

DESIGN DATA			
Traffic	Average Daily		
Current 2012	Pass: 4845	Trucks: 1295	Total: 6140
Forecast 2032	Pass: 7990	Trucks: 2346	Total: 10336
Clear Zone Distance: 32		Design Speed: 60	
Minimum Sight Dist. for Stopping: 570		Bridges: None	
Limited Access Control: Yes			
Pavement Design Life 20 (years)			
Design Accumulated One-way flexible ESALs: 423675			

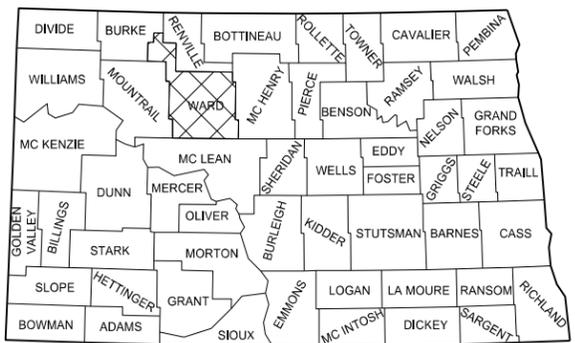
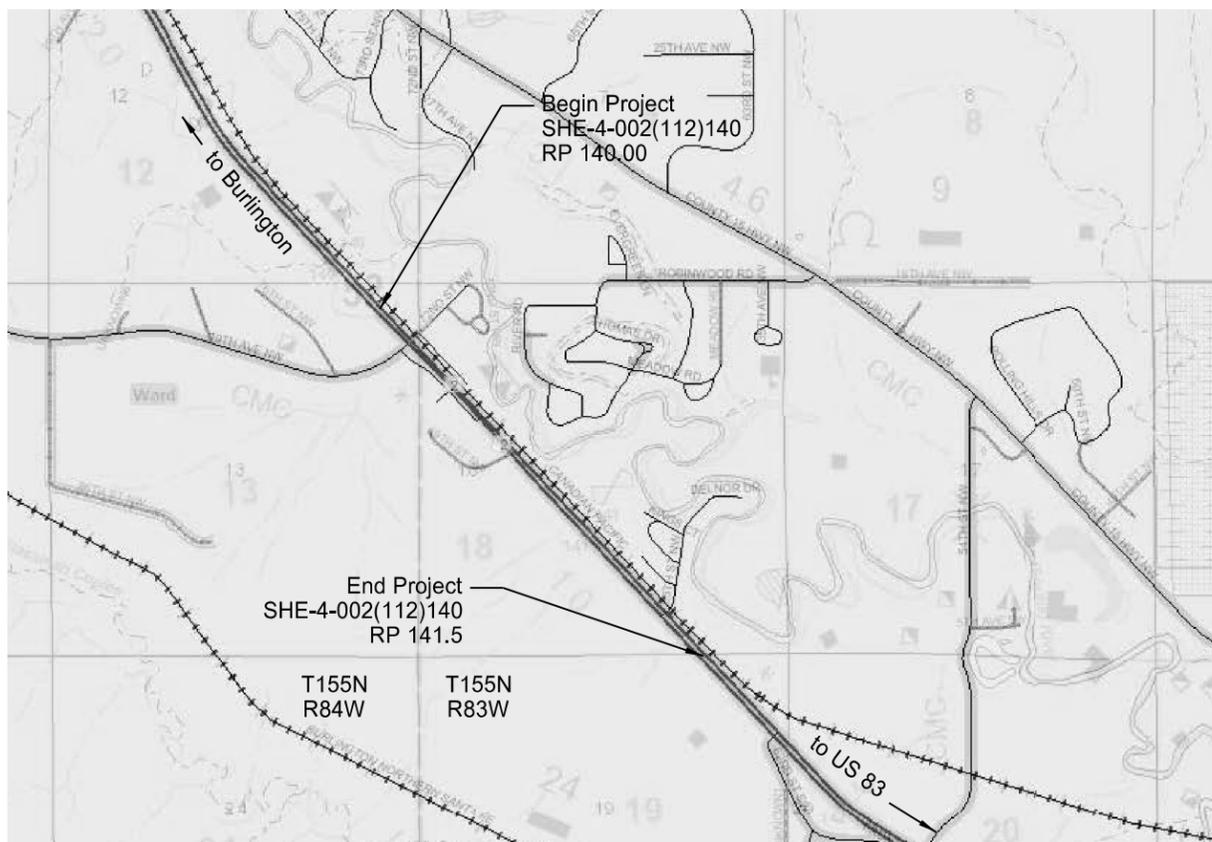
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	20789	1	1

JOB # 7 NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SHE-4-002(112)140
Ward County
19th Ave NW & 65th St NW
Turn Lanes, Pipe Jacking or Boring

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
SHE-4-002(112)140		
19th Ave NW & 65th St NW	0.413	1.497



STATE COUNTY MAP

DESIGNERS
Leon Eckroth /s/
Douglas A. Schumaker /s/

APPROVED DATE 9/1/15

 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 9/1/15

 James Douglas Rath /s/
 NDDOT Design Division

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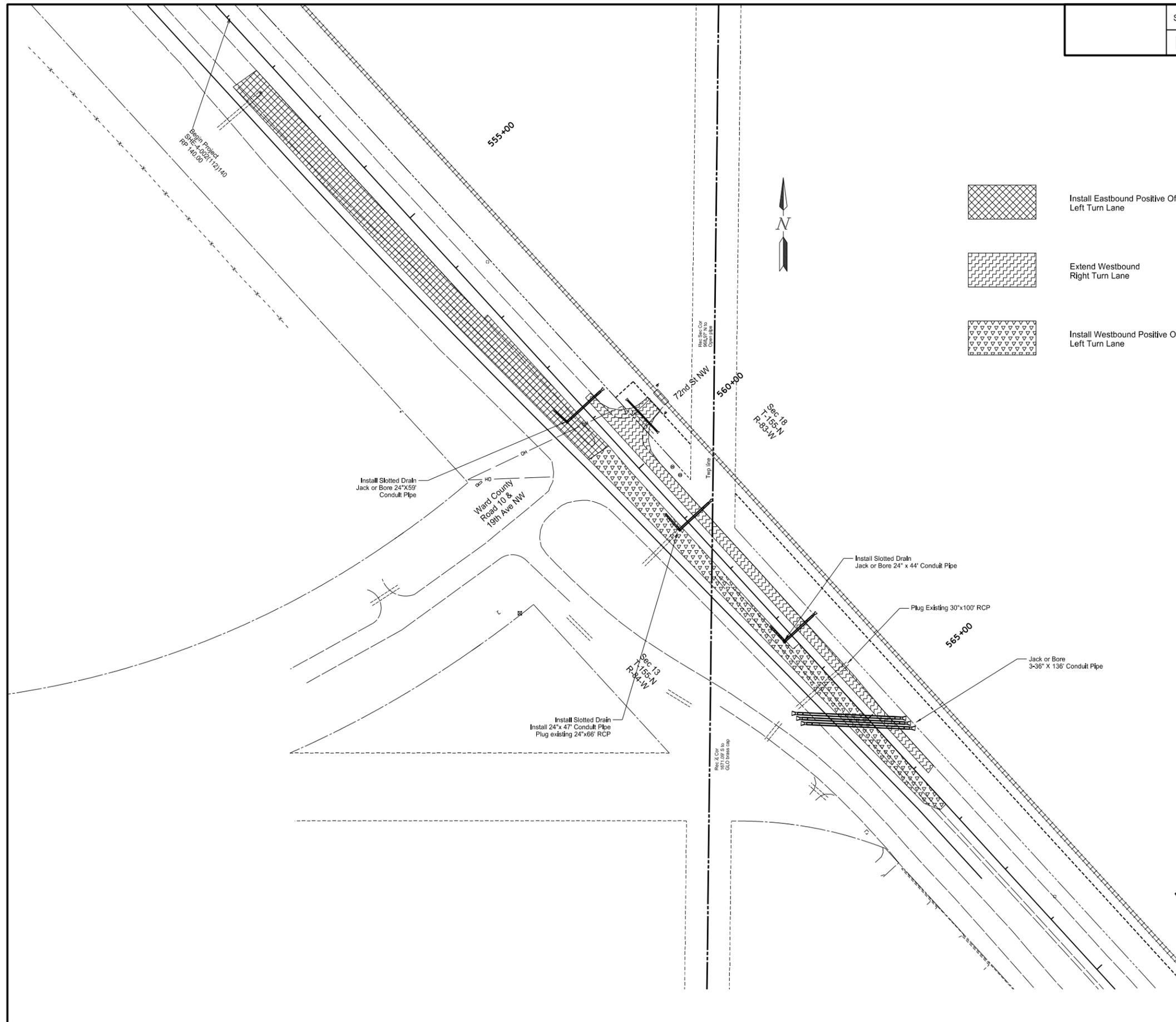
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INDEX OF DRAWINGS

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SP No.	<u>Special Provision Description</u>			
3(14)	Temporary Erosion and Sediment Best Management Practices			

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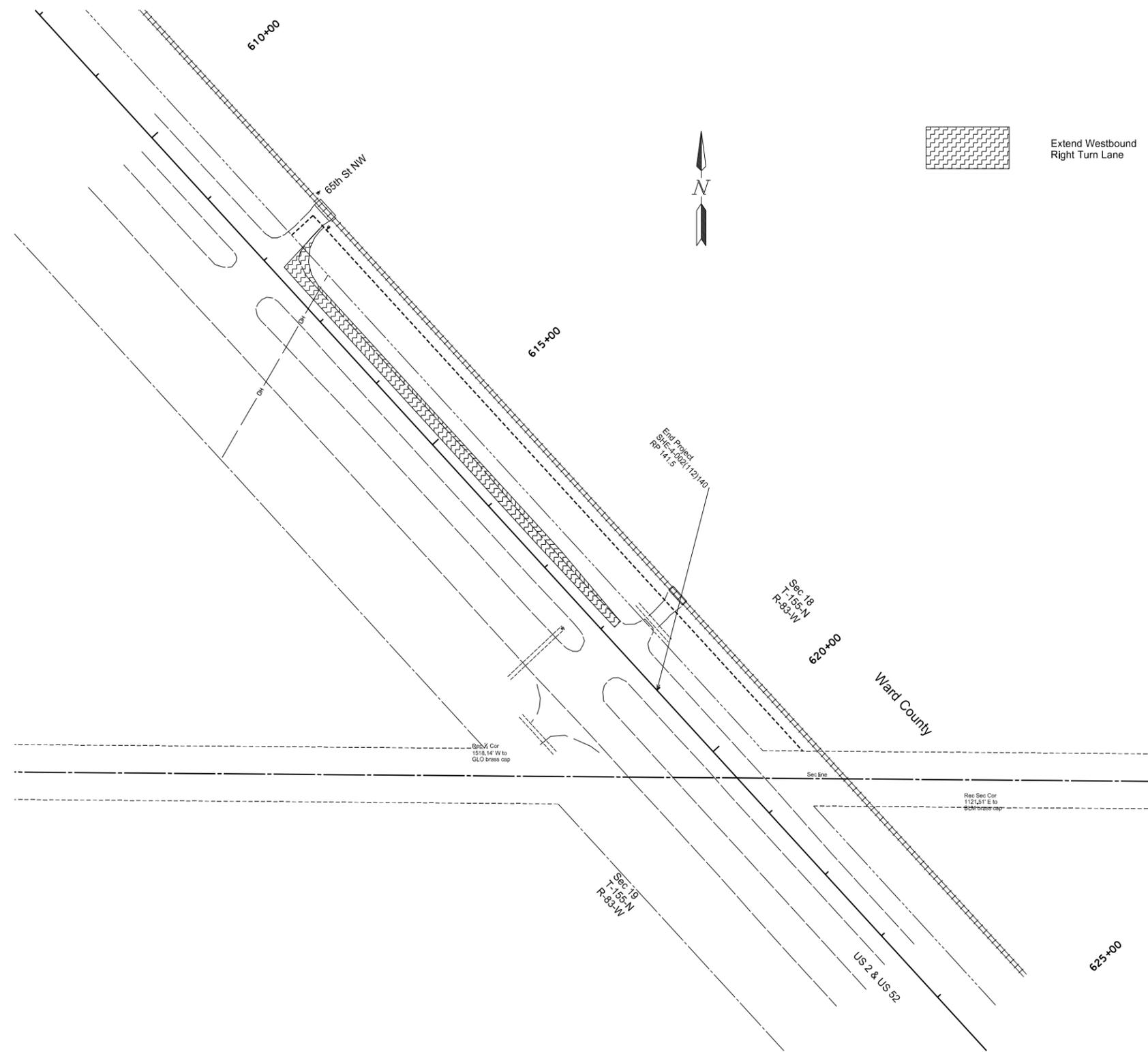


-  Install Eastbound Positive Offset Left Turn Lane
-  Extend Westbound Right Turn Lane
-  Install Westbound Positive Offset Left Turn Lane

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Scope of Work
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

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Scope of Work
 65th St NW
 Turn Lanes
 19th Ave NW & 65th St NW

NOTES

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GENERAL NOTES

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

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

202-P01 REMOVAL OF BITUMINOUS SURFACING: The tonnage of "Removal of Bituminous Surfacing" is based on the existing typical sections shown in section 30 and section 40. The tonnage includes the area of existing bituminous surfacing, existing base, and any other material needed to be removed for the new turn lane installation.

202-P02 ABUTTING PAVEMENT: The areas to be sawed are shown on the plan sheets. Sawing shall be paid as "Saw Bituminous Surfacing-Full Depth."

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

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

203-P01 TOPSOIL: Construct topsoil stockpiles with 10:1 or flatter approach slopes, if located within the clear zone.

230-P01 SUBGRADE PREPARATION-TYPE A-SHOULDERS: Subgrade preparation has been provided for all right turn lane locations and may be added for left turn lanes if determined necessary by the engineer.

Excavate to a depth of 18" below the bottom of the existing aggregate base and daylight out into the inslope.

Drying and compacting the material in place or hauling in suitable embankment material and compacting as specified in Section 203.04 E.2 The excavated material shall be incorporated back into the project.

All costs associated with excavating, handling and placing the material shall be included in the price bid for "Subgrade Preparation-Type A-Shoulders".

430-P01 COMMERCIAL GRADE HOT MIX ASPHALT: The contractor must use a commercial grade asphalt mix that meets Superpave FAA 45 requirements.

Include Prime, Tack, and PG 58-28 oil in the contract unit price bid for "Commercial Grade Hot Mix Asphalt".

430-P02 COMMERCIAL GRADE HOT MIX ASPHALT: Contractor is responsible for sampling and testing of the mix for each days production. The results will be given to the engineer for determining "Calculated Density" for the lot. Tests to be conducted are: ND T 312, ND T 166, and ND T 209 as found in Table 430-7 in the FSTM, performed by certified contractors personal or a qualified testing lab.

Calculated Density is required on all lifts and turn lane locations. Table 430-12 will be followed for pay adjustments.

Cores will be required for each lift at every location. Locations will be marked by the engineer. These cores will be used to determine calculated densities.

Include all cost's related to testing of the HMA in the contract unit price bid for "Commercial Grade Hot Mix Asphalt".

704-P01 TRAFFIC CONTROL FOR SHOULDER DROP-OFF: If the drop-off is greater than 12" at the end of each day, the Contractor will be required to provide a 4:1 traversable taper wedge reducing the drop-off to less than 12". The one lane closure will remain in place.

All cost to construct the taper wedge will be included in the traffic control bid items.

If the traversable wedge cannot be provided, the Contractor will provide 24 hour flagging at their expense until the taper wedge can be constructed.

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NOTES

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704-P02 TRAFFIC CONTROL: The traffic control for the construction of this project shall consist of one lane road closures and flagging. Traffic control devices shall comply with the following Standard Drawings.

D-704-7, 8, 9, 10, 11, 12, 13, and 14 as applicable.

D-704-20, Layout G: For terminal sign spacing.

D-704-22, Layouts Type K and L: For construction trucks hauling materials.

D-704-24, Layouts Type R and T: For Jacking or Boring Culverts, shoulder preparation, topsoil, seeding and mulching.

D-704-26, Layouts Type BB, CC, EE, GG and Z.

D-704-34: Sign Layout for One-Lane Closure for the construction of the turn lanes, milling and paving. Quantities for these lane closures were based on one complete lane closure from 65th St NW to 19th Ave NW.

D-704-50: Portable Sign Support Assembly.

714-P01 PLUG PIPE-ALL TYPES & SIZES: At locations designated on the plans for plugging existing culverts, the contractor shall remove any barrel sections of concrete culvert that the engineer designates for removal. He may then plug the ends of the remaining culverts with precast concrete plugs and rubber seals or a method as approved by the engineer. All costs to dewater, excavation of material, culvert removal and plugging shall be included the unit price bid for "Plug Pipe-All Types & Sizes".

754-P01 REMOVED SIGNS AND SUPPORTS: All signs and supports not to be reset shall become the property of the contractor.

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ENVIRONMENTAL COMMITMENTS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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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 to wetlands will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank., unless meeting the criteria below ***.

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				
							Temp. Ac.	Perm. Ac.	Temp.	Perm.	Mitigation Required			Location; Acreage; Wetland#; Ratio	Onsite Mitigation Acres
											EO 11990	USACE	USFWS		
1	Sec.18,T155N,R83W	PEMAx	Ditch	0.15	Artificial	No	0.04	0.05			N	N	N		
2	Sec.18,T155N, R83W	PEMAx	Ditch	0.08	Artificial	No	0.04	0.04			N	N	N		
				Totals	0.23		0.08	0.09	0.00	0.00					0.00

* A wetland Preliminary & Approved Jurisdictional Determination was issued by the USACE on 09/07/2012; NWO-2012-1922-BIS.

**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.

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

Summary Impact Table			
Total Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.00	Temporary JD	0.00
Natural/Non-JD	0.00	Non-JD Temporary	0.08
Artificial/JD	0.00	Permanent JD > 0.10	0.00
Artificial /Non-JD	0.09	Permanent OW	0.00
Total	0.09	Temporary OW	0.00

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	0.4	0.4
202	0135 REMOVAL OF BITUMINOUS SURFACING	TON	4,088	4,088
202	0153 SAW BITUMINOUS SURFACING-FULL DEPTH	LF	3,772	3,772
202	0170 REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	52	52
203	0101 COMMON EXCAVATION-TYPE A	CY	513	513
203	0109 TOPSOIL	CY	600	600
203	0121 TOPSOIL-WETLAND	CY	140	140
203	0140 BORROW-EXCAVATION	CY	457	457
216	0100 WATER	M GAL	150	150
230	0302 SUBGRADE PREPARATION-TYPE A-SHOULDERS	STA	16	16
251	0200 SEEDING CLASS II	ACRE	2	2
251	2000 TEMPORARY COVER CROP	ACRE	2	2
253	0101 STRAW MULCH	ACRE	4	4
261	0112 FIBER ROLLS 12IN	LF	3,175	3,175
261	0113 REMOVE FIBER ROLLS 12IN	LF	1,670	1,670
302	0120 AGGREGATE BASE COURSE CL 5	TON	5,055	5,055
411	0105 MILLING PAVEMENT SURFACE	SY	430	430
430	0500 COMMERCIAL GRADE HOT MIX ASPHALT	TON	1,795	1,795
430	1000 CORED SAMPLE	EA	24	24
702	0100 MOBILIZATION	L SUM	0.4	0.4
704	0100 FLAGGING	MHR	1,000	1,000
704	1000 TRAFFIC CONTROL SIGNS	UNIT	4,668	4,668
704	1052 TYPE III BARRICADE	EA	8	8
704	1060 DELINEATOR DRUMS	EA	40	40
704	1067 TUBULAR MARKERS	EA	170	170
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	2	2
706	0500 AGGREGATE LABORATORY	EA	1	1
714	4099 PIPE CONDUIT 18IN-APPROACH	LF	63	63
714	4105 PIPE CONDUIT 24IN	LF	45	45
714	4115 PIPE CONDUIT 36IN	LF	66	66
714	4124 PIPE CONDUIT 36IN-JACKED OR BORED	LF	408	408
714	4165 PIPE CONDUIT 24IN-JACKED OR BORED	LF	150	150
714	9680 PLUG PIPE-ALL TYPES & SIZES	EA	2	2

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
722 3713	INLET SPECIAL MOUNTABLE-TYPE B 48IN	EA	3	3
722 3920	INLET SLOTTED DRAIN 18IN	LF	85	85
754 0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	66	66
754 0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	20	20
754 0162	REMOVE & RESET DELINEATORS	EA	3	3
754 0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	148	148
754 0592	RESET SIGN PANEL	EA	1	1
754 0593	RESET SIGN SUPPORT	EA	1	1
754 0805	OBJECT MARKERS - CULVERTS	EA	7	7
762 0111	EPOXY PVMT MK 12IN LINE	LF	462	462
762 0112	EPOXY PVMT MK MESSAGE	SF	192	192
762 0113	EPOXY PVMT MK 4IN LINE	LF	4,782	4,782
762 0115	EPOXY PVMT MK 8IN LINE	LF	1,058	1,058
762 0430	SHORT TERM 4IN LINE-TYPE NR	LF	2,800	2,800
762 0434	SHORT TERM 8IN LINE-TYPE NR	LF	1,280	1,280
766 0100	MAILBOX-ALL TYPES	EA	3	3

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19 Ave NW - WB Right Turn Lane	UNIT	Quantity
Removal of Bituminous Surfacing	Ton	1031
Saw Bituminous Surfacing-Full Depth	LF	659
Common Excavation-Type A	CY	0
Topsoil	CY	100
Topsoil-Wetland	CY	75
Adjusted Embankment (Not A Pay Item)	CY	239
Short Excavation	CY	239
Long Excavation	CY	0
Aggregate Base Course - Cl. 5	Ton	1100
Commercial Grade HMA FAA 45 (All lifts)	Ton	382
Cored Samples	EA	6

19 Ave NW - EB Left Turn Lane	UNIT	Quantity
Removal of Bituminous Surfacing	Ton	853
Saw Bituminous Surfacing-Full Depth	LF	1067
Common Excavation-Type A	CY	357
Topsoil	CY	246
Topsoil-Wetland	CY	0
Adjusted Embankment (Not A Pay Item)	CY	154
Short Excavation	CY	0
Long Excavation	CY	203
Aggregate Base Course - Cl. 5	Ton	1840
Commercial Grade HMA FAA 45 (All lifts)	Ton	464
Cored Samples	EA	6

19 Ave NW - WB Left Turn Lane	UNIT	Quantity
Removal of Bituminous Surfacing	Ton	1418
Saw Bituminous Surfacing-Full Depth	LF	1381
Common Excavation-Type A	CY	156
Topsoil	CY	0
Topsoil-Wetland	CY	0
Adjusted Embankment (Not A Pay Item)	CY	0
Short Excavation	CY	0
Long Excavation	CY	156
Aggregate Base Course - Cl. 5	Ton	1250
Commercial Grade HMA FAA 45 (All lifts)	Ton	625
Cored Samples	EA	6
Milling of Pavement Surfacing	SY	430

65th St NW - WB Right Turn Lane	UNIT	Quantity
Removal of Bituminous Surfacing	Ton	786
Saw Bituminous Surfacing-Full Depth	LF	665
Common Excavation-Type A	CY	0
Topsoil	CY	254
Topsoil-Wetland	CY	65
Adjusted Embankment (Not A Pay Item)	CY	577
Short Excavation	CY	577
Long Excavation	CY	0
Aggregate Base Course - Cl. 5	Ton	865
Commercial Grade HMA FAA 45 (All lifts)	Ton	324
Cored Samples	EA	6

PROJECT TOTALS	UNIT	Quantity
Removal of Bituminous Surfacing	Ton	4088
Saw Bituminous Surfacing-Full Depth	LF	3772
Common Excavation-Type A	CY	513
Topsoil	CY	600
Topsoil-Wetland	CY	140
Adjusted Embankment (Not A Pay Item)	CY	970
Borrow Excavation	CY	457
Aggregate Base Course - Cl. 5	Ton	5055
Commercial Grade HMA FAA 45 (All lifts)	Ton	1795
Cored Samples	EA	24
Milling of Pavement Surfacing	SY	430

* Embankment Quantities have been increased by 25% to account for shrinkage.

MATERIALS

Aggregate base course Cl. 5 @ 1.5 Ton/CY + 25% = 1.875 Ton/CY
 Tack Coat @ 0.05 Gal/SY
 Prime @ 0.25 Gal/SY
 Superpave FAA 45 @ 2 Ton/CY
 PG 58-28 Asphalt Cement @ 6.0 % of HBP
 Mulching @ 2X the seeding area for Permanent and Temporary
 Mulching as needed for the contractor to meet the requirements of
 the ND PES Construction Permit

WATER

20 Gal/Ton for Aggregate Base Course Cl. 5
 10 Gal/CY for Embankment
 25 MGal/Mile for dust Palliative

Removal of Bituminous Surfacing

Bituminous Pavement and Base @ 1.875 Ton/CY
 Westbound Roadway (based on 11" pavement and 7" base thickness)
 Eastbound Roadway (based on 6.5" pavement and 6" base thickness)
 Milling Pavement Surface @ 2 Ton/CY

SHORT TERM PAVEMENT MARKING

Edge Lines - White Paint 1400 LF
 Edge Lines - Yellow Paint 1400 LF
 8" Channel - White Paint 1280 LF

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Basis Of Estimate

Turn Lanes

19th Ave NW & 65th St NW

EARTHWORK SUMMARY

Location	Excavation (CY)	Pvmt. & Base Removal From Excavation Areas (CY)	Common Excavation - Type A (CY)	Embankment (CY)	Short Excavation (+) Long Excavation (-) (CY)	Topsail from Stripping (CY)	Wetland Topsoil (CY)
	A	B	C = A - B	D	E = D - C	F	
19th Ave NW - Eastbound Left Turn Lane	812	455	357	154	-203	246	0
19th Ave NW - Westbound Right Turn Lane	573	582	0	239	239	100	75
19th Ave NW - Westbound Left Turn Lane	913	757	156	0	-156	0	0
65th St NW - Westbound Right Turn Lane	385	405	0	577	577	254	65
TOTALS	2683	2199	513	970	457	600	140

Quantity shown for embankment has been increased by 25% to account for shrinkage.

BASE COURSE SUMMARY

Location	*Removal of Bituminous Surfacing	Milling Pavement Surface	Aggregate Base Course CI 5 Required
	(TON)	(TON)	(TON)
	A	B	C
19th Ave NW - Eastbound Left Turn Lane	853	0	1840
19th Ave NW - Westbound Right Turn Lane	1031	0	1100
19th Ave NW - Westbound Left Turn Lane	1418	47	1250
65th St NW - Westbound Right Turn Lane	786	0	865
TOTALS	4088	47	5055

*Includes the removal of existing pavement and Base as shown in the removal area in Section 40

* Botton 2" of existing base have been subtracted for waste.

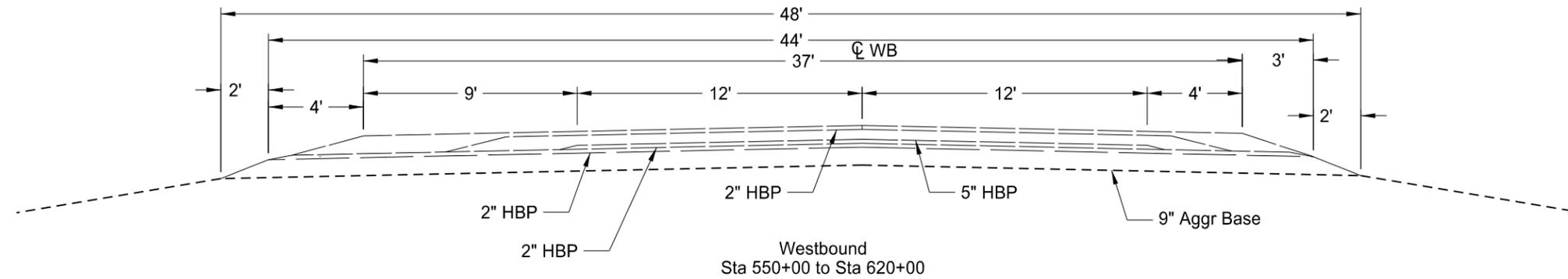
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Earthwork Summary &
 Base Course Summary

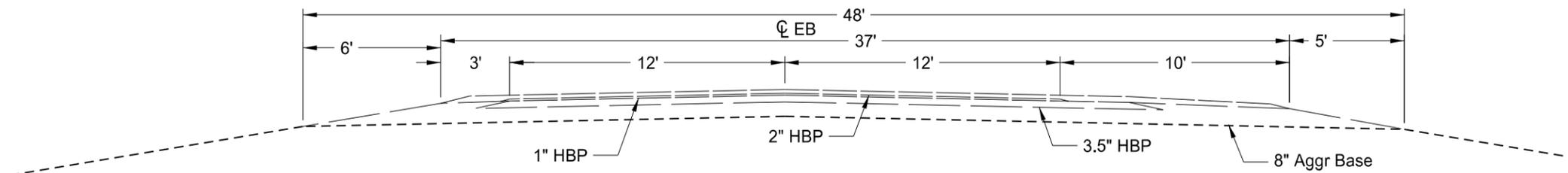
Turn Lanes

19th Ave NW & 65th St NW

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Westbound
Sta 550+00 to Sta 620+00



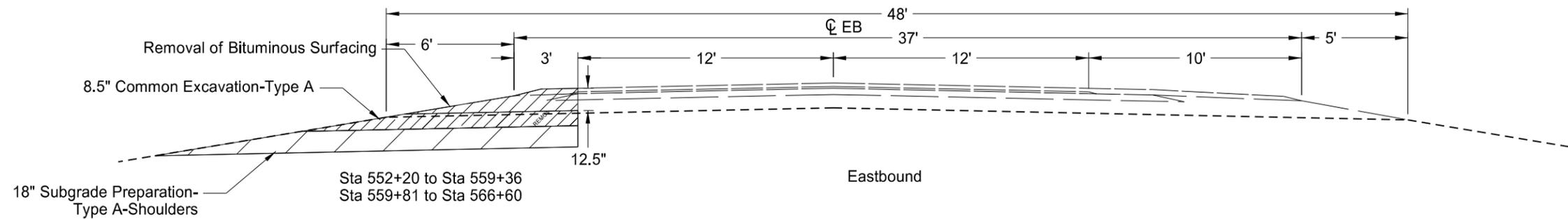
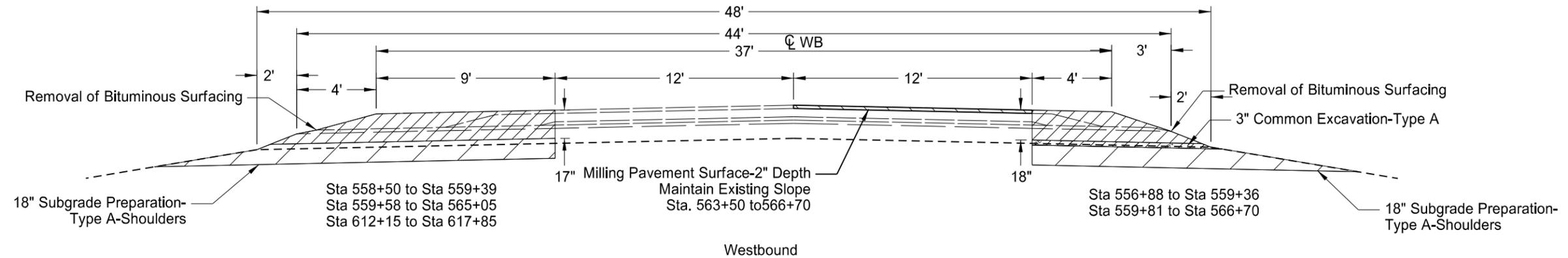
Eastbound
Sta 550+00 to Sta 620+00

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Existing Typical Sections

Turn Lanes
19th AVE NW & 65th St NW

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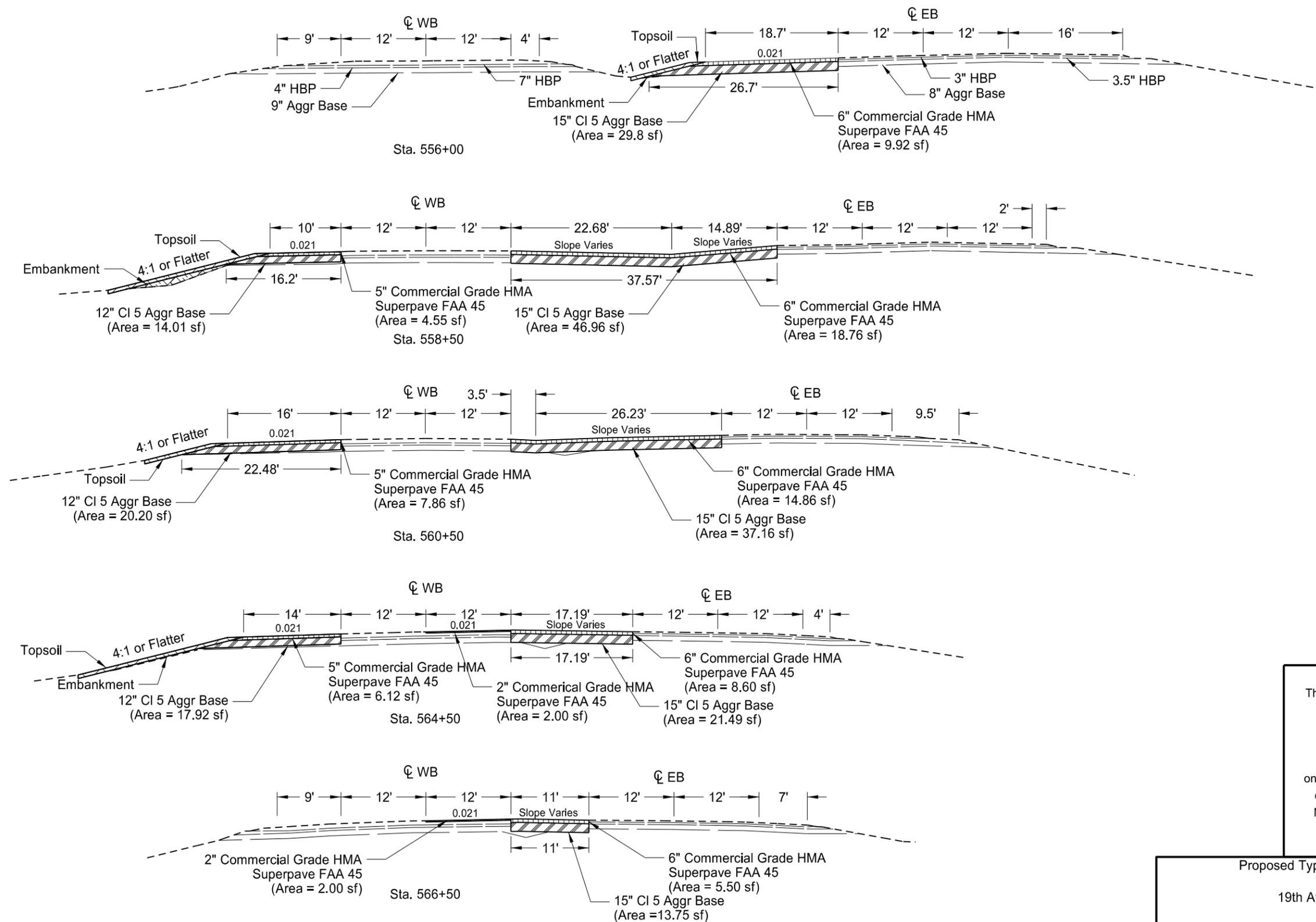
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Removal Typical Sections

Turn Lanes

19th AVe NW & 65th St NW

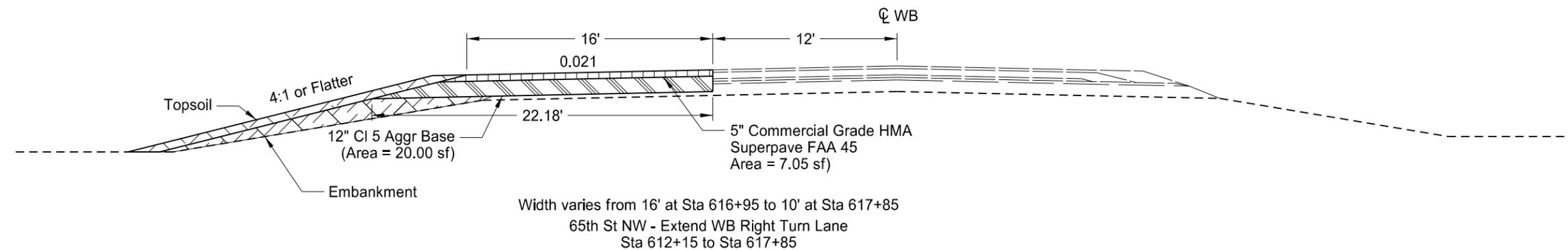
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Proposed Typical Sections
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

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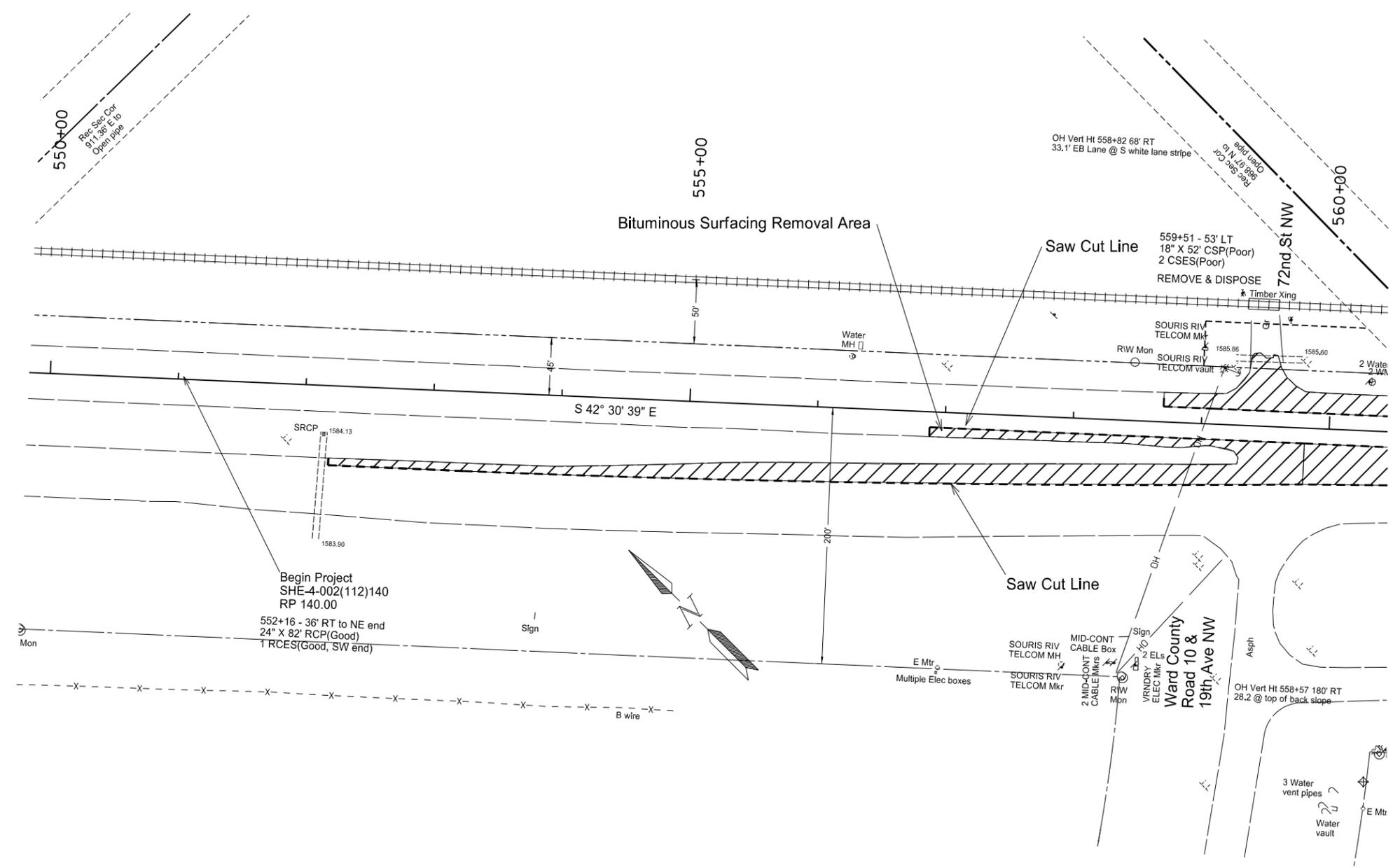


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Proposed Typical Sections
 65th St NW
 Turn Lanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	40	1

Saw Bituminous Surfacing - Full Depth	
552+00 to 559+36 - EB Left Turn Lane	1067 LF
Removal of Bituminous Surfacing	
552+00 to 559+36 - EB Left turn Lane	853 TON

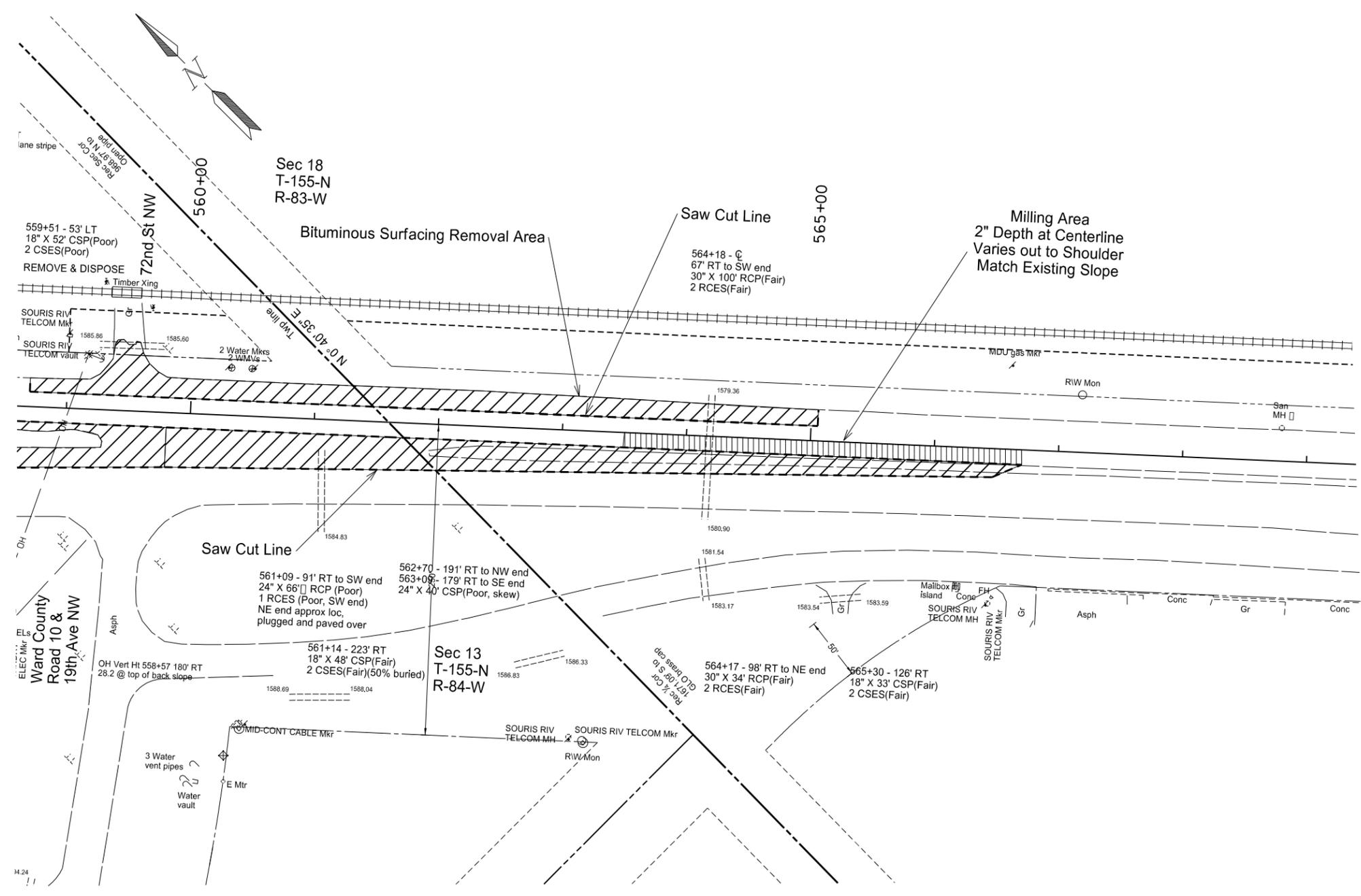


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Removals
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	40	2

Saw Bituminous Surfacing - Full Depth	
598+70 to 564+70 - WB Right Turn Lane	659 LF
559+80 to 566+70 - WB Left Turn Lane	1381 LF
Removal of Bituminous Surfacing	
598+70 to 564+70 - WB Right Turn Lane	1031 TON
559+80 to 566+70 - WB Left Turn Lane	1418 TON
Milling of Pavement Surfacing	
564+50 to 566+70 - WB Left Turn Lane	430 SY



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Removals
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

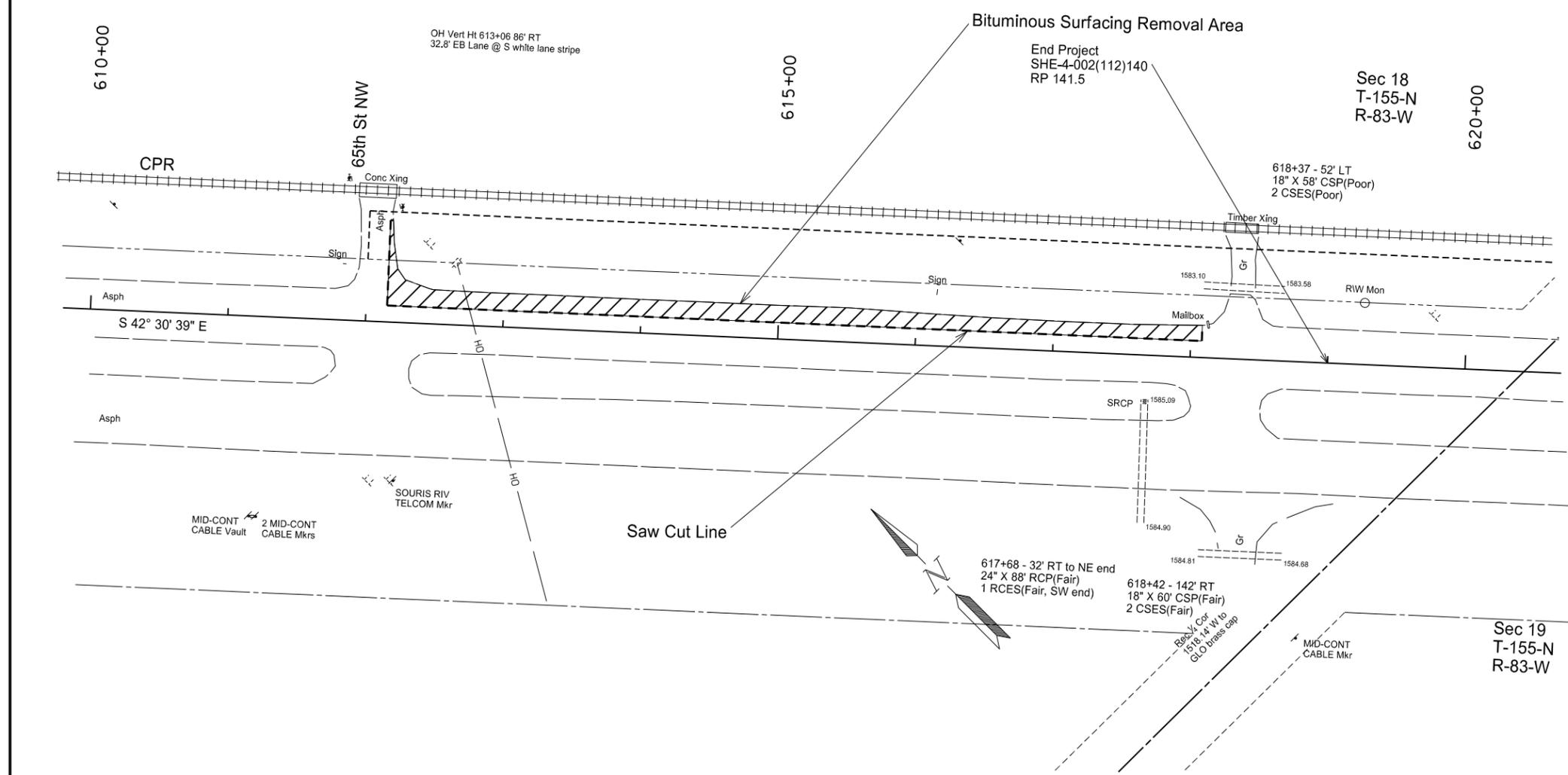
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	40	3

Saw Bituminous Surfacing - Full Depth

612+15 to 617+85 - WB Right Turn Lane 665 LF

Removal of Bituminous Surfacing

612+15 to 617+85 - WB Right Turn Lane 786 TON



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Removals
 65th St. NW
 Turn Lanes
 19th Ave NW & 65th St NW

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SHE-4-002(112)140	50	1

HYDRAULIC DATA FOR SHE-4-002(112)140 (A)									
STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
558+78 - SCL2		24" (B)	0.3	1.92	0.65	4.52	1587.70	2.54	1587.81
561+07 - SCL2		24" (B)	0.3	1.89	0.64	5.05	1586.11	2.50	1586.22
563+33 - SCL2		24" (B)	0.2	1.44	0.56	5.74	1583.62	1.91	1583.70
564+64 - SCL2	30"X110' RCP (C)	3-36" (B)	302.5	91	2.71	8.28	1583.75	147	1584.96

(A) Hydraulic data provided is for smooth-walled (Manning's n = 0.012) type conduits.
(B) Jacked or Bored at this location.
(C) 30" RCP at STA 564+17 (SCL2) to be plugged.

