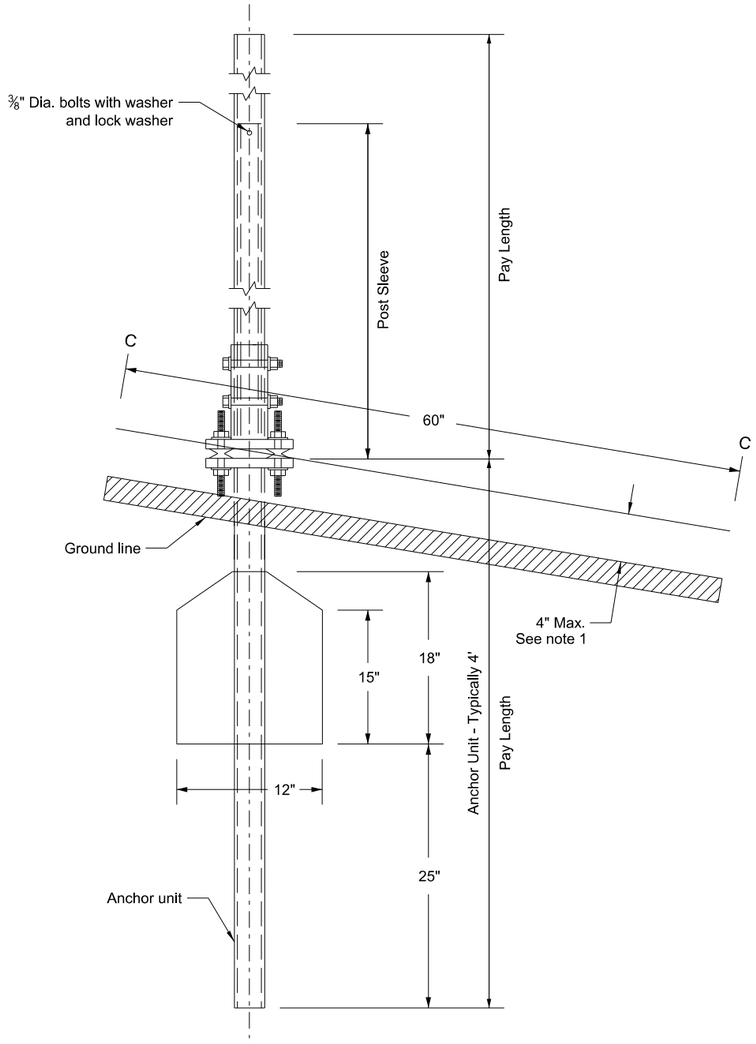
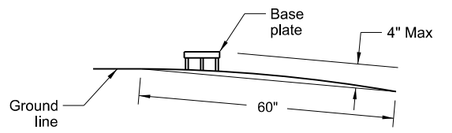
D-754-24A

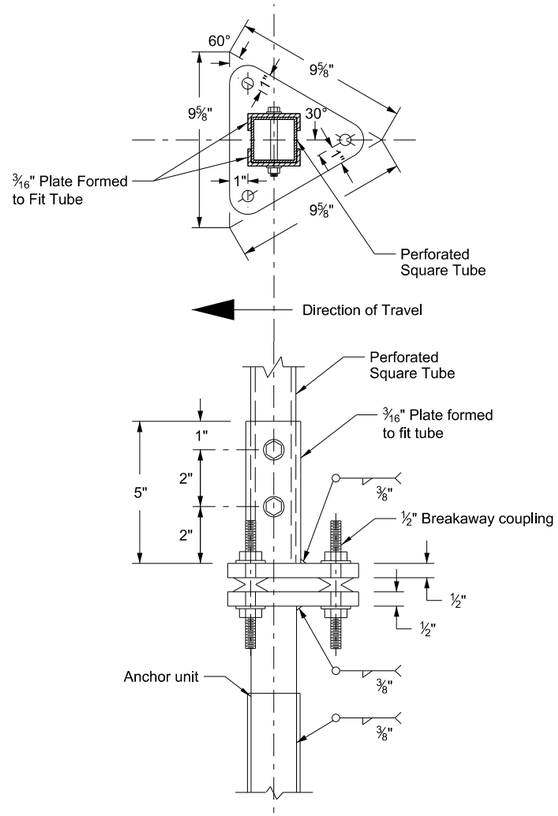
Breakaway Coupler System for Perforated Tubes



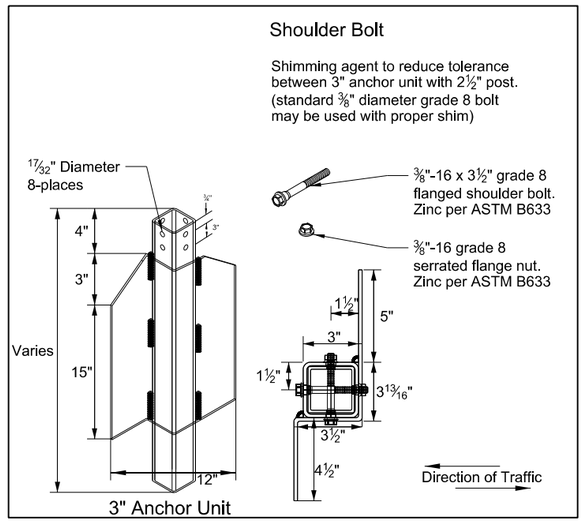


Section C-C

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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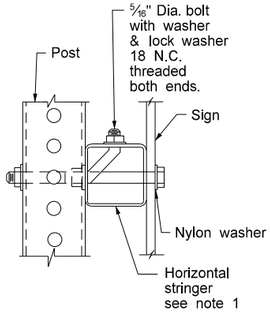
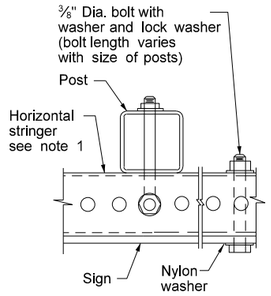
Mounting Details Perforated Tube

D-754-25

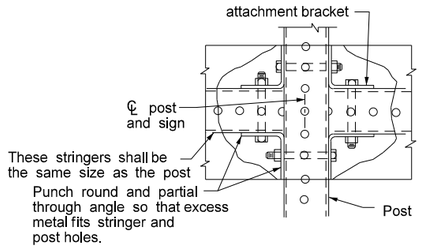


Side View



Top View

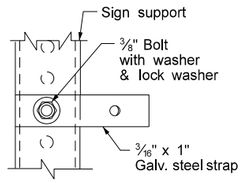
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



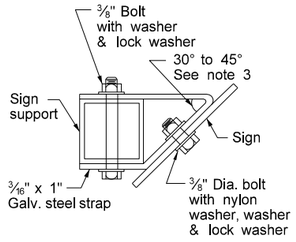
STREET NAME SIGNS
AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR
BACK TO BACK MOUNTING

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.

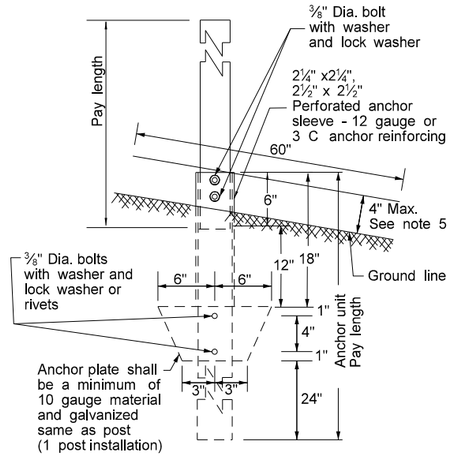


Side View



Top View

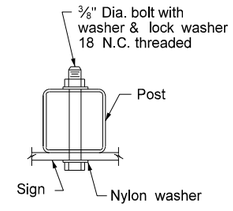
STRAP DETAIL



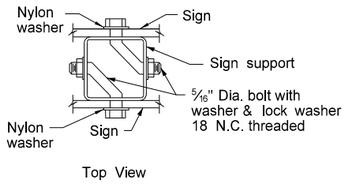
ANCHOR UNIT AND
POST ASSEMBLY

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.

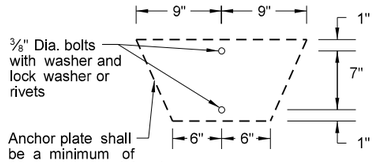


BOLT MOUNTING



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

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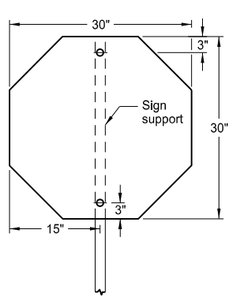
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



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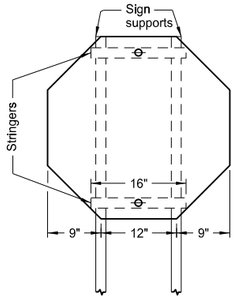
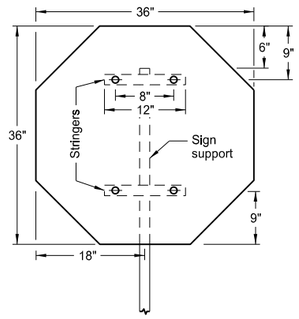


2 Posts

Assembly No. 1



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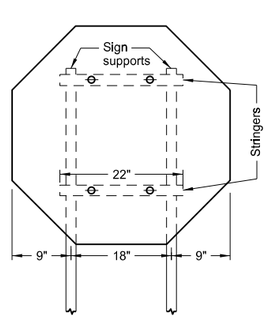
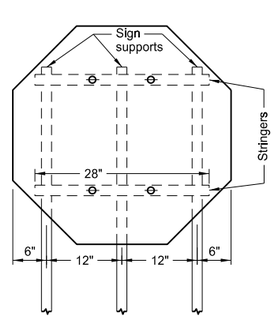


2 Posts



3 Posts

Assembly No. 2

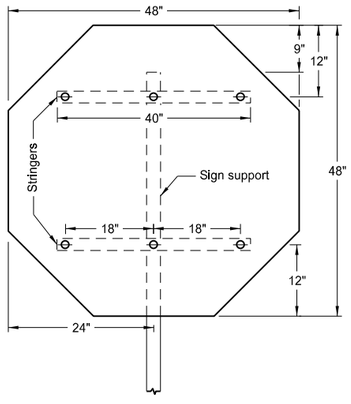
Notes:

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.