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Culvert Hydraulic Data
US 2
Intersection 19th Ave NW & 65th ST NW

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation			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							Begin	End		
													EA	EA		
558+78 - SCL2	22.2' Rt	558+78 - SCL2	31.2' Rt	24	Pipe Conduit	10	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24								D-714-26
							Corrugated Steel Pipe	24	Z,A,P	2	0.064					
							Spiral Rib Steel Pipe	24	Z,A,P	3/4, 1	0.064					
558+78 - SCL2	26.8' Lt	558+78 - SCL2	22.2' Rt	24	Pipe Conduit - Jack or Bore	59	Reinforced Concrete Pipe - Class III (barrel length = 59 LF)	24							D-714-16	
							Smooth Walled Steel Pipe	24			0.312					
558+78 - SCL2	26.8 Lt	558+78 - SCL2	34.8' Lt	24	Pipe Conduit	8	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	24							FES	D-714-26
							Corrugated Steel Pipe	24	Z,A,P	2	0.064					
							Spiral Rib Steel Pipe	24	Z,A,P	3/4, 1	0.064					
559+70 -19WBRT	24.5' Lt	560+57- 19WBRT	20.3' Lt	18	Pipe Conduit - Approach	63	Reinforced Concrete Pipe - Class III (barrel length = 58 LF)	18						FES	FES	
							Corrugated Steel Pipe	18	Z,A,P	2	0.109					
							Spiral Rib Steel Pipe	18	Z,A,P	3/4,1	0.109					
561+07 - SCL2	31.0' Lt	561+07 - SCL2	16.0' Rt	24	Pipe Conduit - Jack or Bore	47	Reinforced Concrete Pipe - Class III (barrel length = 47 LF)	24							D-714-16	
							Smooth Walled Steel Pipe	24			0.312					
561+07 - SCL2	42.0' Lt	651+07 - SCL2	31.0' Lt	24	Pipe Conduit	13	Reinforced Concrete Pipe - Class III (barrel length = 11 LF)	24							FES	D-714-26
							Corrugated Steel Pipe	24	Z,A,P	2	0.064					
							Spiral Rib Steel Pipe	24	Z,A,P	3/4,1	0.064					
563+33 - SCL2	43.0' Lt	563+33 - SCL2	31.0' Lt	24	Pipe Conduit	14	Reinforced Concrete Pipe - Class III (barrell length = 12 LF)	24							FES	D-174-26
							Corrugated Steel Pipe	24	Z,A,P	2	0.064					
							Spiral Rib Steel Pipe	24	Z,A,P	3/4, 1	0.064					
563+33 - SCL2	13.0' Rt	563+33 - SCL2	43' Lt	24	Pipe Conduit - Jack or Bore	44	Reinforced Concrete Pipe - Class III (barrell length = 56 LF)	24							D-714-16	
							Smooth Walled Steel Pipe	24			0.312					

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

Turn Lanes
19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	51	2

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
564+24 - SCL2	71.3' Rt	654+29.6 - SCL2	65.7' Rt	36	Pipe Conduit	11	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	36					FES		D-714-26
							Corrugated Steel Pipe	36	Z,A,P	2	0.064				
							Spiral Rib Steel Pipe	36	Z,A,P	3/4, 1	0.064				
564+29.6 - SCL2	65.7' Rt	565+25.8 - SCL2	30.4' Lt	36	Pipe Conduit - Jack or Bore	136	Reinforced Concrete Pipe - Class III (barrel length = 152 LF)	36							D-714-16
							Smooth Walled Steel Pipe	36			0.469				
565+25.8 - SCL2	30.4' Lt	565+31.5 - SCL2	36.1' Lt	36	Pipe Conduit	11	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	36					FES		D-714-26
							Corrugated Steel Pipe	36	Z,A,P	2	0.064				
							Spiral Rib Steel Pipe	36	Z,A,P	3/4, 1	0.064				
564+34 - SCL2	71.3' Rt	564+39.6 - SCL2	65.7' Rt	36	Pipe Conduit	11	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	36					FES		D-714-26
							Corrugated Steel Pipe	36	Z,A,P	2	0.064				
							Spiral Rib Steel Pipe	36	Z,A,P	3/4, 1	0.064				
564+39.6 - SCL2	65.7' Rt	565+35.8 - SCDL2	30.4' Lt	36	Pipe Conduit - Jack or Bore	136	Reinforced Concrete Pipe - Class III (barrel length = 152 LF)	36							D-714-16
							Smooth Walled Steel Pipe	36			0.469				
565+35.8 - SCL2	30.4' Lt	565+41.5 - SCL2	36.1' Lt	36	Pipe Conduit	11	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	36					FES		D-714-26
							Corrugated Steel Pipe	36	Z,A,P	2	0.064				
							Spiral Rib Steel Pipe	36	Z,A,P	3/4, 1	0.064				
564+44 - SCL2	71.3' RT	465+49.6 - SCL2	65.7' Rt	36	Pipe Conduit	11	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	36					FES		D-714-26
							Corrugated Steel Pipe	36	Z,A,P	2	0.064				
							Spiral Rib Steel Pipe	36	Z,A,P	3/4, 1	0.064				
564+49.6 - SCL2	65.7' Rt	565+45.8 - SCL2	30.4' Lt	36	Pipe Conduit - Jack or Bore	136	Reinforced Concrete Pipe - Class III (barrel length = 152 LF)	36							D-714-16
							Smooth Walled Steel Pipe	36			0.469				
565+45.8 - SCL2	30.4' Lt	565+51.4 - SCL2	36.1' Lt	36	Pipe Conduit	11	Reinforced Concrete Pipe - Class III (barrel length = 8 LF)	36					FES		D-714-26
							Corrugated Steel Pipe	36	Z,A,P	2	0.064				
							Spiral Rib Steel Pipe	36	Z,A,P	3/4, 1	0.064				

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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"

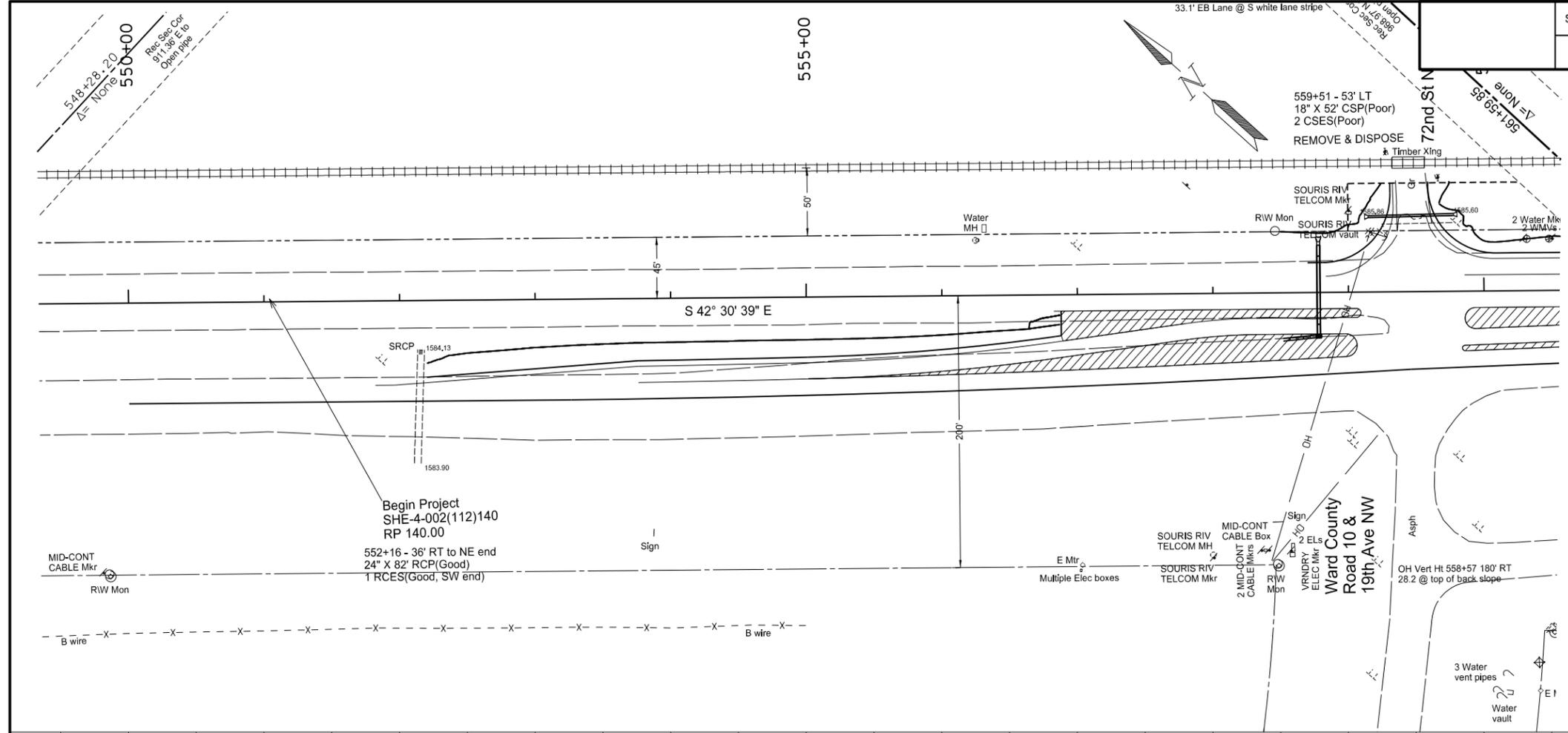
(*) The price bid for "Pipe Conduit" bid items includes end sections. Pipe Extensions shall pay for end sections separately.
FES = Flared End Section
TES = Traversable End Section

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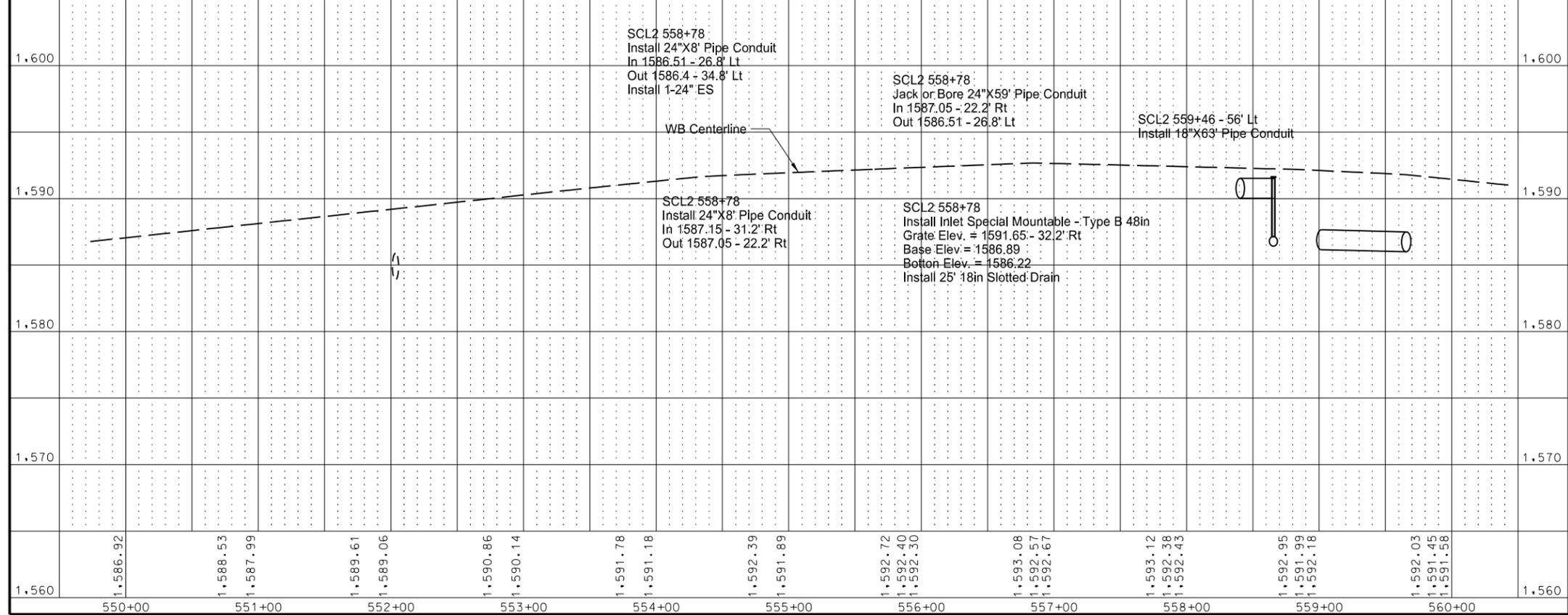
Allowable Pipe List

Turn Lanes
19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	60	1



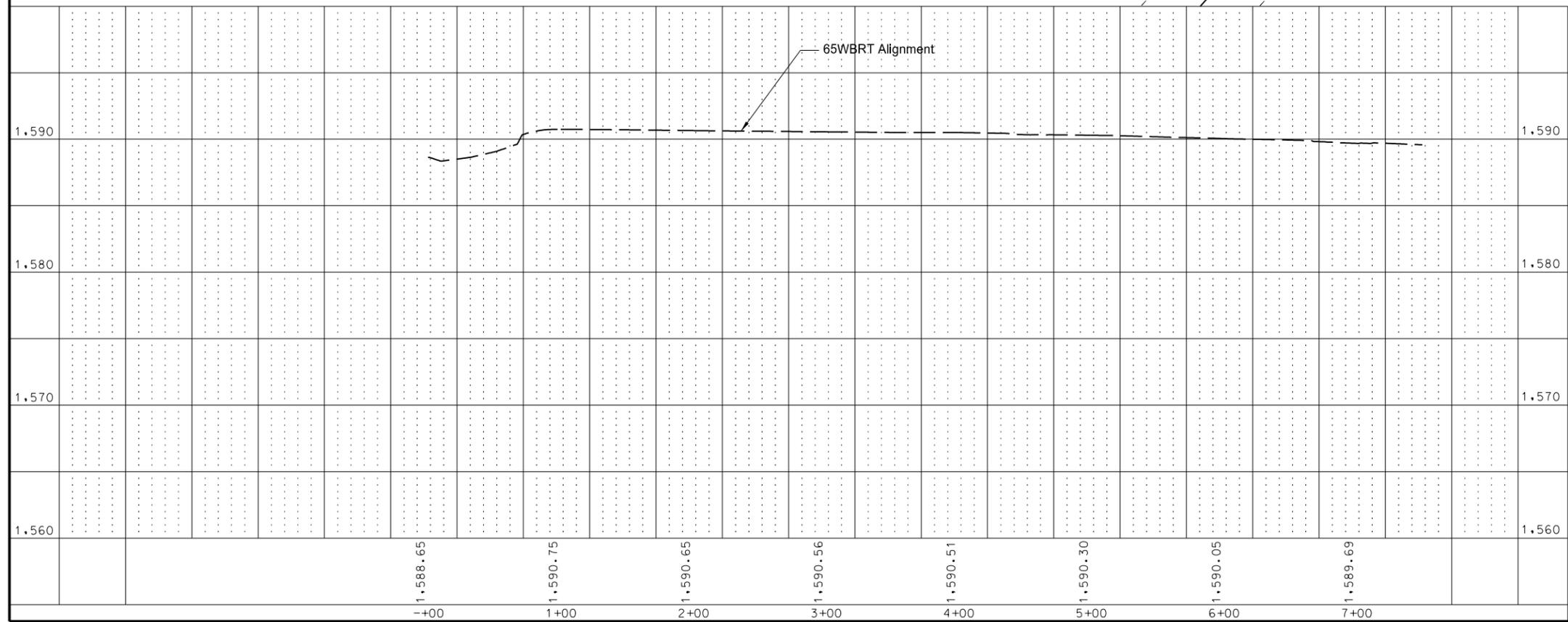
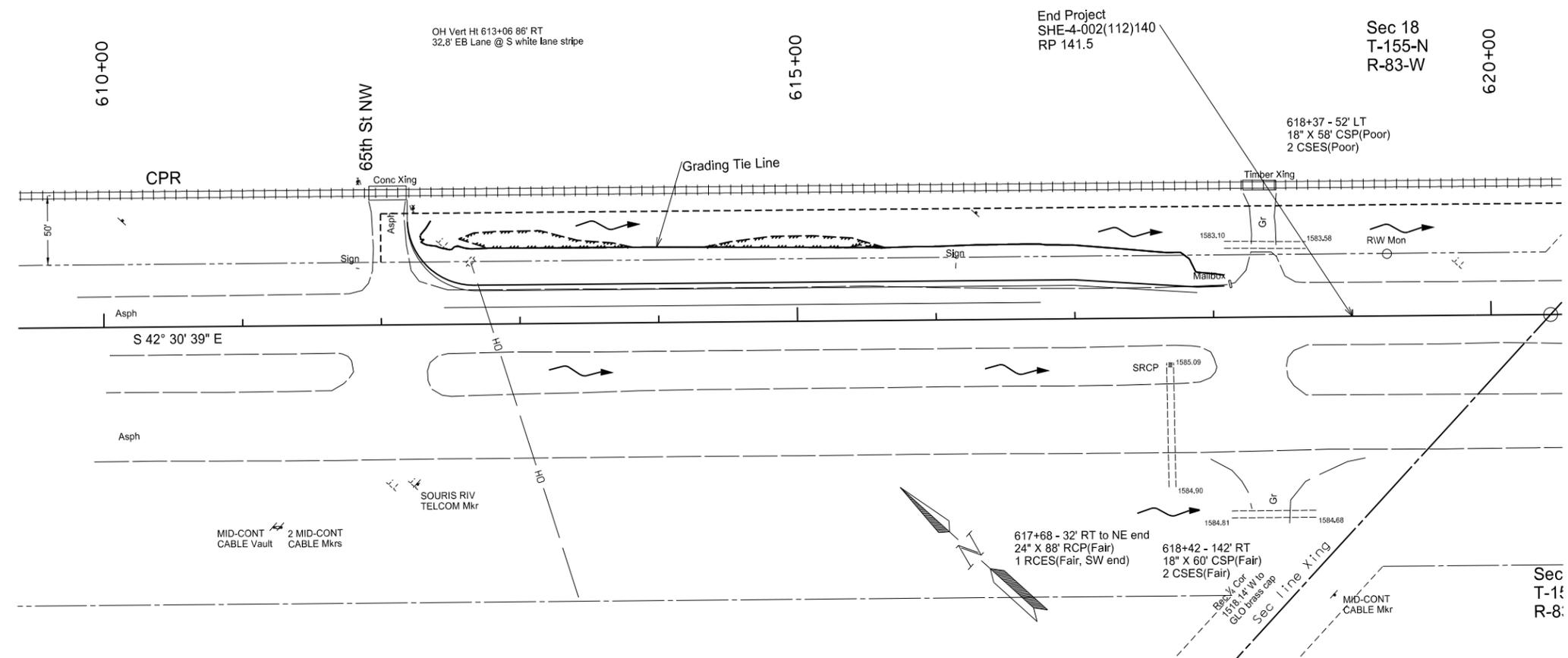
Inlet Slotted Drain 18in	558+51.6 - 34.5' Rt to 558+76.5 - 32.2' Rt	25 LF
Inlet Special Mountable -Type B 48in	558+78.0 - 32.2' Rt	1 EA



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Plan & Profile
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

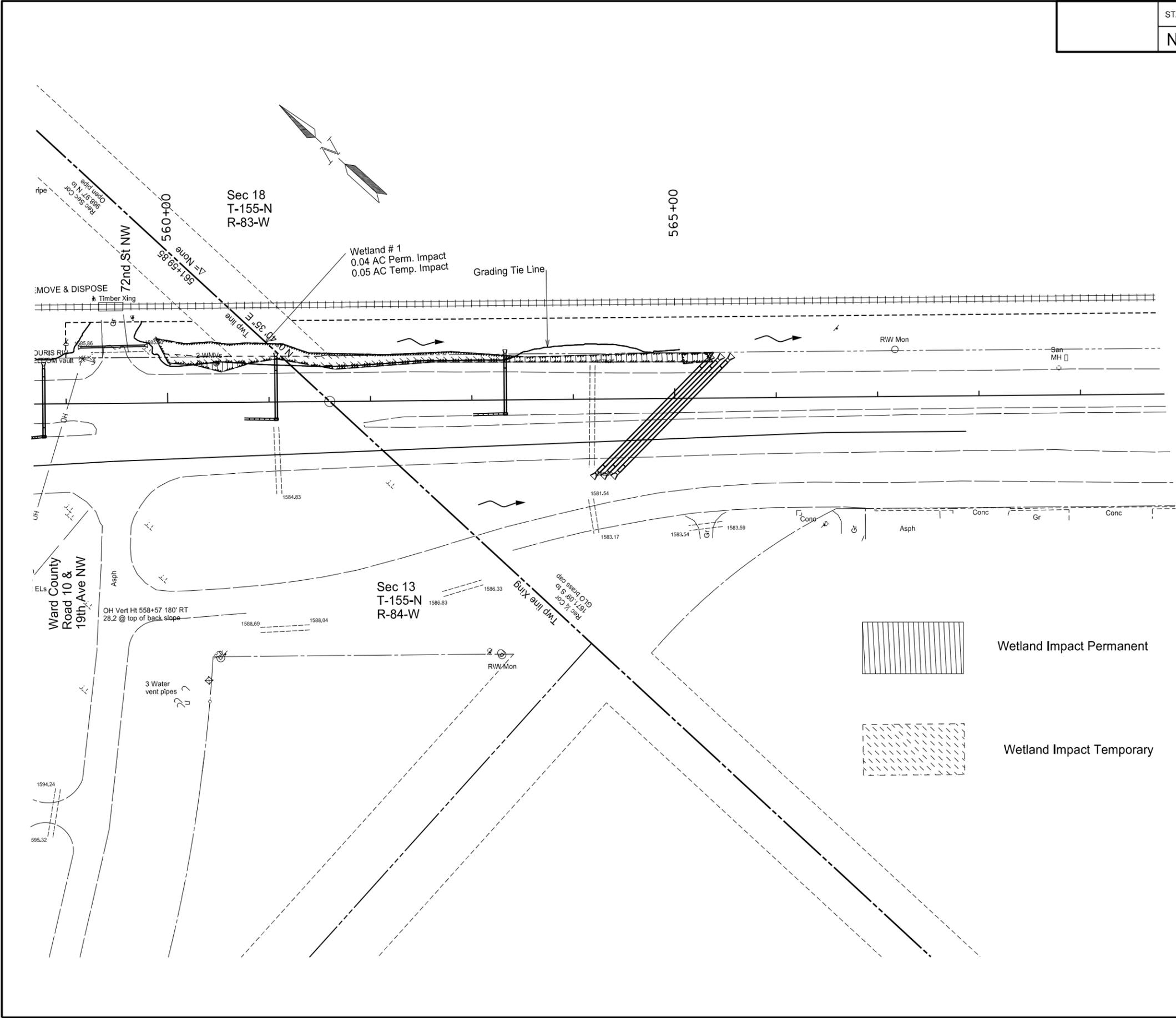
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	60	3



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Plan & Profile
 65th St NW
 Turnlanes
 19th Ave NW & 65th St. NW

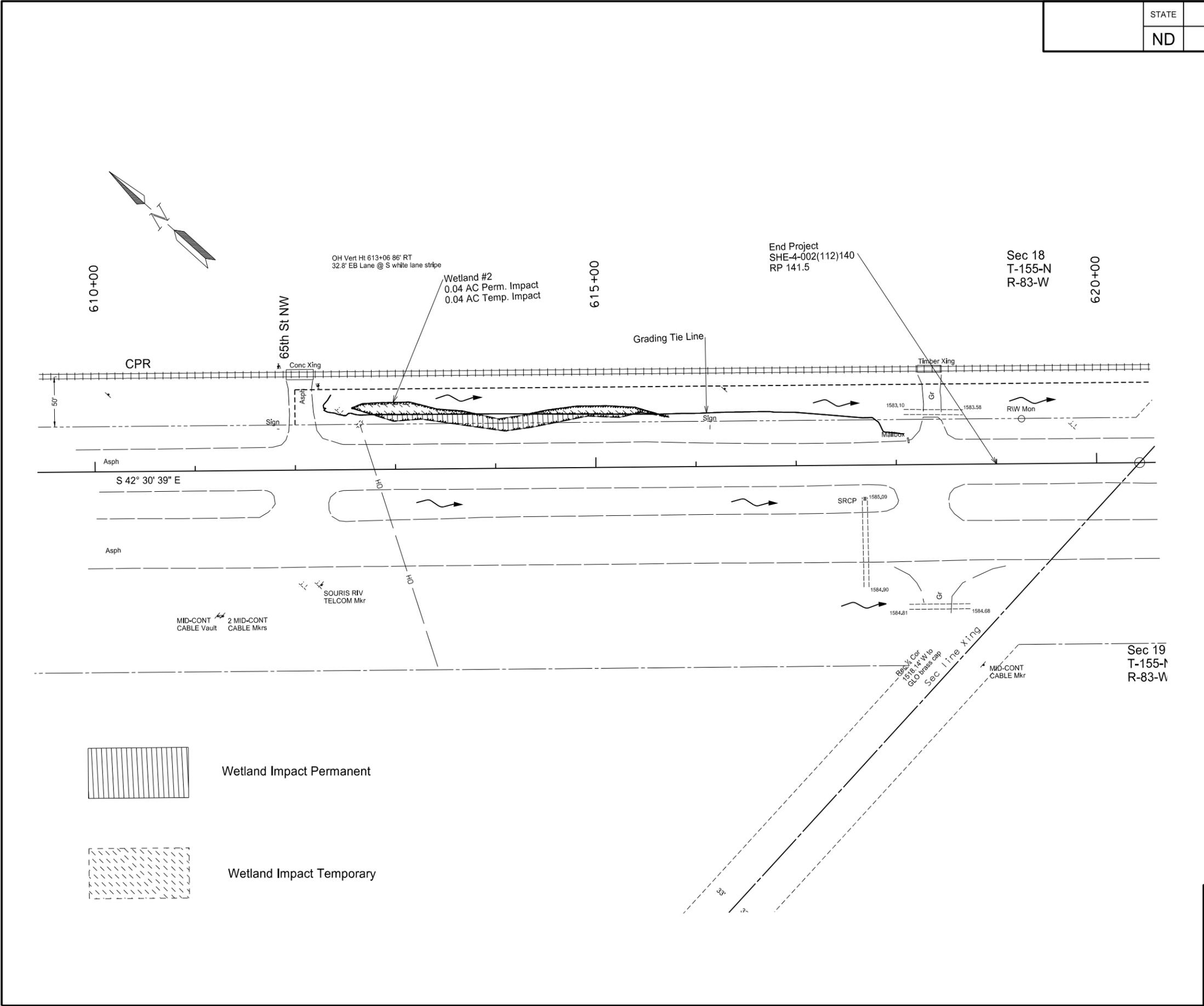
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	75	2

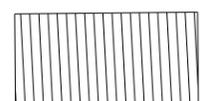


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Wetlands
 19th Ave NW
 Turnlanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	75	3

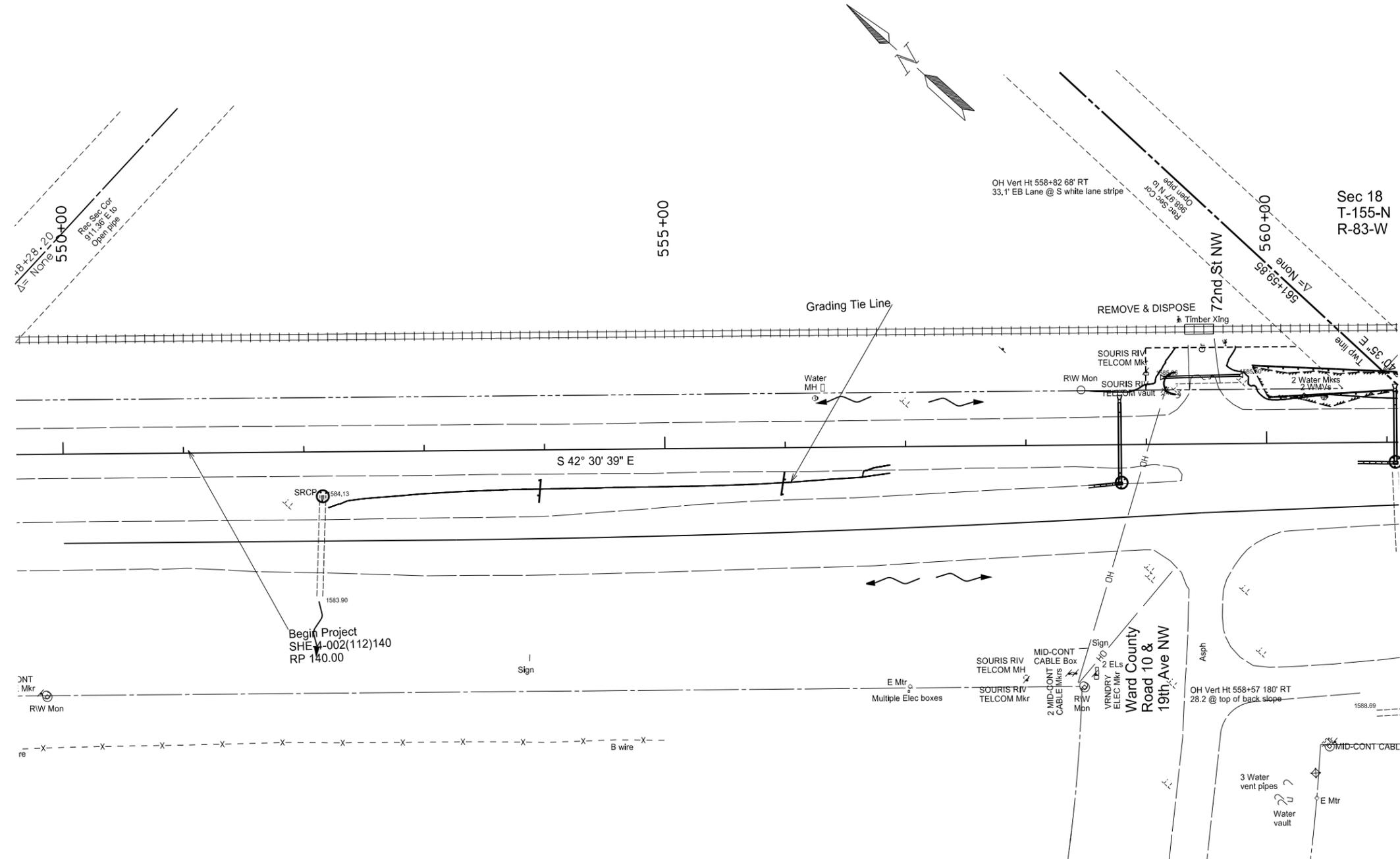


 Wetland Impact Permanent
 Wetland Impact Temporary

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Wetlands
 19th Ave NW
 Turnlanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	76	1



Fiber Rolls 12IN	
552+00 to 558+00 RT	100 LF
557+00 to 558+00 LT	30 LF

Remove Fiber Rolls 12IN	
552+00 to 558+00 RT	100 LF
557+00 to 558+00 LT	30 LF

Sec 18
T-155-N
R-83-W

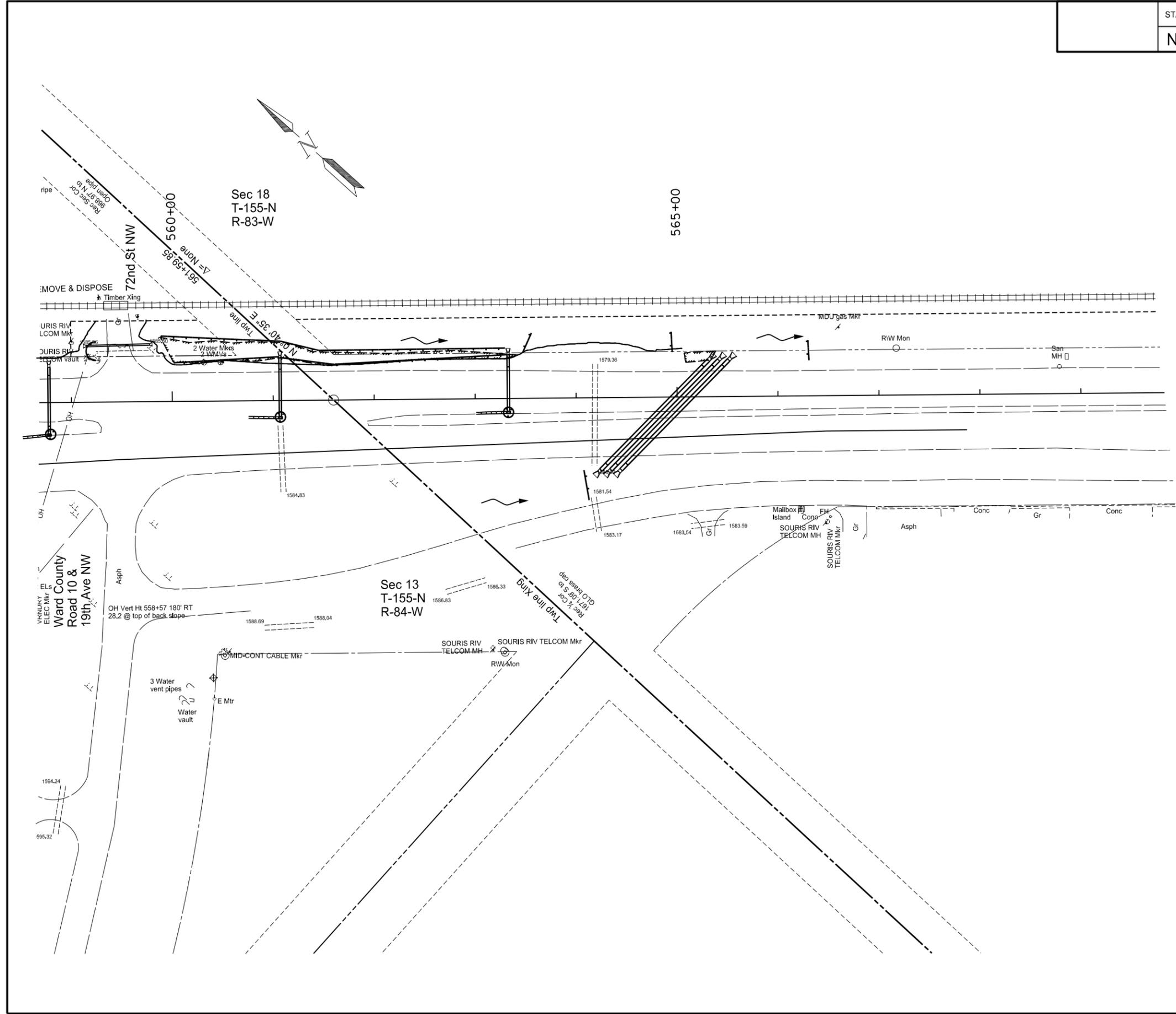
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Temporary Sediment & Erosion Control
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	76	2

Fiber Rolls 12 IN	
560+00 to 568+00 LT	740 LF
560+00 to 565+00 RT	90 LF

Remove Fiber Rolls 12 IN	
560+00 to 568+00 LT	740 LF
560+00 to 565+00 RT	90 LF



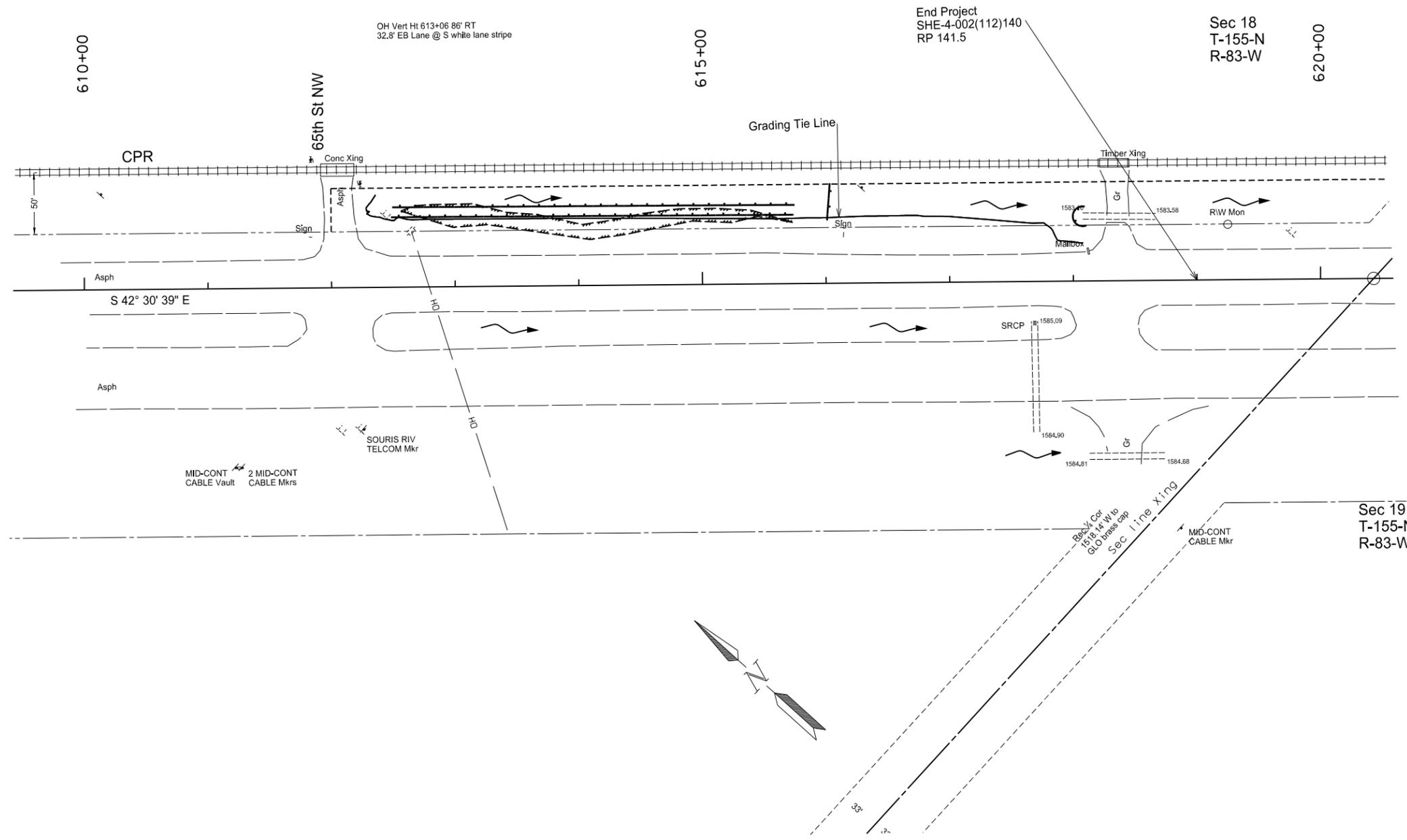
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Temporary Sediment & Erosion Control
 19th Ave NW
 Turnlanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	76	3