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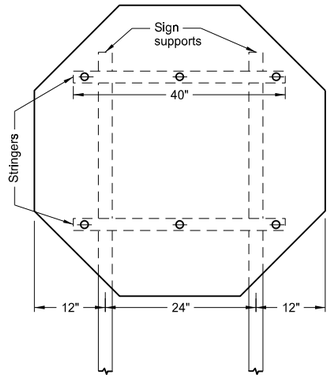
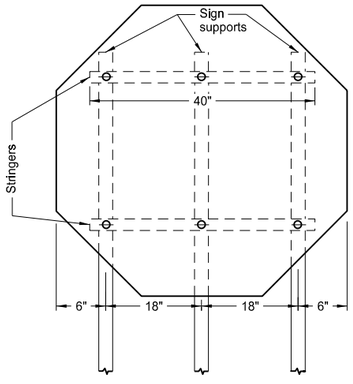
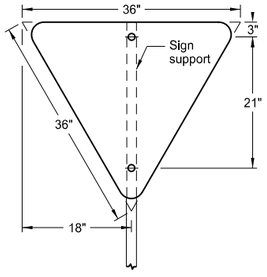


2 Posts



3 Posts

Assembly No. 3



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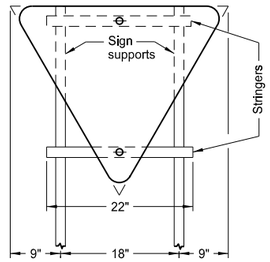
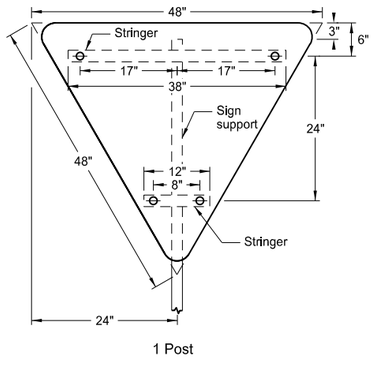
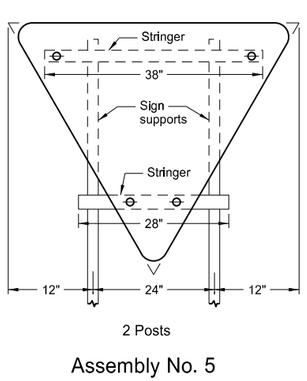


2 Posts

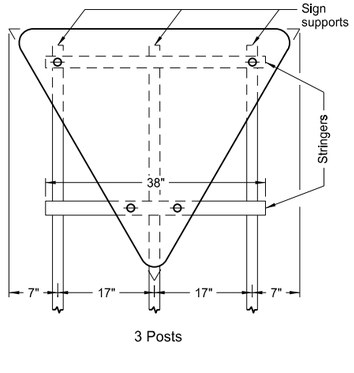
Assembly No. 4



1 Post



2 Posts



3 Posts

Assembly No. 5

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

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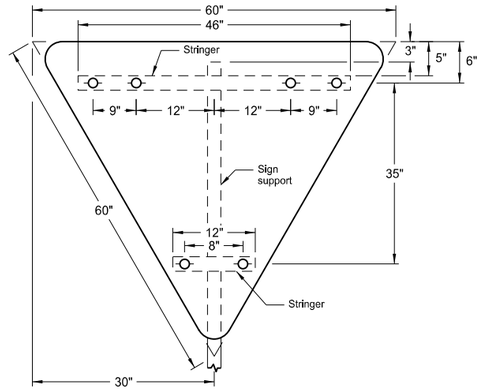
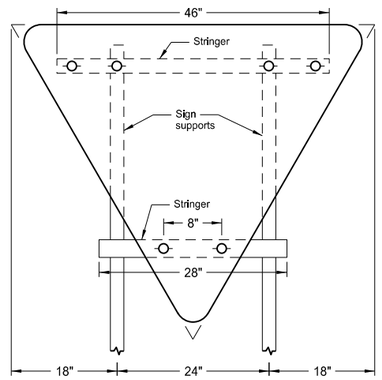
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

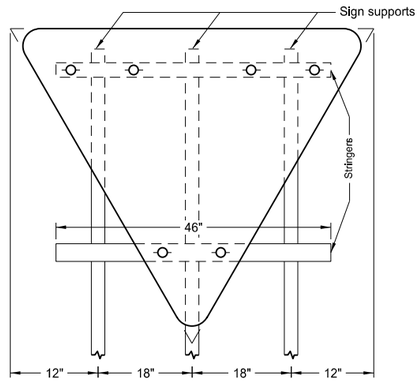
D-754-27



1 Post



2 Posts



3 Posts

Assembly No. 6

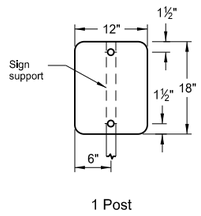
Notes:

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

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

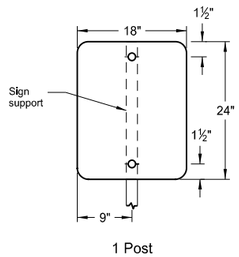
3. Perforated square tube stringer shall be 1½" x 1½".

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



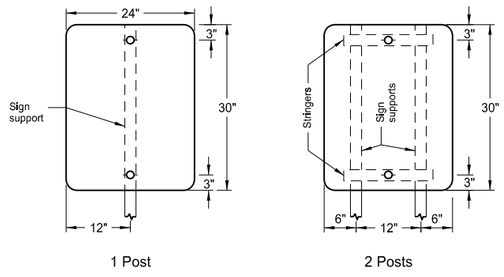
1 Post

Assembly No. 7



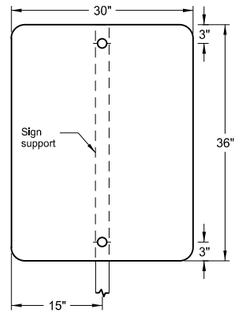
1 Post

Assembly No. 8

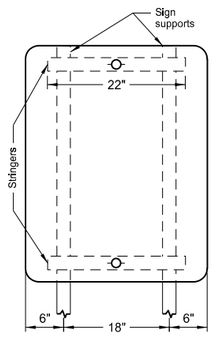


1 Post 2 Posts

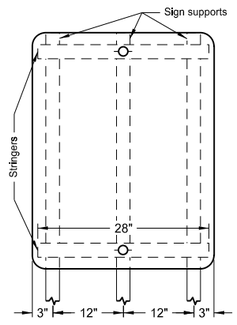
Assembly No. 9



1 Post

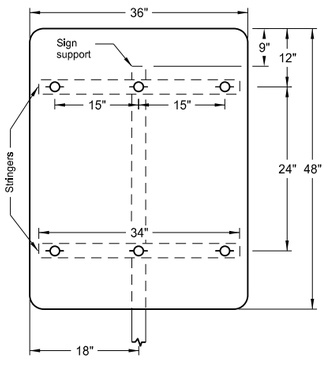


2 Posts

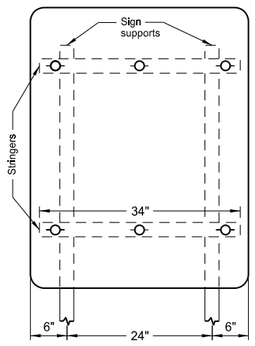


3 Posts

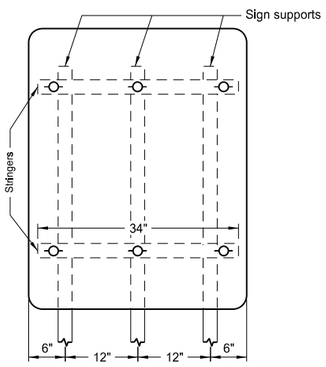
Assembly No. 10



1 Post



2 Posts



3 Posts

Assembly No. 11

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

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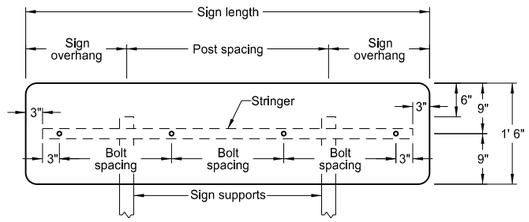
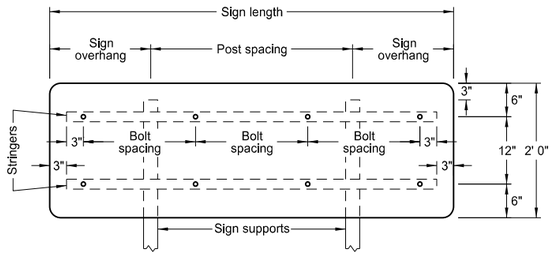
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

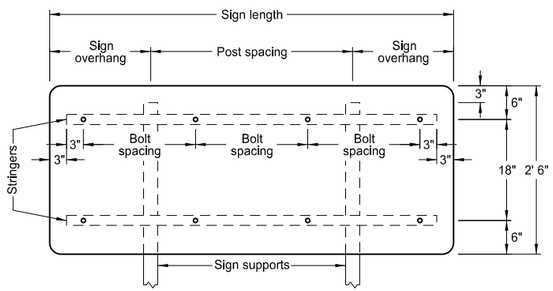
D-754-48



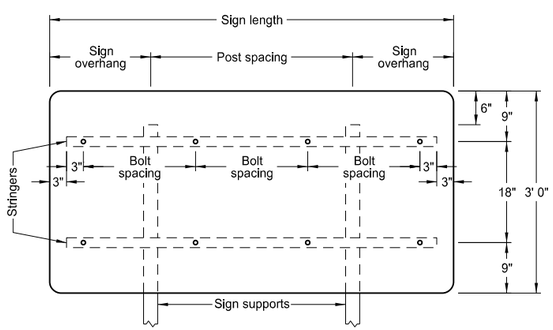
VARIES X 1'-6"



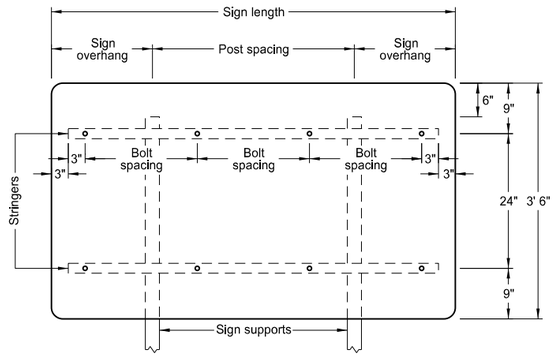
VARIES X 2'-0"



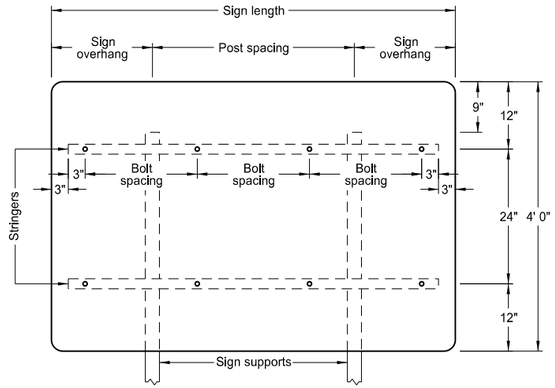
VARIES X 2'-6"



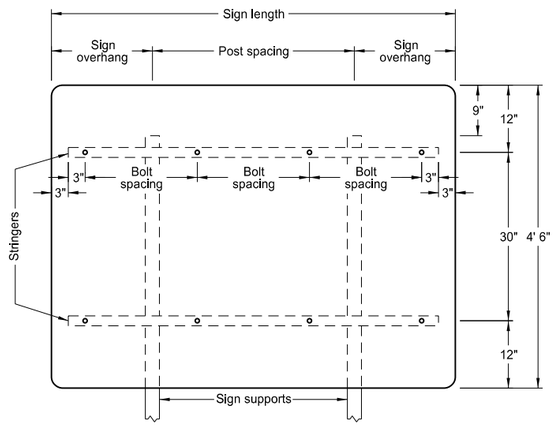
VARIES X 3'-0"



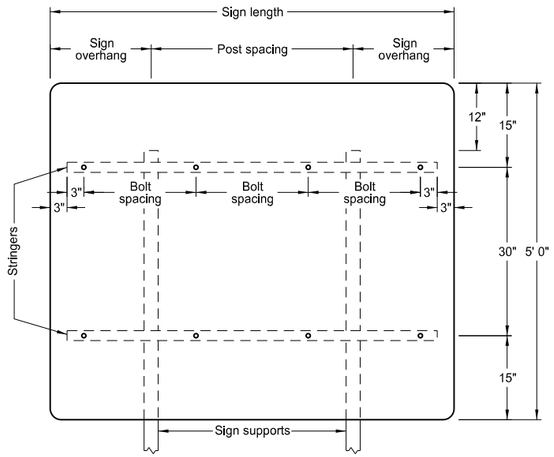
VARIES X 3'-6"



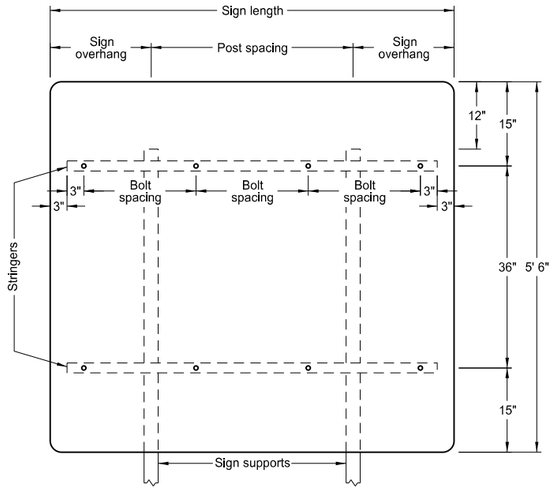
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0'	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	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

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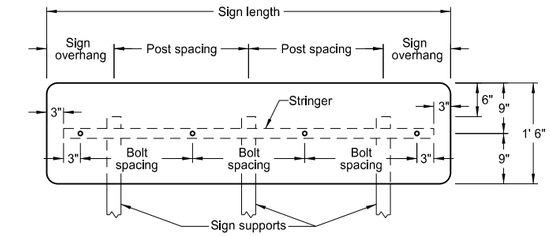
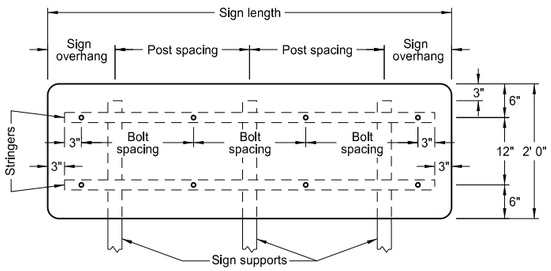
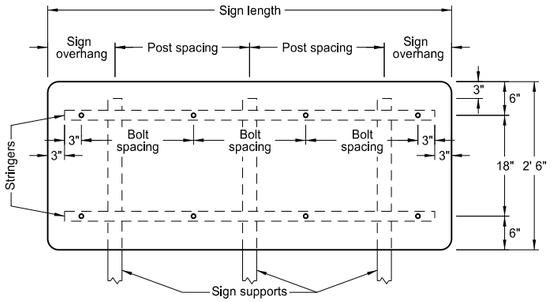
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



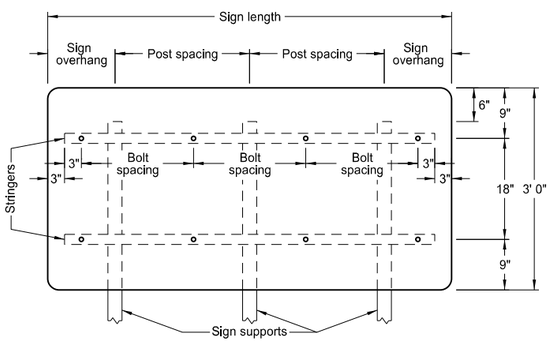
VARIES X 1'-6"



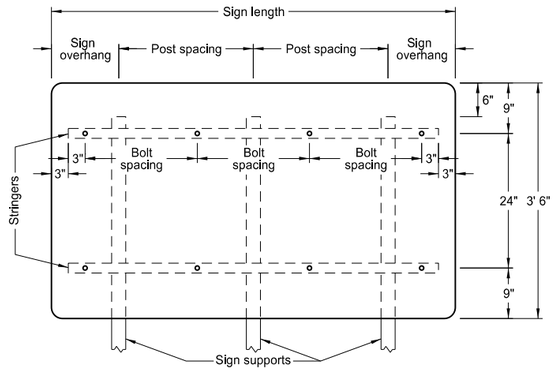
VARIES X 2'-0"



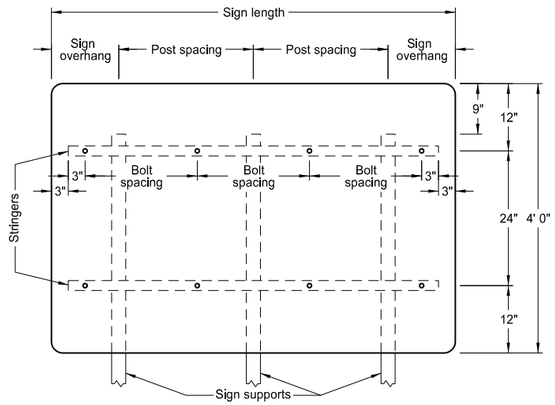
VARIES X 2'-6"



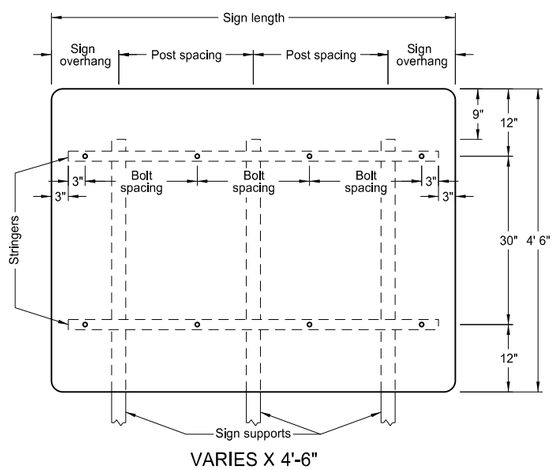
VARIES X 3'-0"



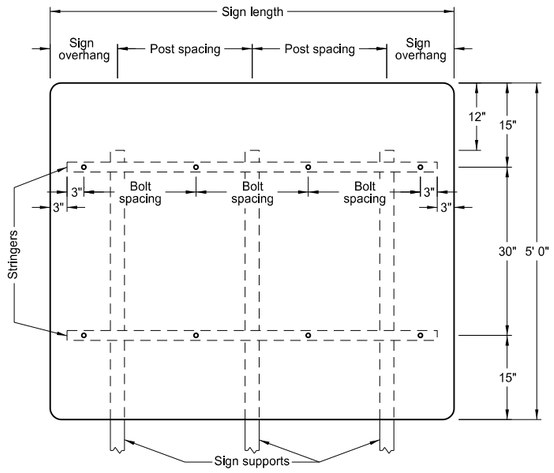
VARIES X 3'-6"



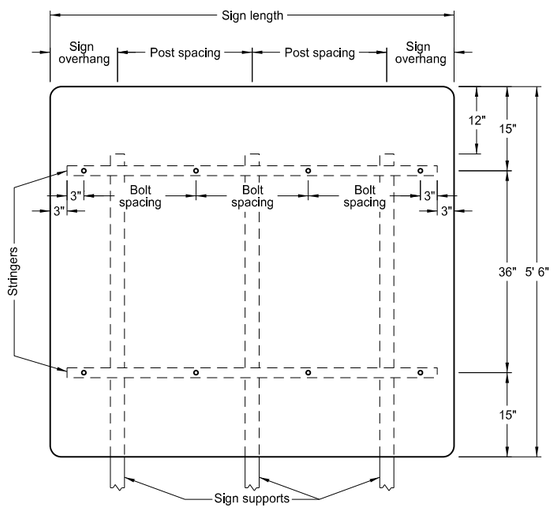
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