Fiber Rolls 12 IN
612+00 to 619+00 LT 710 LF

Remove Fiber Rolls 12 IN
612+00 to 619+00 LT 710 LF



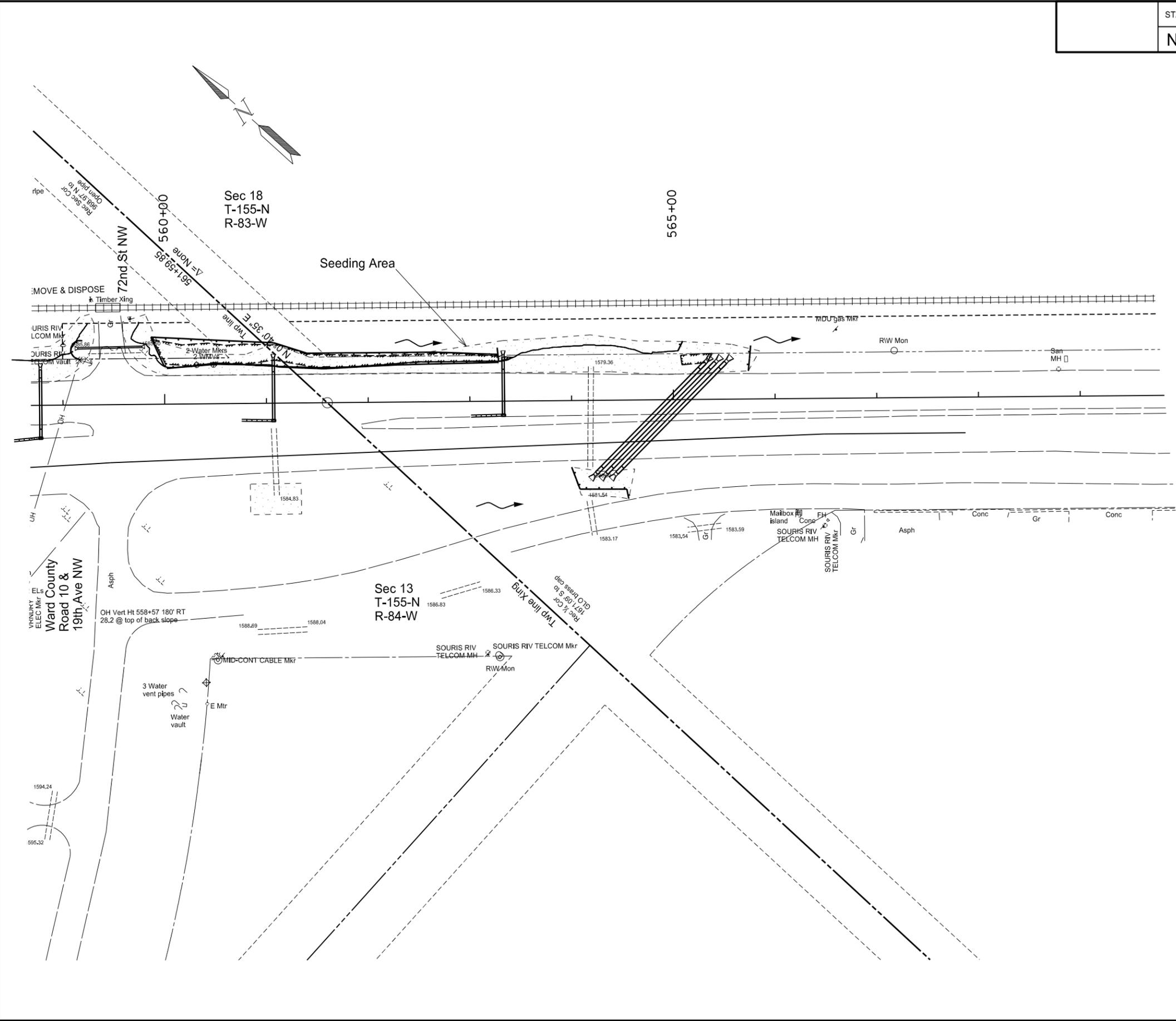
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Temporary Sediment & Erosion Control
 65th St NW
 Turnlanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	77	2

Fiber Rolls 12IN	
560+00 to 568+00 LT	765 LF
560+00 to 565+00 RT	85 LF

Seeding Cl II	
560+00 to 568+00 LT	0.40 AC
560+00 to 565+00 RT	0.10 AC

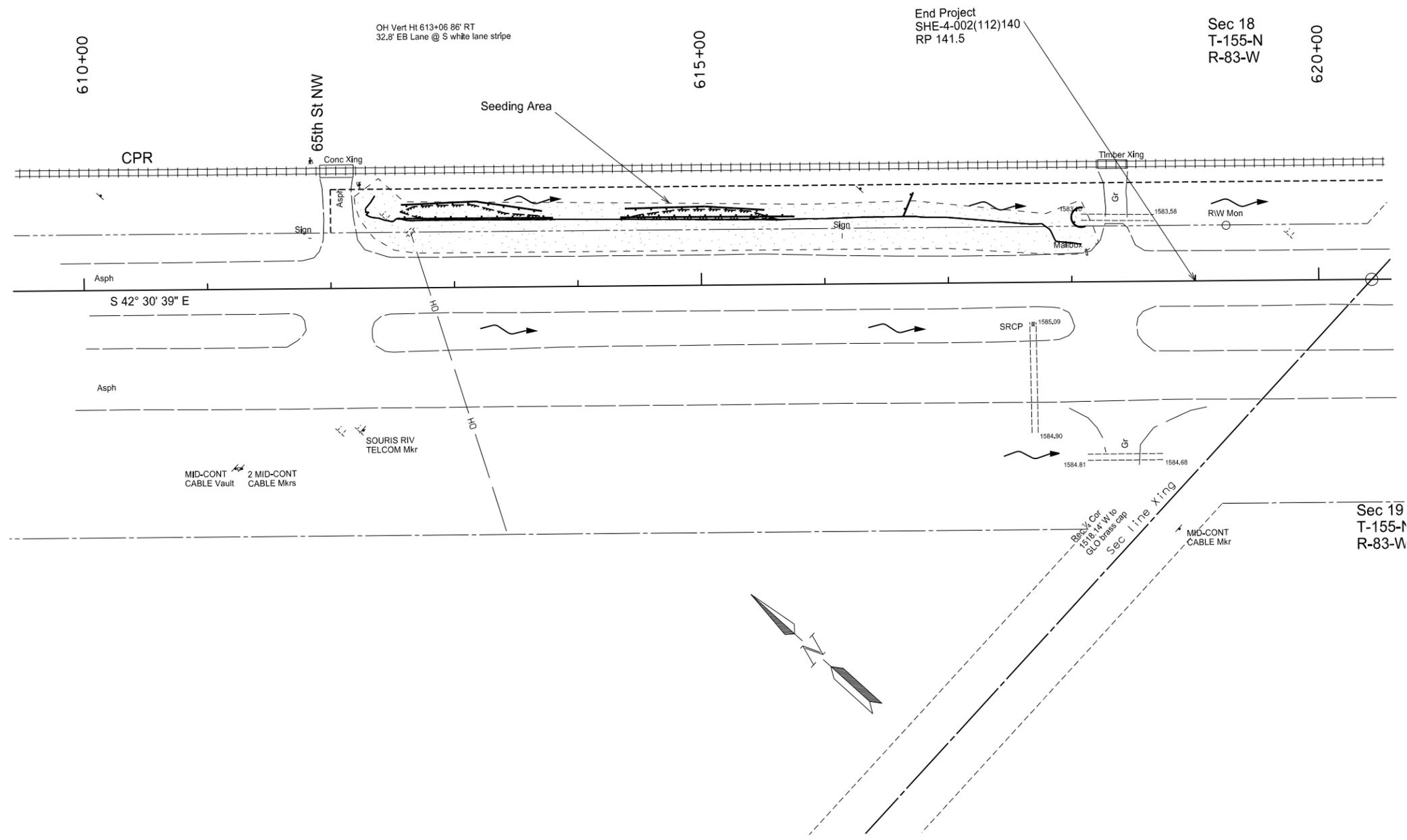


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Permanent Sediment & Erosion Control
 19th Ave NW
 Turnlanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	77	3

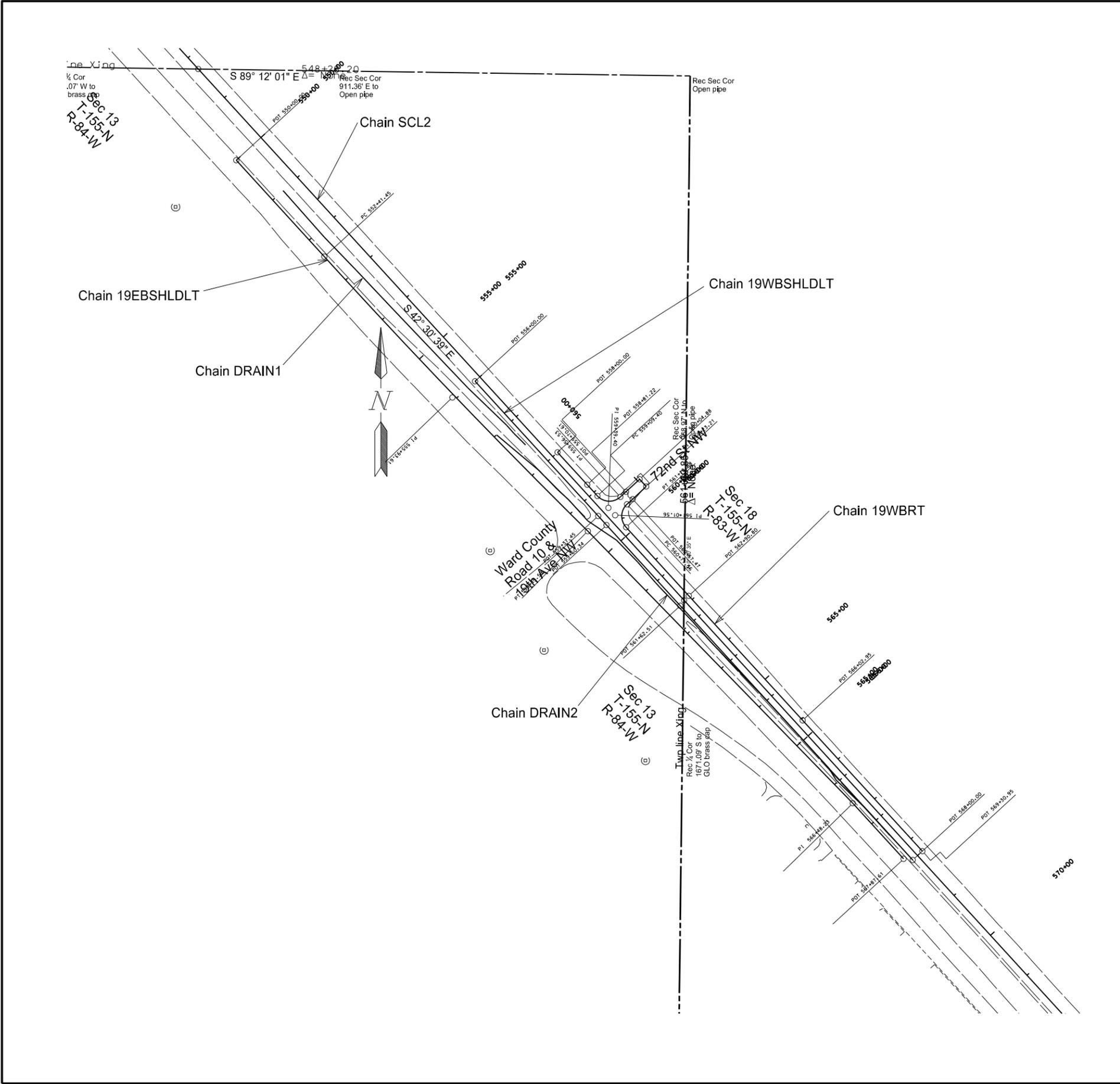
Fiber Rolls 12IN	
612+00 to 619+00 LT	565 LF
Seeding CI II	
612+00 to 619+00 LT	0.55 AC



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Permenant Sediment & Erosion Control
 65th St NW
 Turnlanes
 19th Ave NW & 65th St NW

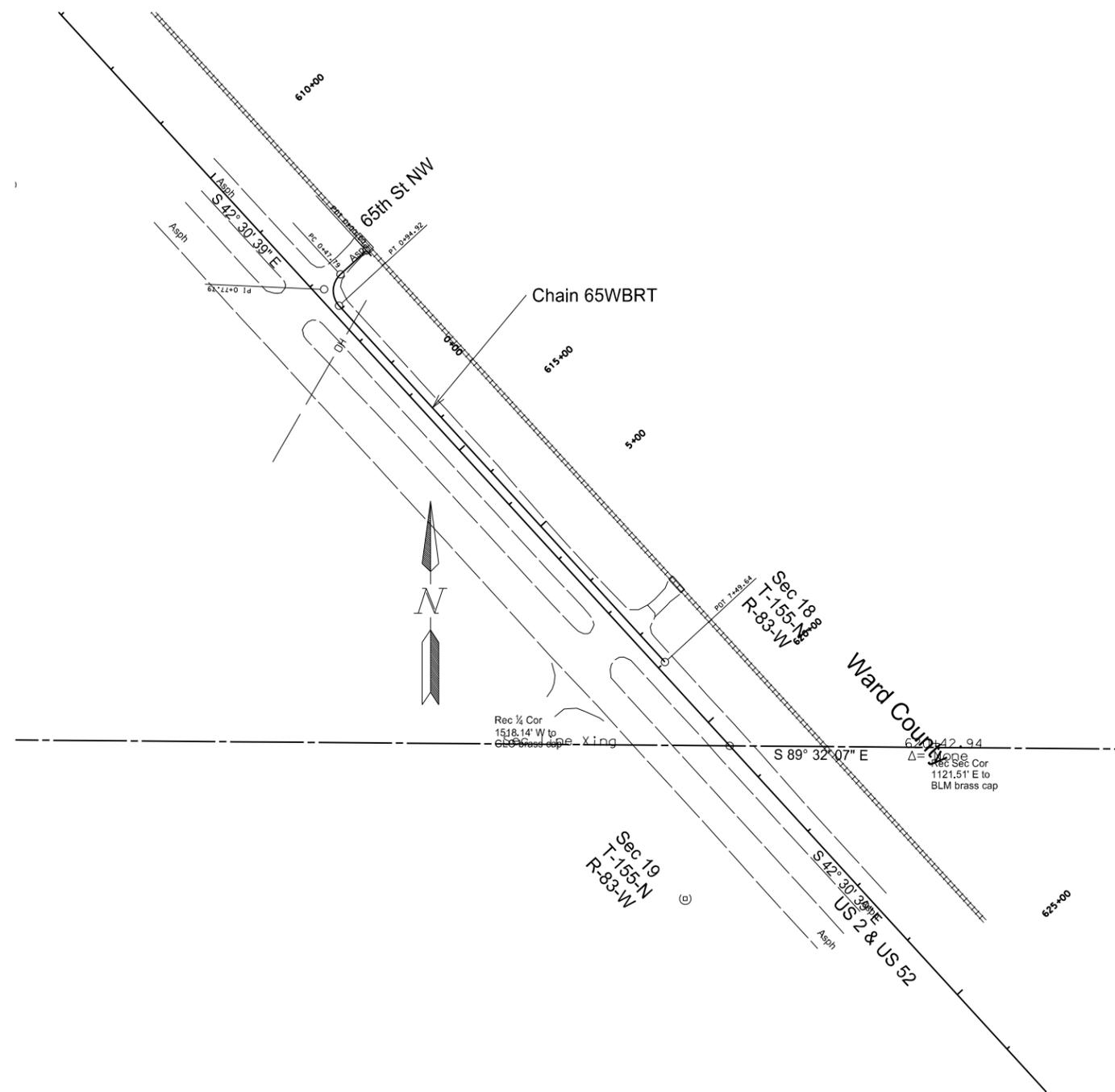
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)104	82	1



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Office Locations Alignments
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)104	82	2



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Office Locations Alignments
 65th St NW
 Turn Lanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)104	82	3

Chain 19EBSHDLT description

Point 8110 N 458,839.1639 E 1,747,732.0783 Sta 550+00.00
 Course from 8110 to PC 19EBSHDLT-1 S 42° 30' 39.05" E Dist 241.4475

Curve Data

 Curve 19EBSHDLT-1
 P.I. Station 555+93.61 N 458,400.8042 E 1,748,132.3415
 Delta = 3° 08' 33.80" (LT)
 Degree = 0° 26' 46.74"
 Tangent = 352.1608
 Length = 704.1450
 Radius = 12,837.4485
 External = 4.8294
 Long Chord = 704.0568
 Mid. Ord. = 4.8276
 P.C. Station 552+41.45 N 458,661.1810 E 1,747,895.2316
 P.T. Station 559+45.59 N 458,153.8181 E 1,748,383.3696
 C.C. N 467,304.6381 E 1,757,386.8454
 Back = S 42° 19' 20.25" E
 Ahead = S 45° 27' 54.05" E
 Chord Bear = S 43° 53' 37.15" E

Course from PT 19EBSHDLT-1 to 8111 S 44° 18' 21.26" E Dist 702.6336

Point 8111 N 457,650.9989 E 1,748,874.1515 Sta 566+48.23

Course from 8111 to 8112 S 42° 30' 39.05" E Dist 139.3823

Point 8112 N 457,548.2533 E 1,748,968.3363 Sta 567+87.61

Ending chain 19EBSHDLT description

Chain 19WBSHDLT description

Point 8113 N 458,430.6607 E 1,748,174.3736 Sta 556+00.00

Course from 8113 to 8114 S 42° 30' 39.05" E Dist 337.4536

Point 8114 N 458,181.9070 E 1,748,402.4011 Sta 559+37.45

Course from 8114 to 8115 S 42° 30' 39.05" E Dist 22.8827

Point 8115 N 458,165.0390 E 1,748,417.8636 Sta 559+60.34

Course from 8115 to 8116 S 42° 30' 39.05" E Dist 202.1707

Point 8116 N 458,016.0090 E 1,748,554.4764 Sta 561+62.51

Course from 8116 to 8117 S 42° 30' 39.05" E Dist 637.4930

Point 8117 N 457,546.0814 E 1,748,985.2494 Sta 568+00.00

Ending chain 19WBSHDLT description

Chain 19WBRT description

Point 8100 N 458,299.4484 E 1,748,327.2112 Sta 558+00.00

Course from 8100 to 8101 S 42° 30' 39.05" E Dist 81.2183

Point 8101 N 458,239.5783 E 1,748,382.0928 Sta 558+81.22

Course from 8101 to PC 19WBRT-1 S 42° 30' 39.05" E Dist 28.1845

Curve Data

 Curve 19WBRT-1
 P.I. Station 559+39.40 N 458,196.6876 E 1,748,421.4098
 Delta = 90° 00' 00.00" (LT)
 Degree = 190° 59' 09.35"
 Tangent = 30.0000
 Length = 47.1239
 Radius = 30.0000
 External = 12.4264
 Long Chord = 42.4264
 Mid. Ord. = 8.7868
 P.C. Station 559+09.40 N 458,218.8021 E 1,748,401.1379
 P.T. Station 559+56.53 N 458,216.9595 E 1,748,443.5243
 C.C. N 458,239.0740 E 1,748,423.2524
 Back = S 42° 30' 39.05" E
 Ahead = N 47° 29' 20.95" E
 Chord Bear = S 87° 30' 39.05" E

Course from PT 19WBRT-1 to 8102 N 47° 29' 20.95" E Dist 14.0848

Point 8102 N 458,226.4771 E 1,748,453.9069 Sta 559+70.61

Course from 8102 to 8103 N 47° 29' 20.95" E Dist 34.2655

Point 8103 N 458,249.6313 E 1,748,479.1658 Sta 560+04.88

Course from 8103 to 8104 S 42° 30' 39.05" E Dist 18.3284

Point 8104 N 458,236.1205 E 1,748,491.5508 Sta 560+23.21

Course from 8104 to 8105 S 47° 29' 20.95" W Dist 34.2655

Point 8105 N 458,212.9663 E 1,748,466.2920 Sta 560+57.47

Course from 8105 to PC 19WBRT-2 S 47° 29' 20.95" W Dist 14.0848

Curve Data

 Curve 19WBRT-2
 P.I. Station 561+01.56 N 458,183.1768 E 1,748,433.7949
 Delta = 90° 00' 00.00" (LT)
 Degree = 190° 59' 09.35"
 Tangent = 30.0000
 Length = 47.1239
 Radius = 30.0000
 External = 12.4264
 Long Chord = 42.4264
 Mid. Ord. = 8.7868
 P.C. Station 560+71.56 N 458,203.4487 E 1,748,455.9094
 P.T. Station 561+18.68 N 458,161.0623 E 1,748,454.0668
 C.C. N 458,181.3342 E 1,748,476.1813
 Back = S 47° 29' 20.95" W
 Ahead = S 42° 30' 39.05" E
 Chord Bear = S 2° 29' 20.95" W

Course from PT 19WBRT-2 to 8106 S 42° 30' 39.05" E Dist 172.1153

Point 8106 N 458,034.1877 E 1,748,570.3702 Sta 562+90.80

Course from 8106 to 8107 S 42° 30' 39.05" E Dist 312.1534

Point 8107 N 457,804.0839 E 1,748,781.3016 Sta 566+02.95

Course from 8107 to 8108 S 42° 30' 39.05" E Dist 328.0000

Point 8108 N 457,562.2989 E 1,749,002.9409 Sta 569+30.95

Ending chain 19WBRT description

Chain 65WBRT description

Point 8120 N 454,360.1492 E 1,752,043.8174 Sta 0+00.00

Course from 8120 to PC 65WBRT-1 S 47° 29' 20.95" W Dist 47.7925

Curve Data

 Curve 65WBRT-1
 P.I. Station 0+77.79 N 454,307.5825 E 1,751,986.4727
 Delta = 90° 00' 00.00" (LT)
 Degree = 190° 59' 09.35"
 Tangent = 30.0000
 Length = 47.1239
 Radius = 30.0000
 External = 12.4264
 Long Chord = 42.4264
 Mid. Ord. = 8.7868
 P.C. Station 0+47.79 N 454,327.8544 E 1,752,008.5872
 P.T. Station 0+94.92 N 454,285.4680 E 1,752,006.7446
 C.C. N 454,305.7399 E 1,752,028.8591
 Back = S 47° 29' 20.95" W
 Ahead = S 42° 30' 39.05" E
 Chord Bear = S 2° 29' 20.95" W

Course from PT 65WBRT-1 to 8121 S 42° 30' 39.05" E Dist 654.7264

Point 8121 N 453,802.8368 E 1,752,449.1627 Sta 7+49.64

Ending chain 65WBRT description

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Survey Data

19th Ave NW & 65th ST NW

Turn Lanes

19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)104	82	4

Chain DRAIN1 description

Point 8125 N 458,783.0515 E 1,747,818.8538 Sta 551+00.00
 Course from 8125 to 8126 S 41° 36' 43.84" E Dist 115.4158
 Point 8126 N 458,696.7601 E 1,747,895.4997 Sta 552+15.42
 Course from 8126 to 8127 S 44° 02' 29.67" E Dist 84.6285
 Point 8127 N 458,635.9261 E 1,747,954.3317 Sta 553+00.04
 Course from 8127 to 8128 S 43° 22' 12.79" E Dist 100.0112
 Point 8128 N 458,563.2248 E 1,748,023.0104 Sta 554+00.06
 Course from 8128 to 8129 S 43° 39' 23.79" E Dist 100.0200
 Point 8129 N 458,490.8613 E 1,748,092.0577 Sta 555+00.08
 Course from 8129 to 8130 S 43° 39' 23.79" E Dist 100.0200
 Point 8130 N 458,418.4978 E 1,748,161.1050 Sta 556+00.10
 Course from 8130 to 8131 S 45° 56' 40.12" E Dist 50.0899
 Point 8131 N 458,383.6675 E 1,748,197.1029 Sta 556+50.19
 Course from 8131 to 8132 S 46° 08' 05.06" E Dist 30.0601
 Point 8132 N 458,362.8369 E 1,748,218.7754 Sta 556+80.25
 Course from 8132 to 8133 S 46° 13' 47.42" E Dist 20.0422
 Point 8133 N 458,348.9724 E 1,748,233.2483 Sta 557+00.29
 Course from 8133 to 8134 S 41° 56' 16.47" E Dist 20.0010
 Point 8134 N 458,334.0942 E 1,748,246.6154 Sta 557+20.29
 Course from 8134 to 8135 S 45° 22' 23.70" E Dist 30.0375
 Point 8135 N 458,312.9933 E 1,748,267.9930 Sta 557+50.33

Ending chain DRAIN1 description

Beginning chain DRAIN2 description

Point 8136 N 458,331.6736 E 1,748,214.3773 Sta 557+00.00
 Course from 8136 to 8137 S 50° 04' 31.67" E Dist 100.8778
 Point 8137 N 458,266.9324 E 1,748,291.7396 Sta 558+00.88
 Course from 8137 to 8138 S 44° 09' 27.53" E Dist 32.0132
 Point 8138 N 458,243.9653 E 1,748,314.0411 Sta 558+32.89
 Course from 8138 to 8139 S 44° 09' 27.53" E Dist 18.0933
 Point 8139 N 458,230.9847 E 1,748,326.6455 Sta 558+50.98
 Course from 8139 to 8140 S 47° 38' 06.88" E Dist 28.5287
 Point 8140 N 458,211.7607 E 1,748,347.7245 Sta 558+79.51
 Course from 8140 to 8141 S 42° 15' 39.33" E Dist 52.5457
 Point 8141 N 458,172.8722 E 1,748,383.0619 Sta 559+32.06
 Course from 8141 to 8142 S 56° 08' 33.39" E Dist 64.3622
 Point 8142 N 458,137.0142 E 1,748,436.5100 Sta 559+96.42

Continued Chain DRAIN2 description

Course from 8142 to 8143 S 44° 13' 45.13" E Dist 56.4305
 Point 8143 N 458,096.5786 E 1,748,475.8720 Sta 560+52.85
 Course from 8143 to 8144 S 40° 42' 38.57" E Dist 35.0173
 Point 8144 N 458,070.0351 E 1,748,498.7117 Sta 560+87.87
 Course from 8144 to 8145 S 40° 58' 59.95" E Dist 15.0053
 Point 8145 N 458,058.7076 E 1,748,508.5528 Sta 561+02.87
 Course from 8145 to 8146 S 42° 30' 39.05" E Dist 13.0000
 Point 8146 N 458,049.1246 E 1,748,517.3373 Sta 561+15.87
 Course from 8146 to 8147 S 44° 03' 32.41" E Dist 37.0135
 Point 8147 N 458,022.5258 E 1,748,543.0764 Sta 561+52.89
 Course from 8147 to 8148 S 43° 39' 23.79" E Dist 50.0100
 Point 8148 N 457,986.3441 E 1,748,577.6001 Sta 562+02.90
 Course from 8148 to 8149 S 41° 49' 23.99" E Dist 50.0036
 Point 8149 N 457,949.0812 E 1,748,610.9443 Sta 562+52.90
 Course from 8149 to 8150 S 43° 46' 16.14" E Dist 50.0121
 Point 8150 N 457,912.9670 E 1,748,645.5416 Sta 563+02.91
 Course from 8150 to 8151 S 43° 53' 08.45" E Dist 50.0144
 Point 8151 N 457,876.9204 E 1,748,680.2127 Sta 563+52.93
 Course from 8151 to 8152 S 44° 00' 02.23" E Dist 49.9978
 Point 8152 N 457,840.9554 E 1,748,714.9444 Sta 564+02.93
 Course from 8152 to 8153 S 42° 30' 39.05" E Dist 100.0000
 Point 8153 N 457,767.2404 E 1,748,782.5174 Sta 565+02.93
 Course from 8153 to 8154 S 42° 30' 39.05" E Dist 70.0000
 Point 8154 N 457,715.6400 E 1,748,829.8185 Sta 565+72.93
 Course from 8154 to 8155 S 31° 29' 26.08" E Dist 25.2793
 Point 8155 N 457,694.0837 E 1,748,843.0234 Sta 565+98.20
 Course from 8155 to 8156 S 46° 08' 56.50" E Dist 76.1525
 Point 8156 N 457,641.3264 E 1,748,897.9403 Sta 566+74.36
 Course from 8156 to 8157 S 42° 03' 03.81" E Dist 66.9023
 Point 8157 N 457,591.6482 E 1,748,942.7509 Sta 567+41.26

Ending chain DRAIN2 description

Chain SCL2 description

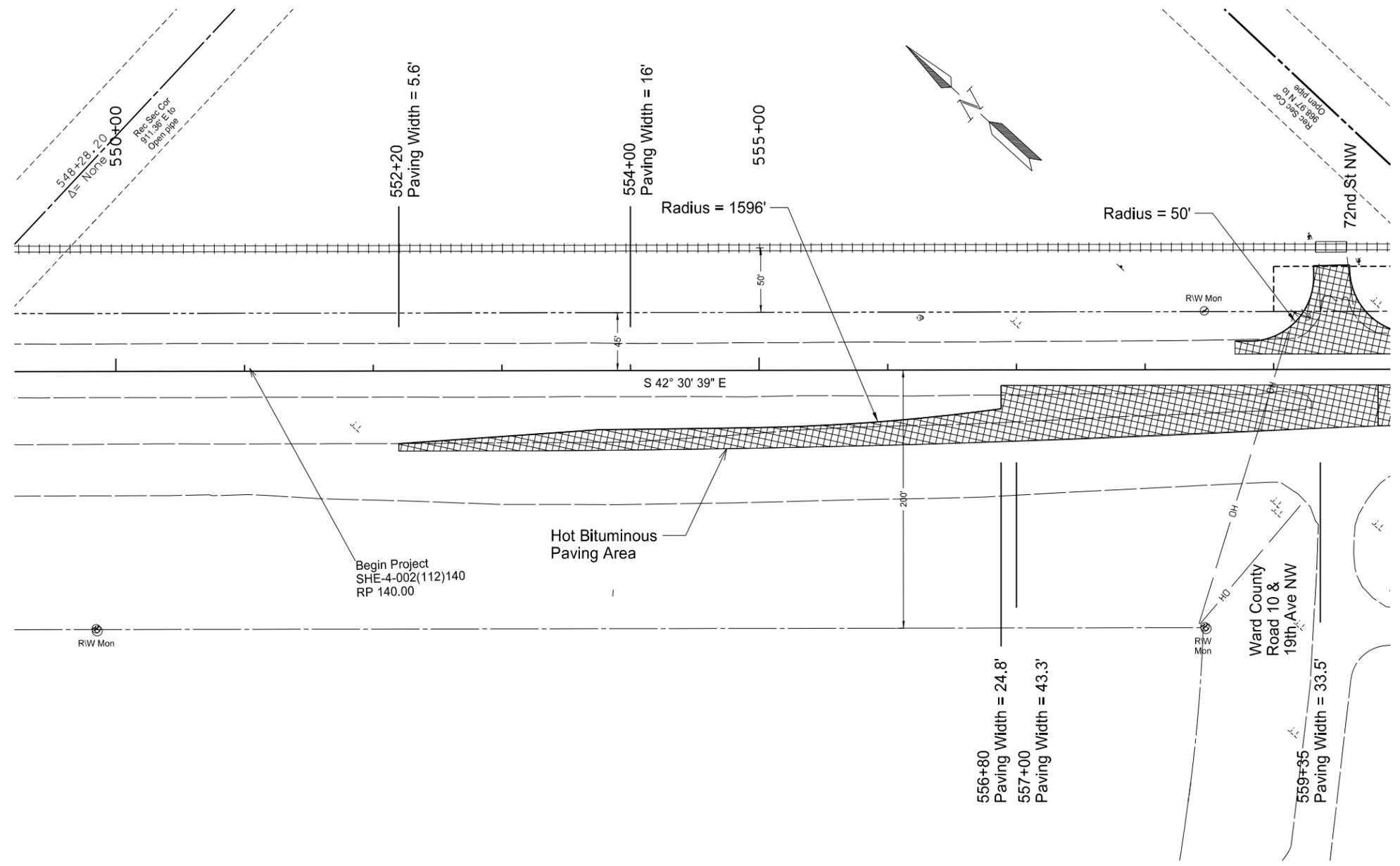
Point 400 N 460,353.6996 E 1,746,427.8425 Sta 530+02.25
 Course from 400 to 401 S 42° 30' 39.05" E Dist 1,825.9496
 Point 401 N 459,007.7019 E 1,747,661.6910 Sta 548+28.20
 Course from 401 to 402 S 42° 30' 39.05" E Dist 1,331.6469
 Point 402 N 458,026.0791 E 1,748,561.5244 Sta 561+59.85
 Course from 402 to 403 S 42° 30' 39.05" E Dist 5,883.0964
 Point 403 N 453,689.3579 E 1,752,536.9078 Sta 620+42.94
 Course from 403 to 404 S 42° 30' 39.05" E Dist 1,642.4441
 Point 404 N 452,478.6311 E 1,753,646.7562 Sta 636+85.39

Ending chain SCL2 description

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Survey Data
 19th Ave NW & 65th St NW
 Turn Lanes
 19th Ave NW & 65th St NW

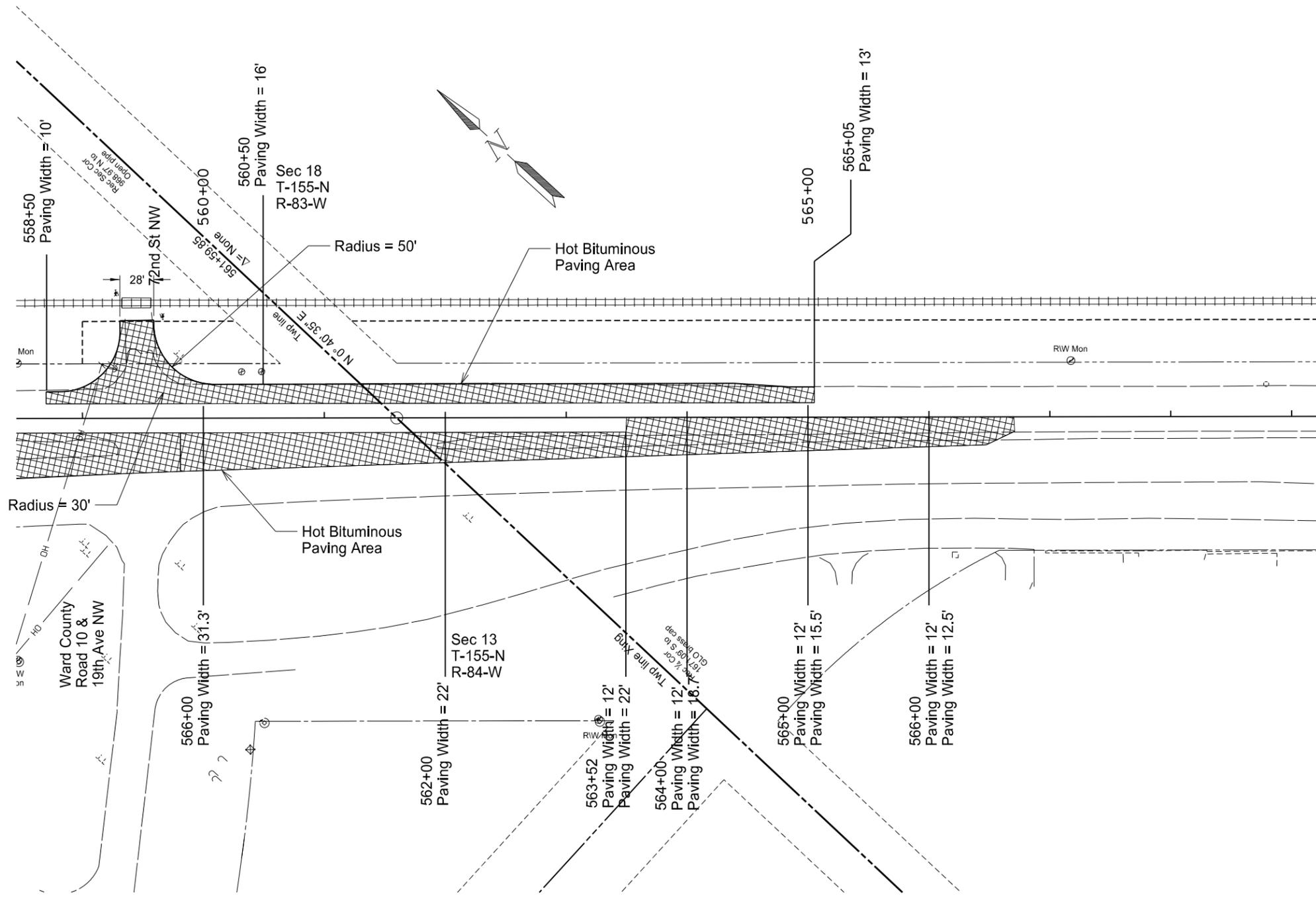
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	90	1



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Paving Layouts
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

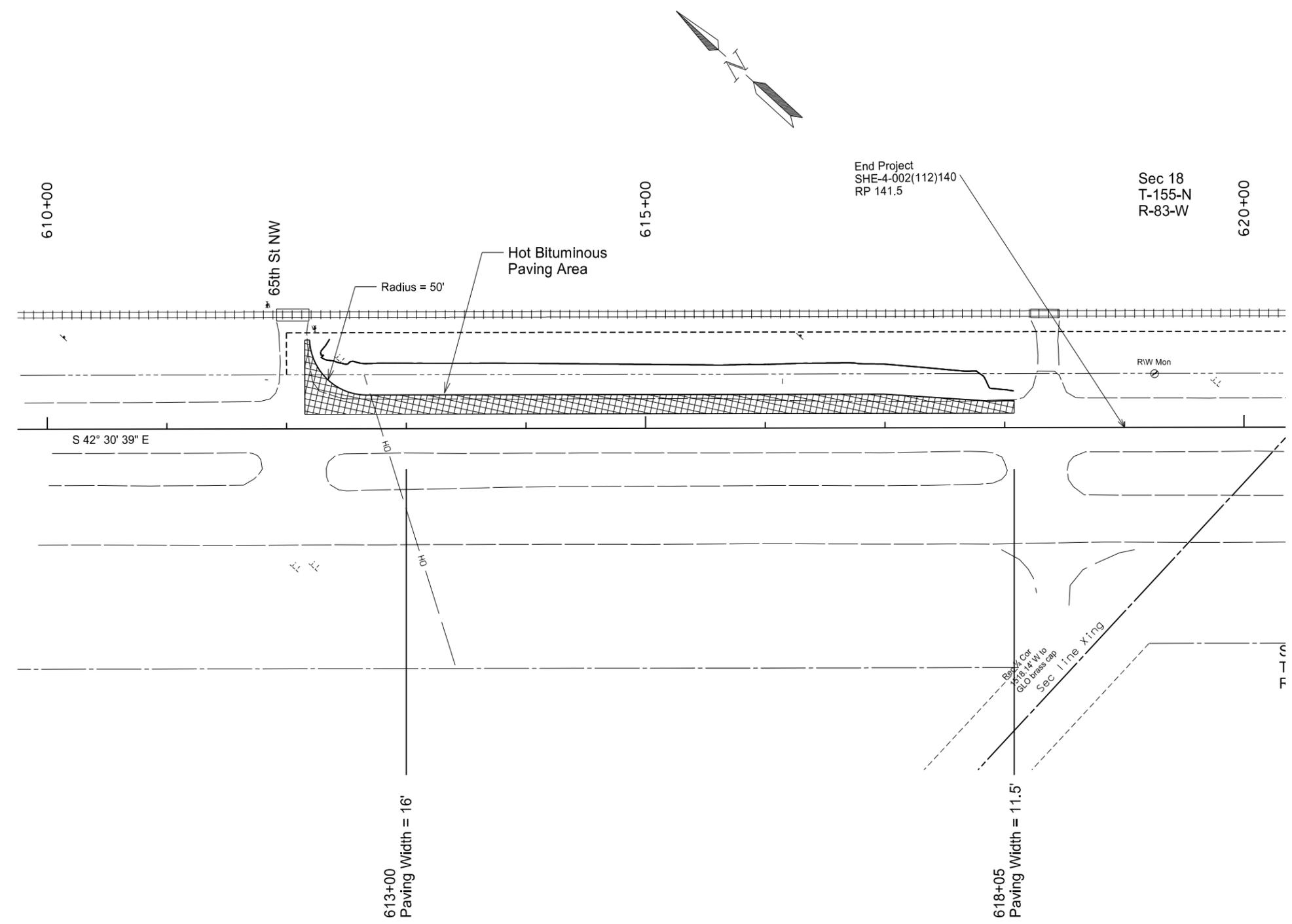
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	90	2



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Paving Layouts
 19th Ave NW
 Turn Lanes
 19th Ave NW & 65th St NW

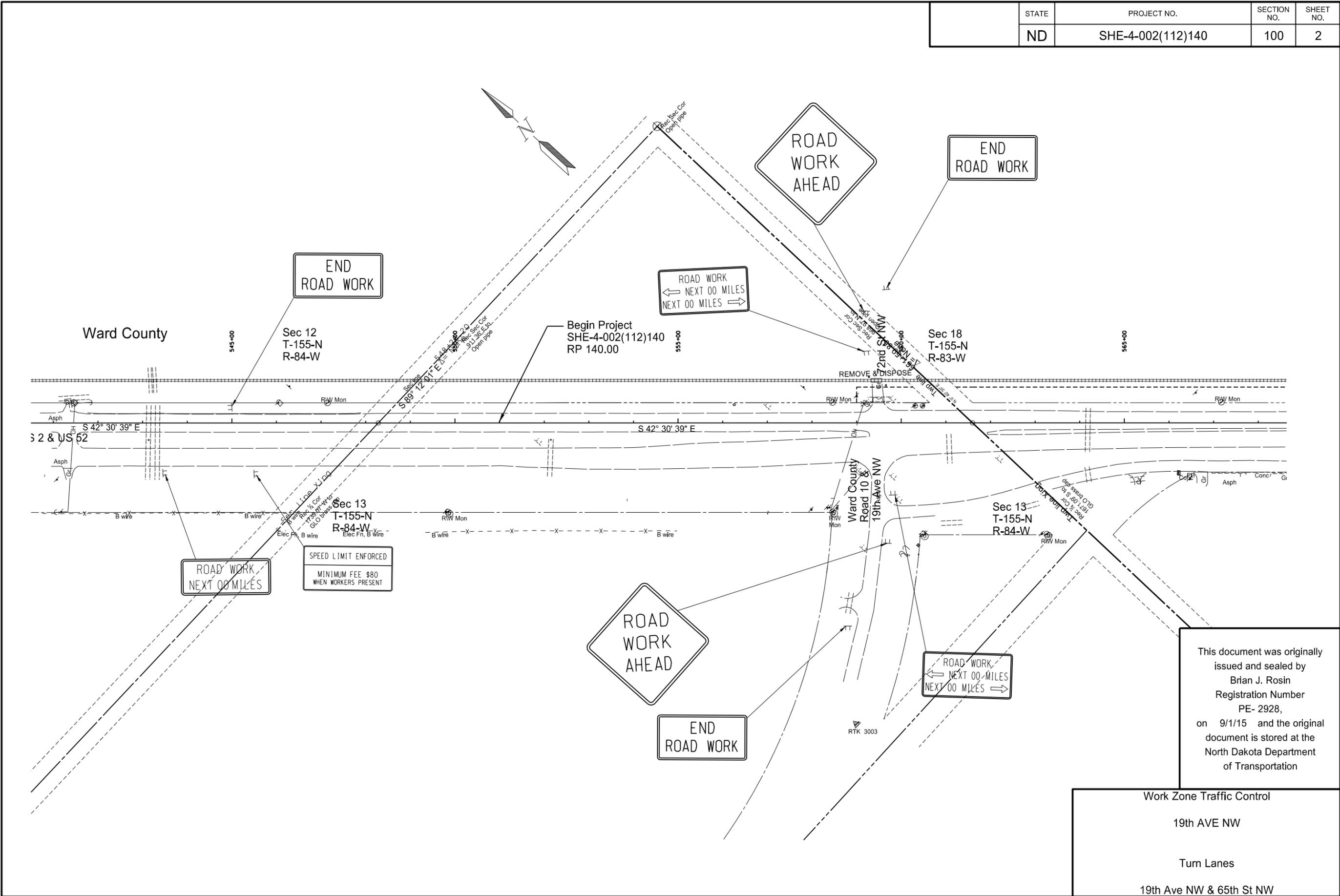
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	90	3



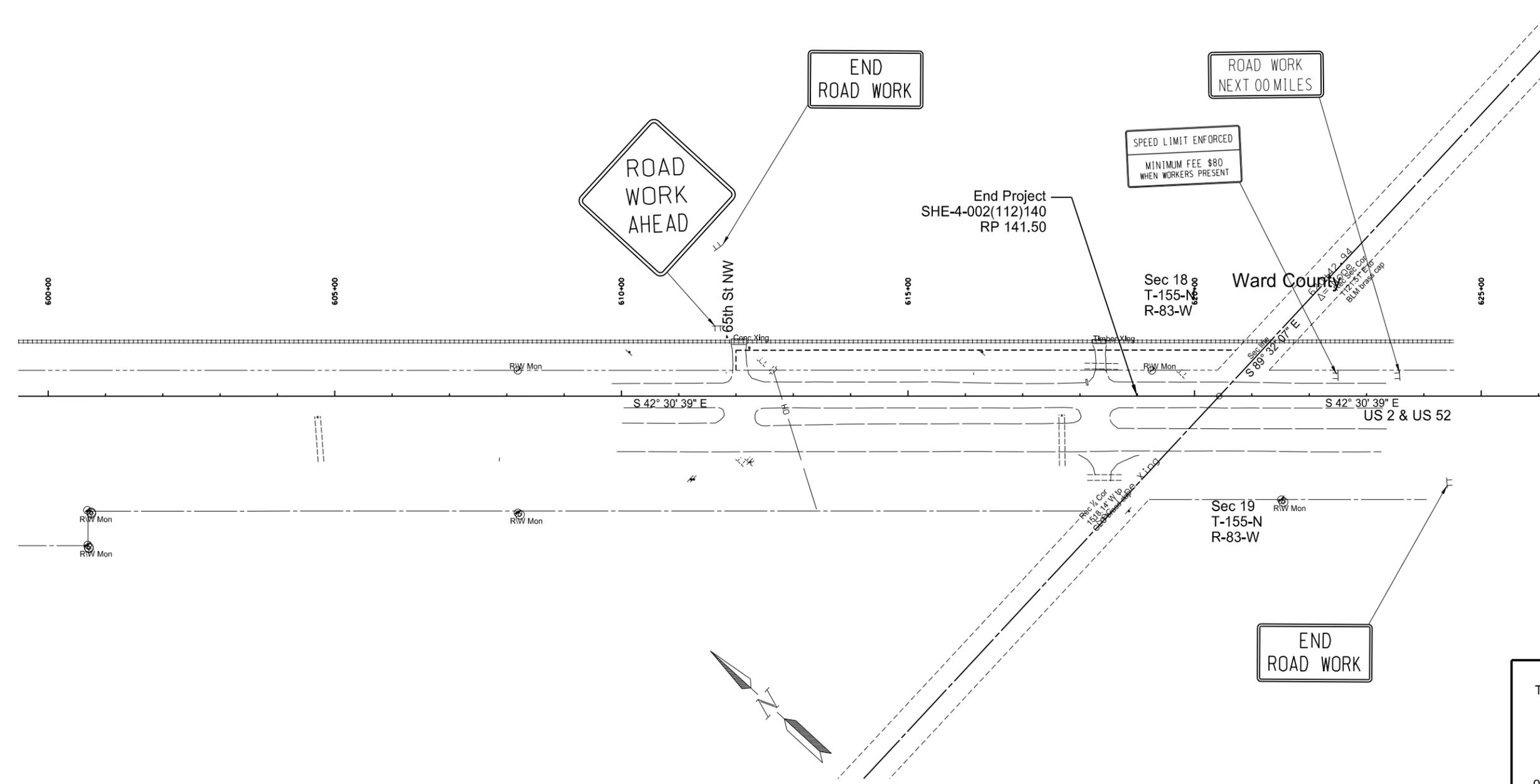
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Paving Layouts
 65th St NW
 Turn Lanes
 19th Ave NW & 65th St NW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	100	2



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	100	3



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Work Zone Traffic Control
 65th St NW
 Turn Lanes
 19th Ave NW & 65th St NW

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF		LF	1st LF	2nd LF	3rd LF	4th LF								
US Hwy 2 & 19th Ave NW																						
140.162 Rt mdn		21		16.0	13.4	13.7			2.5 x 2.5 10 ga	14.3						2	4	3 x 3 7 ga			2	
140.300 Lt									2 x 2 12 ga										1	1		
140.356 Lt	SN 1		20.0		13.1	14.1			2.5 x 2.5 12 ga	15.7	3.9	4.9			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
140.457 Lt		21		16.0	15.2	15.7			2.5 x 2.5 12 ga	20.0	3.2	3.7			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
140.495 Lt	S.A.A			17.8																		
Sub Total			20.0	49.8	Total 85.2											Total 24			1	1	6	
US Hwy 2 & 65th St NW																						
141.449 Lt		21		16.0	15.2	15.7			2.5 x 2.5 12 ga	20.0	3.2	3.7			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga			2	
Sub Total			0.0	16.0	Total 30.9											Total 8			0	0	2	
Grand Total			20.0	65.8	Total 116.1											Total 32			1	1	8	

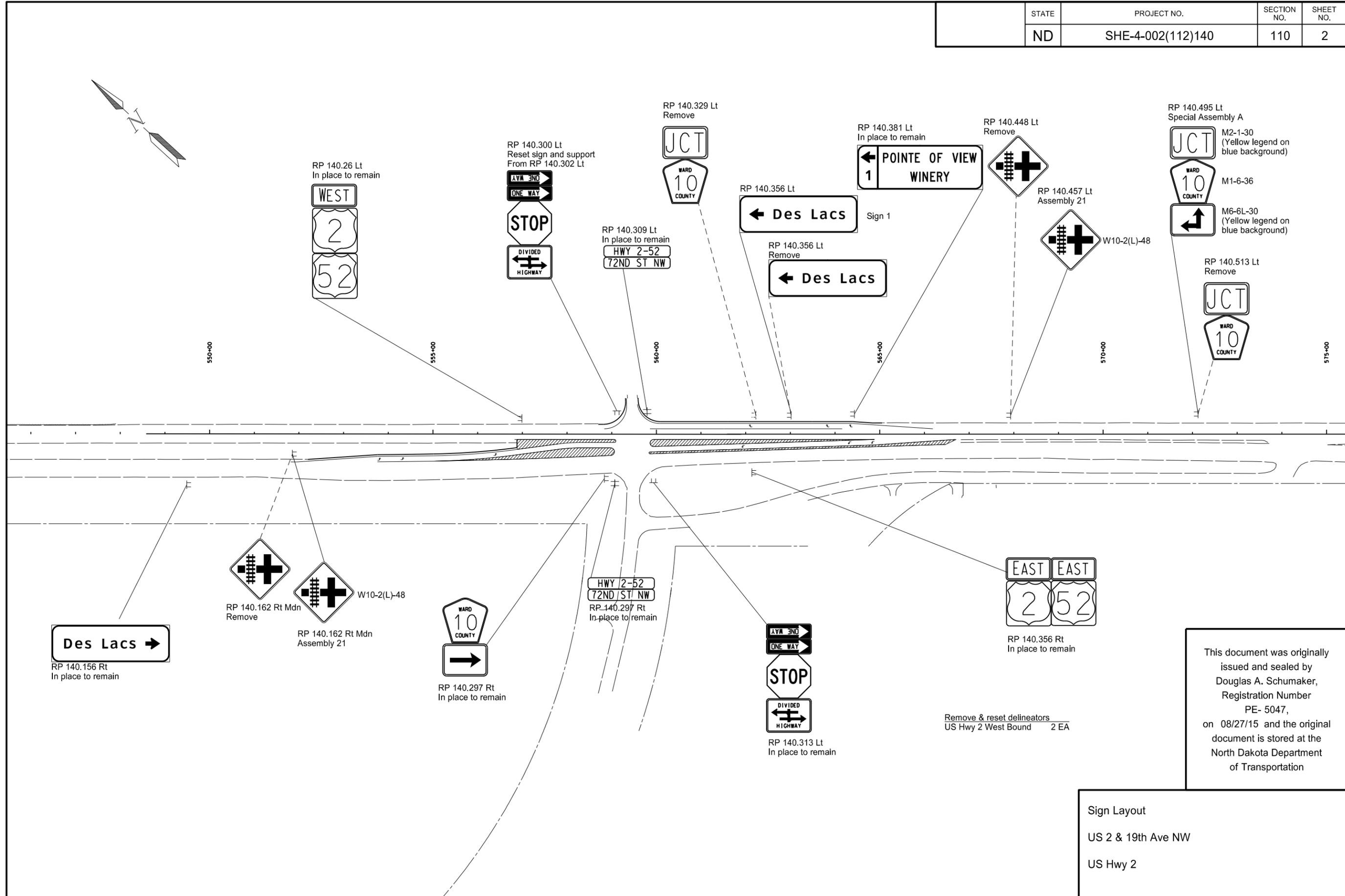
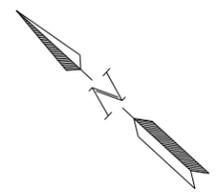
Basis of Estimate
Sign Support Lengths

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

Urban/rural expressway and freeway - 84" (Offset - 60")

<p>This document was originally issued and sealed by Douglas A. Schumaker, Registration Number PE-5047, on 8/27/2015 and the original document is stored at the North Dakota Department of Transportation</p>	<p>Sign Summary Perforated Tube</p> <p>US Hwy 2</p>
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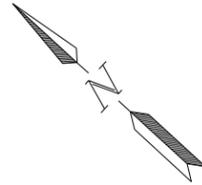
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	110	2



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Sign Layout
 US 2 & 19th Ave NW
 US Hwy 2

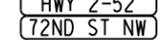
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	110	3



RP 141.299 Lt
In place to remain



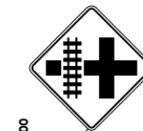
RP 141.308 Lt
In place to remain



RP 141.449 Lt
Remove



RP 141.449 Lt
Assembly 21



W10-2(L)-48

600+00

605+00

610+00

615+00

620+00

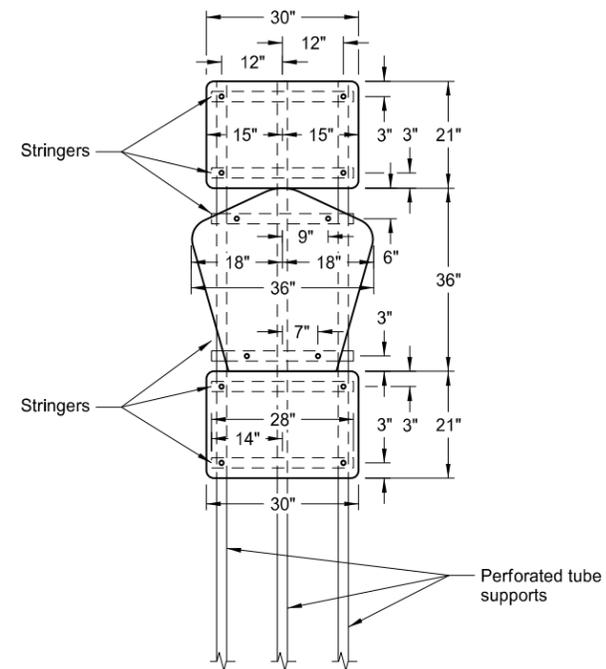
625+00

Remove & reset delineators
US Hwy 2 West Bound 1 EA

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Sign Layout
US 2 & 65th St NW
US Hwy 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SHE-4-002(112)140	110	5

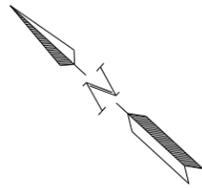


Special Assembly A
 RP 140.495 Lt
 Pay Area: 17.8 SF

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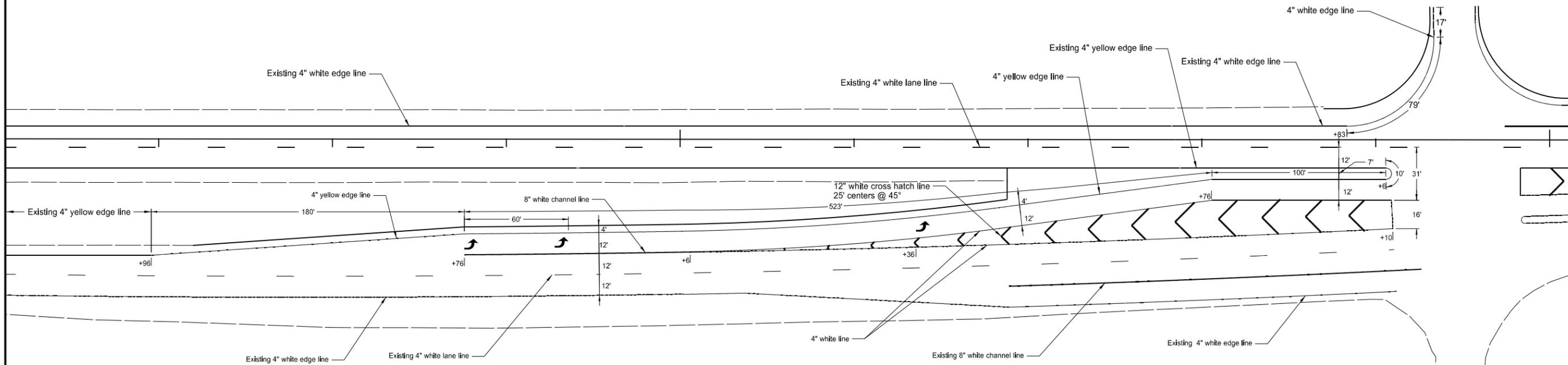
Special Assembly Details
 US 2 & 19th Ave NW
 US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	120	1



555+00

560+00



Epoxy pvmt mk message
Left arrow (x3) 48 SF

Epoxy pvmt mk 4" line
4" white edge line 97 LF
4" white line 826 LF
4" yellow edge line 723 LF
Total 1646 LF

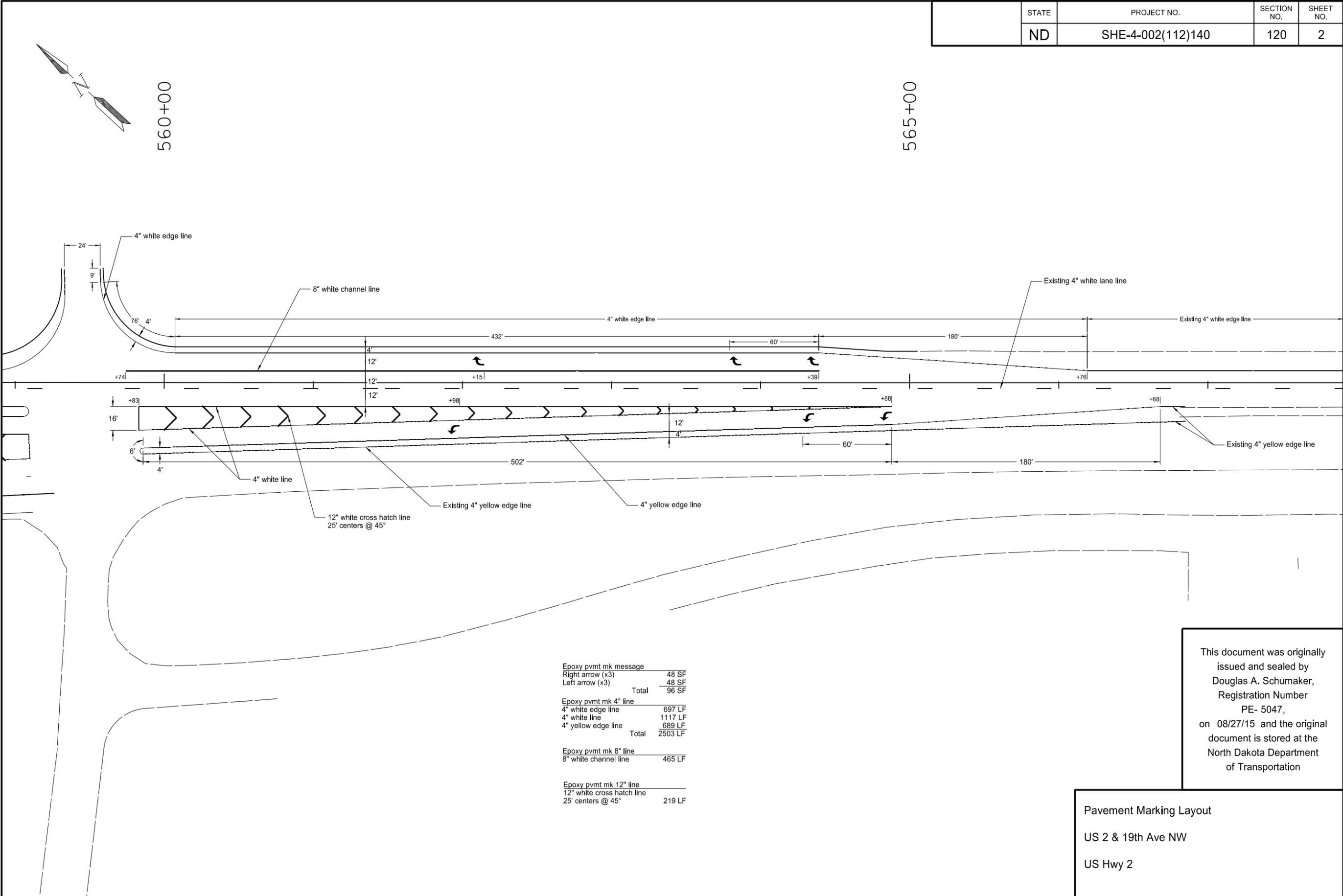
Epoxy pvmt mk 8" line
8" white channel line 130 LF

Epoxy pvmt mk 12" line
12" white cross hatch line
25' centers @ 45° 243 LF

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Pavement Marking Layout
US 2 & 19th Ave NW
US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	120	2

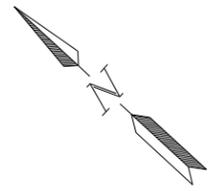


Epoxy pvmt mk message	
Right arrow (x3)	48 SF
Left arrow (x3)	48 SF
Total	96 SF
Epoxy pvmt mk 4" line	
4" white edge line	697 LF
4" white line	1117 LF
4" yellow edge line	689 LF
Total	2503 LF
Epoxy pvmt mk 8" line	
8" white channel line	465 LF
Epoxy pvmt mk 12" line	
12" white cross hatch line	219 LF
25' centers @ 45°	

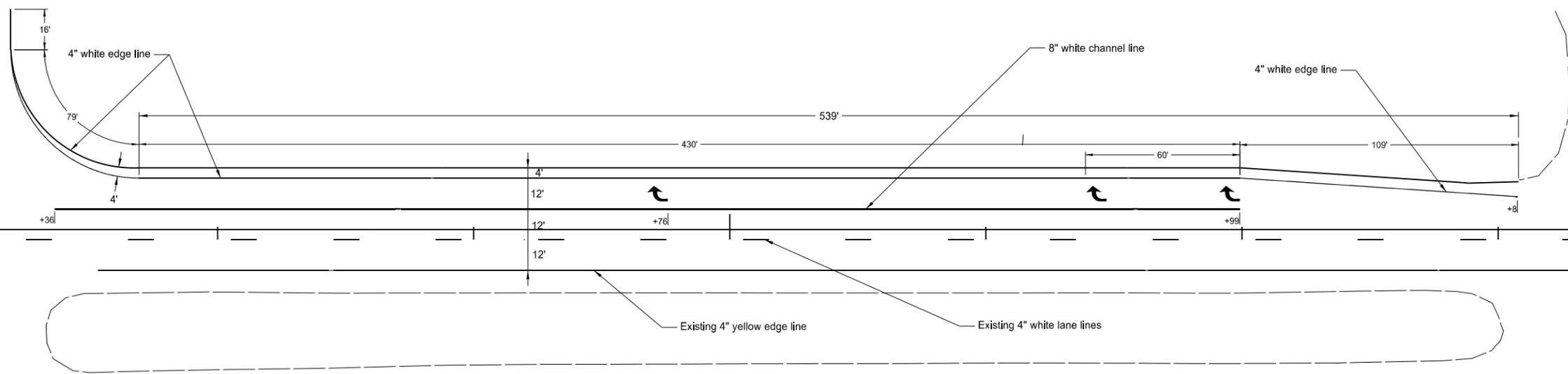
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Pavement Marking Layout
 US 2 & 19th Ave NW
 US Hwy 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SHE-4-002(112)140	120	3



615+00



Epoxy pvmt mk message	
Right Arrows (x3)	48 SF
Epoxy pvmt mk 4" line	
4" white edge line	633 LF
Epoxy pvmt mk 8" line	
8" white channel line	463 LF

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Pavement Marking Layout
 US 2 & 65th St NW
 US Hwy 2

NDDOT ABBREVIATIONS

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

Abn abandoned
 Abut abutment
 Ac acres
 Adj adjusted
 Aggr aggregate
 Ahd ahead
 ARV air release valve
 Align alignment
 Al alley
 Alt alternate
 Alum aluminum
 ADA Americans with Disabilities Act
 A ampere
 & and
 Appr approach
 Approx approximate
 ACP asbestos cement pipe
 Asph asphalt
 AC asphalt cement
 Assmd assumed
 @ at
 Atten attenuation
 ATR automatic traffic recorder
 Ave Avenue
 Avg average
 ADT average daily traffic
 Az azimuth
 Bk back
 BF back face
 Bs backsight
 Balc balcony
 B Wire barbed wire
 Barr barricade
 Btry battery
 Brg bearing
 BI beehive inlet
 Beg begin
 BM bench mark
 Bkwy bikeway
 Bit bituminous
 Blk block
 Bd Ft board feet
 BH bore hole
 BS both sides
 Bot bottom
 Blvd Boulevard
 Bndry boundary
 BC brass cap
 Brkwy breakaway
 Br bridge
 Bldg building

BV butterfly valve
 Byp bypass
 C Gdrl cable guardrail
 Calc calculate
 Cd candela
 CIP cast iron pipe
 CB catch basin
 CRS cationic rapid setting
 C Gd cattle guard
 C To C center to center
 Cl or C centerline
 Cm centimeter
 Ch chain
 Chnlk chain-link
 Ch Blk channel block
 Ch Ch channel change
 Chk check
 Chsld chiseled
 Cir circle
 Cl class
 Cl clay
 Cl F clay fill
 Cl Hvy clay heavy
 Cl Lm clay loam
 Clnt clean-out
 Clr clear
 Cl&gr clearing & grubbing
 Co S coal slack
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 Cond conductor
 Const construction
 Cont continuous
 CSB continuous split barrel sample
 Contr contraction
 Contr contractor
 CP control point
 Coord coordinate
 Cor corner
 Corr corrected
 CAES corrugated aluminum end section
 CAP corrugated aluminum pipe
 CMES corrugated metal end section
 CMP corrugated metal pipe
 CPVCP corrugated poly-vinyl chloride pipe
 CSES corrugated steel end section
 CSP corrugated steel pipe
 C coulomb
 Co County
 Crse course
 C Gr course gravel
 CS course sand

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

ES end section
 Engr engineer
 ESS environmental sensor station
 Eq equal
 Eq equation
 Evgr evergreen
 Exc excavation
 Exst existing
 Exp expansion
 Expy Expressway
 E external of curve
 Extru extruded
 FOS factor of safety
 F Fahrenheit
 FS far side
 F farad
 Fed Federal
 FP feed point
 Ft feet/foot
 Fn fence
 Fn P fence post
 FO fiber optic
 FB field book
 FD field drive
 F fill
 FAA fine aggregate angularity
 FS fine sand
 FH fire hydrant
 Fl flange
 Flrd flared
 FES flared end section
 F Bcn flashing beacon
 FA flight auger sample
 FL flow line
 Ftg footing
 FM force main
 Fs foresight
 Fnd found
 Fdn foundation
 Frac fractional
 Frwy freeway
 Frt front
 FF front face
 F Disp fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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NDDOT ABBREVIATIONS

D-101-2

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

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NDDOT ABBREVIATIONS

D-101-3

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 All 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
 MCKENZIE 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 GHG 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

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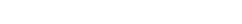
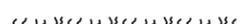
Line Styles

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

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Line Styles

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

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Symbols

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

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

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Symbols

D-101-32

 Pad Mounted Feed Point  Pipe Mounted Feed Point with Pad  Pole Mounted Feed Point  Headwall  Double Headwall with Vegetation Barrier  Single Headwall with Vegetation Barrier  Pole Mounted Head  Sprinkler Head  Fire Hydrant  Inlet Type 1  Inlet Type 2  Double Inlet Type 2  Inlet Gate Type 2  Junction Box  High Mast Light Standard 10 Luminaire  High Mast Light Standard 3 Luminaire  High Mast Light Standard 4 Luminaire  High Mast Light Standard 5 Luminaire  High Mast Light Standard 6 Luminaire  High Mast Light Standard 7 Luminaire  High Mast Light Standard 8 Luminaire  High Mast Light Standard 9 Luminaire  Relocate Light Standard  Overhead Sign Structure Load Center  Light Standard 100 Watt High Pressure Sodium Vapor Luminaire	 Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire  Light Standard 150 Watt High Pressure Sodium Vapor Luminaire  Light Standard 175 Watt High Pressure Sodium Vapor Luminaire  Light Standard 200 Watt High Pressure Sodium Vapor Luminaire  Light Standard 250 Watt High Pressure Sodium Vapor Luminaire  Light Standard 310 Watt High Pressure Sodium Vapor Luminaire  Light Standard 35 Watt High Pressure Sodium Vapor Luminaire  Light Standard 400 Watt High Pressure Sodium Vapor Luminaire  Light Standard 50 Watt High Pressure Sodium Vapor Luminaire  Light Standard 70 Watt High Pressure Sodium Vapor Luminaire  Light Standard 700 Watt High Pressure Sodium Vapor Luminaire  Manhole  Manhole 48 Inch  Sanitary Force Main Manhole  Sanitary Sewer Manhole  Storm Drain Manhole  Storm Drain Manhole with Inlet  Reset Mile Post  Mile Post Type A  Mile Post Type B  Mile Post Type C  Right of Way Marker  Tubular Marker  Alignment Monument  Iron Pin Reference Monument	 Object Marker Type I  Object Marker Type II  Object Marker Type III  Caution Mode Arrow Panel  Back to Back Vertical Panel Sign  Double Direction Arrow Panel  Left Directional Arrow Panel  Right Directional Arrow Panel  Sequencing Arrow Panel  Truck Mounted Arrow Panel  Power Pole  Wood Pole  Pedestrian Push Button Post  Property Corner  Pull Box  Intelligent Transportation Pull Box  Sanitary Pump  Storm Drain Pump  Reinforced Pavement  Reinforced Concrete End Section 15 Inch  Reinforced Concrete End Section 18 Inch  Reinforced Concrete End Section 24 Inch  Reinforced Concrete End Section 30 Inch  Reinforced Concrete End Section 36 Inch  Reinforced Concrete End Section 42 Inch	 Reinforced Concrete End Section 48 Inch  Reinforced Concrete End Section 54 Inch  Reset Right of Way Marker  Reset USGS Marker  Right of Way Markers  Riser 30 Inch  Continuous Split Barrel Sample  Flight Auger Sample  Split Barrel Sample  Thinwall Tube Sample  Highway Sign  SNOW GATE 18 FT  SNOW GATE 28 FT  SNOW GATE 40 FT  Standard Penetration Test  Transformer  Inclinometer Tube  Underdrain Cleanout  Excavation Unit  Water Valve
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

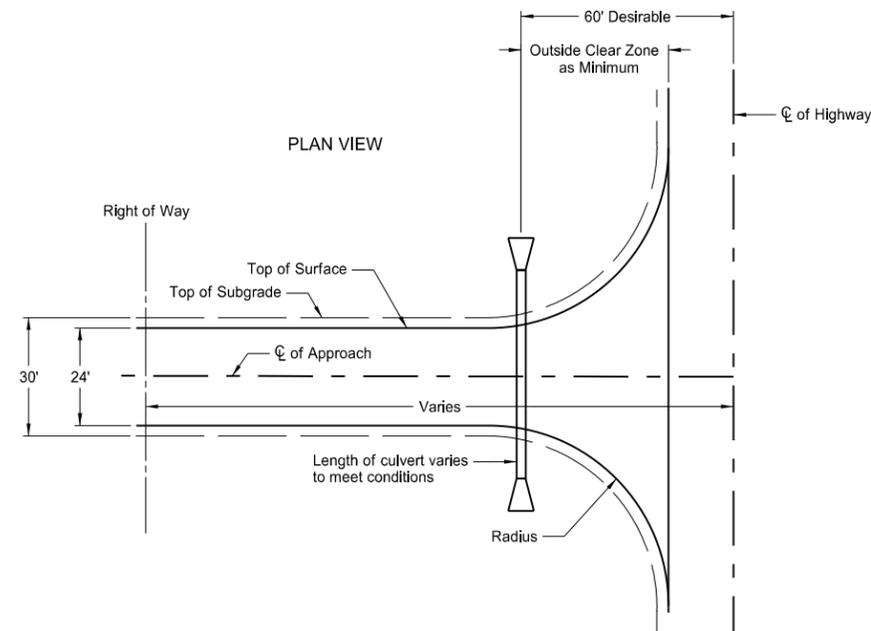
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STANDARD RURAL APPROACHES

D-203-8

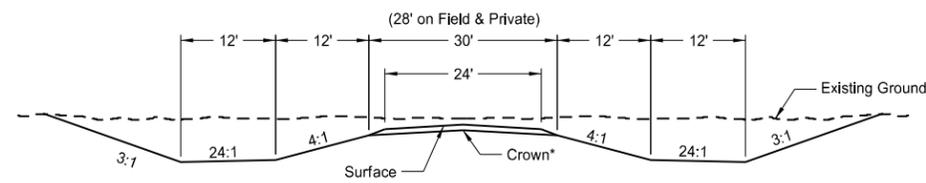
NOTES:

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.



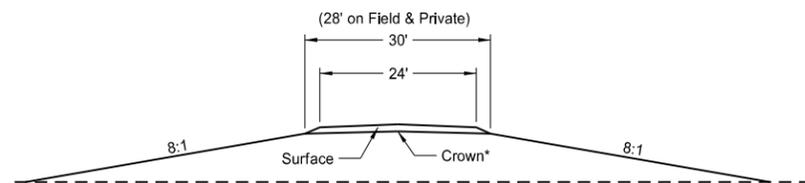
CRITERIA FOR RURAL APPROACH TYPES

	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)

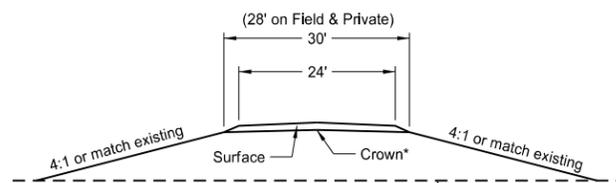


SECTION A-A

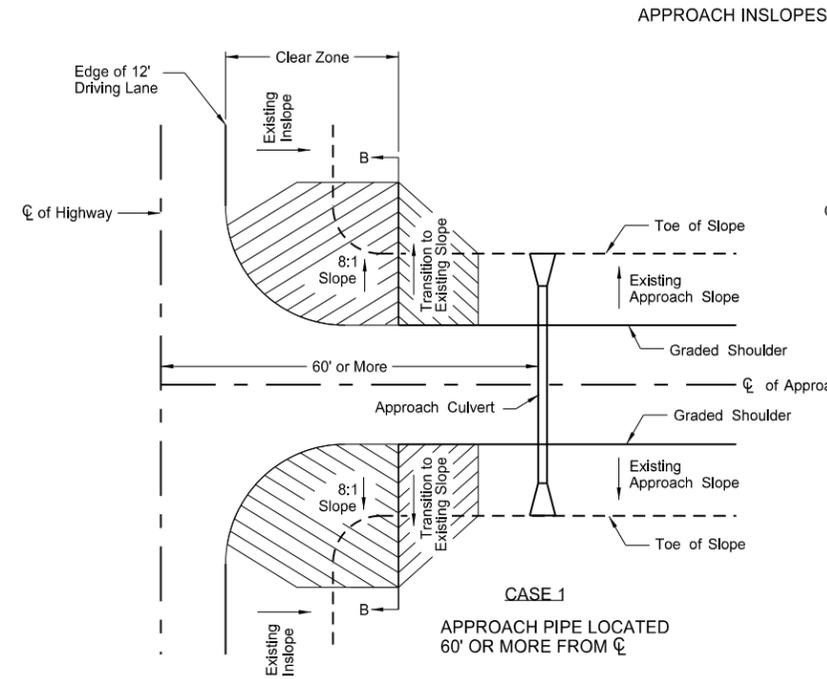
*2.1% crown for paved surface
*3.0% crown for gravel surface



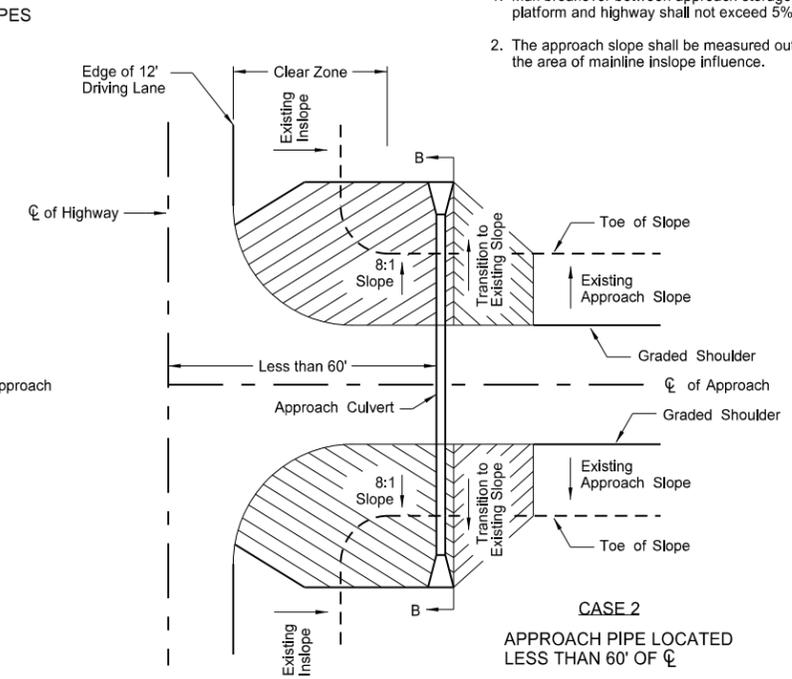
SECTION B-B



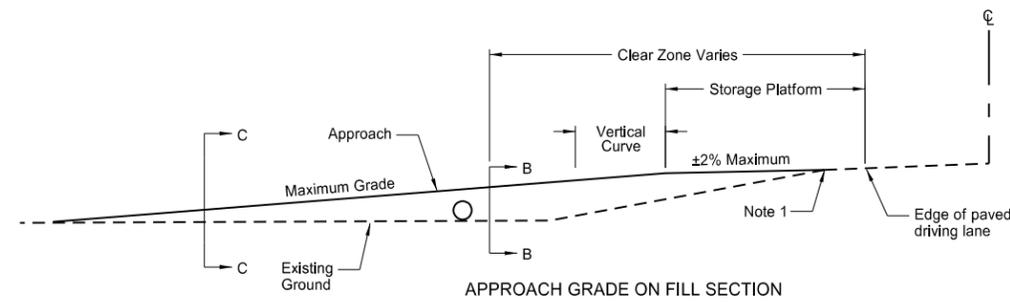
SECTION C-C



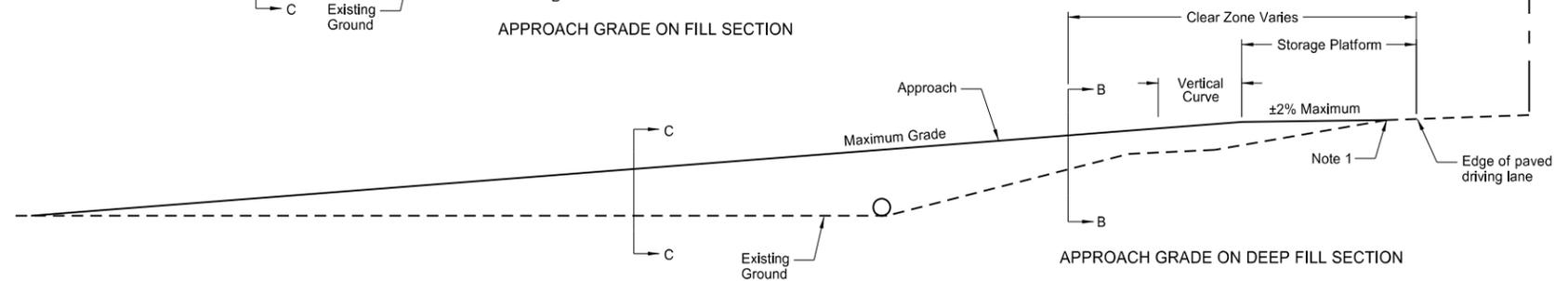
CASE 1
APPROACH PIPE LOCATED
60' OR MORE FROM C



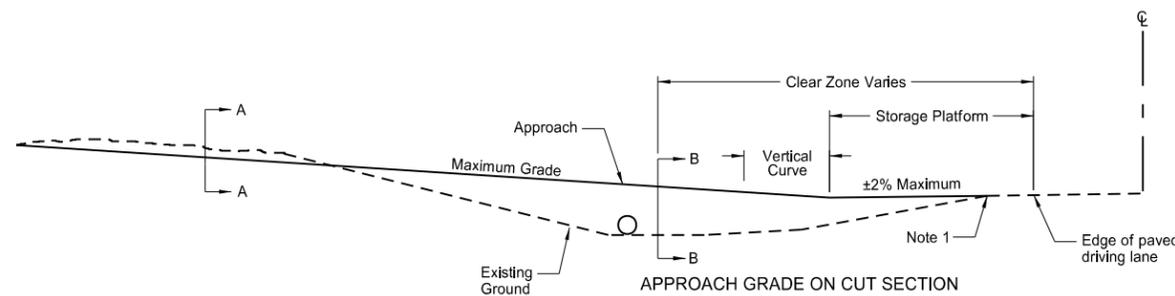
CASE 2
APPROACH PIPE LOCATED
LESS THAN 60' OF C



APPROACH GRADE ON FILL SECTION



APPROACH GRADE ON DEEP FILL SECTION

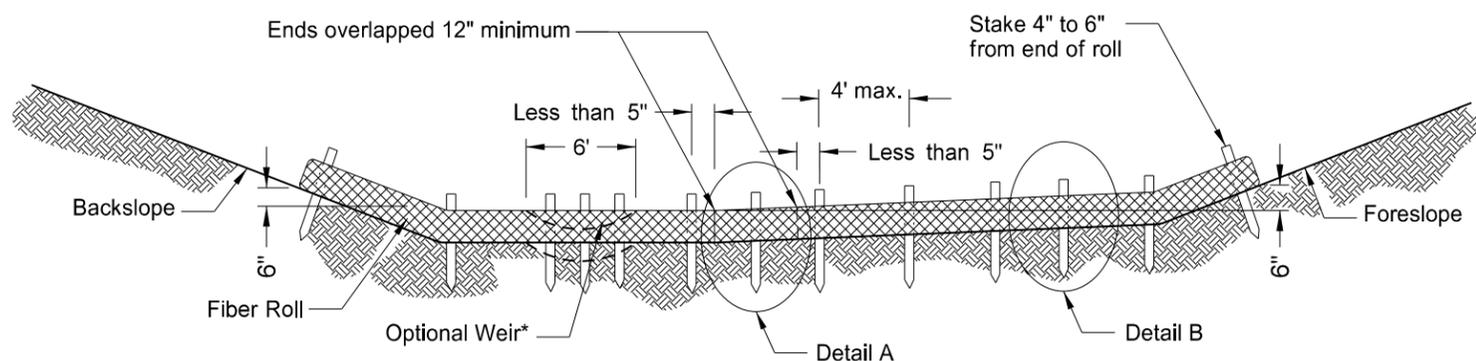


APPROACH GRADE ON CUT SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
REVISIONS	
DATE	CHANGE

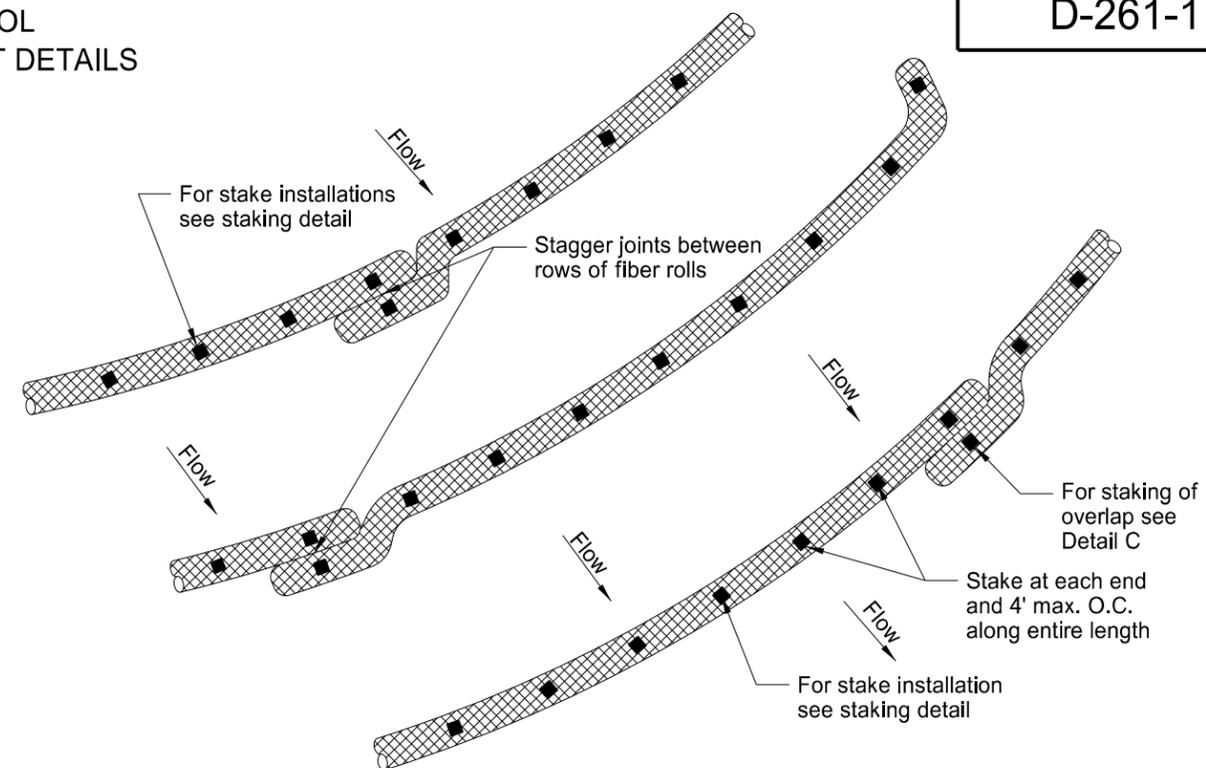
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

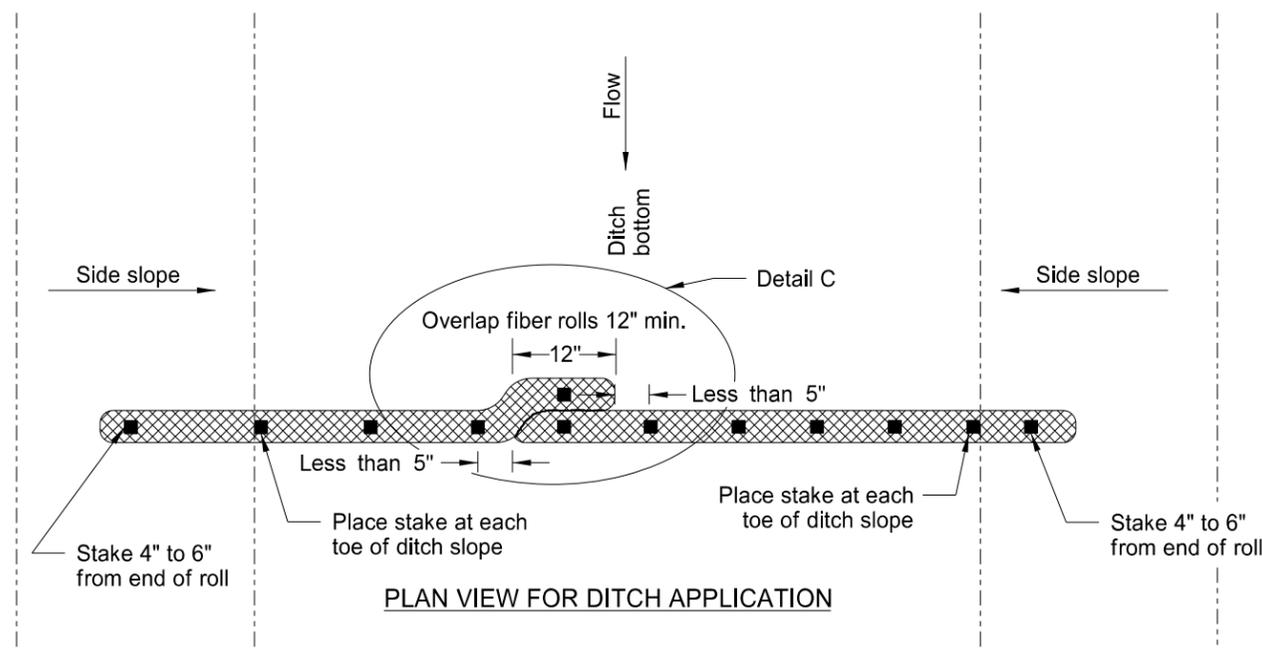


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

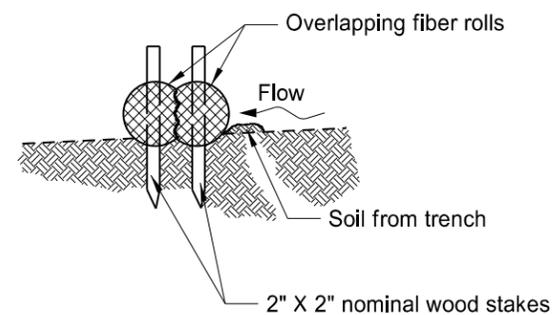
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



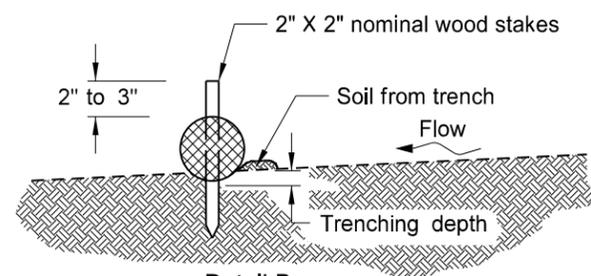
PLAN VIEW FOR SLOPE APPLICATION



PLAN VIEW FOR DITCH APPLICATION



Detail A
Fiber Roll Overlapping Staking Detail



Detail B
Fiber Roll Staking Detail

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

NOTE: Runoff must not be allowed to run under or around roll.