3 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	0'-6"	1'-6"	18"
4'-6"	0'-6"	1'-9"	21"
5'-0"	0'-6"	2'-0"	24"
5'-6"	1'-3"	1'-6"	18"
6'-0"	1'-0"	2'-0"	20"
6'-6"	1'-3"	2'-0"	22"
7'-0"	1'-6"	2'-0"	24"
7'-6"	1'-6"	2'-3"	2-20" & 2-19"
8'-0"	1'-9"	2'-3"	21"
8'-6"	2'-0"	2'-3"	2-22" & 2-23"
9'-0"	1'-6"	3'-0"	24"
9'-6"	1'-9"	3'-0"	4-20" & 1-22"
10'-0"	1'-9"	3'-3"	2-21" & 3-22"
10'-6"	1'-9"	3'-6"	4-23" & 1-22"
11'-0"	2'-0"	3'-6"	24"
11'-6"	2'-3"	3'-6"	21"
12'-0"	2'-4"	3'-8"	22"
12'-6"	2'-5"	3'-10"	23"
13'-0"	2'-6"	4'-0"	24"
13'-6"	2'-9"	4'-0"	3-22" & 4-21"
14'-0'	3'-0"	4'-0"	2-23" & 5-22"
14'-6"	3'-3"	4'-0"	6-23" & 1-24"
15'-0"	3'-6"	4'-0"	24"
15'-6"	2'-4"	5'-5"	6-22" & 2-21"
16'-0"	2'-5"	5'-7"	4-23" & 4-22"
16'-6"	2'-5"	5'-10"	6-23" & 2-24"
17'-0"	2'-6"	6'-0"	24"
17'-6"	3'-3"	5'-6"	22"
18'-0"	3'-6"	5'-6"	6-23" & 3-22"
18'-6"	3'-9"	5'-6"	6-23" & 3-24"
19'-0"	3'-6"	6'-0"	24"
19'-6"	4'-3"	5'-6"	8-22" & 2-23"
20'-0"	4'-4"	5'-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

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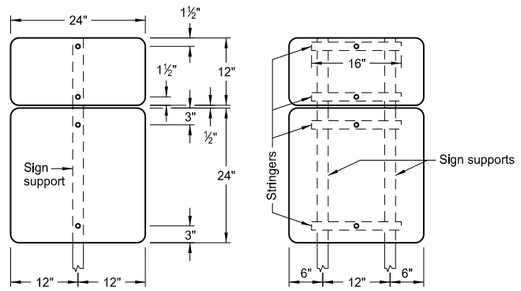
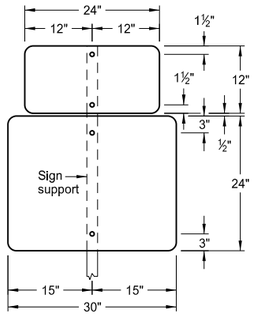
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

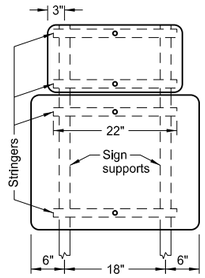
D-754-51



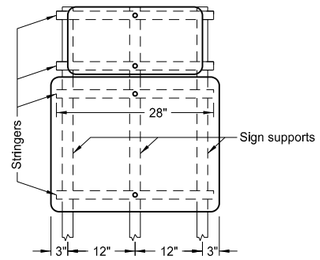
1 Post 2 Posts



1 Post



2 Posts



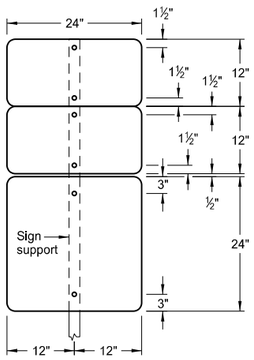
3 Posts

ASSEMBLY NO. 371

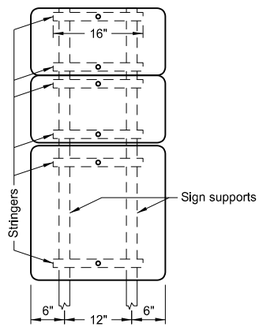
ASSEMBLY NO. 372

Notes:

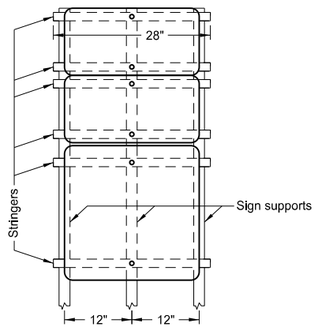
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ⅜" bolt.



1 Post

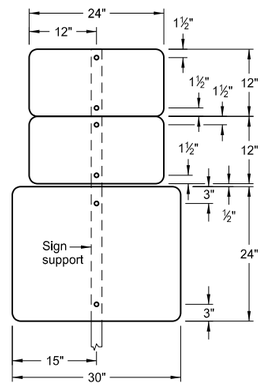


2 Posts

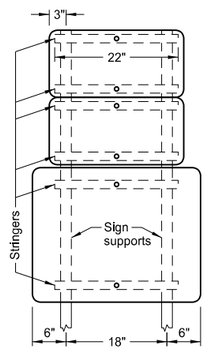


3 Posts

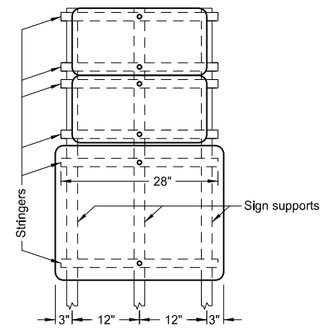
ASSEMBLY NO. 373



1 Post

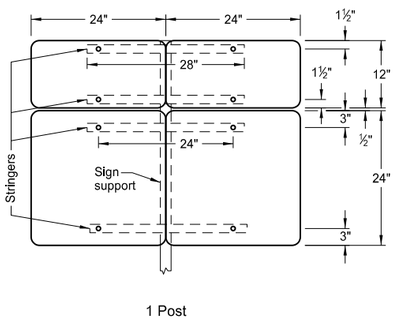


2 Posts

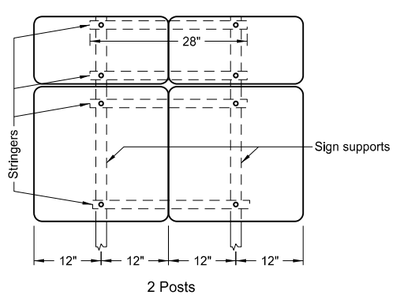


3 Posts

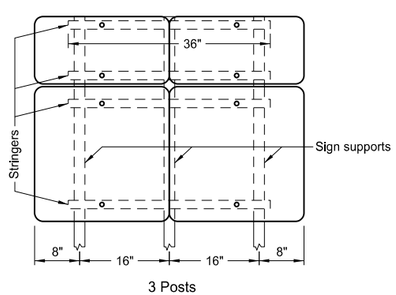
ASSEMBLY NO. 374



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 375

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

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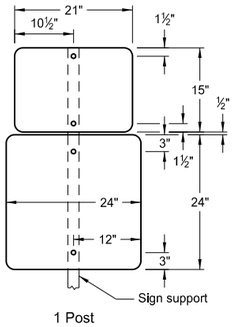
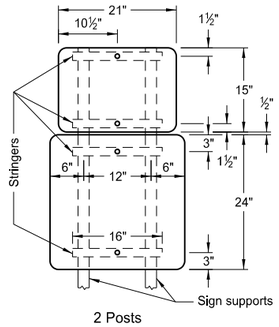
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-57

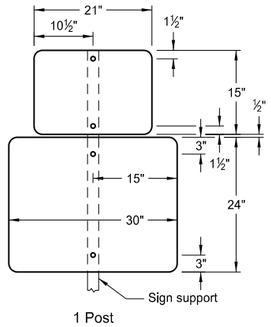


1 Post

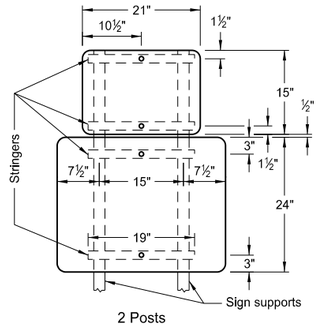


2 Posts

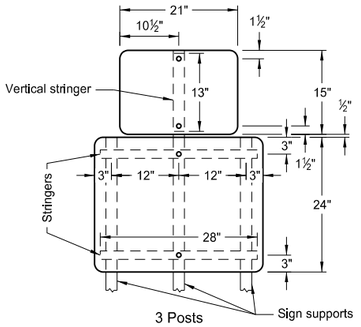
ASSEMBLY 391



1 Post

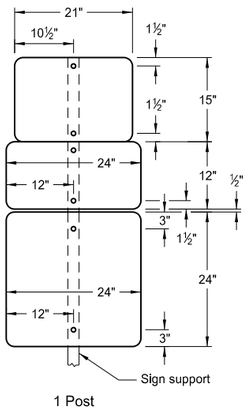


2 Posts

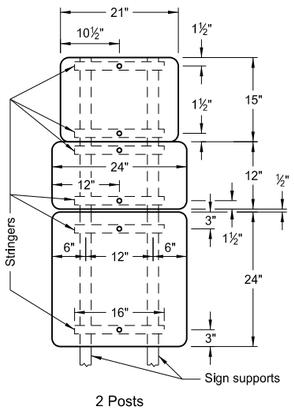


3 Posts

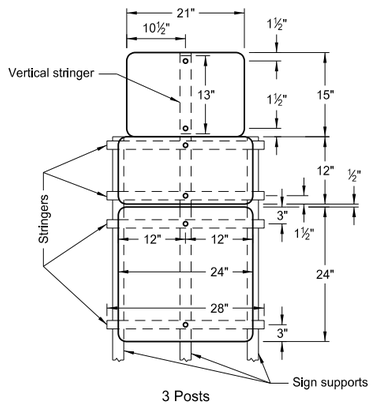
ASSEMBLY 392



1 Post

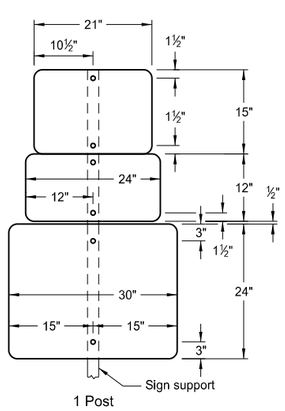


2 Posts

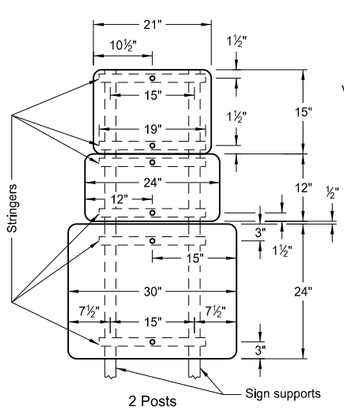


3 Posts

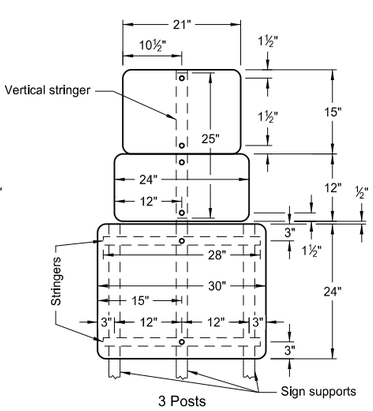
ASSEMBLY 393



1 Post

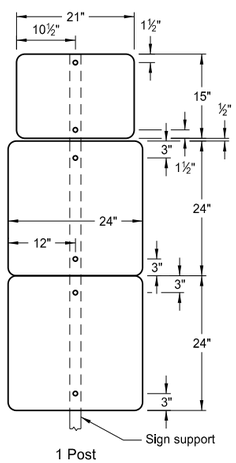


2 Posts

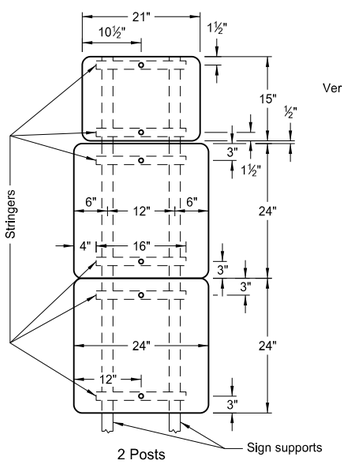


3 Posts

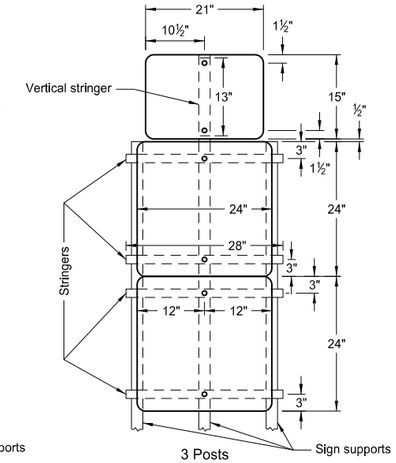
ASSEMBLY 394



1 Post



2 Posts



3 Posts

ASSEMBLY 395

Notes:

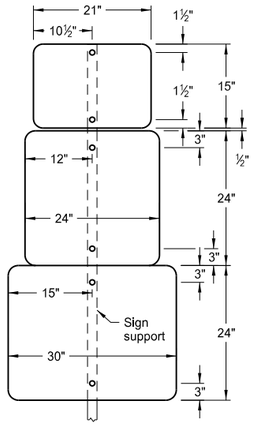
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ⅜" bolt.

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

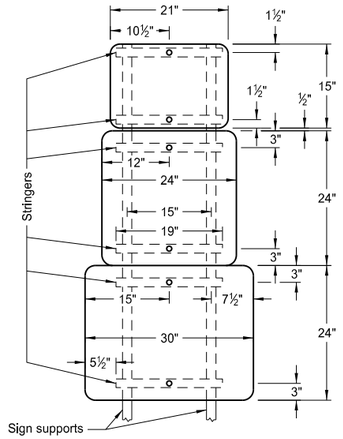
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

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

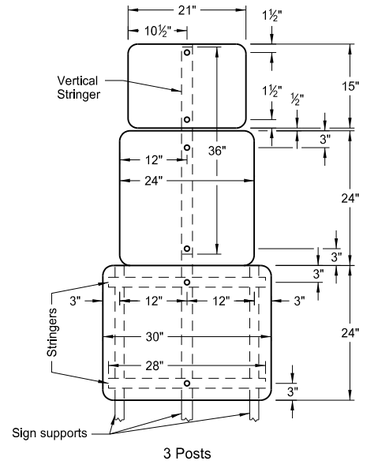
D-754-58



1 Post

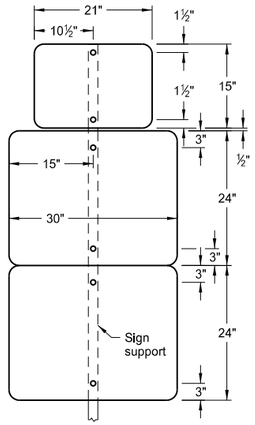


2 Posts

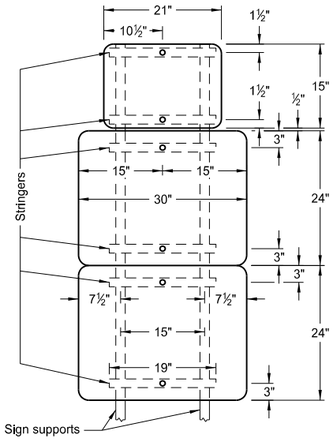


3 Posts

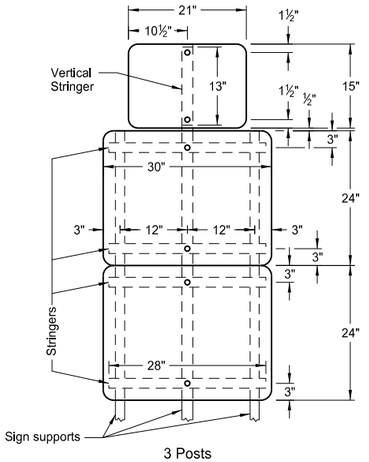
ASSEMBLY 396



1 Post

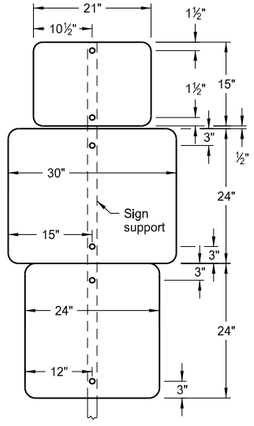


2 Posts

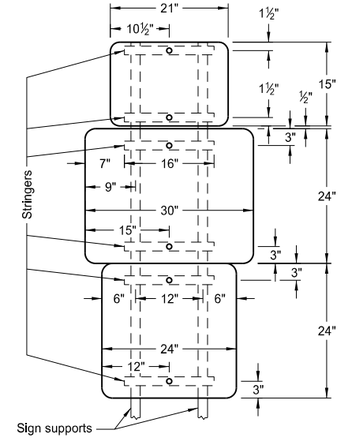


3 Posts

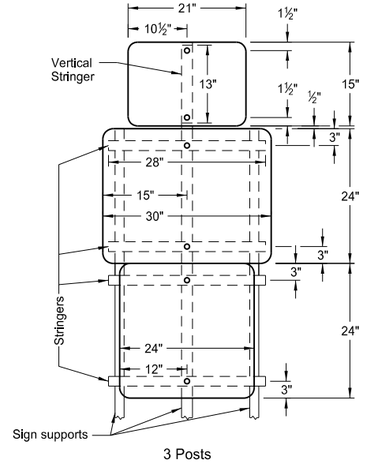
ASSEMBLY 397



1 Post

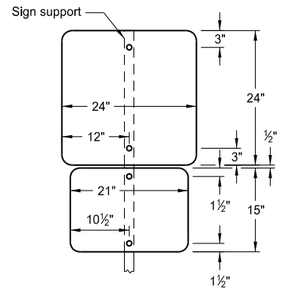


2 Posts

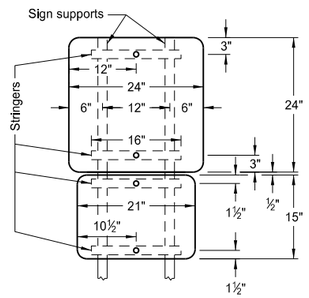


3 Posts

ASSEMBLY 398



1 Post



2 Posts

ASSEMBLY 399

Notes:

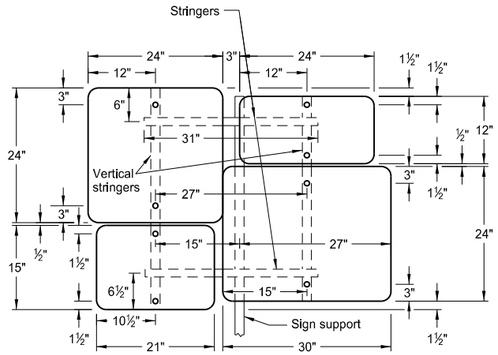
1. The minimum sign backing material thickness shall be 0.100 inch.
2. Perforated square tube stringer shall be 1½"x1½".
3. All holes shall be punched round for ⅜" bolt.

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

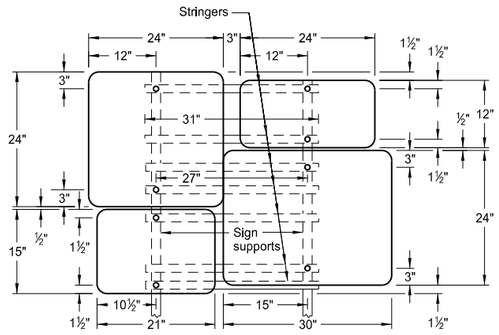
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

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

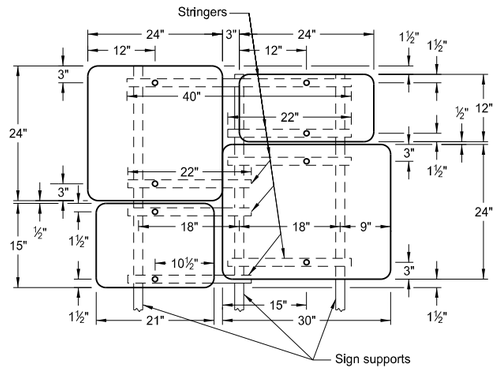
D-754-60



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 403

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 NO. 404

1 Post

2 Posts

3 Posts

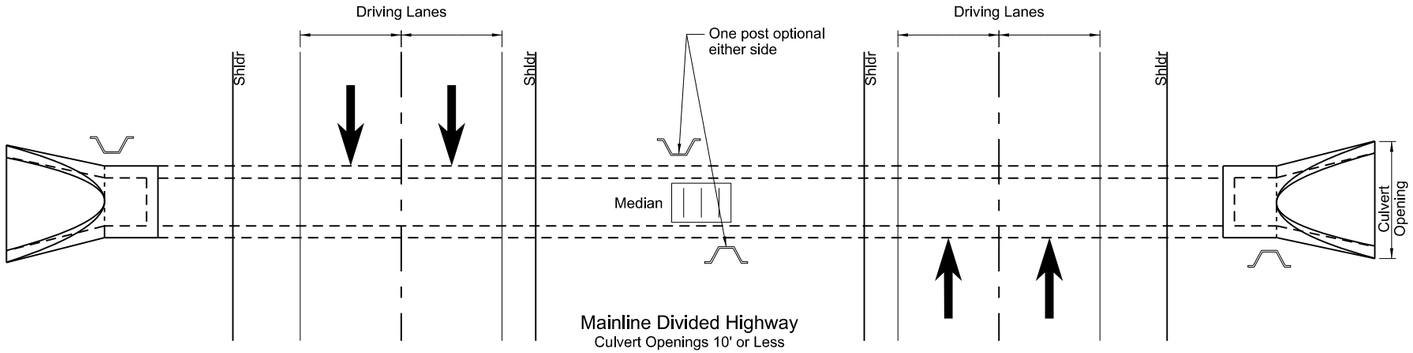
ASSEMBLY NO. 405

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

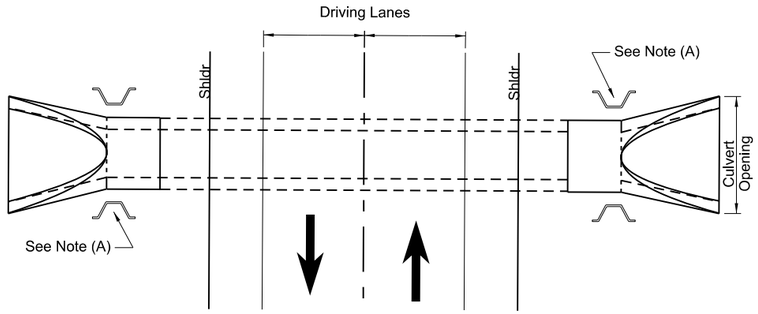
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8/22/12 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS - CULVERTS