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

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CONSTRUCTION SIGN DETAIL

D-704-5

SIGN NUMBER	G20-10-108	STATION(S):		AREA:	36.0 Sq.Ft.
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	Dimensions are in inches.tenths Letter locations are panel edge to lower left corner			
	42.1 6.2 24 4 0				

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							

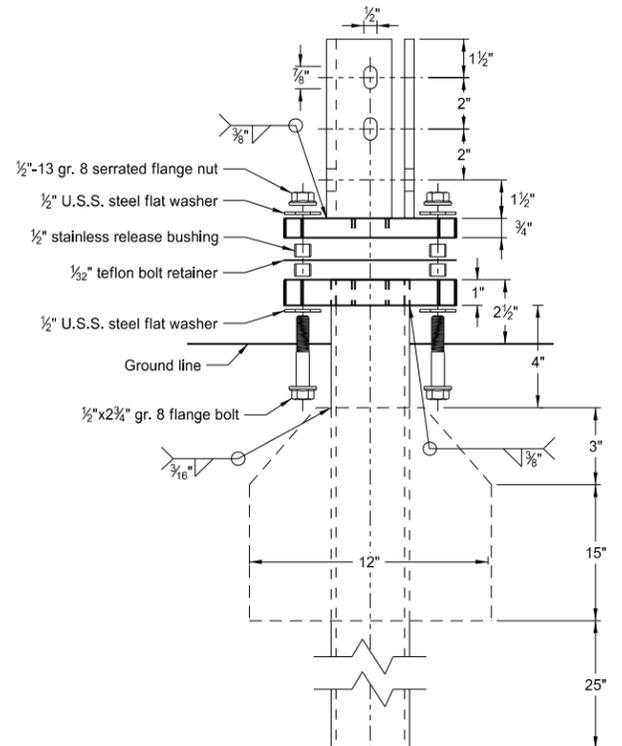
Notes:

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

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

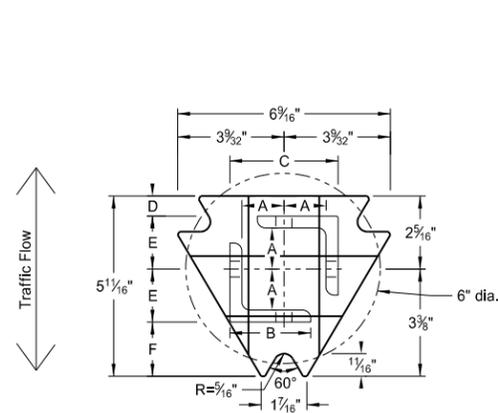
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV

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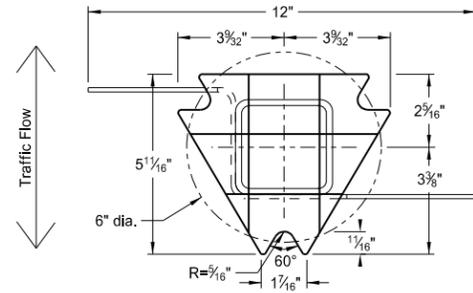


Multi-Directional Slip Base Assembly

Perforated Tube



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



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

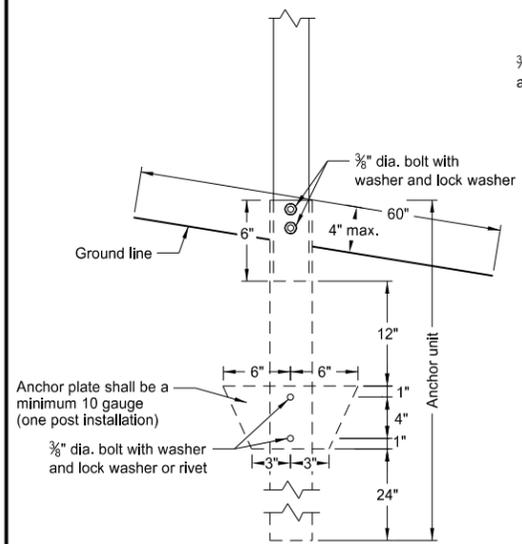
Notes:

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

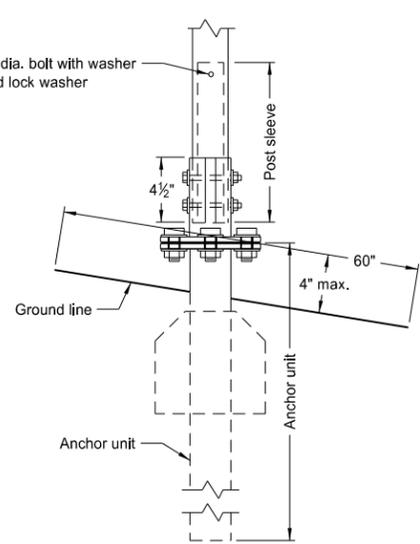
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

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

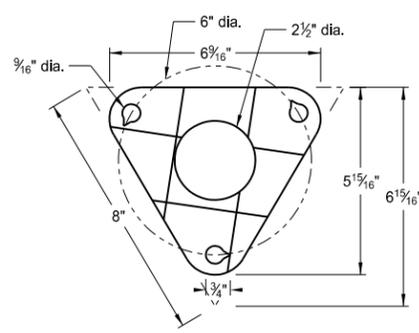
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16" x 10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2" x 10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



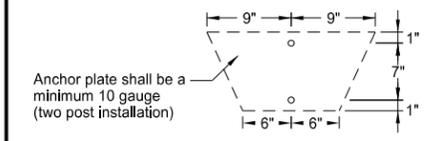
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



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



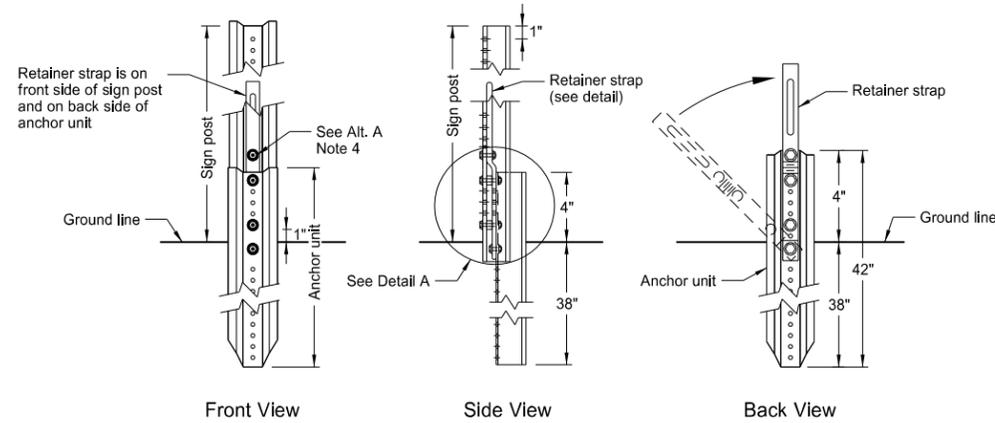
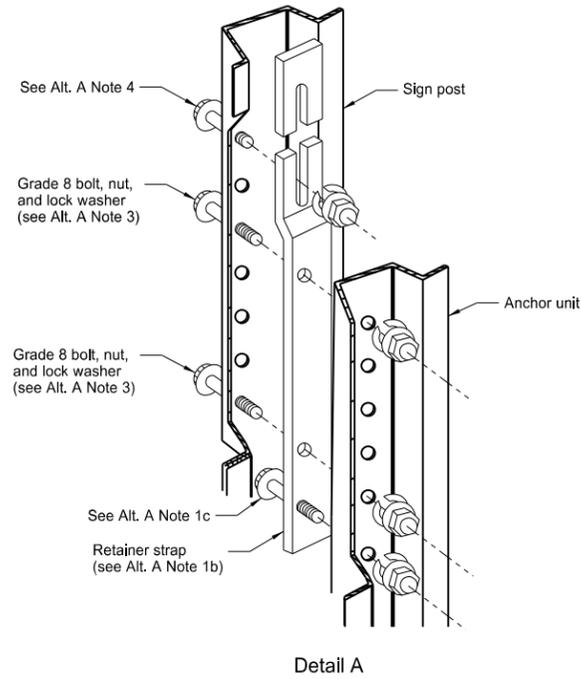
Anchor plate shall be a minimum 10 gauge (two post installation)

- (A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.
 (B) The 2 3/16" x 10 ga. may be inserted into 2 1/2" x 10 ga. for additional wind load.

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

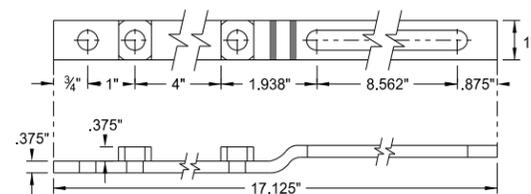
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U-Channel Post

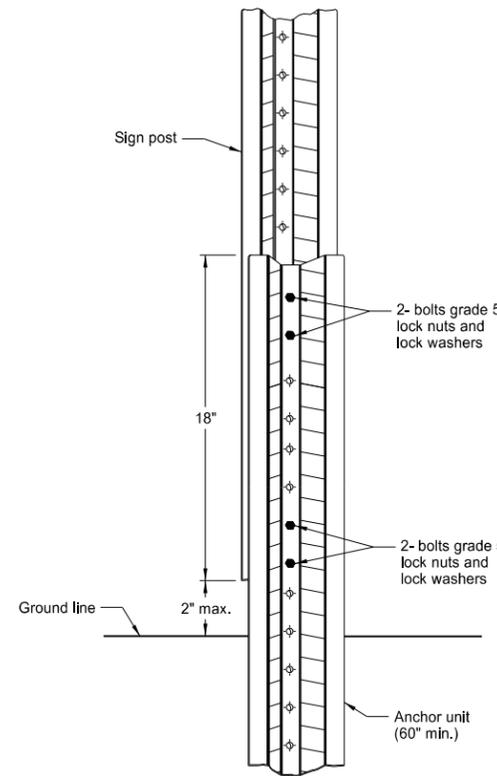


Breakaway U-Channel Detail Alternate A

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

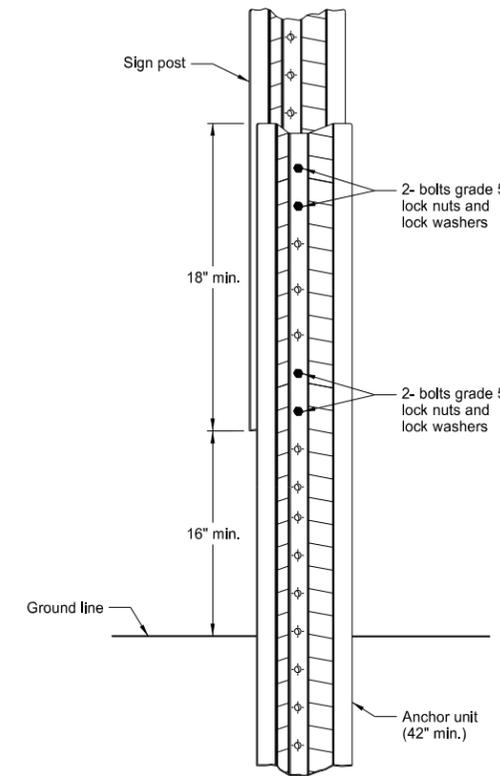


Retainer Strap Detail



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:

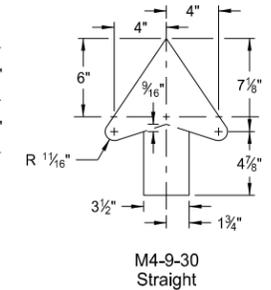
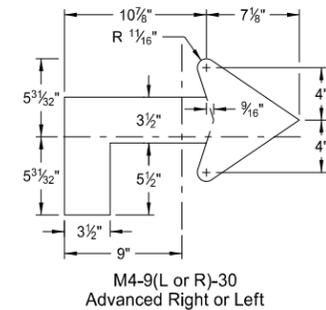
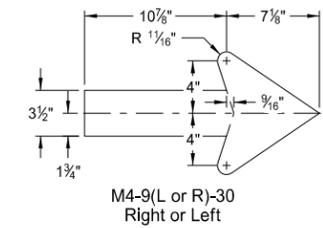
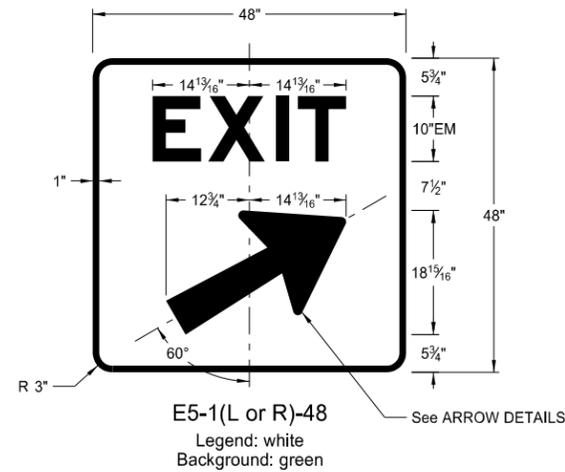
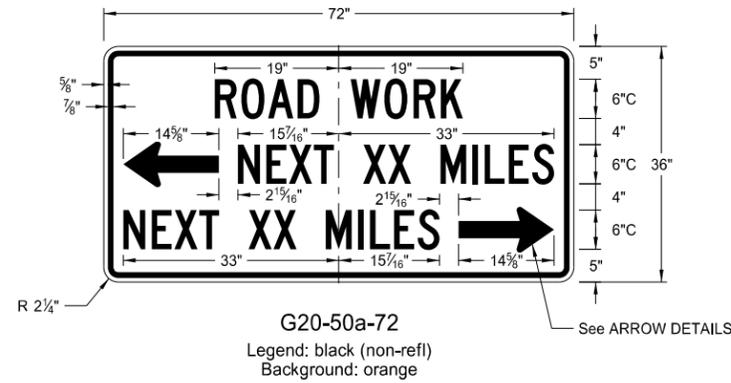
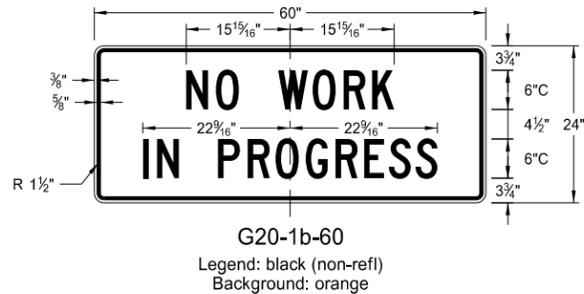
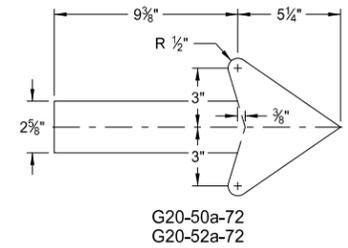
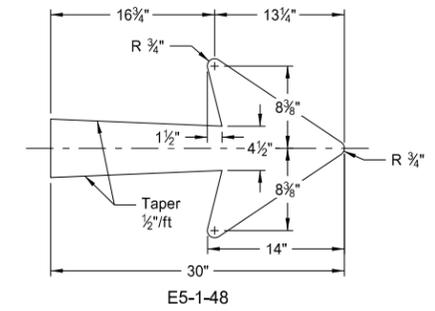
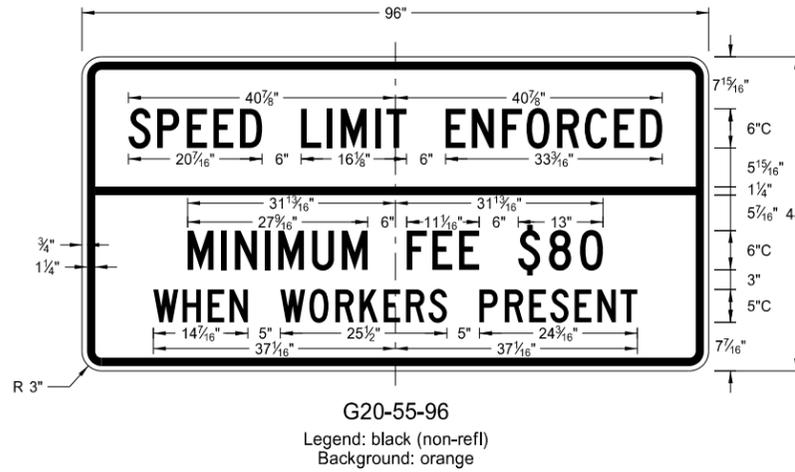
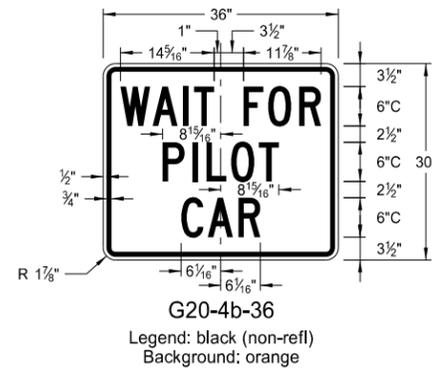
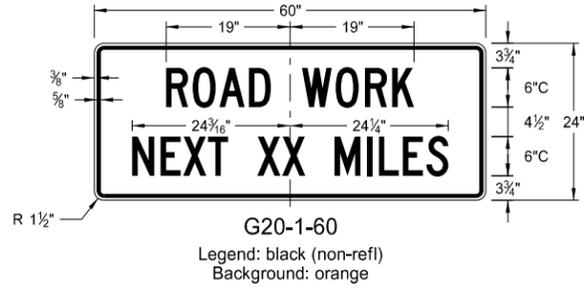
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a)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

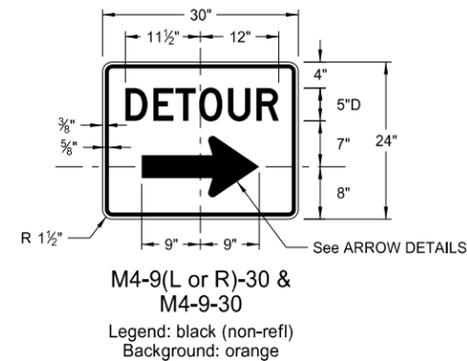
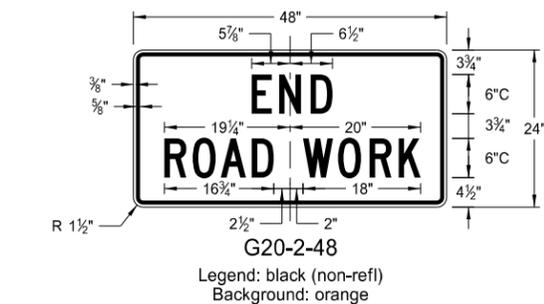
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

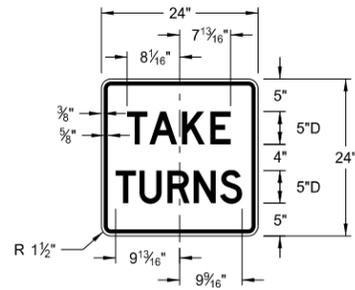
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

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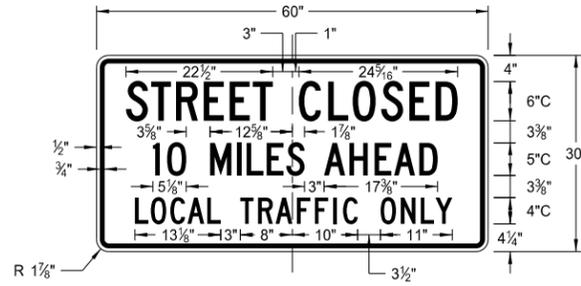
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

D-704-10



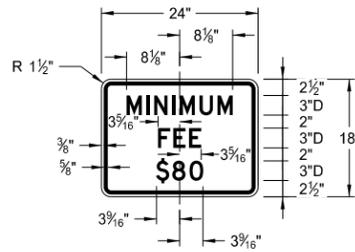
R1-50-24

Legend: black (non-refl)
Background: white



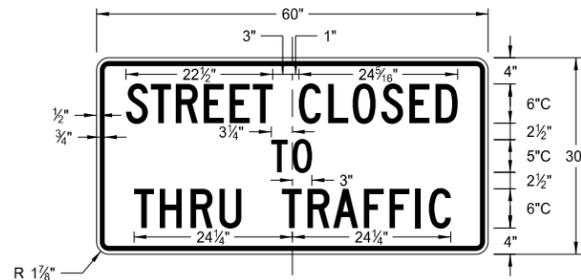
R11-3c-60

Legend: black (non-refl)
Background: white



R2-1a-24

Legend: black (non-refl)
Background: white



R11-4a-60

Legend: black (non-refl)
Background: white



R11-2a-48

Legend: black (non-refl)
Background: white

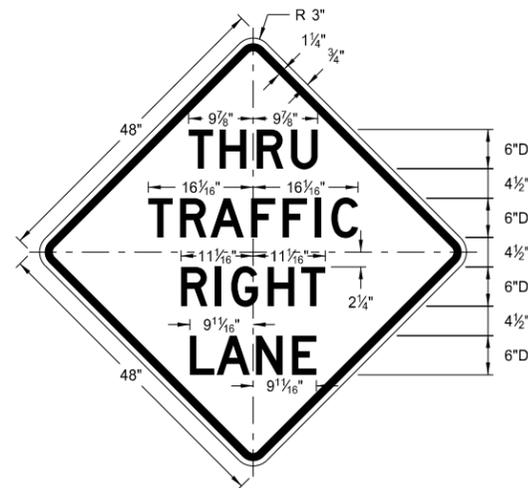
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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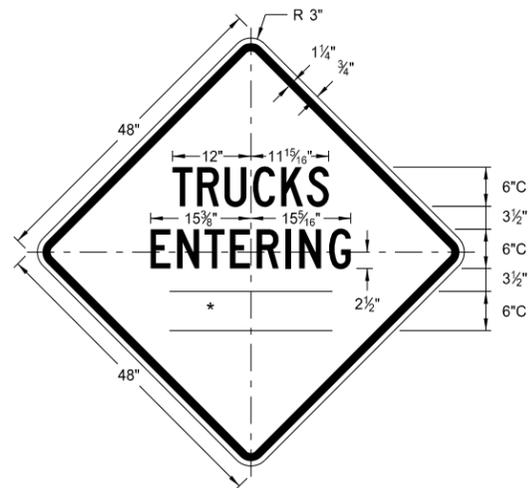
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

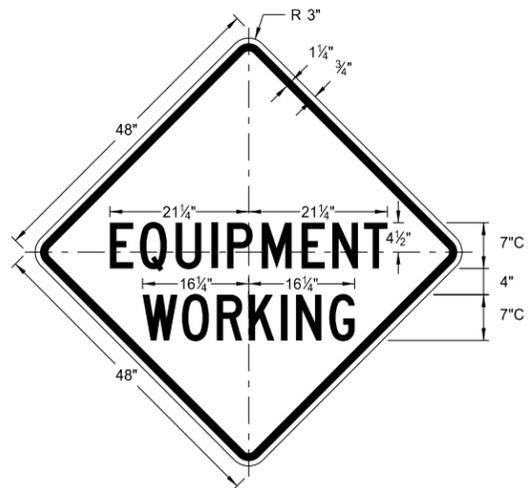
* DISTANCE MESSAGES



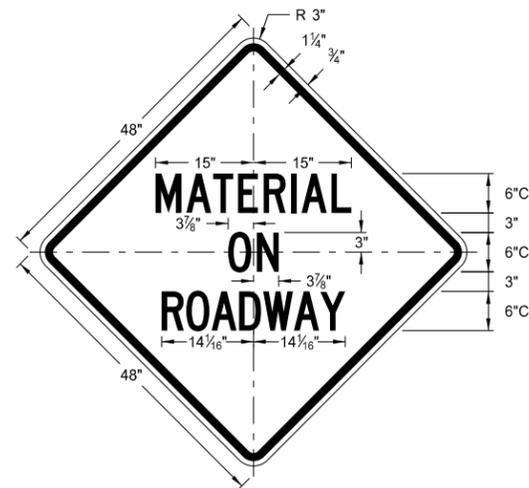
W5-8-48
Legend: black (non-refl)
Background: orange



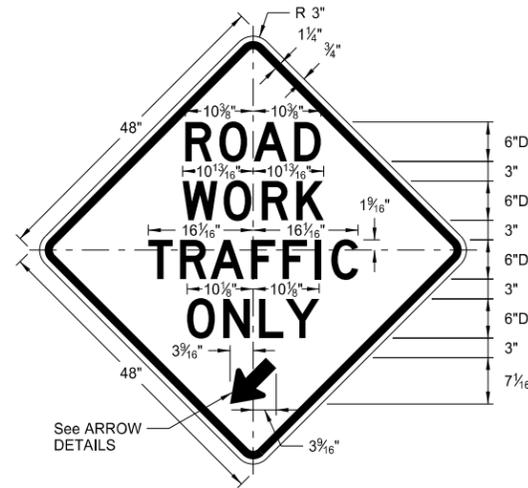
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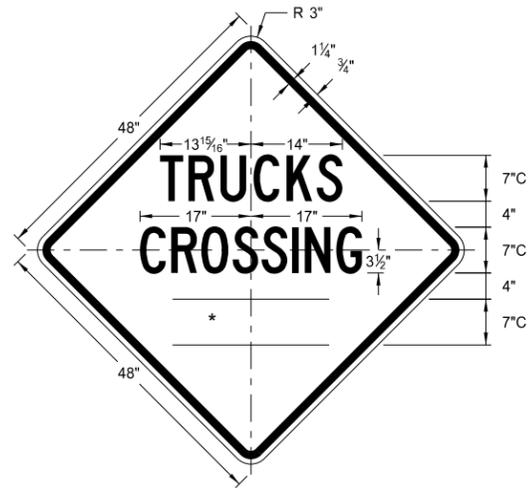
W20-51-48
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Background: orange



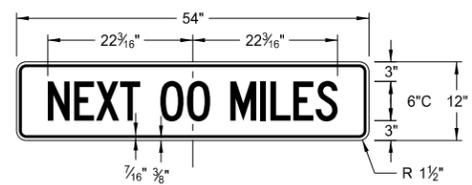
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Background: orange



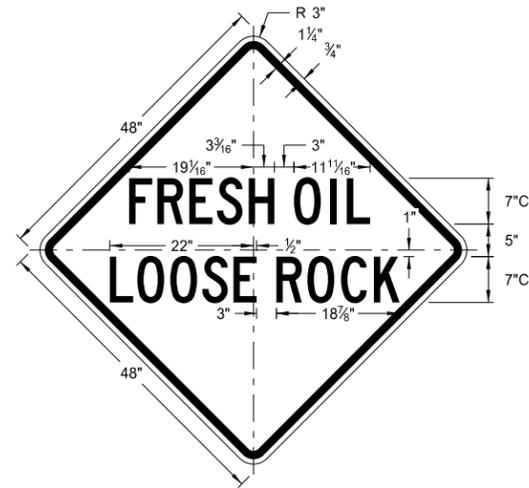
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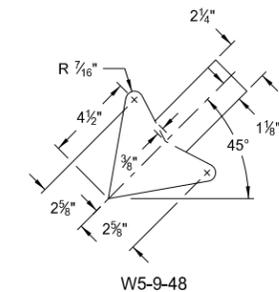
W8-55-48
Legend: black (non-refl)
Background: orange



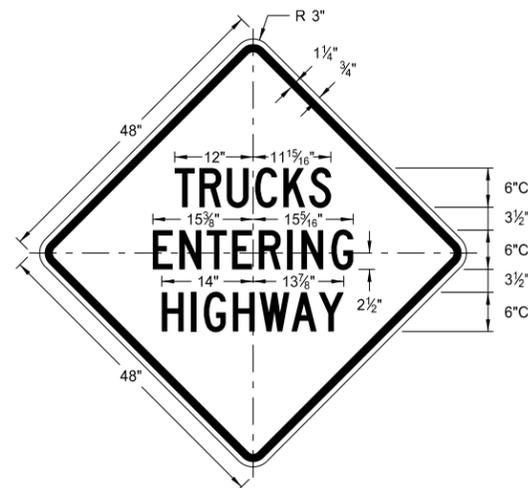
W20-52-54
Legend: black (non-refl)
Background: orange



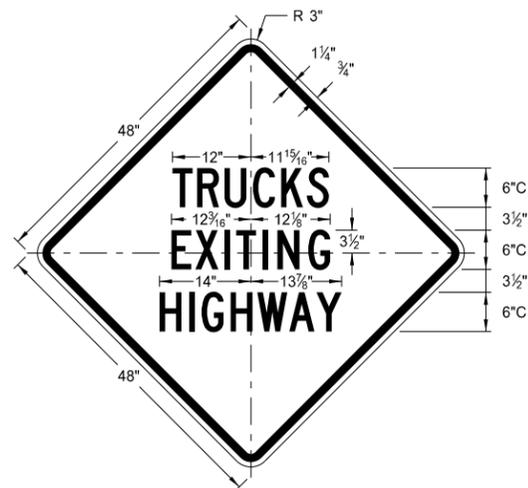
W22-8-48
Legend: black (non-refl)
Background: orange



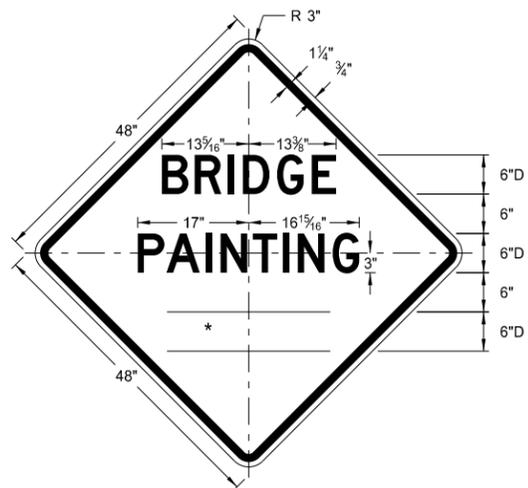
ARROW DETAILS



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



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



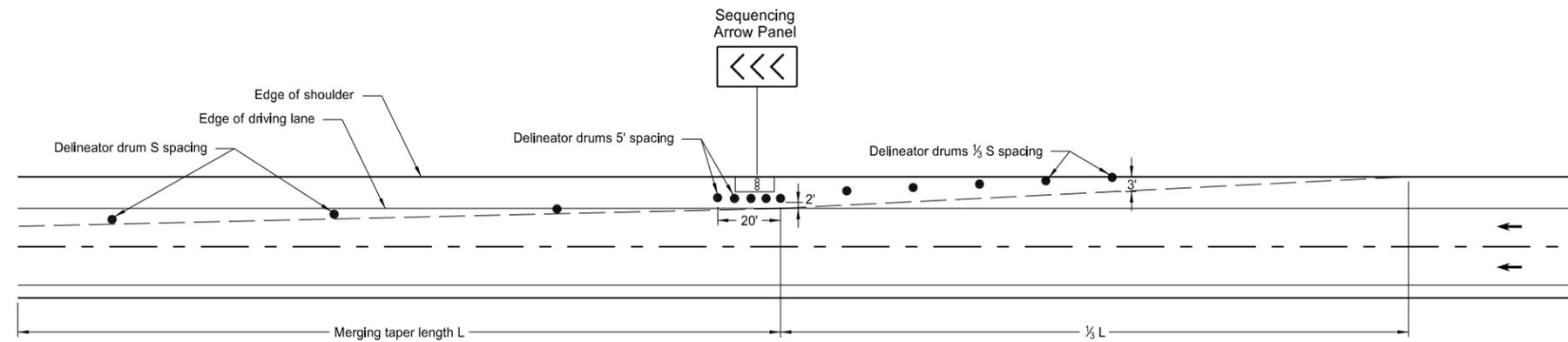
W21-50-48
Legend: black (non-refl)
Background: orange

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

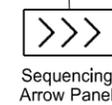
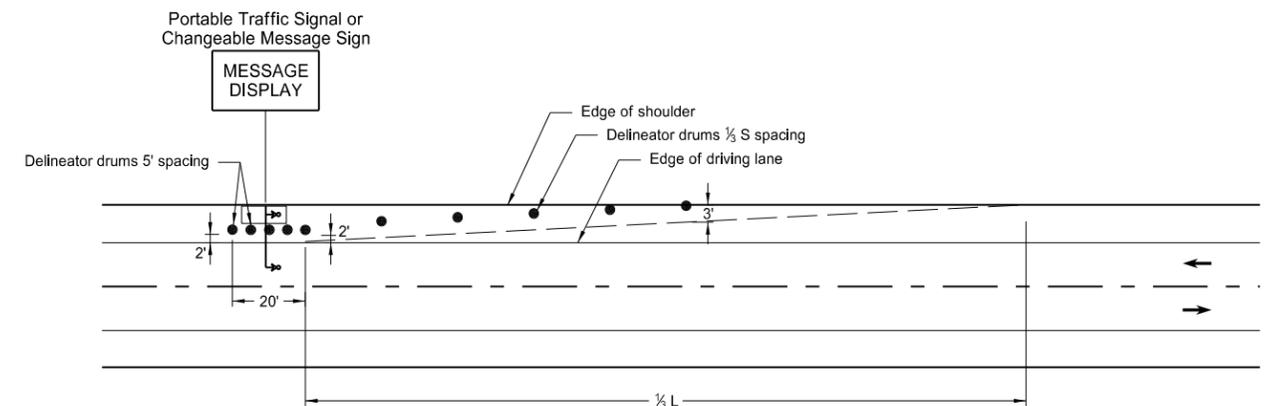
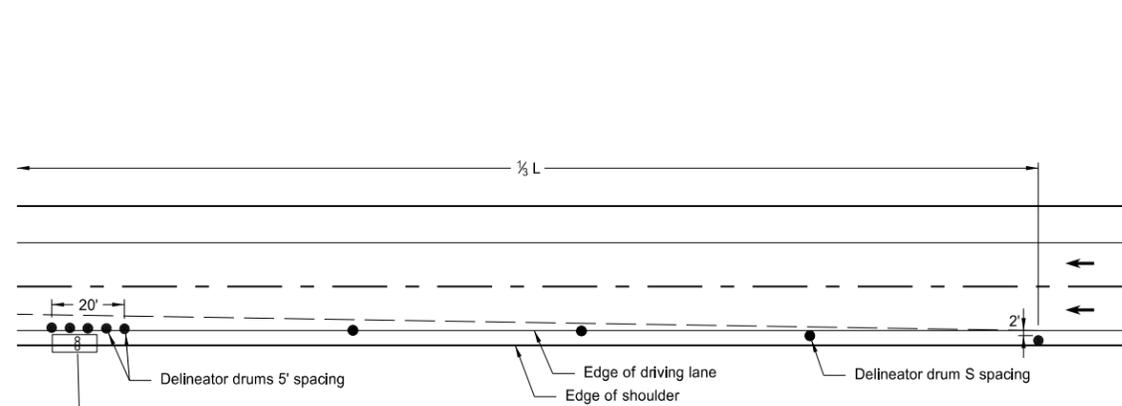
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SHOULDER CLOSURE TAPERS

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

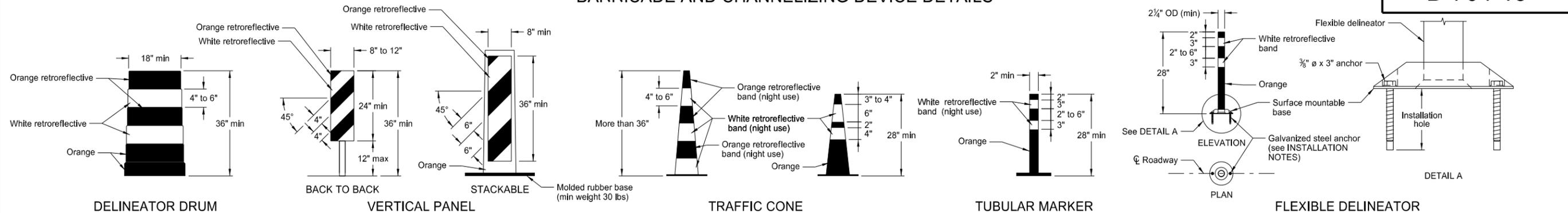
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = $WS^2/60$ (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately $1/3L$. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- 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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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BARRICADE AND CHANNELIZING DEVICE DETAILS



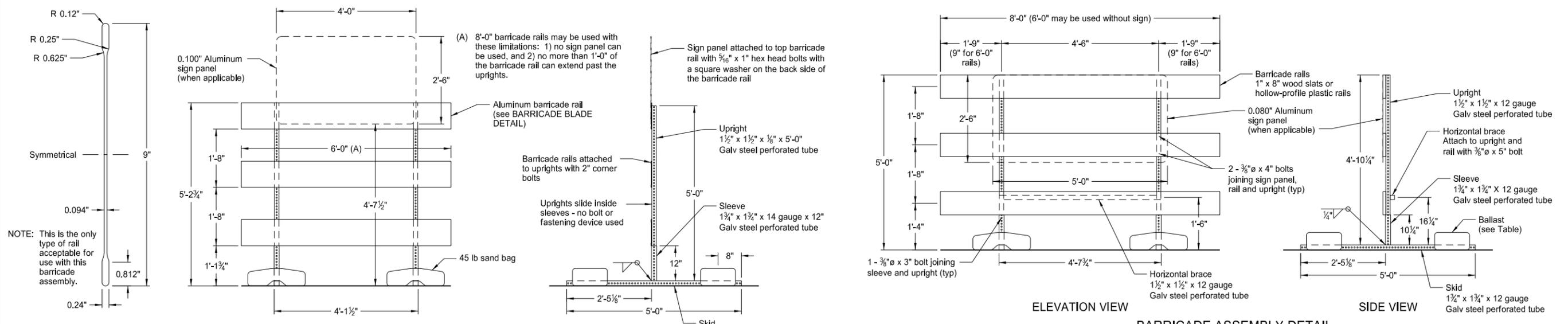
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
 2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
 3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl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

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.

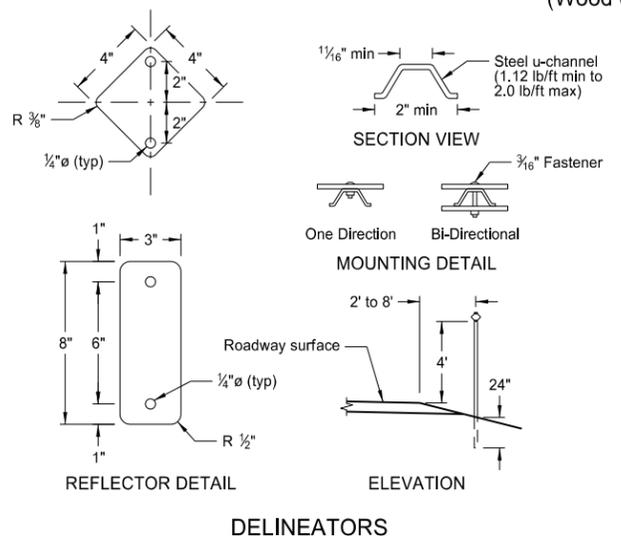
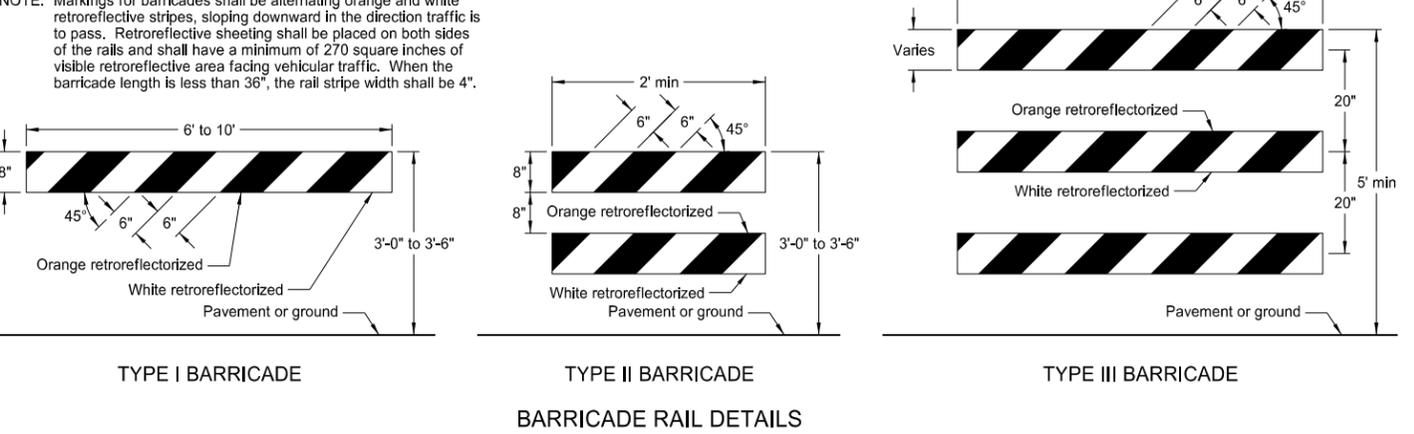
Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular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

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.

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.



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".



MINIMUM BALLAST
 (For each side of barricade support)

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

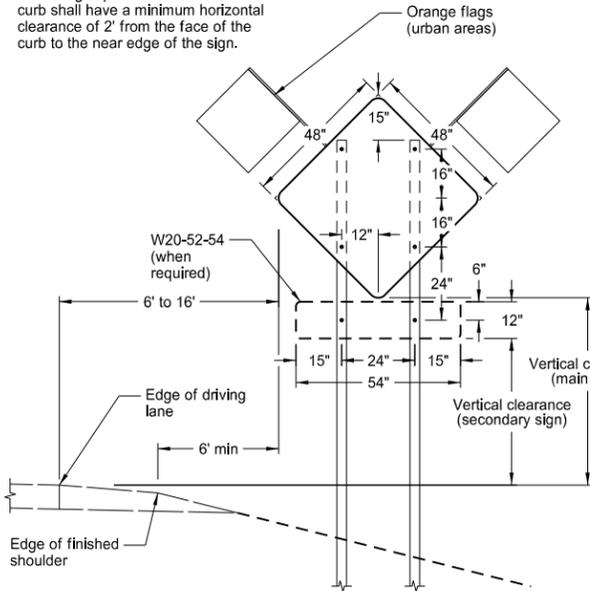
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

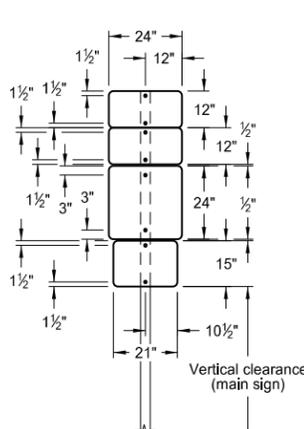
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

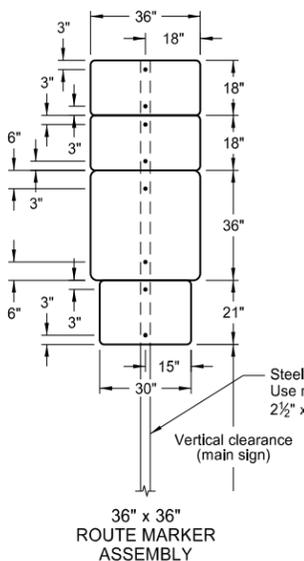
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



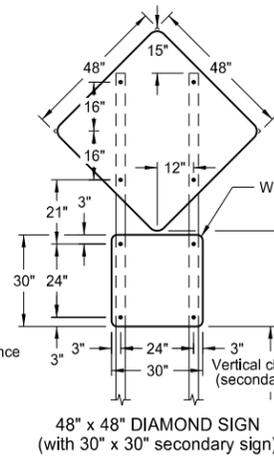
TYPICAL SECTION (48" x 48" diamond warning sign shown)



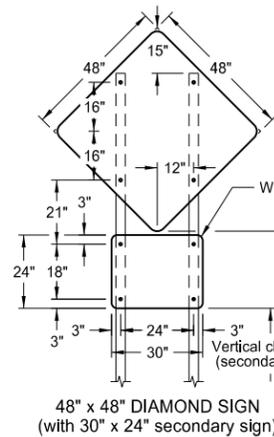
24" x 24" ROUTE MARKER ASSEMBLY



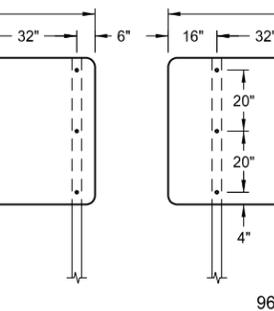
36" x 36" ROUTE MARKER ASSEMBLY



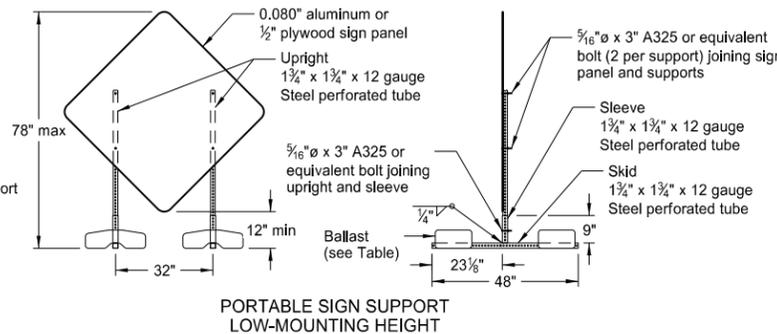
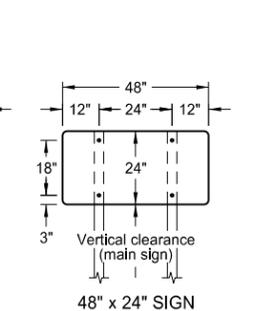
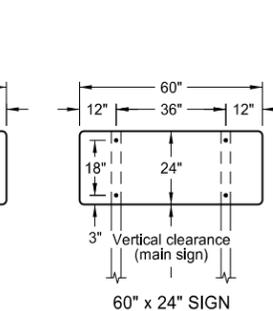
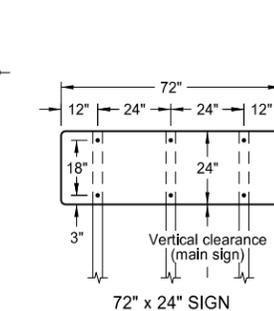
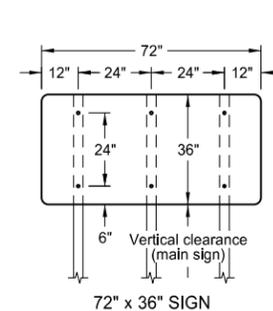
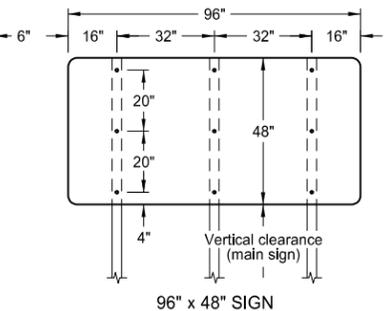
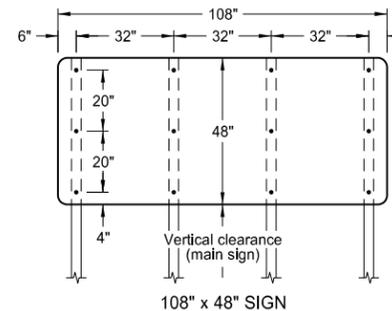
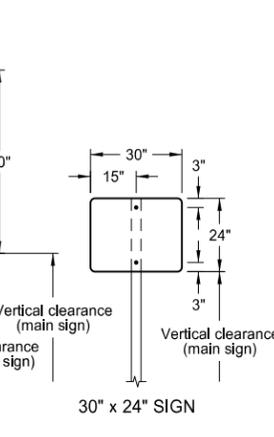
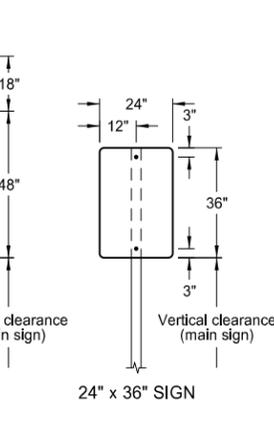
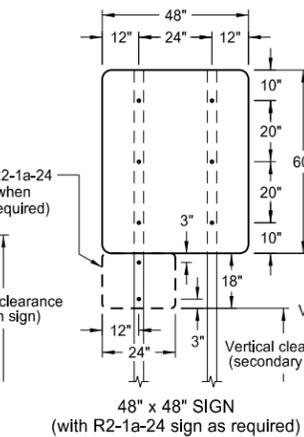
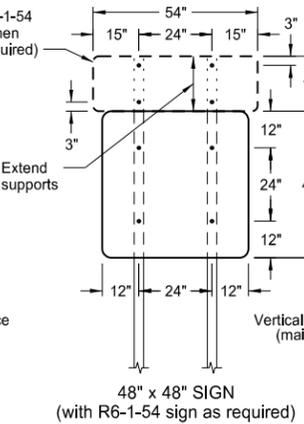
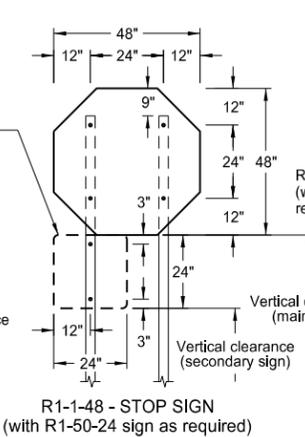
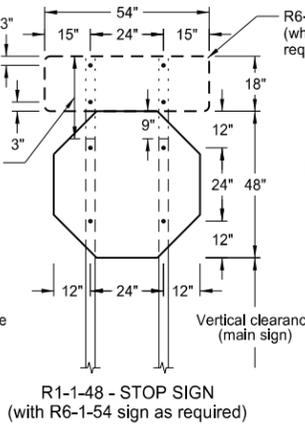
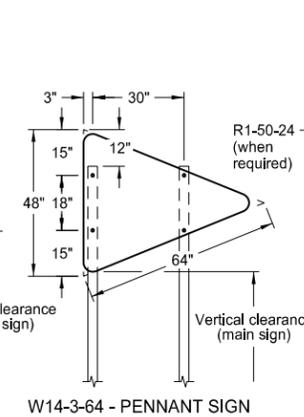
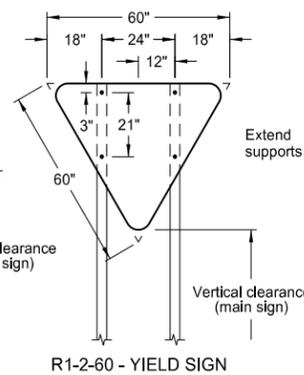
48" x 48" DIAMOND SIGN (with 30" x 30" secondary sign)



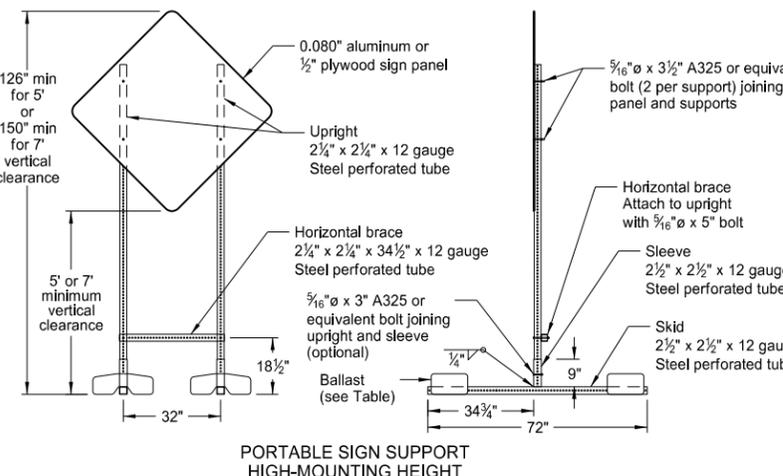
18" x 18" DIAMOND SIGN



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



PORTABLE SIGN SUPPORT LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT HIGH-MOUNTING HEIGHT

NOTES:

- Sign Supports: Supports shall be galvanized or painted. Minimum post sizes are 2.5 lb/ft u-channel or 2" x 2" x 12 gauge steel perforated tube, except where noted. When installing signs on u-channel, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.
Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.
Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
- Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
- Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:
Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
- Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.
The vertical clearance to secondary signs is 1'-0" less than the vertical clearance as stated above.
Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
- Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.
When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.
Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST (For each side of sign support base)

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

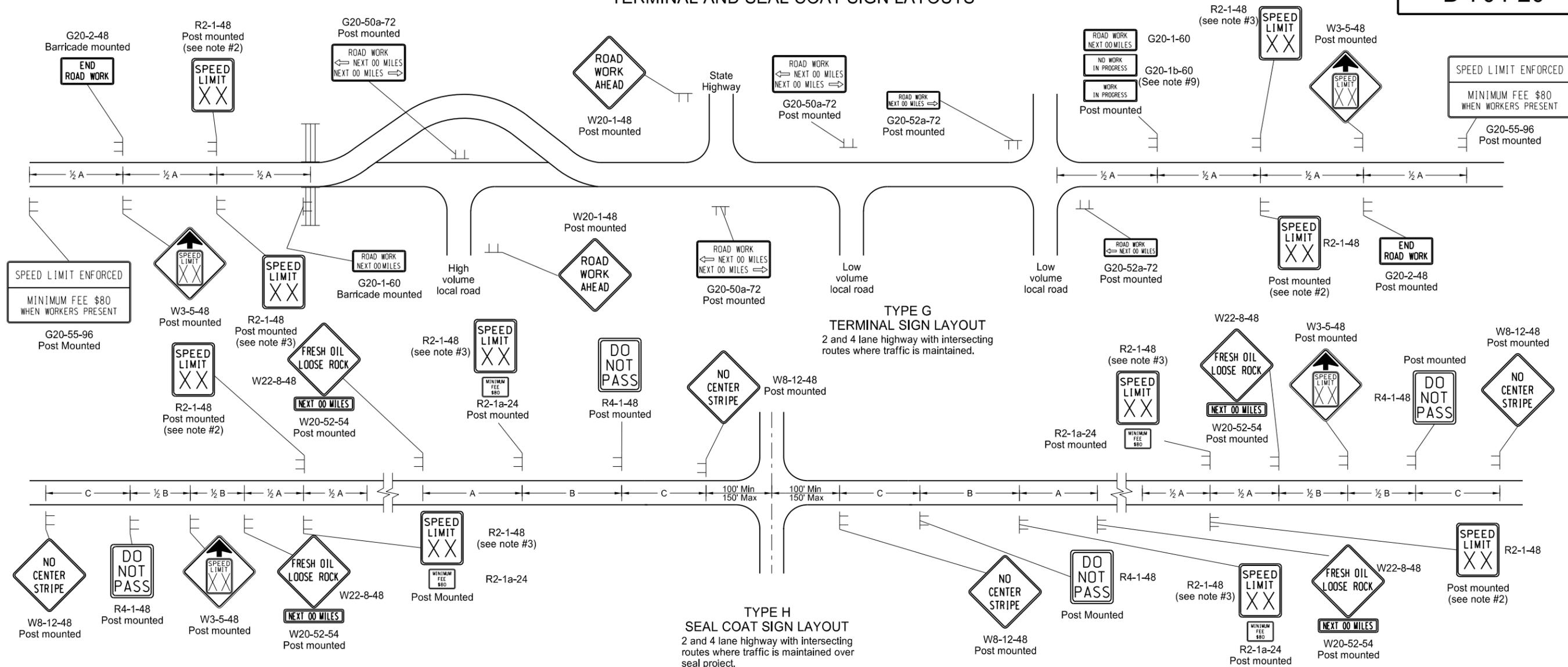
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

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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 1/2 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.

KEY

Type III barricade
 Sign

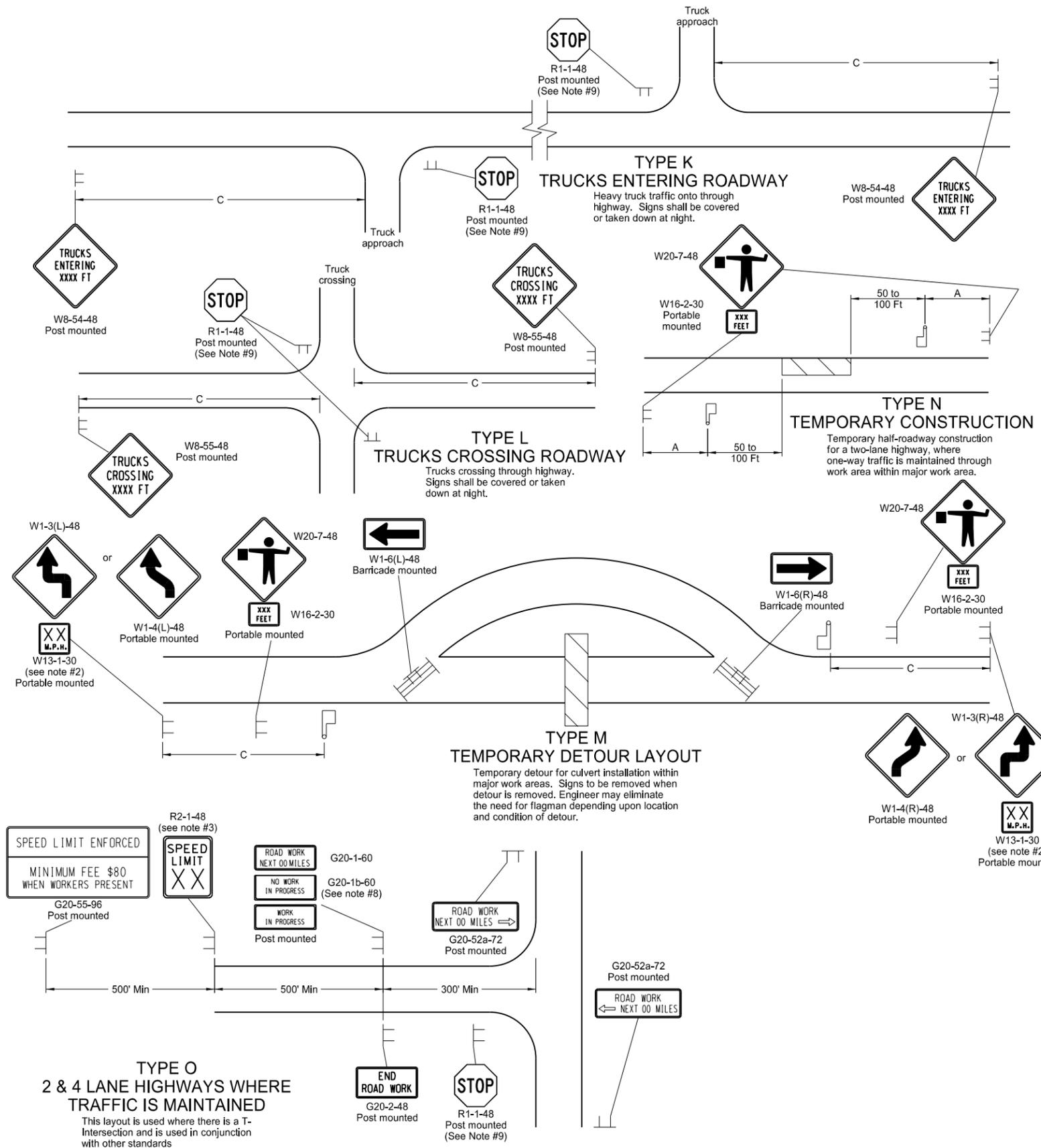
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

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

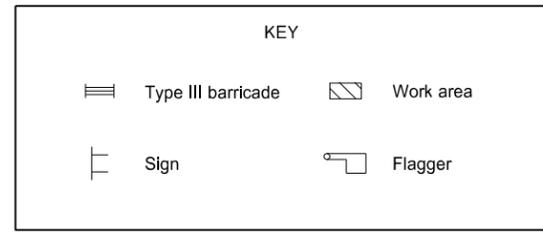
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 Registration Number
PE-2930,
 on **09/27/13** and the original document is stored at the
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 of Transportation

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



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



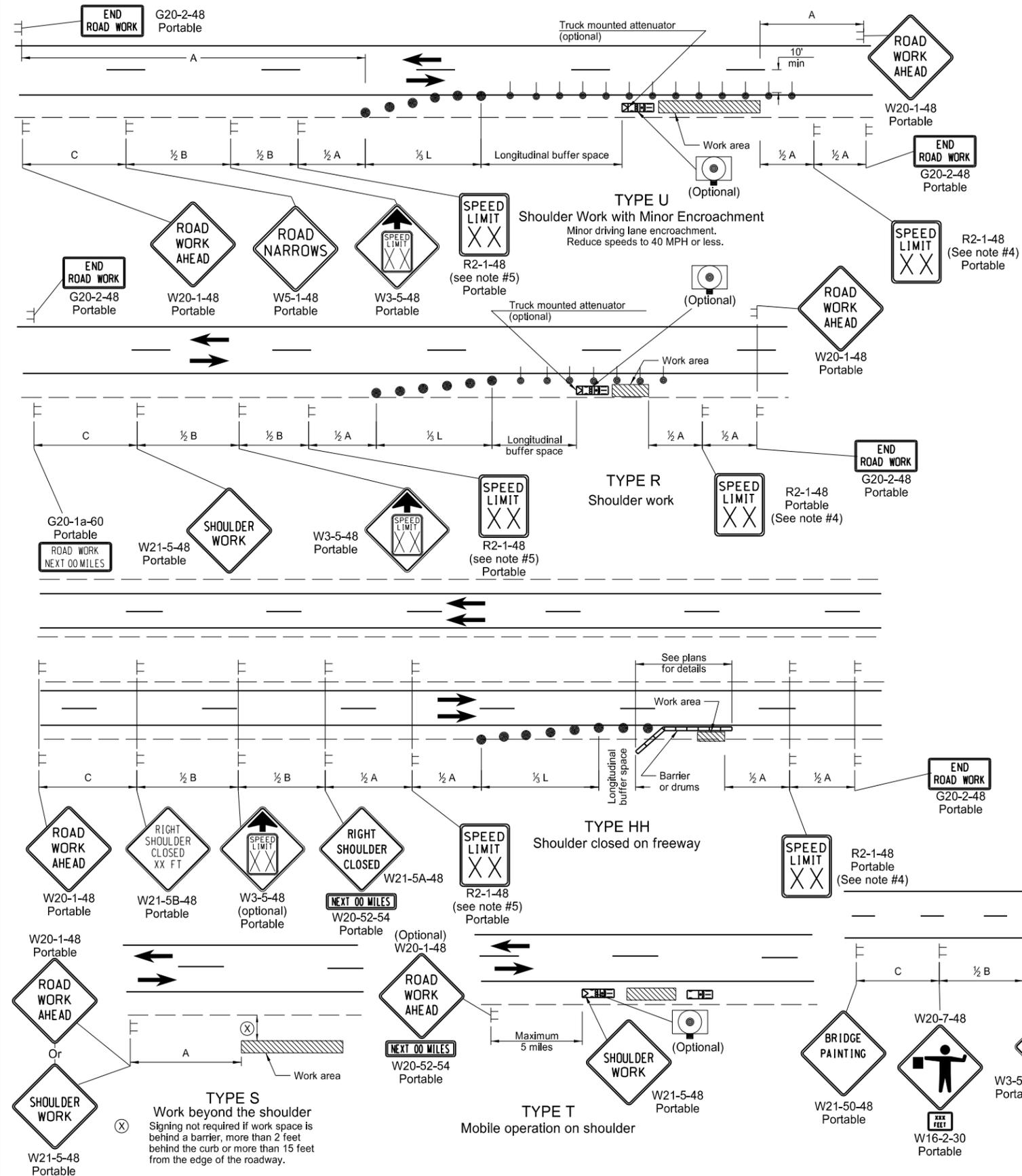
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

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

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SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

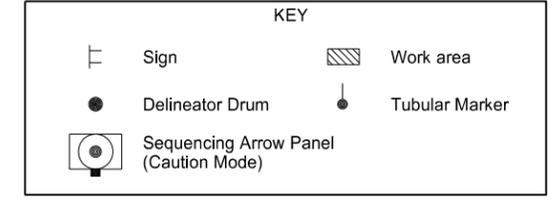
D-704-24



- Notes
- Variables
S = Numerical value of speed limit or 85th percentile.
W = The width of the taper.
L = Minimum length of taper, or $S \times W$ for freeways, expressways, and all other roads with speeds of 45 mph or greater, or $W \times S^2 / 60$ for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums used for tapering traffic shall be spaced at dimension "S".
Delineator drums or tubular markers used for tangents shall be spaced at 2 times "S".
 - Sequencing Arrow Panels
Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at $\frac{1}{2}B$.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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

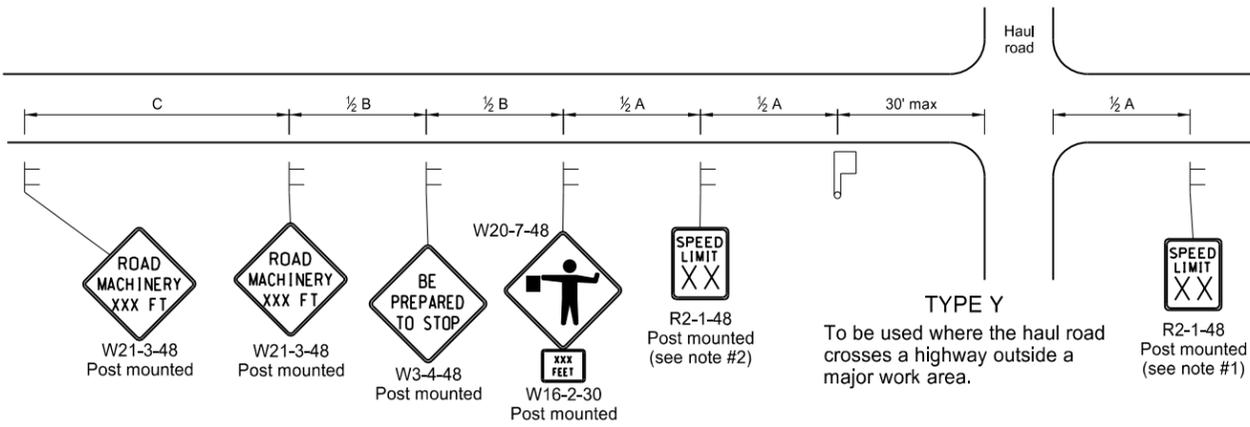


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

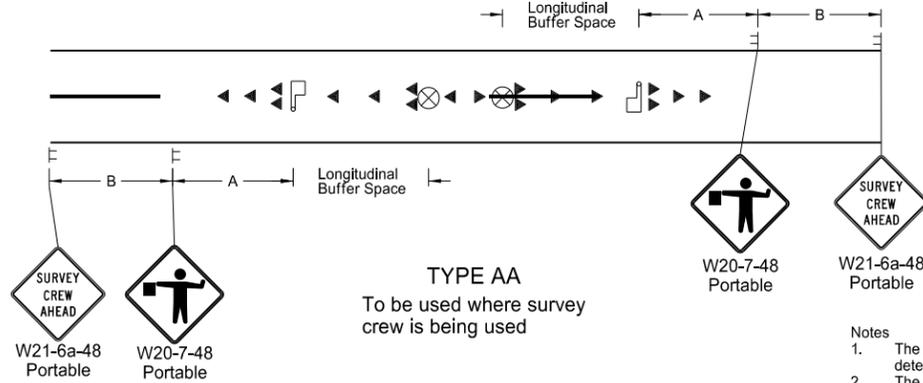
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MISCELLANEOUS SIGN LAYOUTS

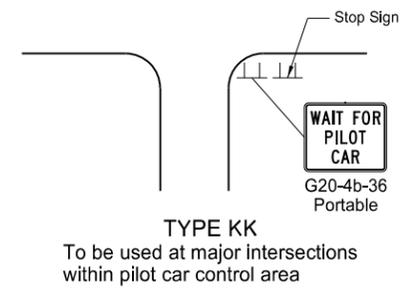
D-704-26



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

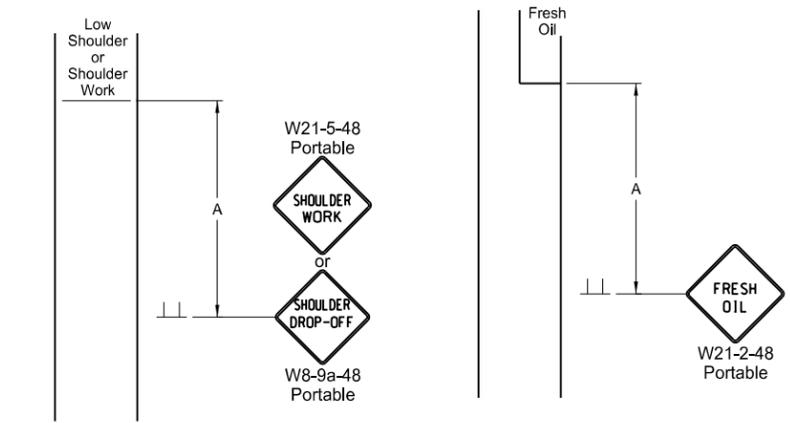


TYPE AA
To be used where survey crew is being used



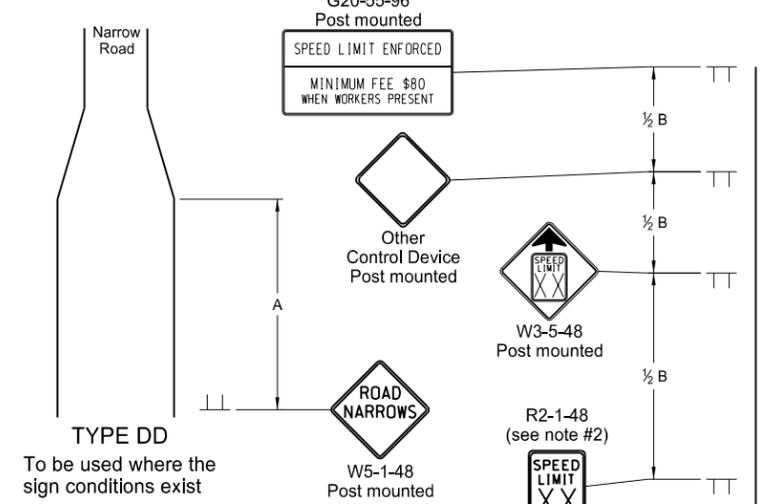
TYPE KK
To be used at major intersections within pilot car control area

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

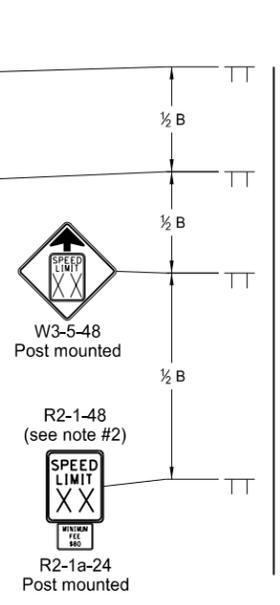


TYPE BB
To be used within a major work area where the sign conditions exist

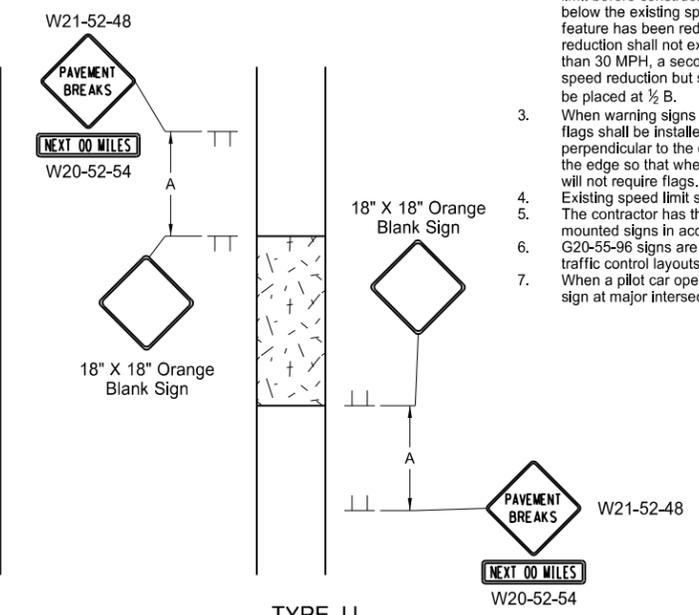
TYPE CC
To be used where the sign conditions exist



TYPE DD
To be used where the sign conditions exist



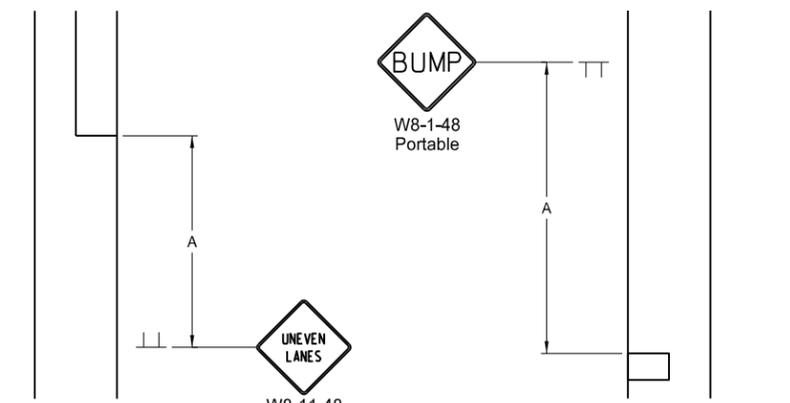
TYPE Z
To be used where speed zone is needed



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

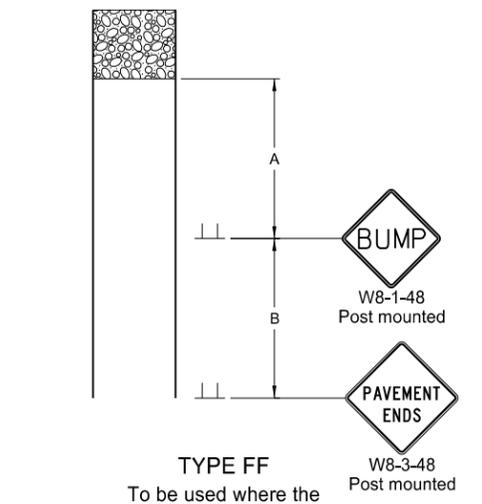
Longitudinal Buffer Space	
*Speed (mph)	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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



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

TYPE EE
To be used where the sign conditions exist



TYPE FF
To be used where the sign conditions exist

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

KEY

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

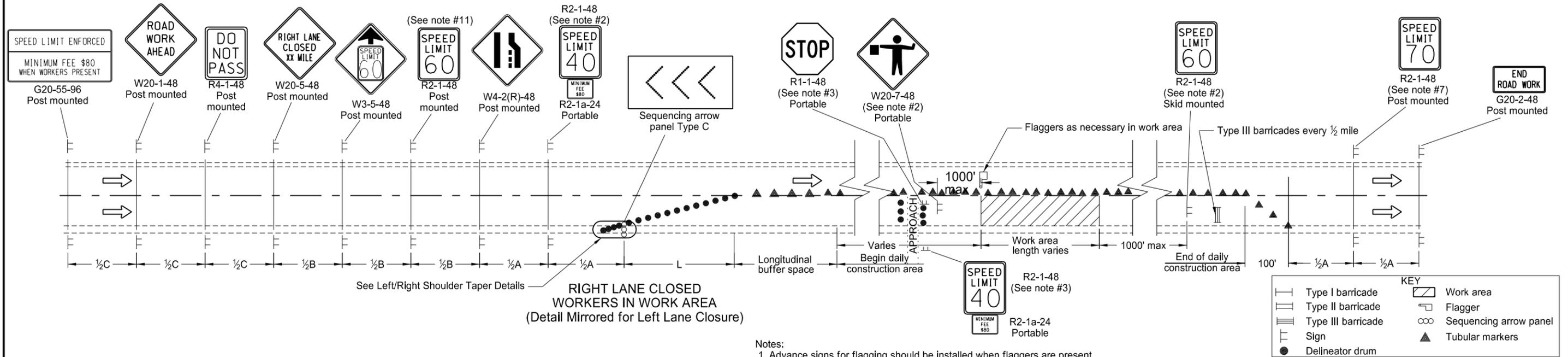
Flagger (represented by a square with a diagonal line)

Cones (represented by a triangle)

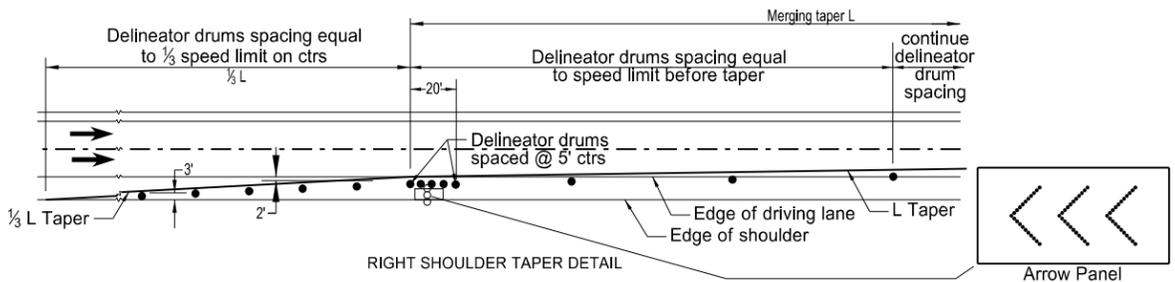
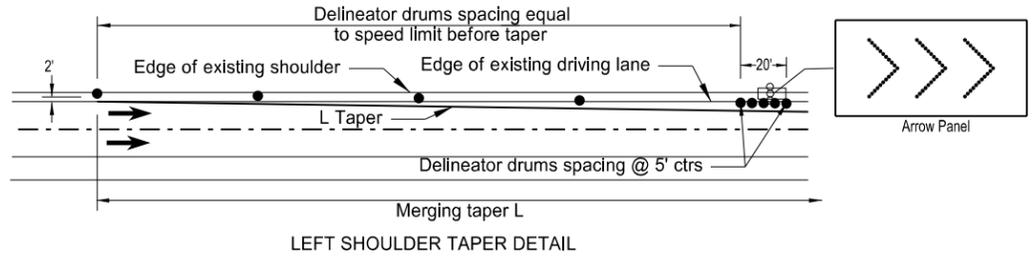
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

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SIGN LAYOUT FOR ONE LANE CLOSURE



- Notes:
- Advance signs for flagging should be installed when flaggers are present.
 - The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 40 mph speed limit sign shall be spaced at 1/2A in advance of the flagger sign. The 60 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 40 mph speed limit and the Minimum Fee \$80 signs shall be covered or removed. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - Approaches: When the work area encompasses an approach, the approach shall be controlled by installing a 40 mph speed limit sign. If this approach is on the side of the lane closure, the existing stop sign shall be covered and a new portable stop sign shall be installed. When the main line 40 mph speed zone is moved past the approach, the approach speed limit sign shall be removed.
 - Variables:
 - S=Numerical value of speed limit or 85th percentile
 - W=The width of taper.
 - L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
 - Sequencing arrow 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.
 - 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).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - 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.
 - 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 1/2B.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
 - Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.



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

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

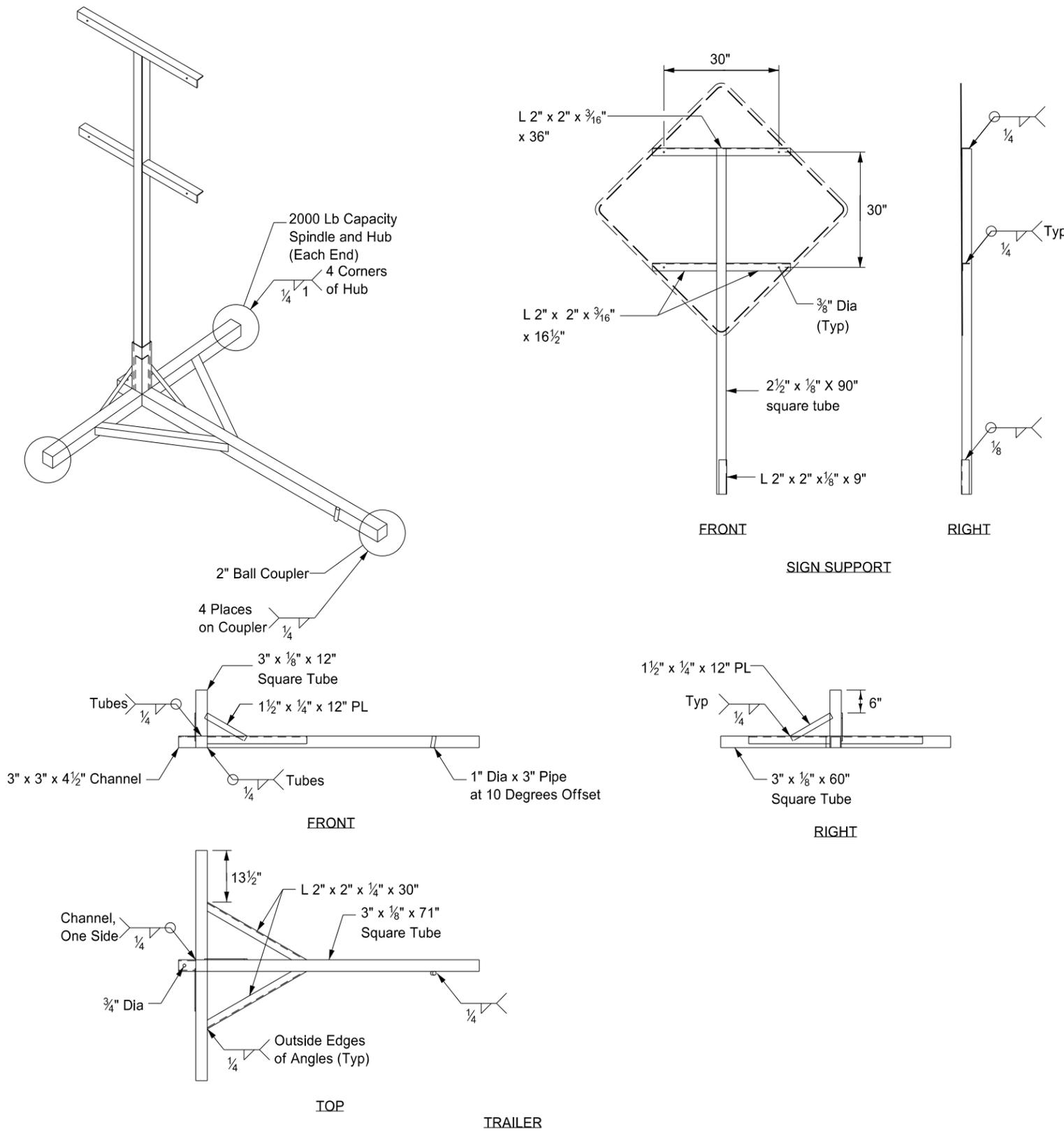
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-26-2012	
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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

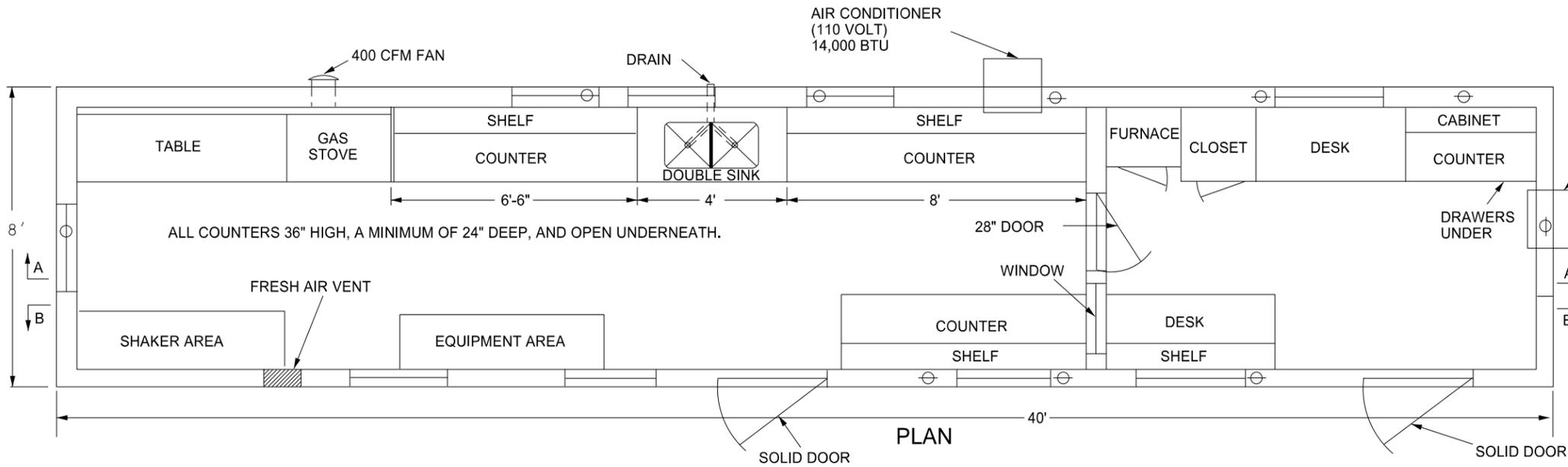
- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

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

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BITUMINOUS LABORATORY

D-706-1



AIR CONDITIONER (110 VOLT) 8,000 BTU

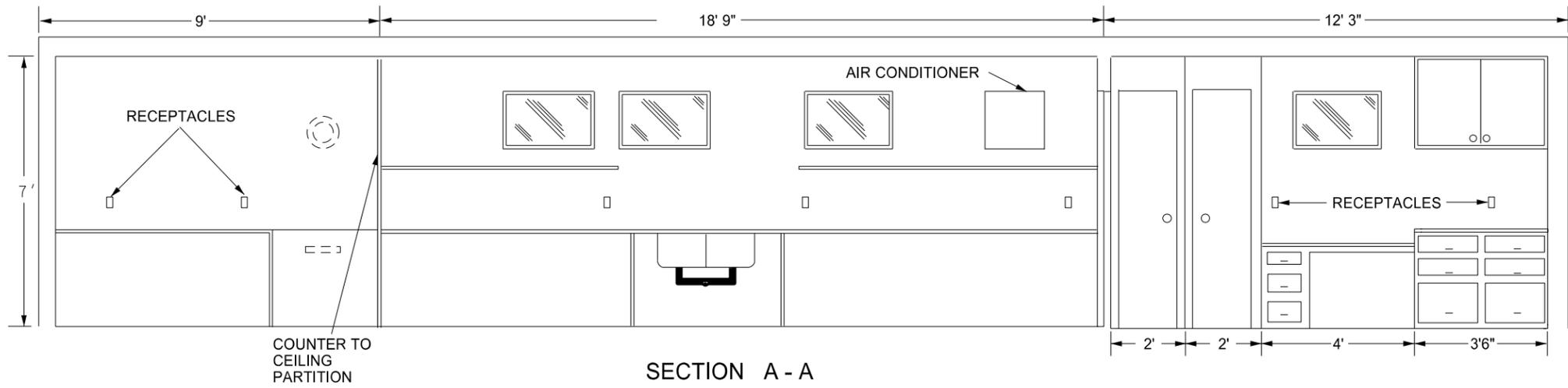
NOTES:

There shall be a minimum of six screened exterior windows on two or more sides, with a minimum of one window in each room. Windows shall have a minimum area of 4 square feet each. Suggested locations are shown on drawing.

The lab shall be equipped with a 1'x1' shelf at 36" above the regular countertop to hold the stock solution container for the Sand Equivalent test.

The sink shall be double compartment stainless steel. Each compartment shall be a minimum of 16"x14"x10" deep. The sink shall be drained to an outside waste line. A trap is not required. Water service lines shall be copper or plastic having a diameter of 1/2 inch.

The lab shall be equipped with an exhaust fan capable of removing inside air at a rate of 400 CFM.



The fresh air vent shall be hinged to open or close manually.

24" x 48" table shall be provided capable of holding a 200 lb. masonry saw. The table shall have a minimum clearance of 36" overhead.

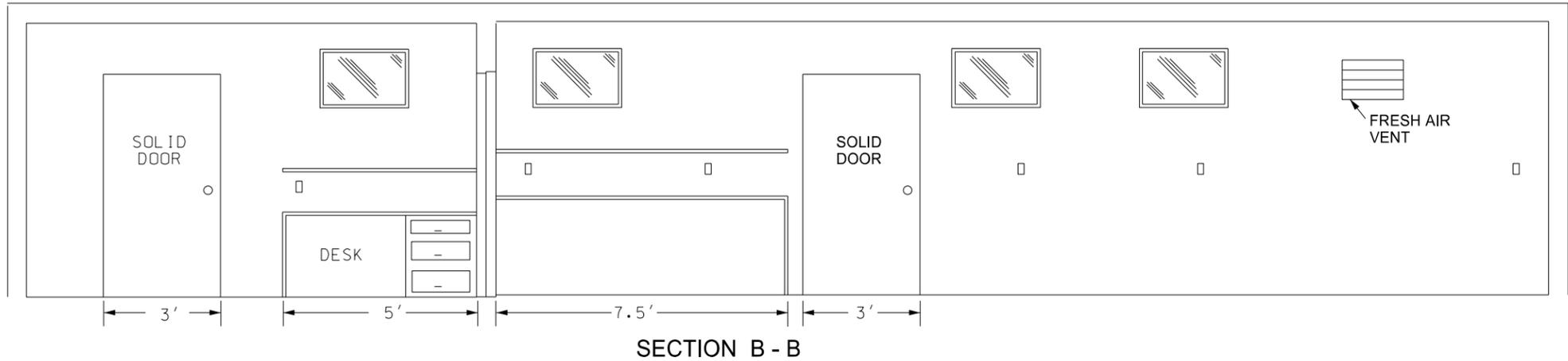
The water supply tank shall have a capacity of 500 gallons.

Steps and a landing for each set of steps shall be provided for each of two entrance doors. Steps for each area shall be made of, or covered with, a material providing for a non-slip surface. They shall be heavy duty steps that are capable of withstanding heavy loadings and extensive use.

The pressure tank on the pump shall be 20 gallon capacity.

Locks, latches, and hinges for main doors shall be heavy duty type to withstand the intense use in service.

The wall between the office and the work area shall be properly insulated to prevent the transmission of heat and noise.



The floor beneath the marshall area shall be heavily reinforced.

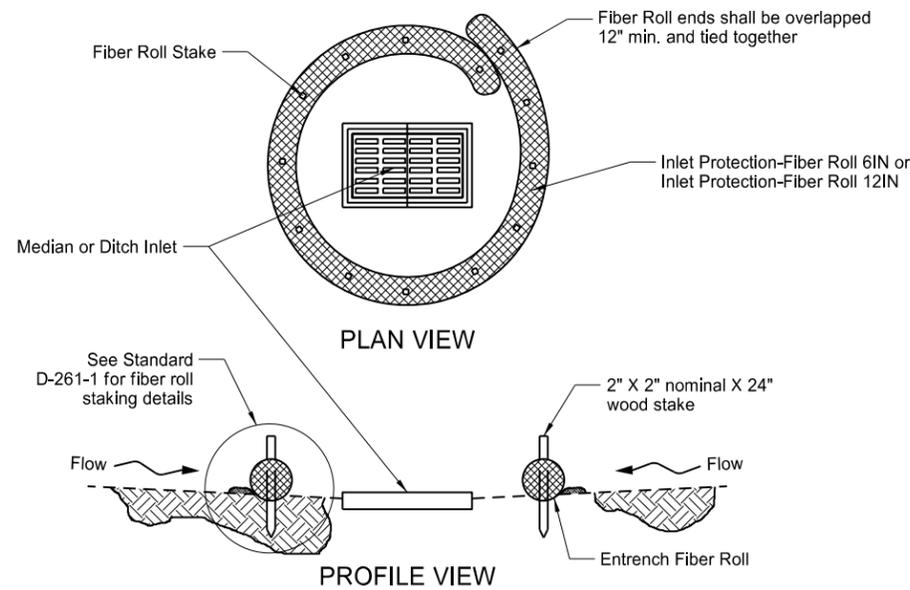
The lab shall be equipped with steel cable tie downs and ground anchors at each corner of the lab.