D-754-83

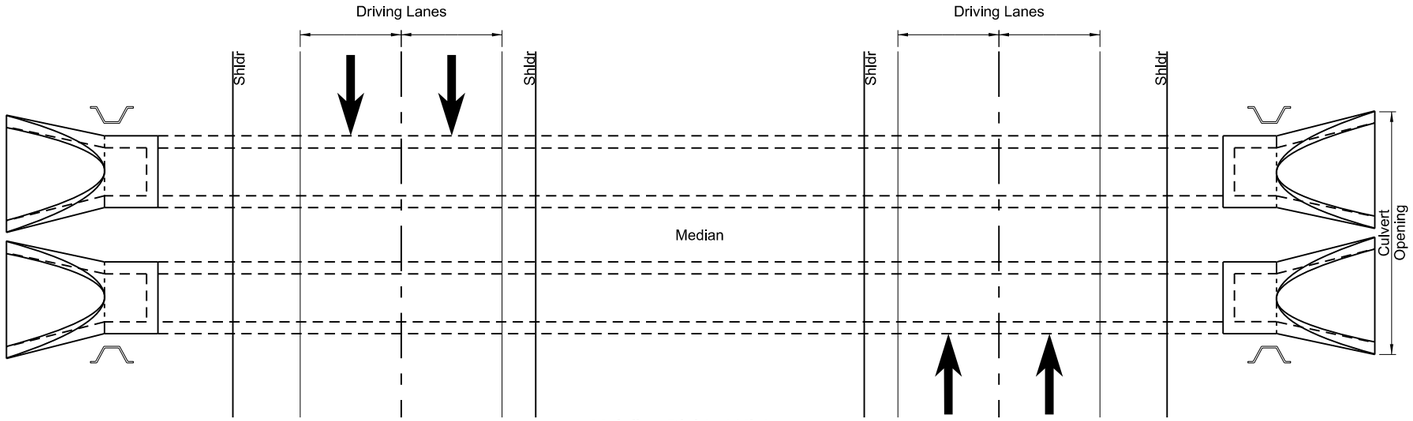


Mainline Divided Highway
Culvert Openings 10' or Less

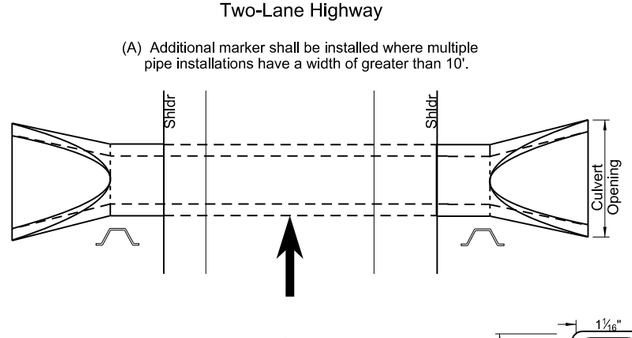


Two-Lane Highway

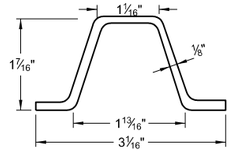
(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.



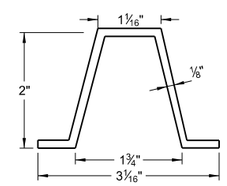
Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations



Ramp



Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

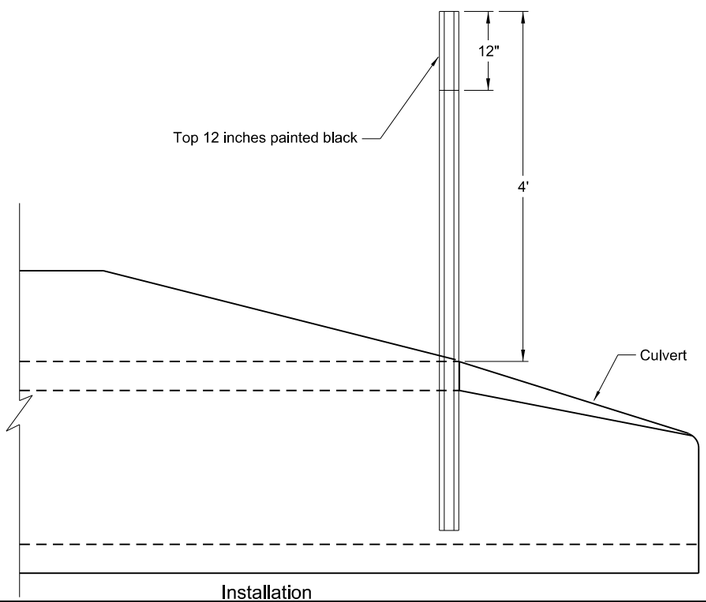
Post Location

Notes:

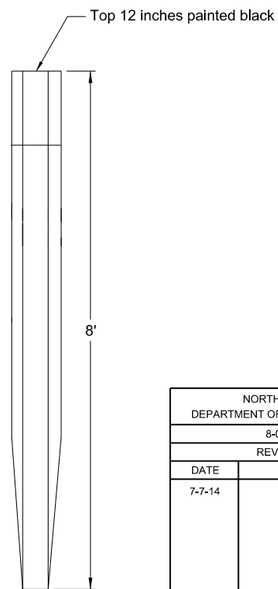
Installation: Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.

Posts: Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.

Basis of Payment: The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



Installation

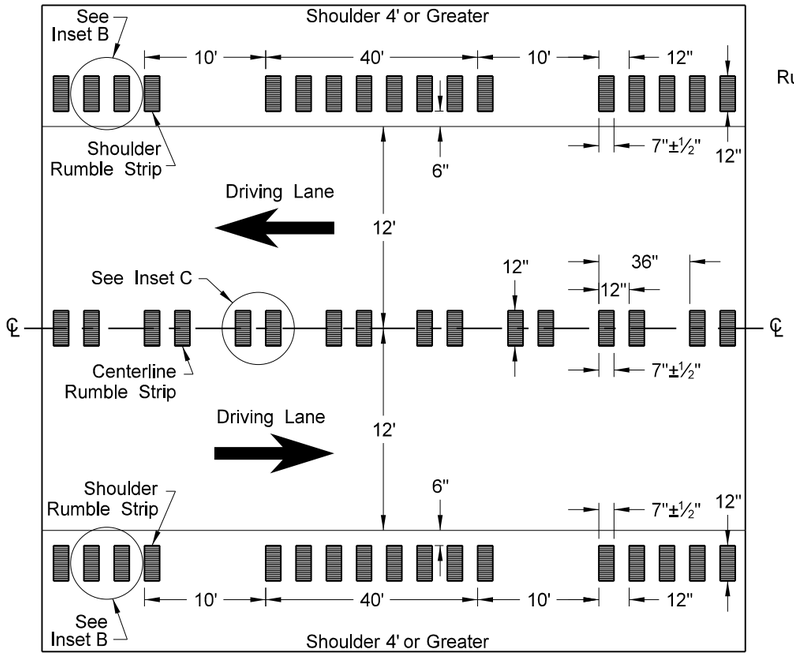


U-Type Post

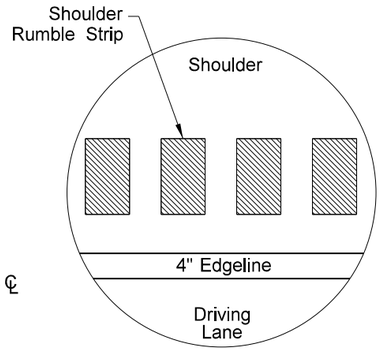
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/7/2014 and the original document is stored at the North Dakota Department of Transportation

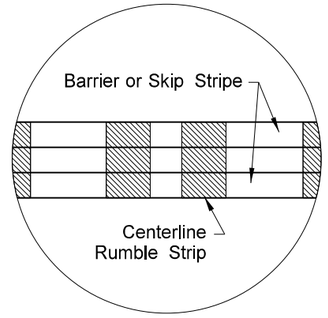
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS 4' OR GREATER)



Undivided Highways (Shoulders 4' or Greater)



Inset B - Shoulder Rumble Strip

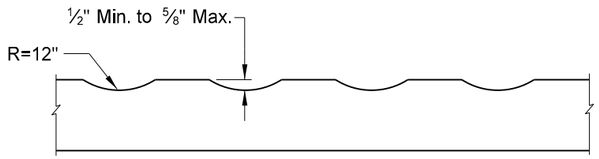


Inset C - Centerline Rumble Strip

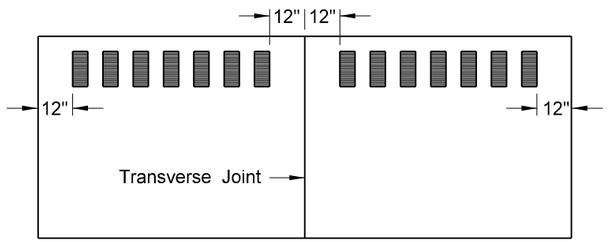
NOTES:

1) Discontinue shoulder 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.