Electrical service entrance shall be wired for 100 amps, and have separate circuits for air conditioners. Convenience outlets shall have a minimum spacing of four feet in counter areas.

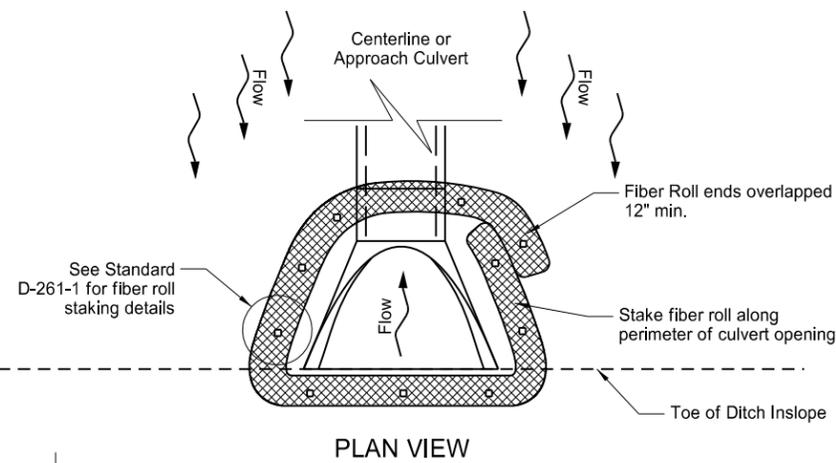
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.

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 of Transportation

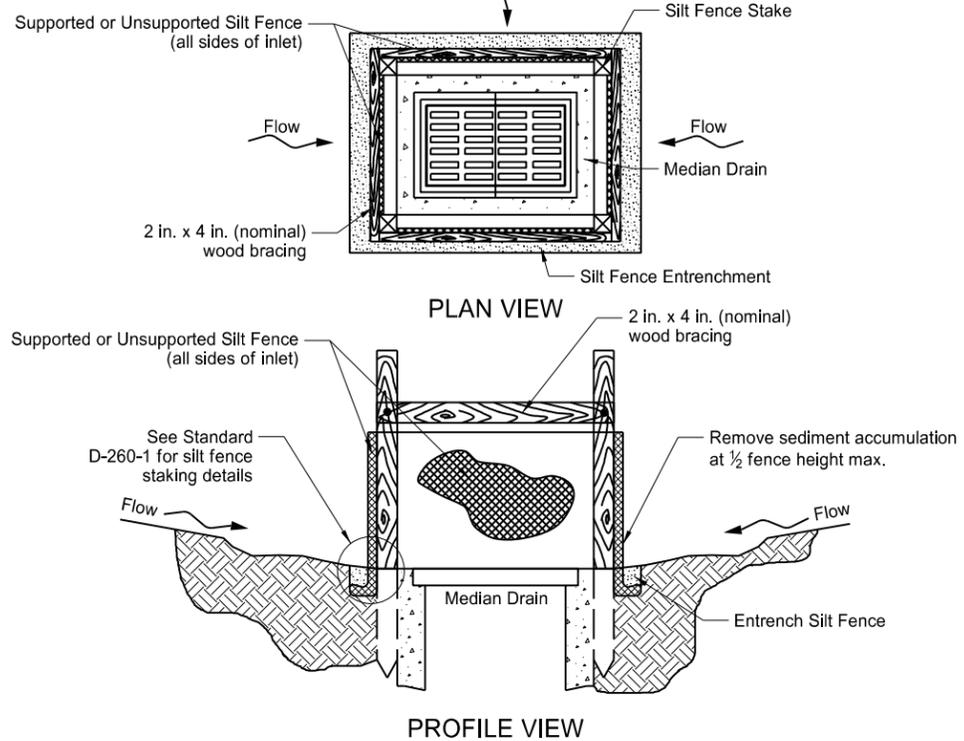
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



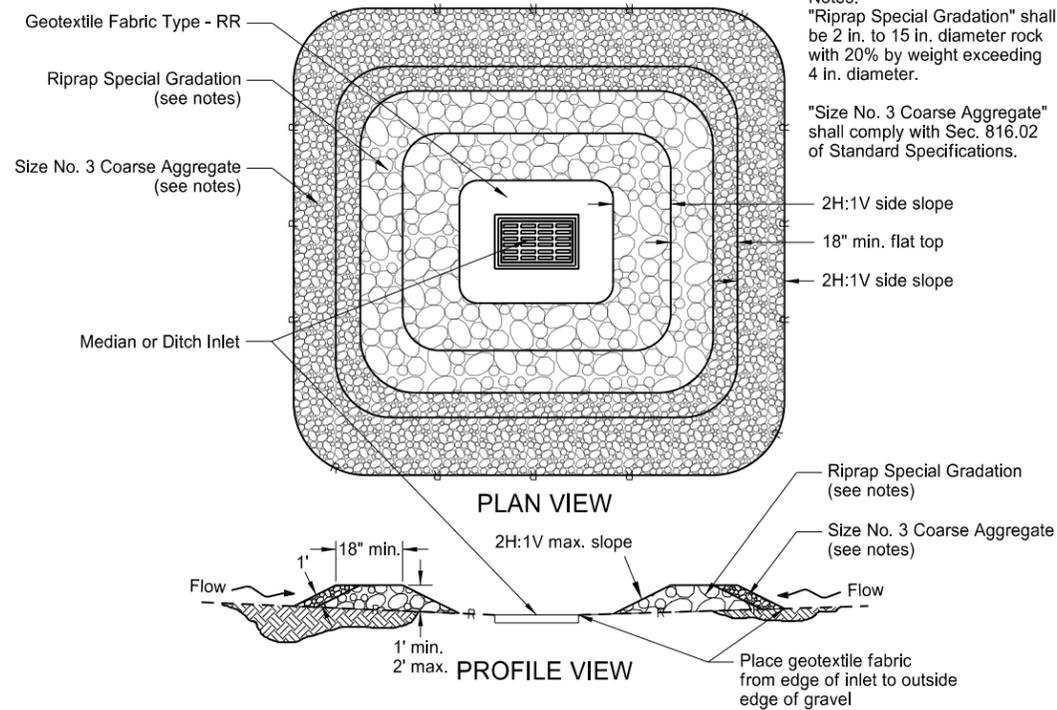
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



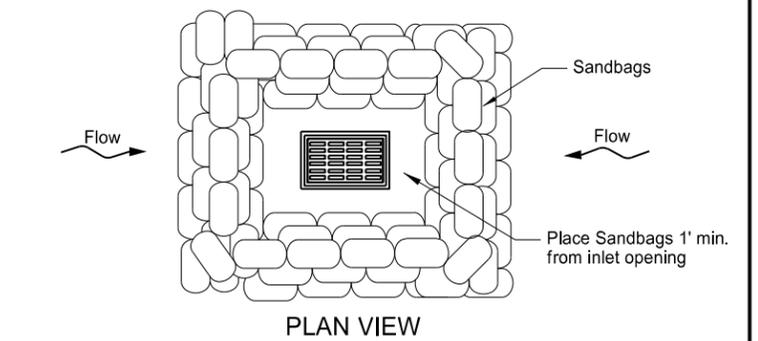
FIBER ROLL PROTECTION (INLET OF CULVERT)



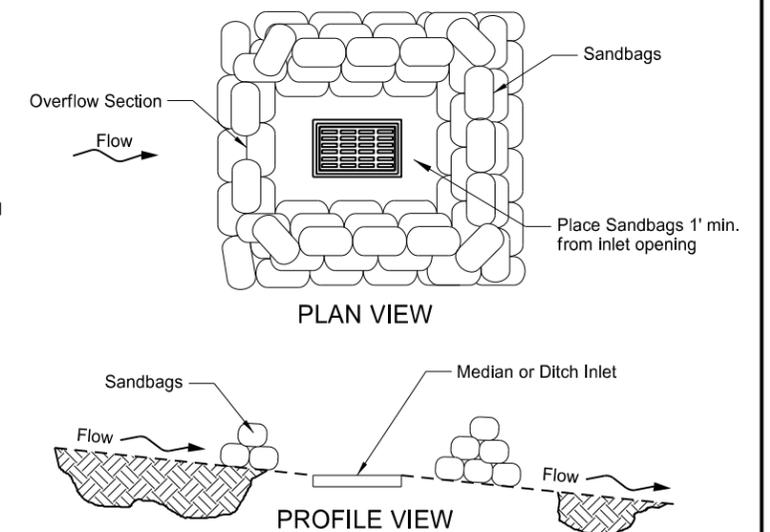
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (LOW POINT)



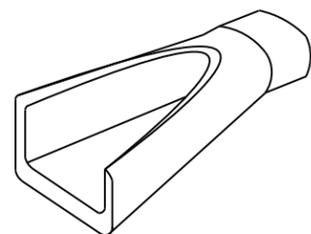
SANDBAG PROTECTION (ON SLOPE)

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

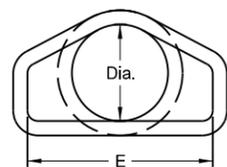
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.

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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

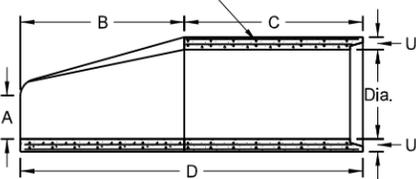


PERSPECTIVE

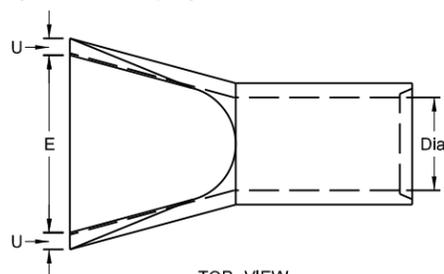


END VIEW

Standard Reinforcement for Class III pipe reinforced as per AASHTO M170



SIDE VIEW

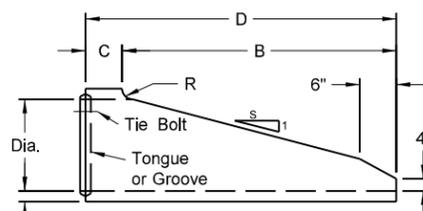


TOP VIEW

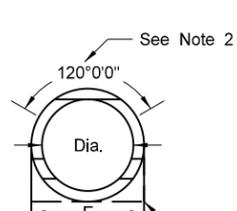
REINFORCED CONCRETE PIPE - FLARED END SECTION

Reinforcement to be equivalent to Class III RCP

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



SIDE VIEW



END VIEW

End may be supplied with flat bottom

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

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.

FLARED END SECTION

TERMINAL DIMENSIONS

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

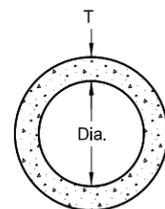
All Classifications of Round Concrete Pipe

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

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

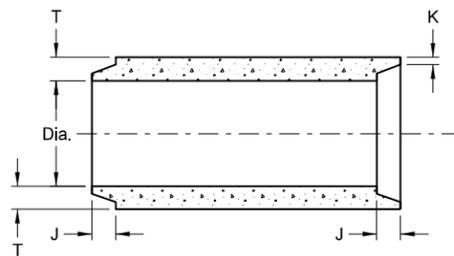
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

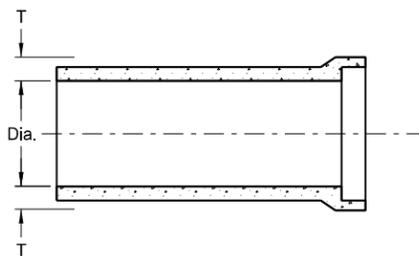


END VIEW

CIRCULAR PIPE

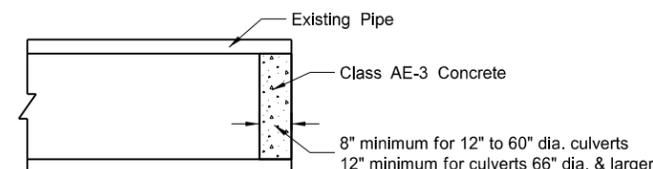


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

NOTES:

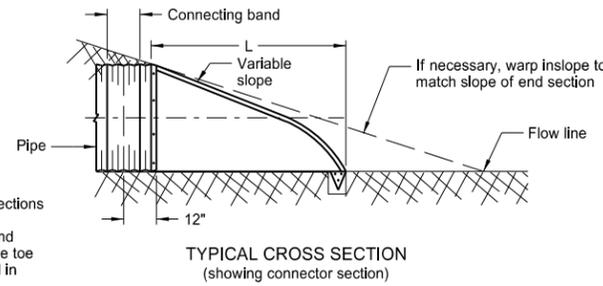
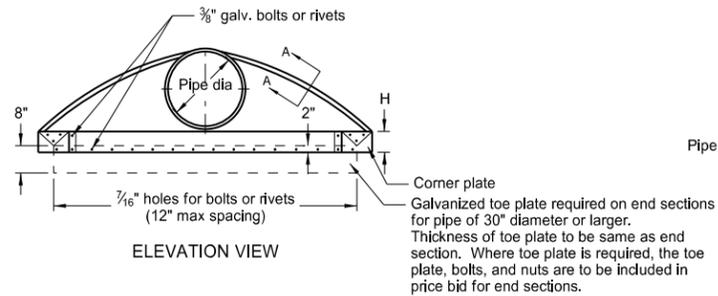
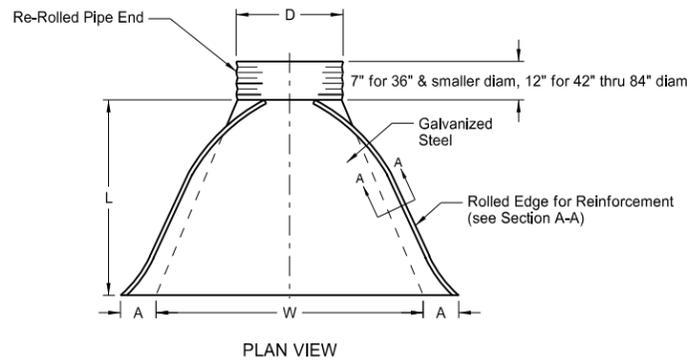
1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (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

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ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4



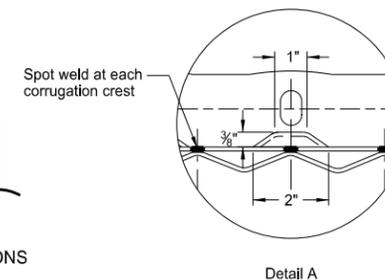
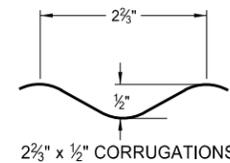
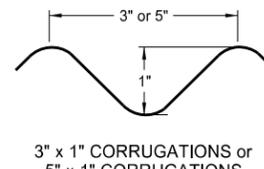
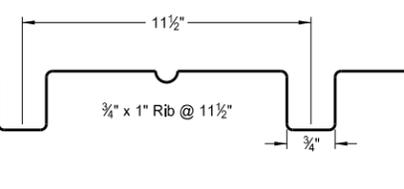
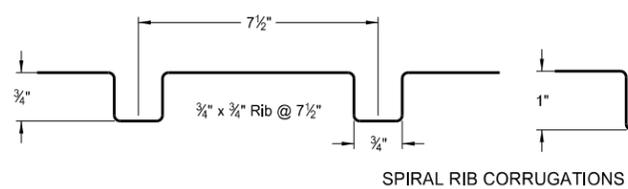
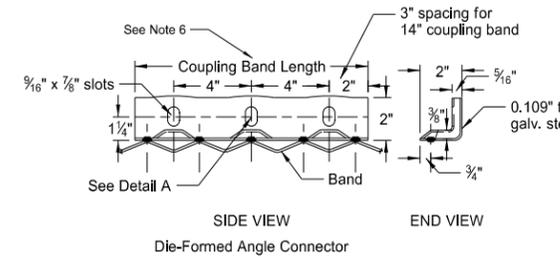
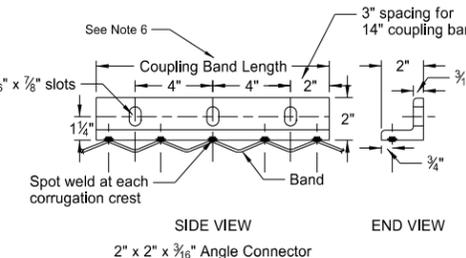
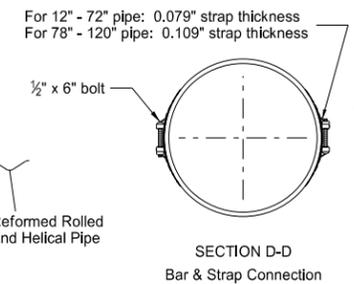
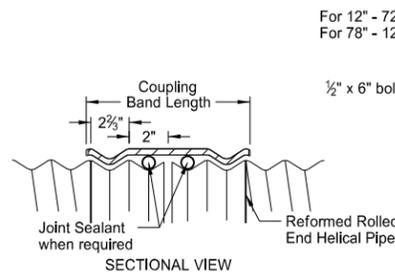
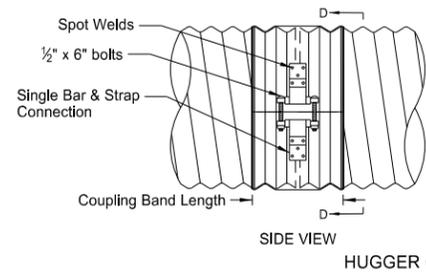
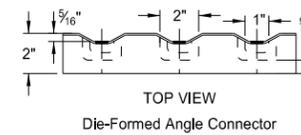
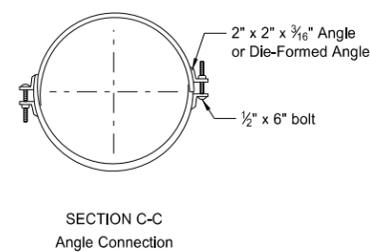
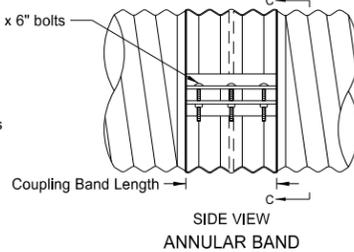
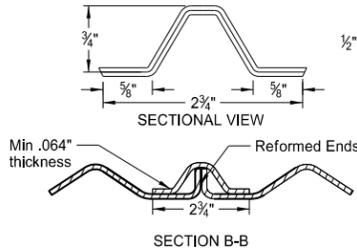
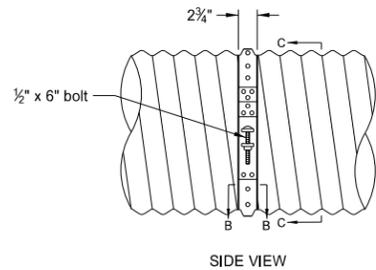
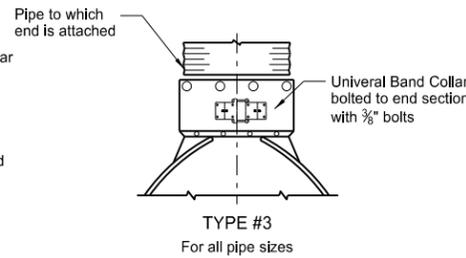
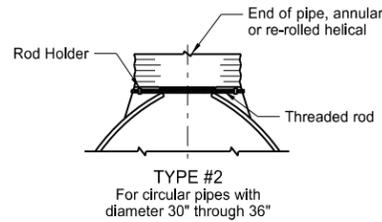
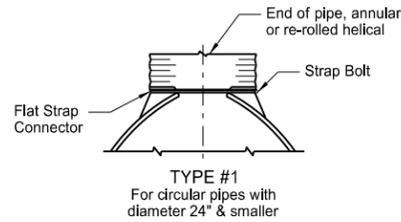
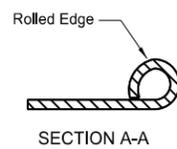
PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS					APPROX. SLOPE	BODY PIECE
		A	B	H	L	W		
15	0.064	7	8	6	26	30	2 1/2:1	1
18	0.064	8	10	6	31	36	2 1/2:1	1
24	0.064	10	13	6	41	48	2 1/2:1	1
30	0.079	12	16	8	51	60	2 1/2:1	1 or 2
36	0.079	14	19	9	60	72	2 1/2:1	2
42	0.109	16	22	11	69	84	2 1/2:1	2
48	0.109	18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

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

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

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

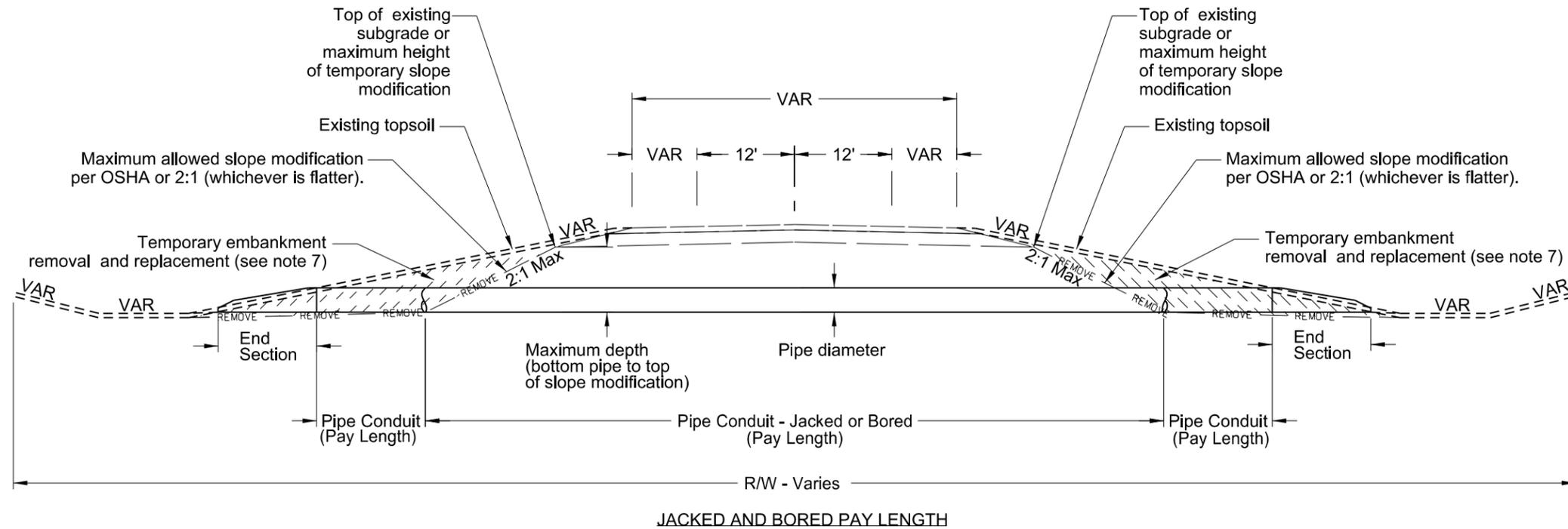
- NOTES:
- Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
 - Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x 1/4" galv. angle for 60" through 72" dia. and 2 1/2" x 2 1/2" x 1/4" galv. angle for 78" and 84" dia.. Angles to be attached by galv. 3/8" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
 - 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.
 - 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.
 - 1/2" x 8" bolts may be used as a substitute for the 1/2" x 6" bolts shown in the details.
 - Coupling bands wider than 14" may be used if a minimum of four 1/2" bolts with maximum spacing of 5 1/2" are used for the connection.
 - Length of spot welds shall be minimum 1/2".



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

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JACKED AND BORED PIPE

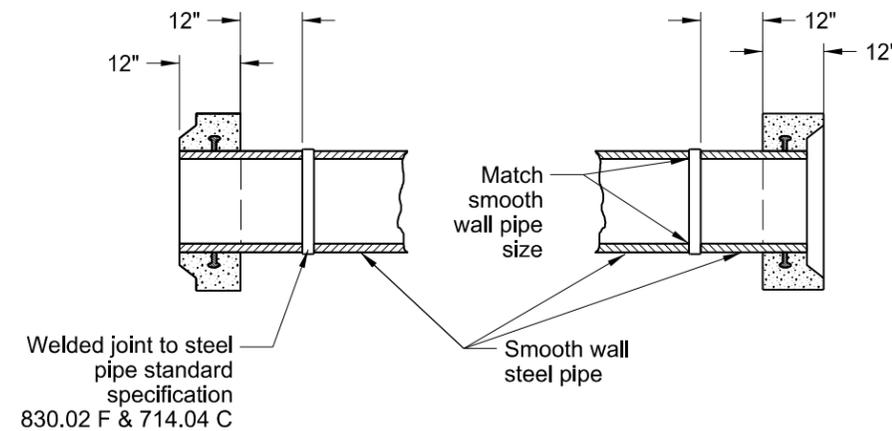


NOTES:

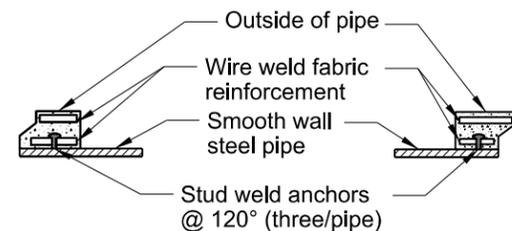
- The method used to install the pipe indicated as jacked on the plans shall be left to the discretion of the contractor. The boring or jacked methods are acceptable. If the boring method is used, the contractor may use smooth wall steel pipe in lieu of RCP. Jacked concrete pipe sections shall be the class required for the height of fill, but concrete compressive strength shall be a minimum of 6,000 psi or greater. If smooth walled steel pipe is to be used, this material shall be welded steel pipe of new material, meeting ASTM Specifications A-139, Grade B with minimum yield strength of 35,000 psi. The Table of Minimum Wall Thicknesses for Smooth Walled Steel Pipe Through Roadway Embankment shall be used.
- Pipe culverts that are bored or jacked shall conform to section 714 and section 830 of the standard specifications.
- Pipe culverts shall be installed using equipment that encases the hole as the earth is removed. Boring or jacking without the concurrent installation of the pipe will not be permitted.
- Pipe shall extend through the undisturbed fill and shall be installed so as not to disrupt traffic nor damage roadway grade and surface. Contractor shall ensure proper traffic control and traffic safety measures are put into place to protect the travelling public throughout the jacking or boring process.
- The encased hole shall not be more than 0.1 foot greater than the outside diameter of the pipe.
- Use of water in the process of boring or jacking is prohibited.
- Temporary removal and replacement of embankment shall be included in price bid for Pipe Conduit - Jacked or Bored. Temporary removal of embankment may be allowed up to a maximum of 2:1, and shall not be into the existing pavement section (base, pavement, etc). Contractor is responsible for protection and stability of the slope throughout the jacking or boring process.
- Proper cushioning material shall be inserted between the jack and pipe. Damaged ends that result in an unsatisfactory joint when the additional sections of pipe are placed, shall be rejected and removed, and a new section shall be installed.
- The boring or jacking shall start from the low or downstream end, be made in straight lines, to the grade and alignment as shown on the plans. The flow line elevation at the starting point for boring or jacking shall be within 0.1 ft. of staked grade; the flow line shall not be reversed at any point; and the line and grade at any point within the pipe shall not vary by more than 0.5 ft. from the line and grade designated.
- Openings more than 1/4 inch (5 mm) in width between adjacent sections of concrete pipe shall be filled with 1:2 cement/sand mortar. All concrete pipe sections and end sections shall be tied in accordance with standard drawing D-714-22. All steel sections shall be welded continuously around their periphery in accordance with Standard Specification 830.02 F & 714.04 C.
- Once the pipe jacking has begun, proceed with the operation without interruption to prevent the pipe from becoming firmly set in the embankment.
- The culvert consists of separate bid items for each portion: "Pipe Conduit XXIn - Jacked or Bored" and "Pipe Conduit XXIn". The pay lengths of the pipe bid items are as shown for the type and size specified per linear foot. Connecting bands or Couplers shall be included in the unit price bid for "Pipe Conduit XXIn - Jacked or Bored". The required materials, labor, and equipment to complete the work shall be included in the price bid for the above bid items.

Note: This Standard Drawing only applies to jacked and bored pipe under a roadway embankment. Additional coordination and design is needed for railroad embankments.

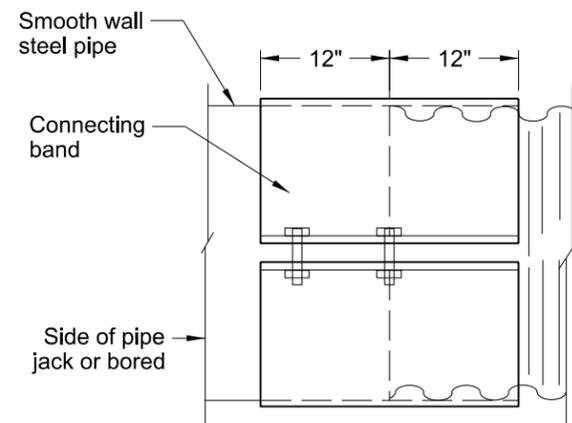
Diameter of Pipe	Minimum Wall Thickness
24 Inches	0.312 Inch
30 Inches	0.406 Inch
36 Inches	0.469 Inch
42 Inches	0.500 Inch
48 Inches	0.563 Inch
54 Inches	0.656 Inch
60 Inches	0.719 Inch
66 Inches	0.813 Inch
72 Inches	0.875 Inch



Welded joint to steel pipe standard specification 830.02 F & 714.04 C



STANDARD COUPLER FOR JOINING SMOOTH WALL STEEL PIPE TO REINFORCED CONCRETE PIPE

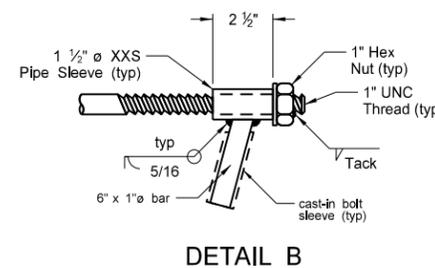
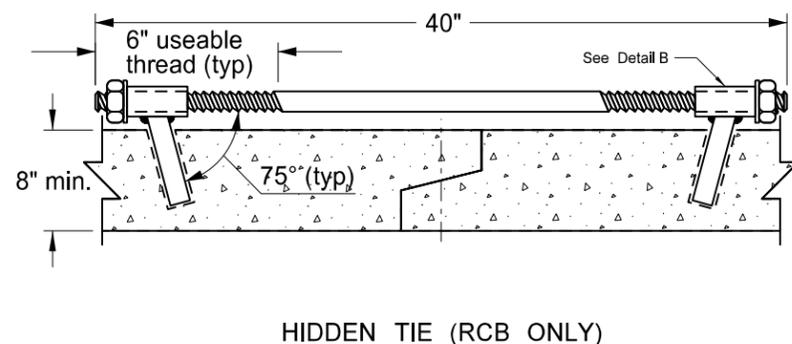
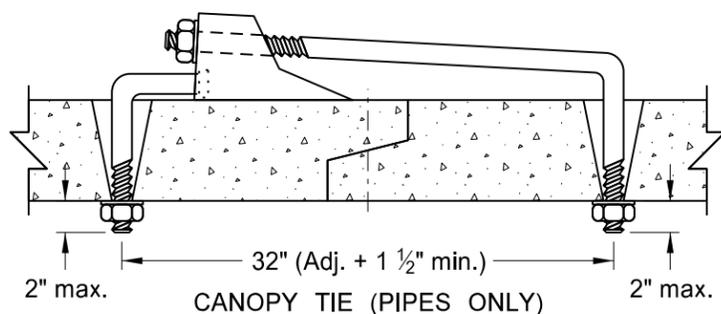
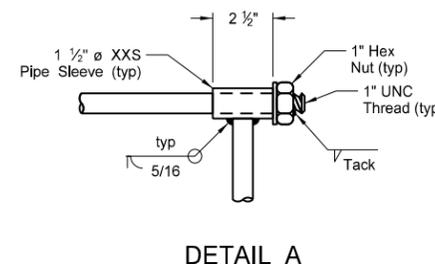
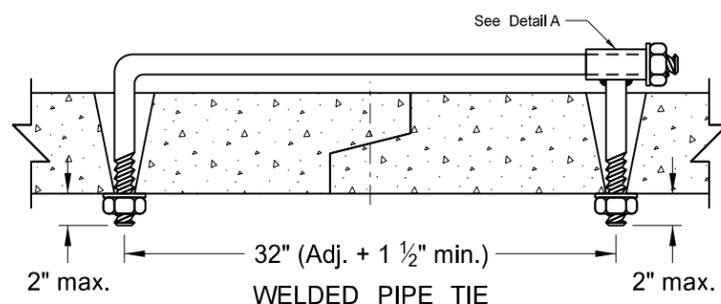
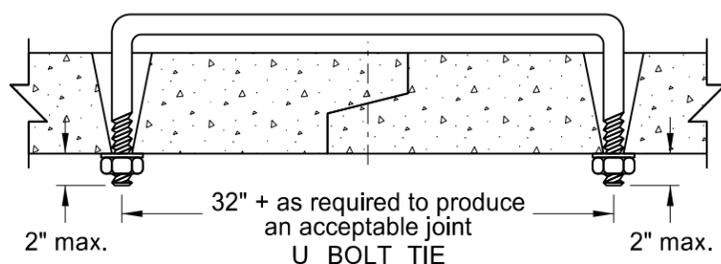
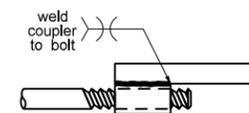
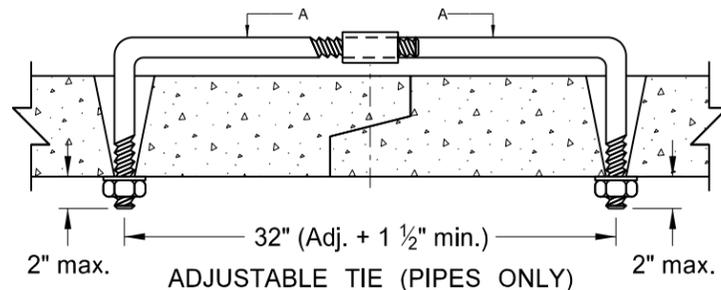
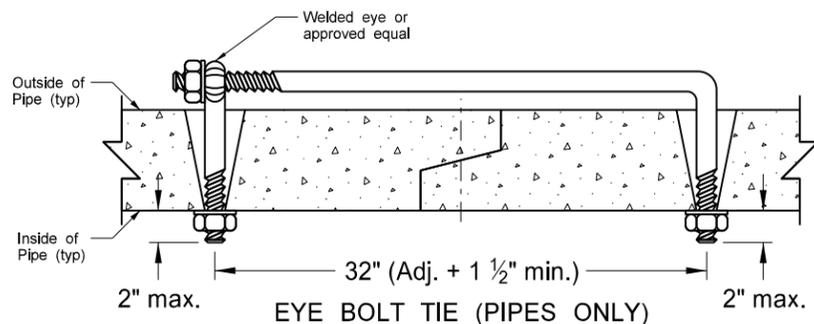


STANDARD CONNECTING BAND FOR JOINING SMOOTH WALL STEEL PIPE TO CORRUGATED PIPE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
02-28-2014	
REVISIONS	
DATE	CHANGE
07-07-2014	Revise Notes

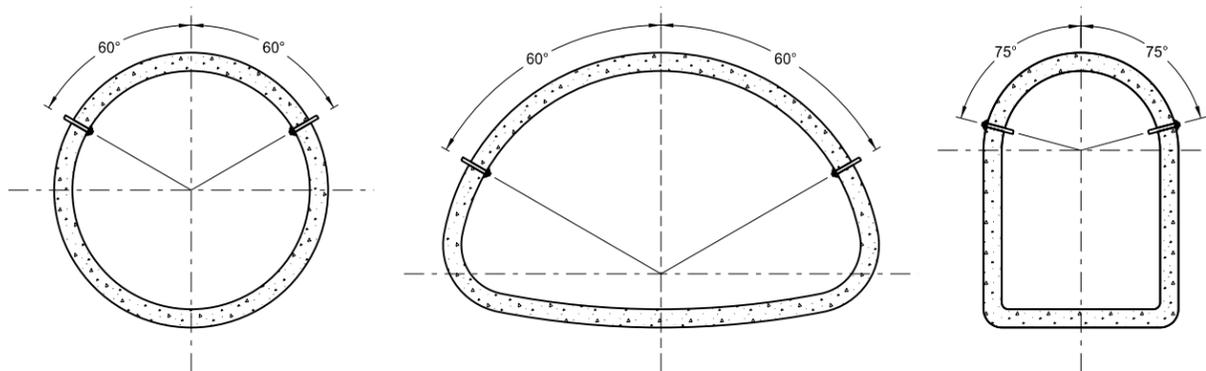
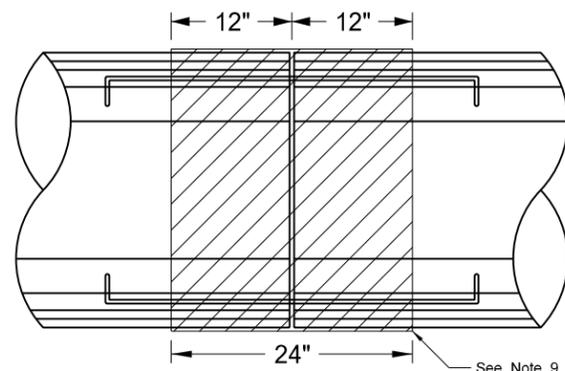
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CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES



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

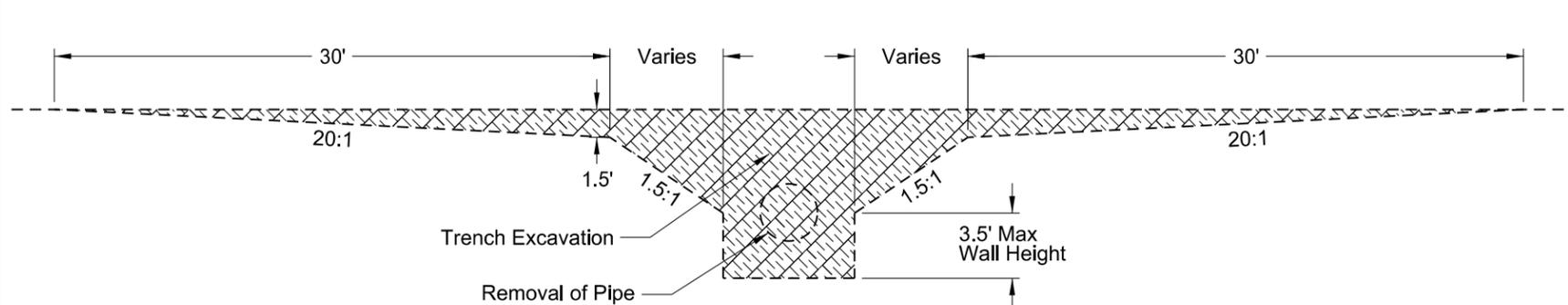
- NOTES:
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
 - Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.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



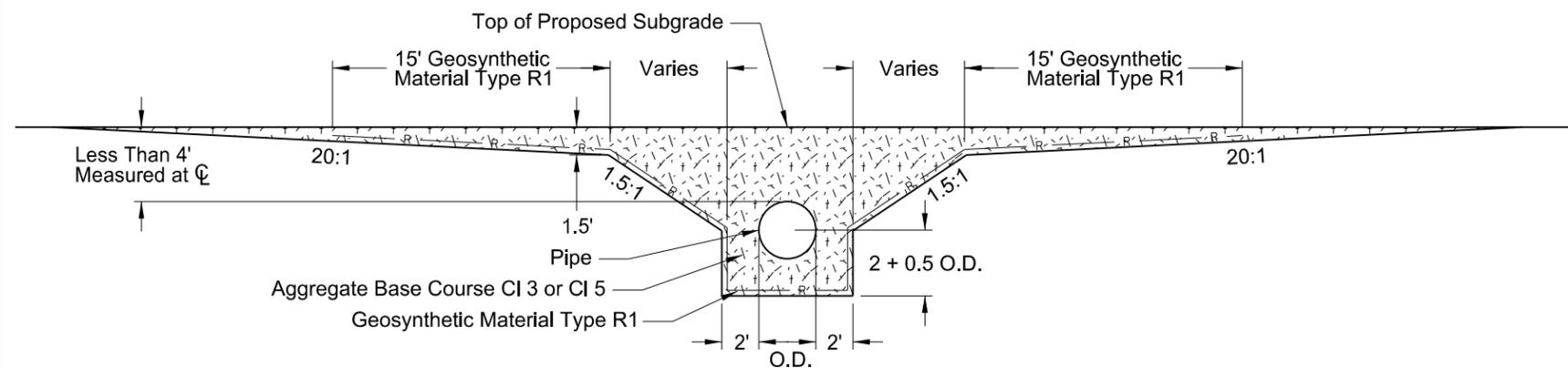
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8

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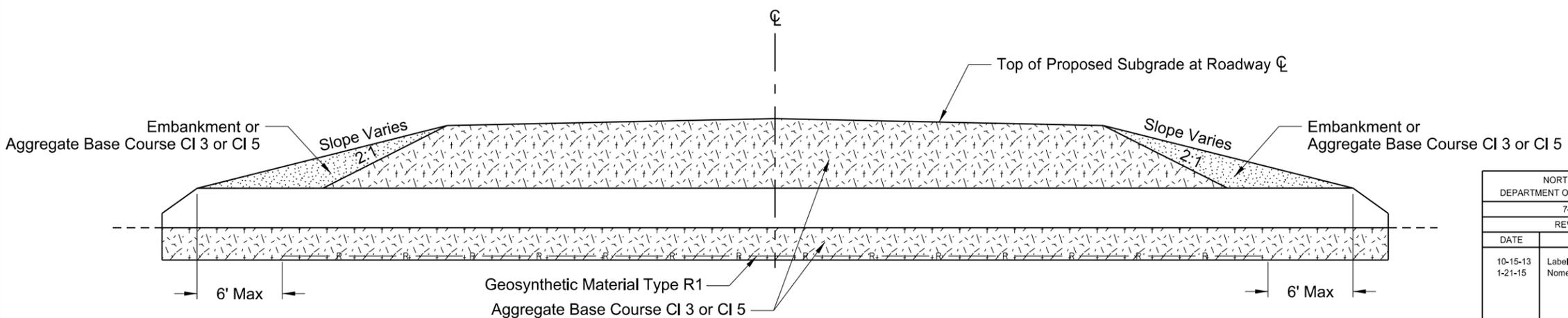
TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL FOR PIPES
4 FEET OR LESS BELOW THE TOP OF THE PROPOSED SUBGRADE



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items

- 1) Pipe*
- 2) Geosynthetic Material Type R1
- 3) Removal of Pipe (if required)

*Included in Pipe Pay Item

- 1) Pipe
- 2) Trench Excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

NOTES:

- 1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
- 2) Embankment may be either Borrow Excavation or Common Excavation - Type A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-26-13	
REVISIONS	
DATE	CHANGE
10-15-13 1-21-15	Label Formatting Nomenclature

This document was originally issued and sealed by
Ron Homer,
Registration Number
PE-2087,
on 1/22/2015 and the original document is stored at the
North Dakota Department
of Transportation

INLET - SPECIAL

D-722-1B

TYPE 1
(See Standard Drawing D-722-1)

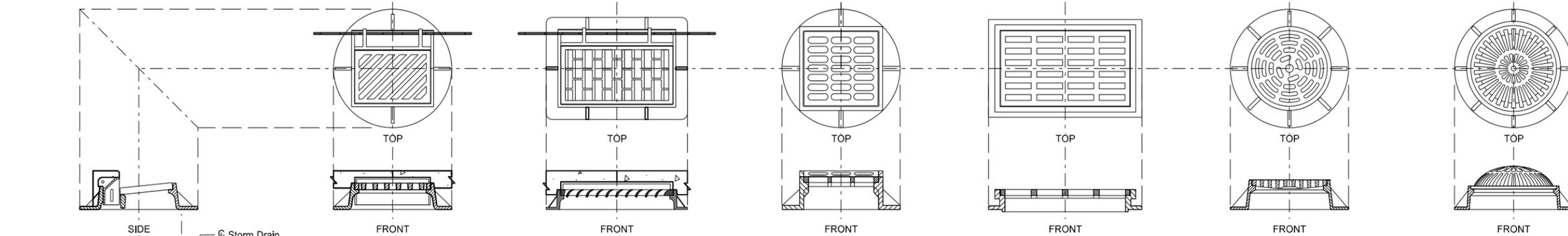
TYPE 2
(See Standard Drawing D-722-2)

MOUNTABLE - TYPE A
(See Standard Drawing D-722-3)

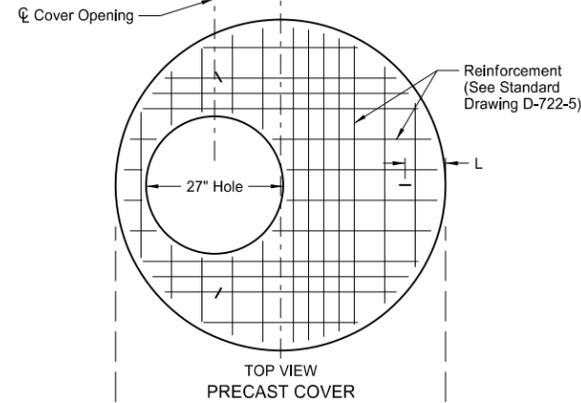
MOUNTABLE - TYPE B
(See Standard Drawing D-722-3)

CATCH BASIN - TYPE A
(See Standard Drawing D-722-1A)

CATCH BASIN - BEEHIVE (6 in. or 9 in.)
(See Standard Drawing D-722-1A)

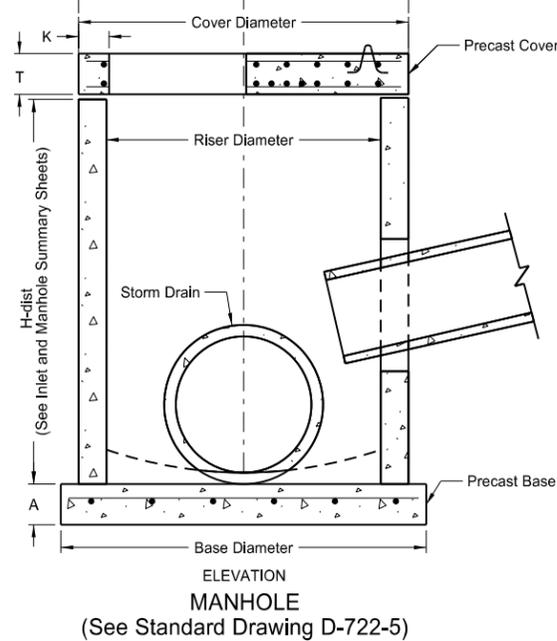


See Note 1.