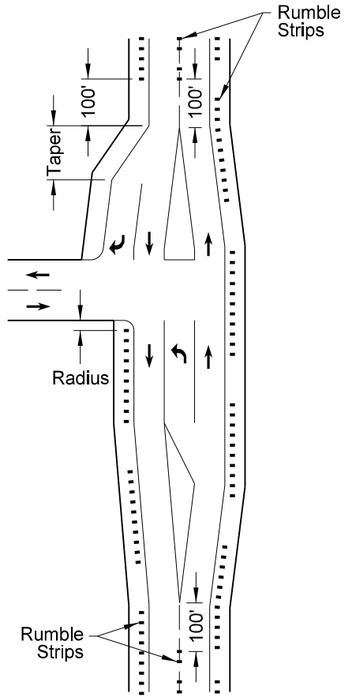
2) Discontinue centerline rumble strips through the entire length of left turn lanes, 100' before left turn lane tapers and median islands, and 100' before and after a paved or gravel highway, section line, approach, or private drive.



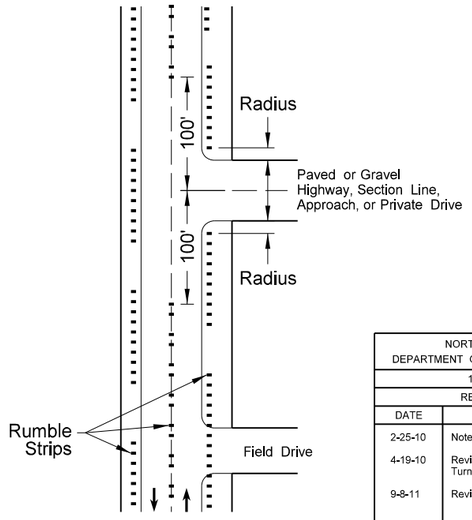
Profile of Rumble Strips - Bituminous and PCC Pavements



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



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-760-3.

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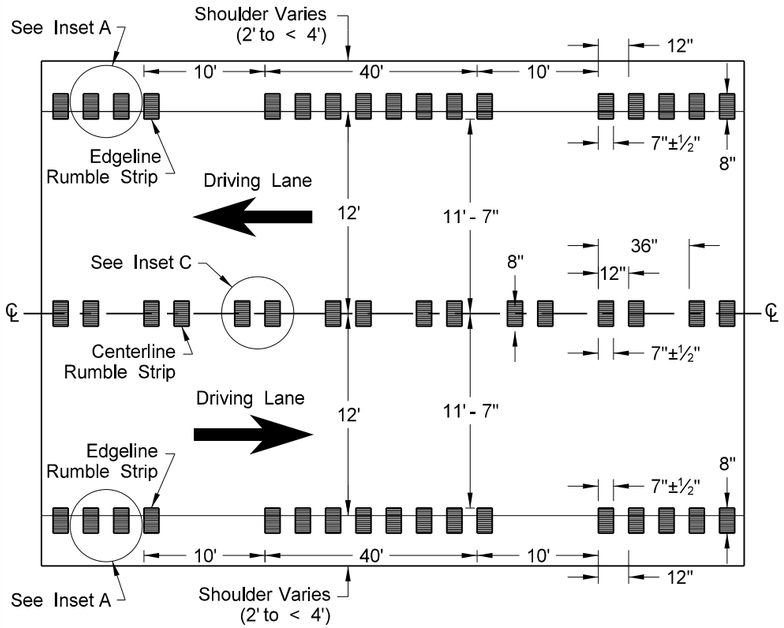
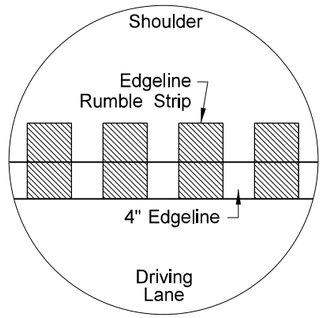
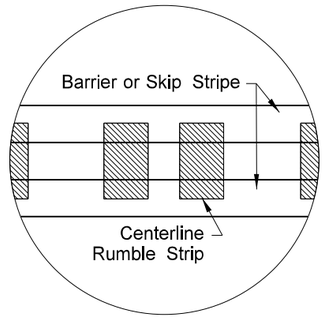
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')



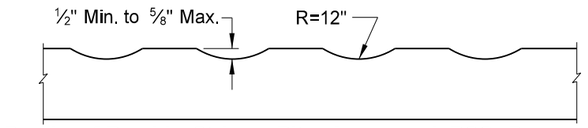
Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')



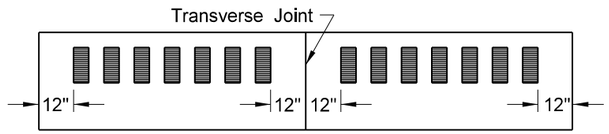
Inset A - Edgeline Rumble Strip



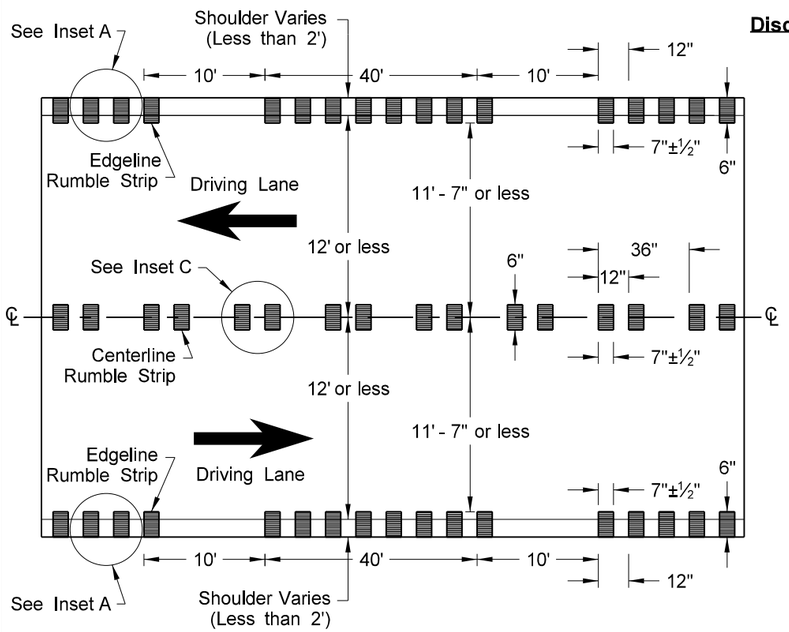
Inset C - Centerline Rumble Strip



Profile of Rumble Strips - Bituminous and PCC Pavements



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

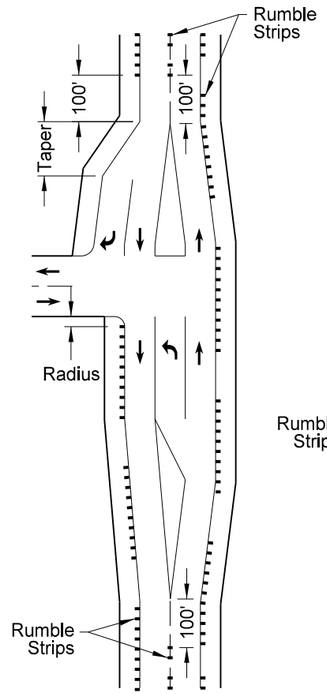


Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')

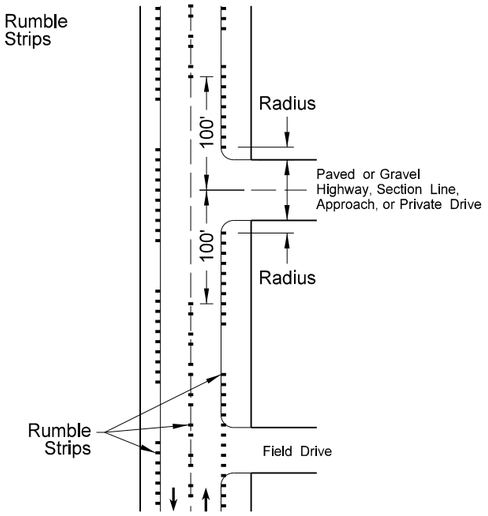
NOTES:

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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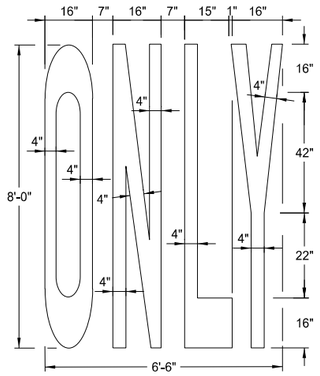
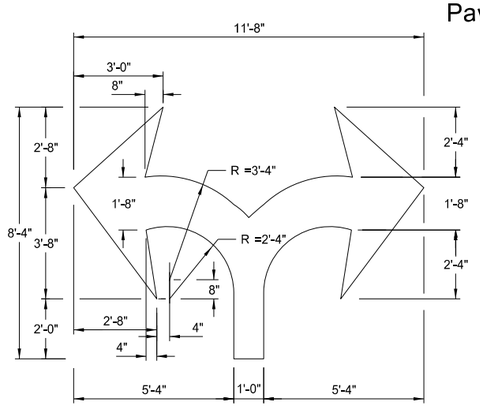
Pavement Marking Message Details

D-762-1



22 S. F.



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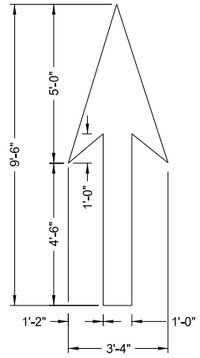
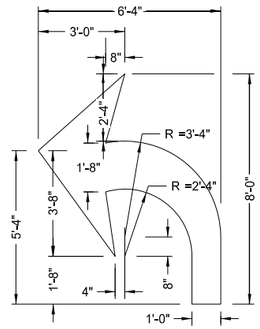
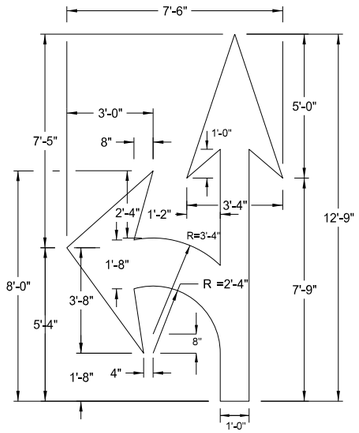


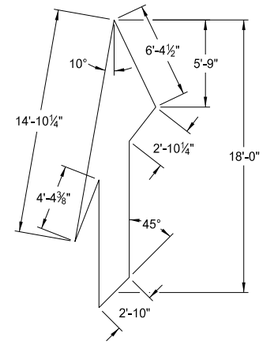
12 S. F.



16 S. F.

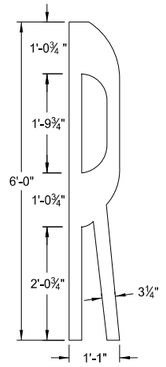


27 S. F.

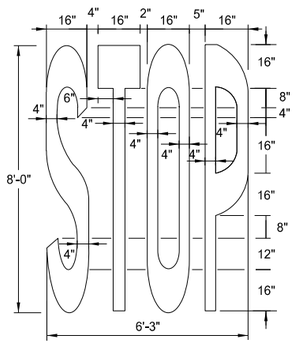


41 S. F.

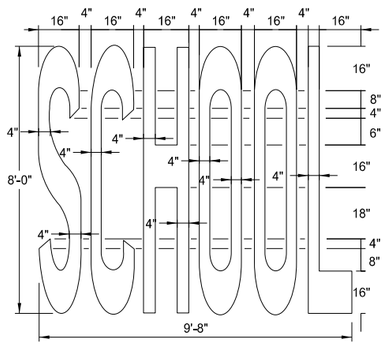
Note:
The merge arrow shall be rotated 20° from the edge of the roadway.



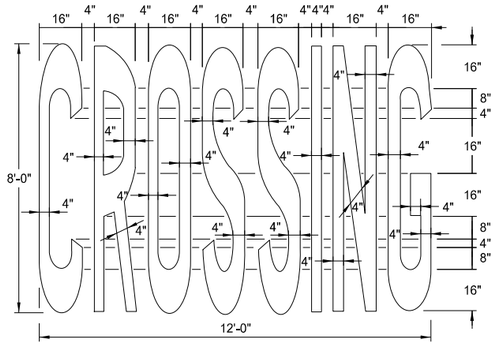
4 S. F.



22 S. F.



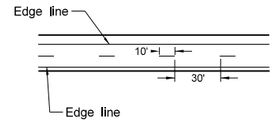
34.5 S. F.



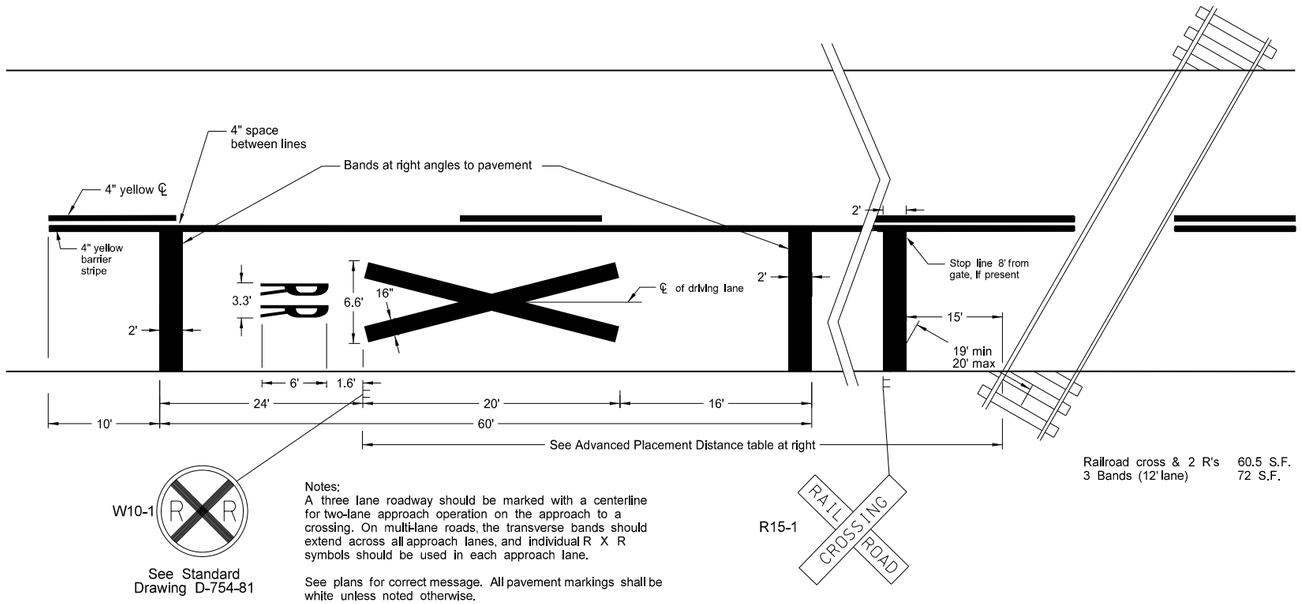
46 S. F.

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

Chevron Crosshatching Table



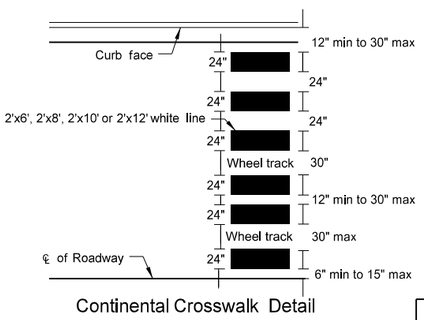
Centerline Pavement Marking Skip Spacing Detail



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

Notes:
A three lane roadway should be marked with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, the transverse bands should extend across all approach lanes, and individual R X R symbols should be used in each approach lane.

See plans for correct message. All pavement markings shall be white unless noted otherwise.



Continental Crosswalk Detail

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-6-11	
REVISIONS	
DATE	CHANGE

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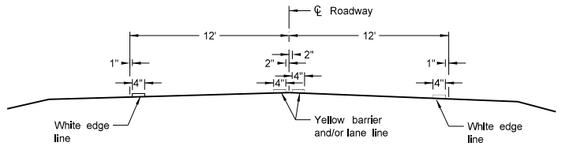
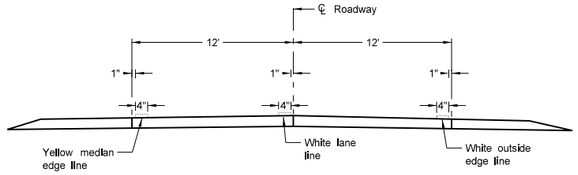
PAVEMENT MARKING

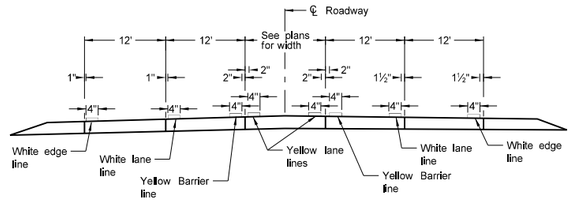
D-762-4



Two Lane Two Way
RURAL ROADWAY



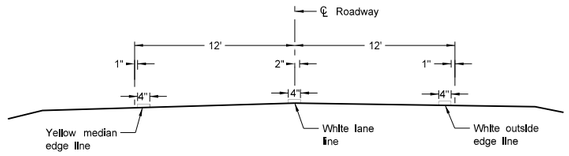
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



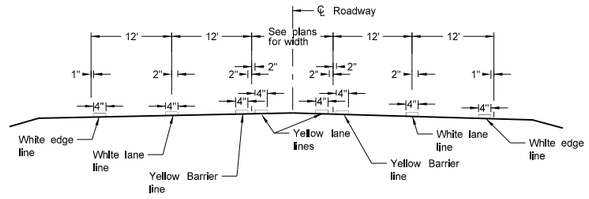
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

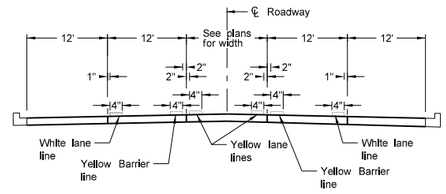
1. Edge lines shall be continued through private drives and field drives and broken for intersections.



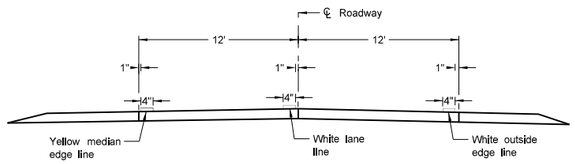
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



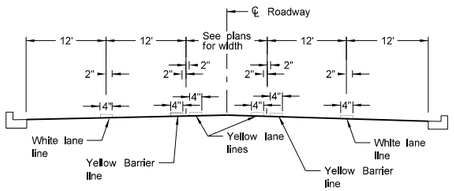
RURAL FIVE LANE ROADWAY
Asphalt Section



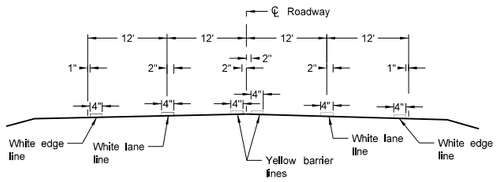
URBAN FIVE LANE SECTION
Concrete Section



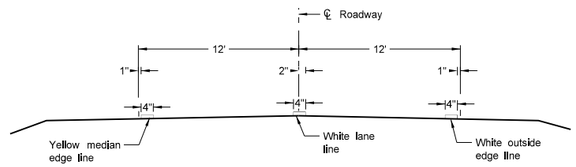
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



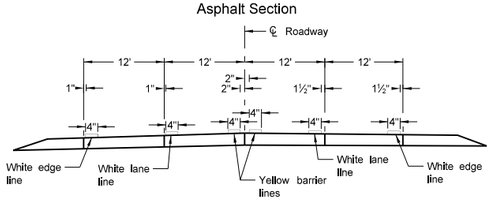
URBAN FIVE LANE SECTION
Asphalt Section



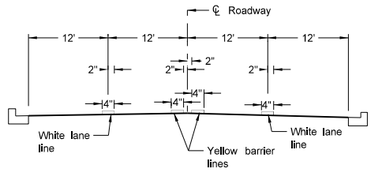
RURAL FOUR LANE ROADWAY
Asphalt Section



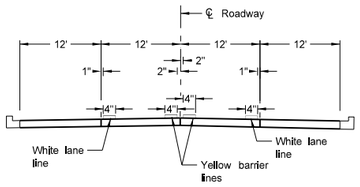
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



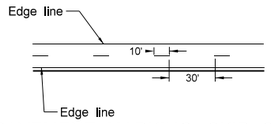
RURAL FOUR LANE ROADWAY
Concrete Section



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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