RISER DIAMETER	COVER DIAMETER	BASE DIAMETER
48"	58"	66"
60"	72"	78"
72"	86"	92"

See Note 4.



PAY ITEMS

48 in. Riser	Inlet Special - Type 1 48 in.	Ea.
	Inlet Special - Type 2 48 in.	Ea.
	Inlet Special Mountable - Type A 48 in.	Ea.
	Inlet Special Mountable - Type B 48 in.	Ea.
	Inlet Special Catch basin 6 in. beehive 48 in.	Ea.
	Inlet Special Catch basin - Type A 48 in.	Ea.
60 in. Riser	Inlet Special - Type 1 60 in.	Ea.
	Inlet Special - Type 2 60 in.	Ea.
	Inlet Special Mountable - Type A 60 in.	Ea.
	Inlet Special Mountable - Type B 60 in.	Ea.
	Inlet Special Catch basin 6 in. beehive 60 in.	Ea.
	Inlet Special Catch basin 9 in. beehive 60 in.	Ea.
72 in. Riser	Inlet Special - Type 1 72 in.	Ea.
	Inlet Special - Type 2 72 in.	Ea.
	Inlet Special Mountable - Type A 72 in.	Ea.
	Inlet Special Mountable - Type B 72 in.	Ea.
	Inlet Special Catch basin 6 in. beehive 72 in.	Ea.
	Inlet Special Catch basin 9 in. beehive 72 in.	Ea.

NOTES:

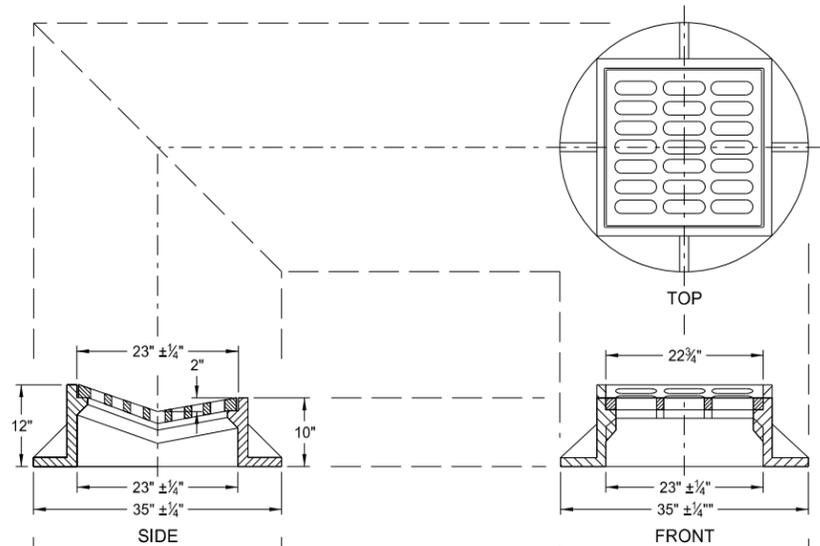
- For inlet casting details, see Standard Drawings D-722-1, D-722-21A, D-722-2, and D-722-3. Other castings, similar in dimension, may be used provided the casting meets the requirements set forth in the referenced Standard Drawings. The grate style shall be as specified on the plans and included in the price bid for "Inlet Special - (casting type & riser size)".
- Metal used in the manufacture of castings shall conform to AASHTO M-105, Class 35B.
- The Class of concrete, aggregate size, and methods of construction for the manhole riser, cover, and base shall be as detailed in Standard Drawing D-722-5.
- See Standard Drawing D-722-5 for manhole riser, cover, and base details, dimensions, and reinforcement requirements.
- The distance between the center of the cover opening and the center of the storm drain shall be noted on the Plan & Profile sheets.
- Manhole steps, if noted on the Plan and Profile sheets, shall be constructed per Standard Drawing D-722-5.
- On projects with P.C.C. pavement, all risers shall be constructed 4 to 5 inches below final elevation and adjusted to final elevation after paving. Adjustments may be made with adjusting rings or cast-in-place concrete. All costs for this adjustment shall be included in the price bid for "Inlet - Special, (casting type & riser size)".

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
03-18-14	
REVISIONS	
DATE	CHANGE

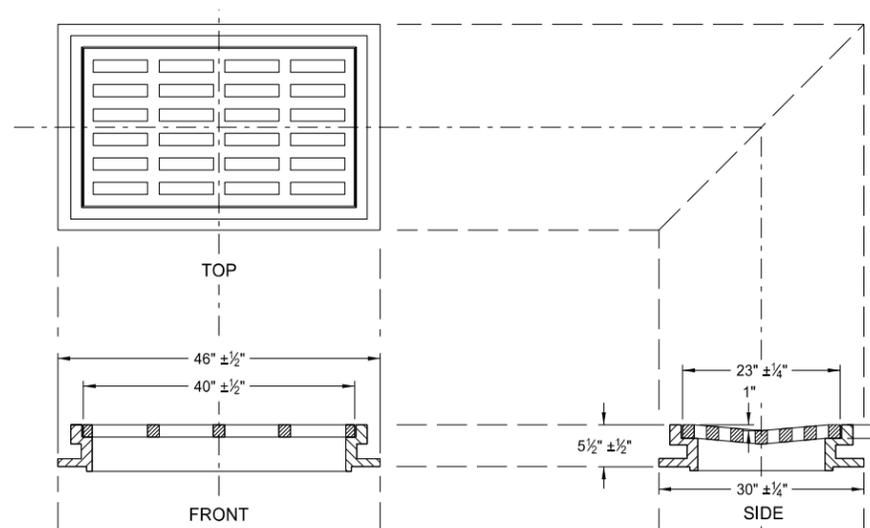
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INLET - MOUNTABLE CURB

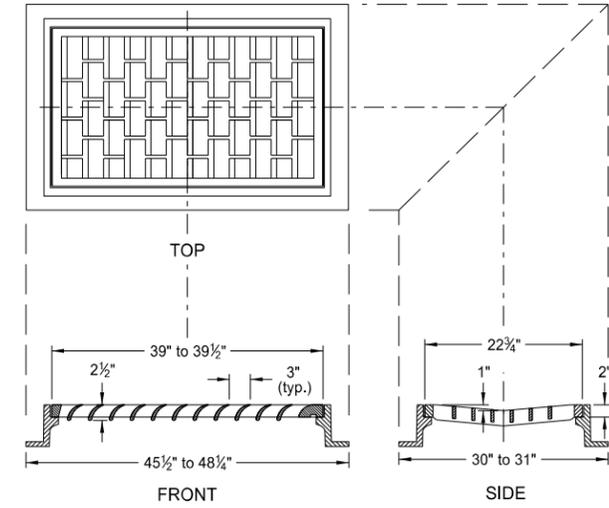
TYPE A
(Minimum Waterway Area 1.5 S.F.)



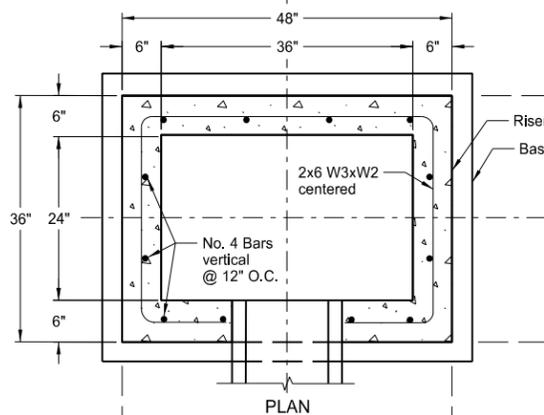
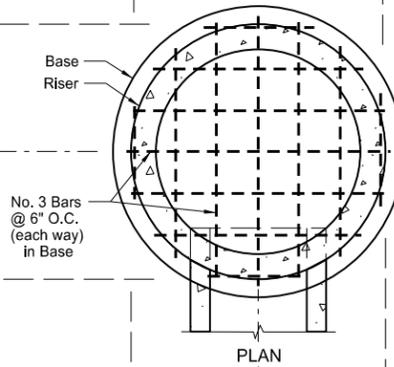
TYPE B
(Minimum Waterway Area 2.3 S.F.)



TYPE B ALTERNATE GRATE
Type "L" Vane Grate
(Minimum Waterway Area 2.3 S.F.)



CASTING DETAILS

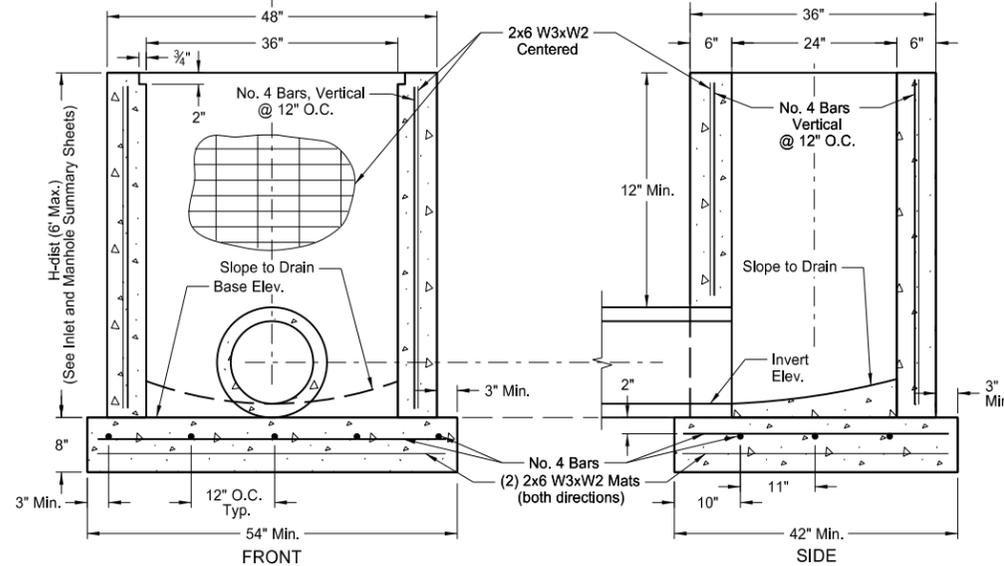
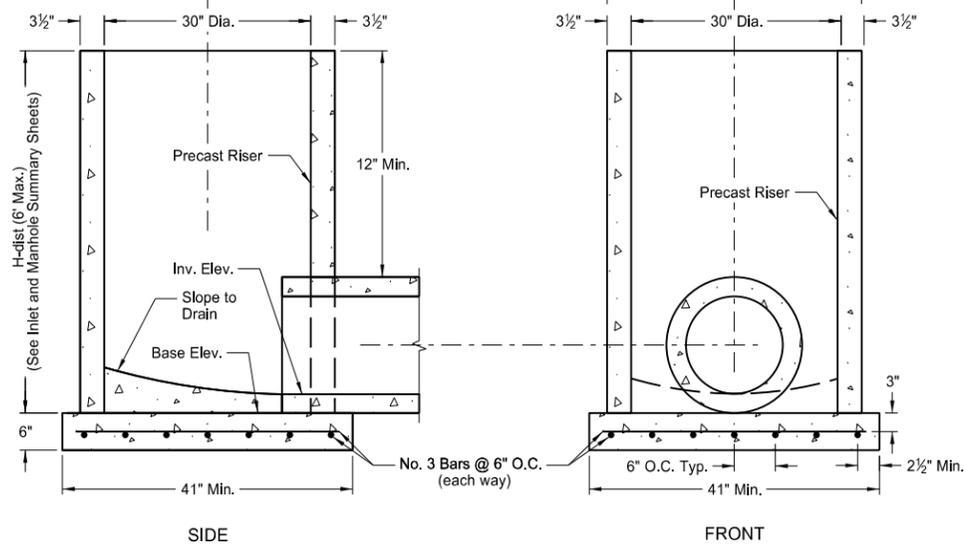


NOTES:

1. Drainage structure castings shall be manufactured in accordance with AASHTO M 306. Metal used in the manufacture of castings shall conform to the requirements of AASHTO M 105 Class 35B.
2. Other castings, similar in dimension, may be used if the casting conforms to the riser section and has the grate style specified on the plans. If modifications to the inlet riser are required to accommodate the similar casting, the contractor must receive written approval from the engineer.
3. Type A precast risers shall be constructed in accordance with AASHTO M 199. Type B precast risers shall be constructed in accordance with ASTM C858.
4. Precast concrete bases shall be constructed in accordance with AASHTO M 199 and shall be reinforced as shown.
5. The contractor shall have the option of using precast or cast-in-place bases. Cast-in-place concrete shall be Class AE-3. Construction shall be in accordance with section 722 of the Standard Specifications.
6. On projects with P.C.C. pavement, all inlet risers shall be constructed 4 to 5 inches below final elevation and adjusted to final elevation after paving. Adjustment may be done with adjusting rings or cast-in-place concrete. All costs for this adjustment shall be included in the price bid for the inlet.

PAY ITEMS

- Inlet Mountable Curb - Type A Ea.
- Inlet Mountable Curb - Type B Ea.



RISER DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-13-14	
REVISIONS	
DATE	CHANGE
07-07-14	Revision to Note 5

This document was originally issued and sealed by
TERRENCE R. UDLAND
Registration Number
PE-2674,
on 07/07/14 and the original document is stored at the
North Dakota Department
of Transportation

INLET - SLOTTED DRAIN

NOTES:

1. Corrugated steel pipe shall conform with applicable sections of NDDOT Standard Specifications and AASHTO M 36.
2. Slotted grate assembly, including rebar and steel plate end, shall be a weldable grade of steel complying with the mechanical requirements of AASHTO M 183 and shall be hot dip galvanized in accordance with AASHTO M 111.
3. All labor, equipment and materials necessary to complete the work, except for the concrete curb and gutter and the inlets, shall be included in the price bid for "Inlet - Slotted Drain (Size)".
4. The non-slotted corrugated pipe angled fitting (see Table 1) shall not be paid for separately but shall be included in the price bid for the Inlet - Slotted Drain.
5. Construction shall be in accordance with Sections 714 and 722 of the Standard Specifications.

PAY ITEMS

Inlet - Slotted Drain, 12 In	L.F.
Inlet - Slotted Drain, 15 In	L.F.
Inlet - Slotted Drain, 18 In	L.F.
Inlet - Slotted Drain, 24 In	L.F.
Inlet - Slotted Drain, 30 In	L.F.
Inlet - Slotted Drain, 36 In	L.F.

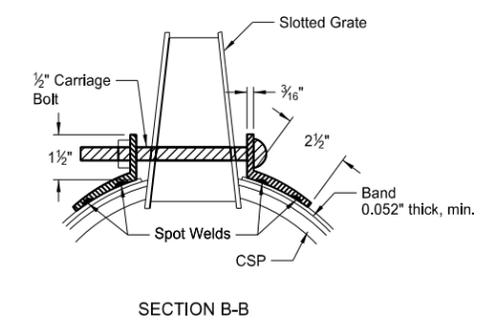
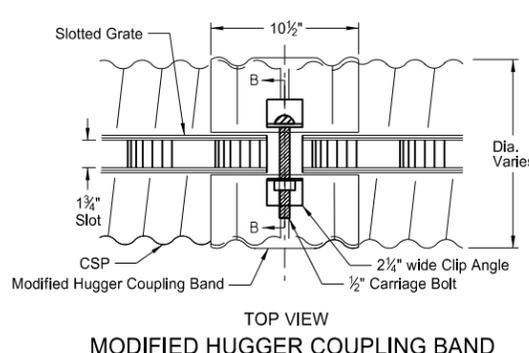
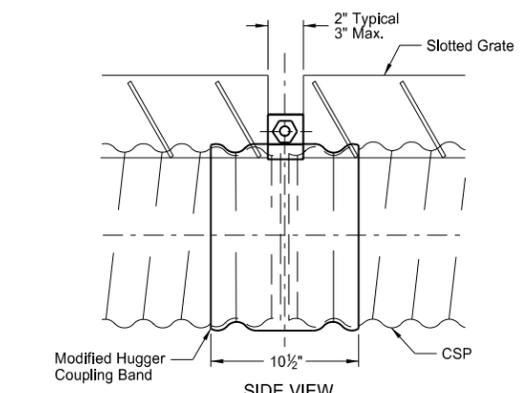
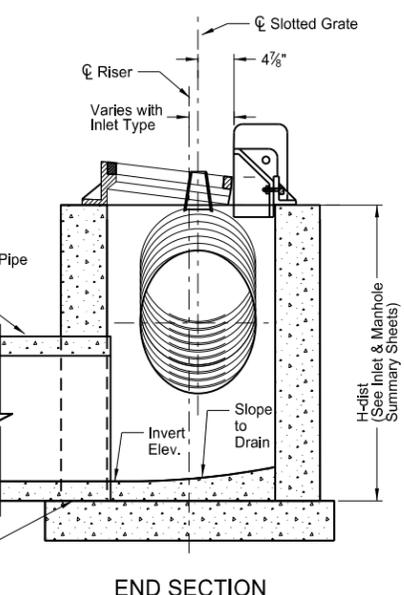
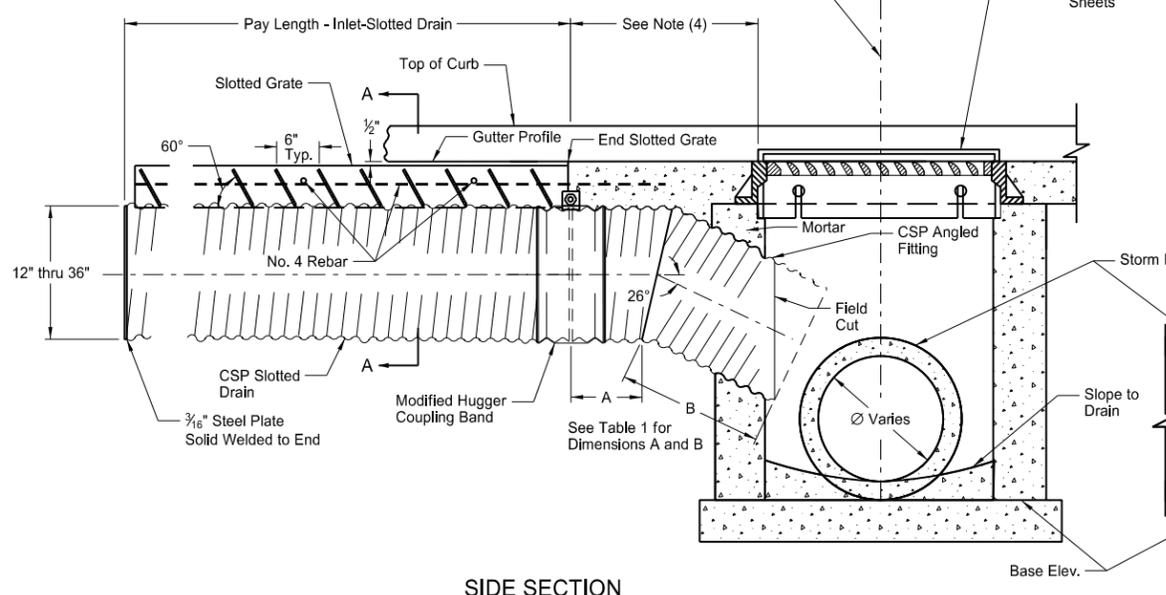
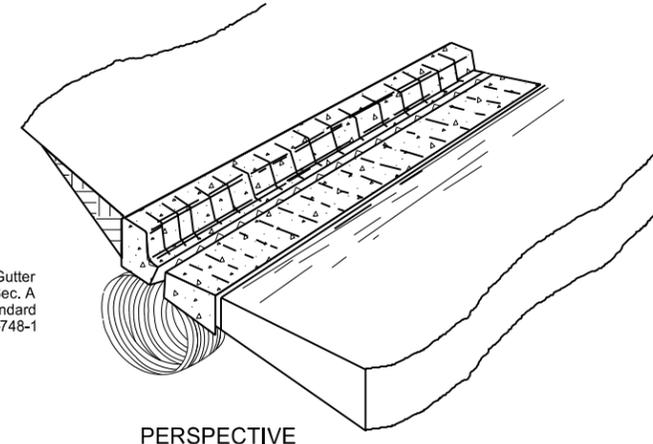
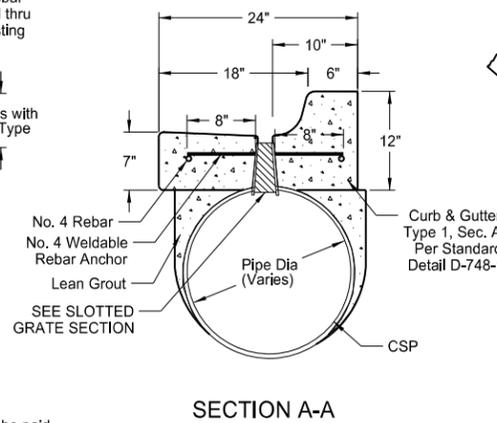
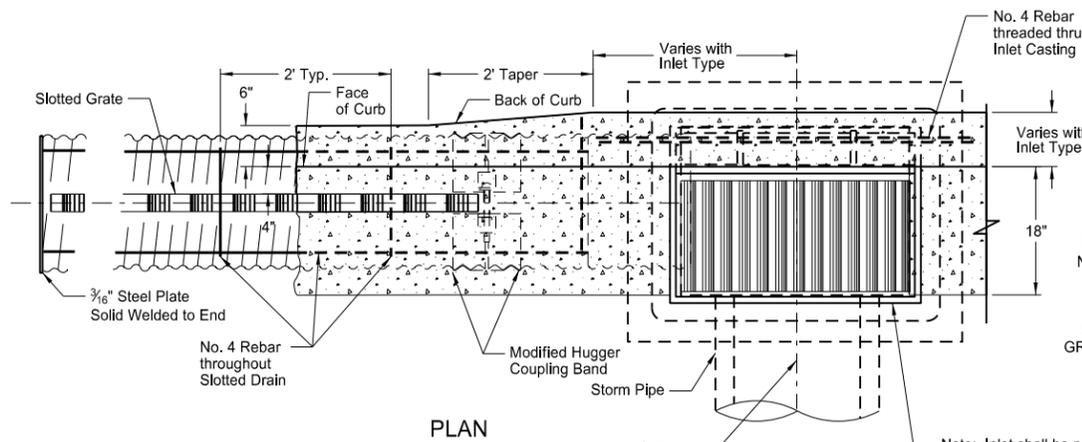
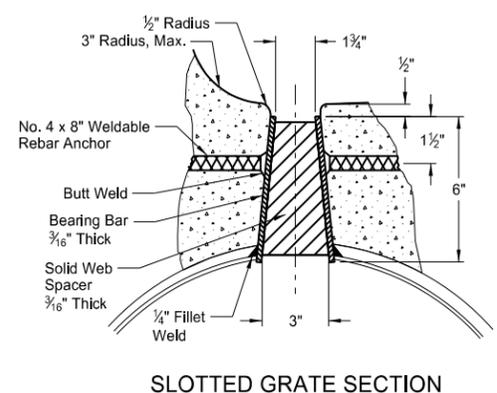
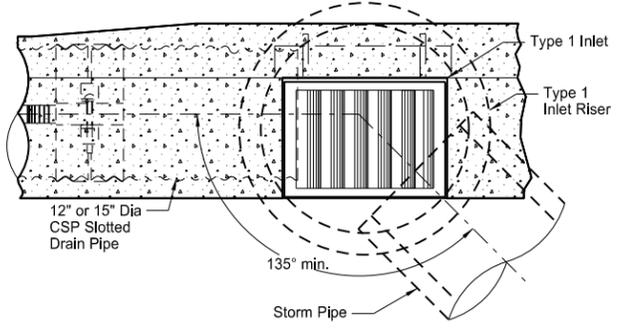


TABLE 1
CSP Angled Fitting Dimensions

Slotted Drain Pipe Dia (in.)	A (in.)	B (in.)							
		Inlet		Inlet - Special					
		Type 1	Type 2	Type 1 48"	Type 1 60"	Type 1 72"	Type 2 48"	Type 2 60"	Type 2 72"
12	12	18(A)	18	35	41	42	31	36	37
15	12	18(A)	18	36	42	43	31	37	38
18	12		18	37	42	43	32	38	39
24	24				44	45		39	41
30	24				45	46		41	42
36	24					48			44

(A) 135° min. angle required between CSP and Storm Pipe for Type 1 Inlet - see Type 1 Inlet Connection Detail

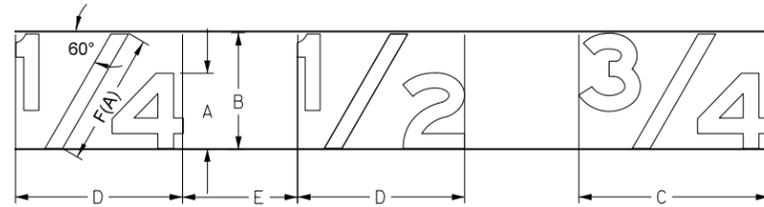


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
03-17-2014	
REVISIONS	
DATE	CHANGE

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LETTER AND ARROW DETAILS FOR VARIABLE LENGTH SIGNS

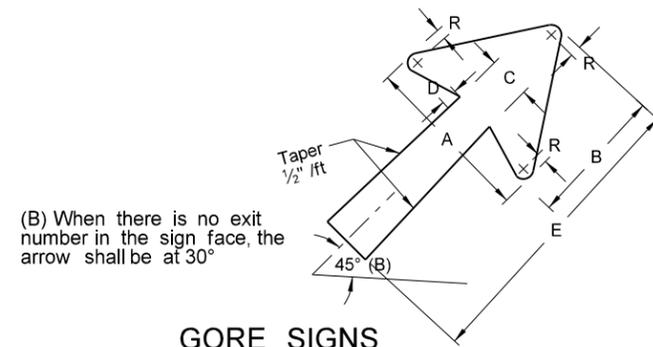
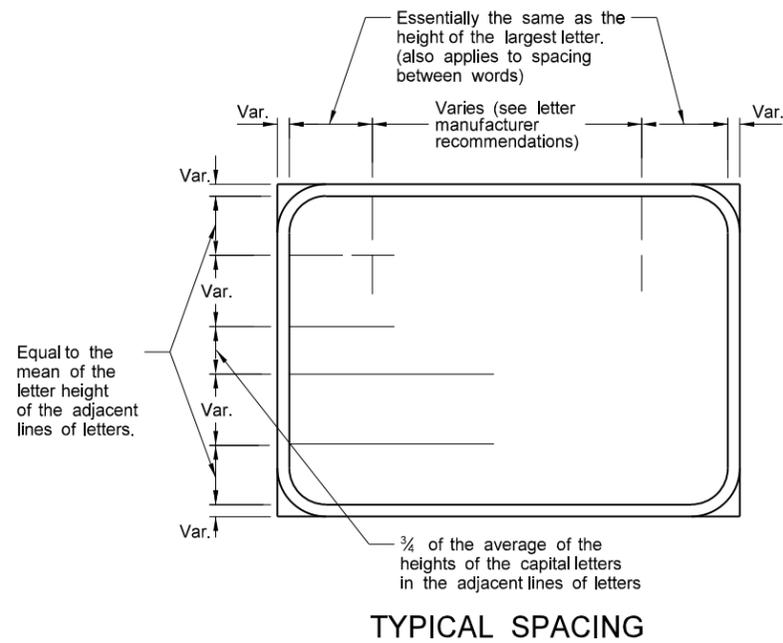
D-754-9



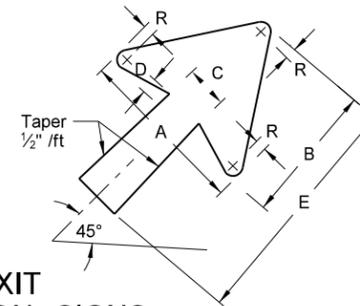
SIZE OF THE FRACTION IS DETERMINED AS FOLLOWS:

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

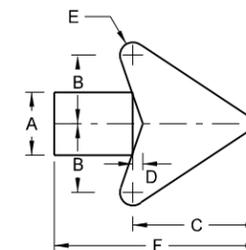
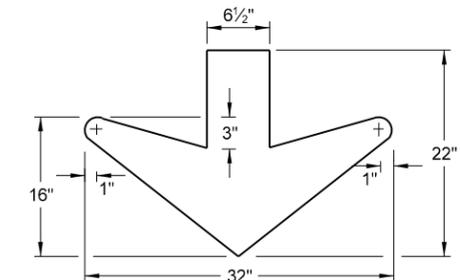
(A) Diagonal stroke of fraction is to be centered optically.



"EXIT" LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15 1/8"	11 1/16"	3 3/4"	1 5/16"	25"	13 1/16"
10" - 13 1/3"	18 1/4"	14"	4 1/2"	1 1/2"	30"	3 1/4"



LETTER SIZE (Upper Case)	A	B	C	D	E	R
8"	15 1/8"	11 1/16"	3 3/4"	1 5/16"	17"	13 1/16"
10" - 13 1/3"	18 1/4"	14"	4 1/2"	1 1/2"	20"	3 1/4"
16" - 20"	22 1/4"	17"	5 3/8"	1 3/4"	25"	1"

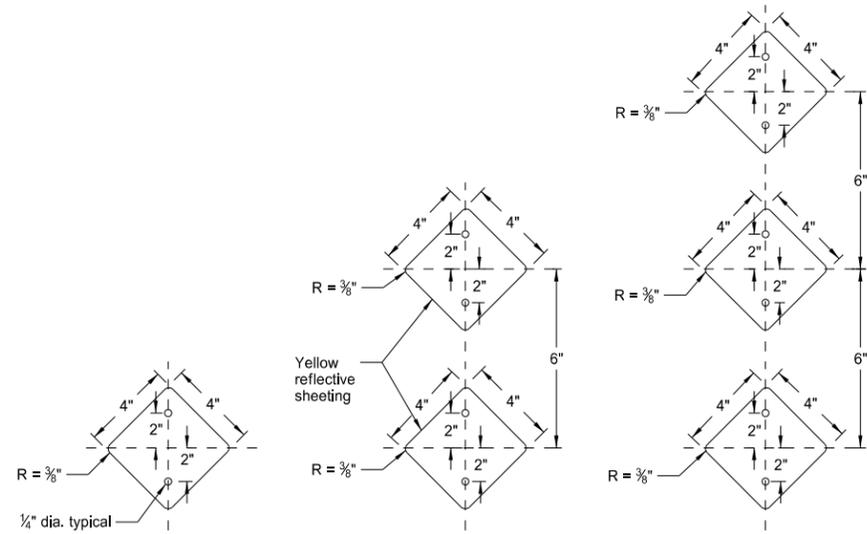


LETTER SIZE (Upper Case)	A	B	C	D	E	F
4"	1 3/4"	2"	3 9/16"	5/16"	3/8"	6"
6"	2 3/4"	3"	5 9/16"	7/16"	9/16"	9"
8"	3 1/2"	4"	7 1/8"	9/16"	1 1/16"	12"
12"	5 1/4"	6"	10 5/8"	1 3/16"	1 1/16"	18"

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

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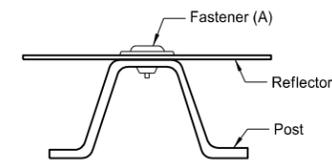
REFLECTORIZED DELINEATORS



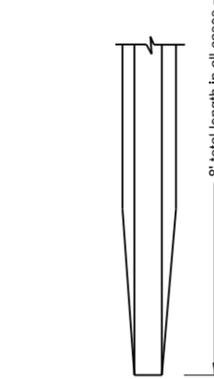
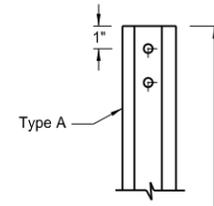
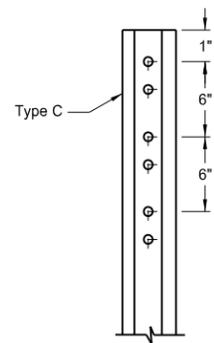
Main line
One reflector
(Type A delineator)

Ramps
Two reflectors
(Type B delineator)

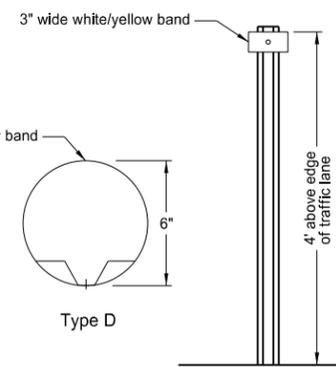
Narrow Bridges
Three reflectors
(Type C delineator)



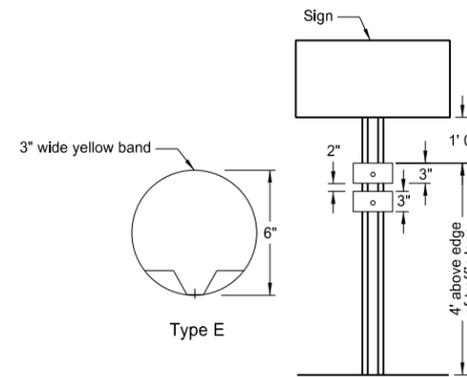
Delineator Attachment Detail



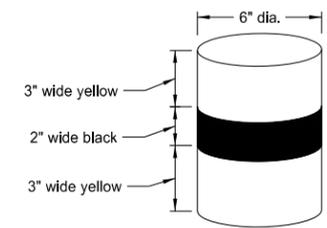
U-type Post



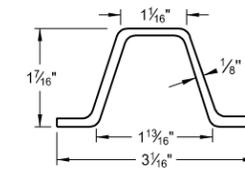
Median
One reflector
(Type D delineator)



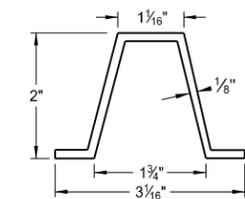
Median
One or Two reflectors
(Type E delineator)



Alternate Type E



Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

Delineator Details
Type A, B, and C

Installation: Posts are to be installed along the right shoulder line unless shown otherwise on the plans.

Reflectors: Reflector shall be the same color as the adjacent pavement marking.

Spacing: Delineator spacing along main line tangents and curves with radius greater than 11500' (less than 0° 30') shall be at 528' centers. Curves with a radius less than 11500' but greater than 1200' the spacing shall be at 264' centers. With curves less than 1200' use spacing (S) = 3*√R-50

Type E

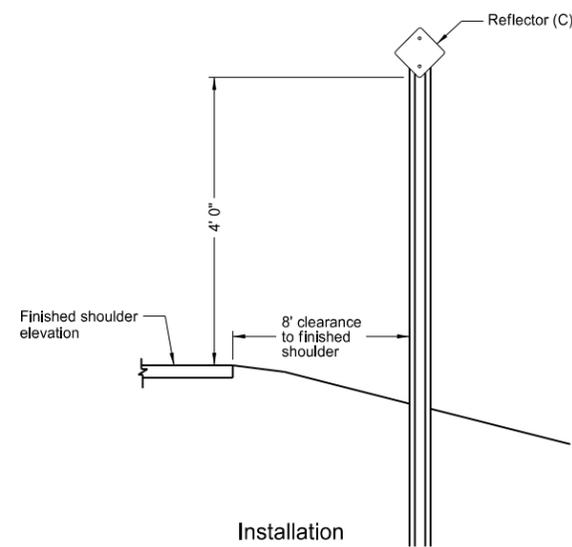
Alternate: One unit band consisting of two yellow stripes separated by a 2" black stripe may be used in place of two 3" yellow bands.

(A) The fastener shall be 3/8" dia. with flat washer having a min. outside dia. of 1 3/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

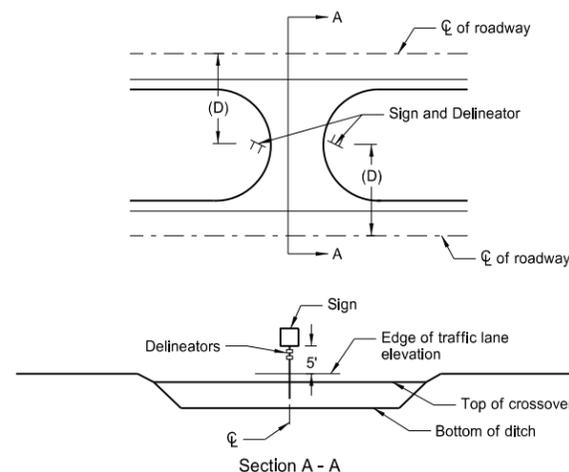
(B) The contractor may drill only those holes required to attach the number of reflectors on that post, or drill all the posts the same so that any number of reflectors may be added.

(C) Reflector to be mounted facing traffic at an angle of 93° away from oncoming traffic.

(D) The median width may vary. The sign and delineator assembly shall be placed in the median crossover an equal distance from each roadway.



Installation



Section A - A
Median Crossovers
Signing and Delineation system

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

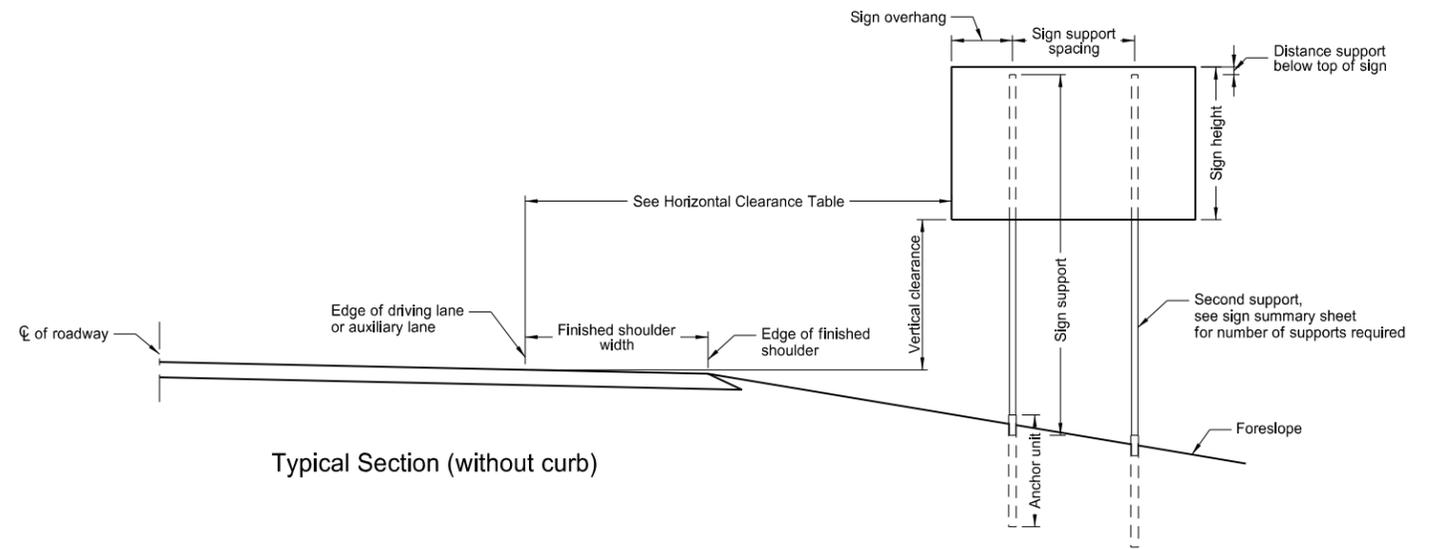
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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

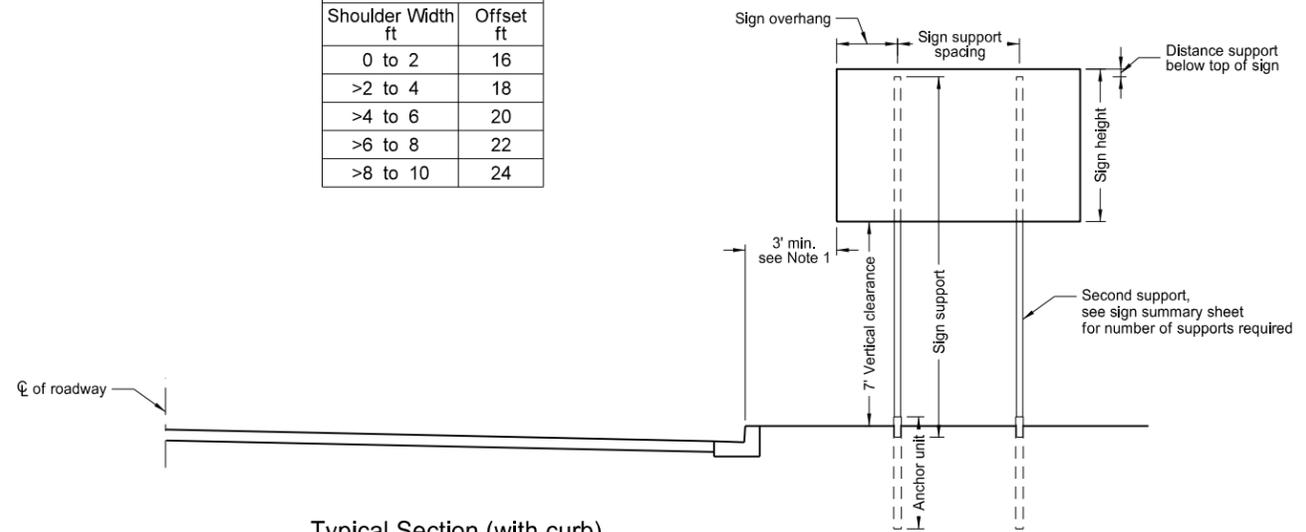
Notes:

1. Curbed Roadways: The clearance from the face of the curb should be 3' except where right of way or sidewalk width is limited, a minimum clearance of 2' shall be provided. The horizontal clearance may need to be increased to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Signs installed at the side of the road in rural districts shall be at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7'.
- Signs on expressways shall be installed with a minimum height of 7'.
- Adopt-a-highway signs installed on Freeways shall be at least 7' above the edge of the driving lane.
- The vertical clearance shall have a maximum height of 6" above the vertical clearance specified above.
3. Offset signs: Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5' above the edge of the driving lane.
4. The clearance from edge of shared use path to edge of sign should be 3' except where width is limited, a minimum clearance of 2' shall be provided.

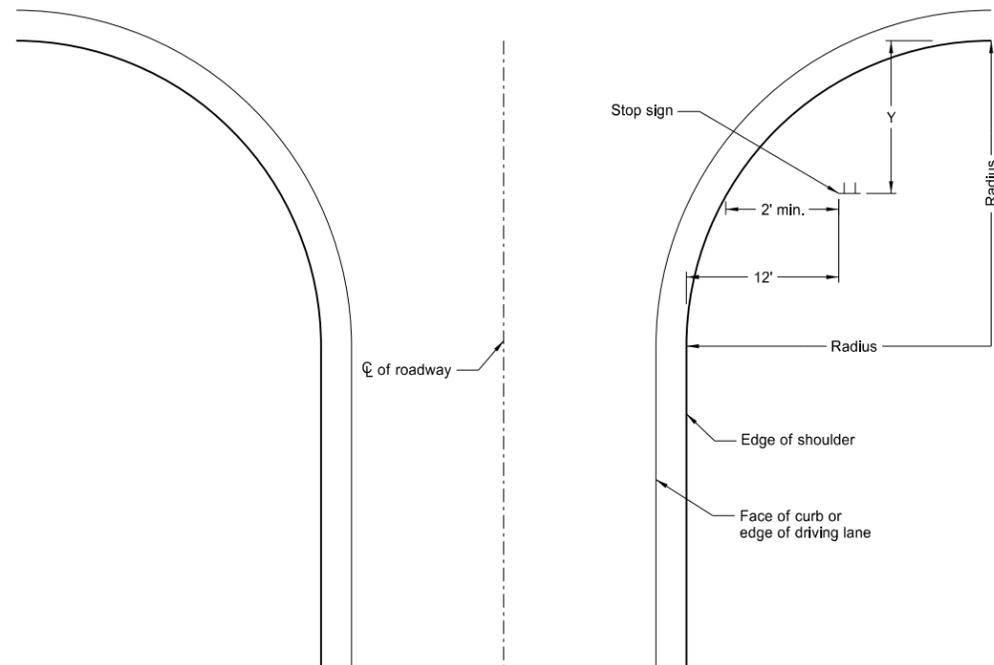


Typical Section (without curb)

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



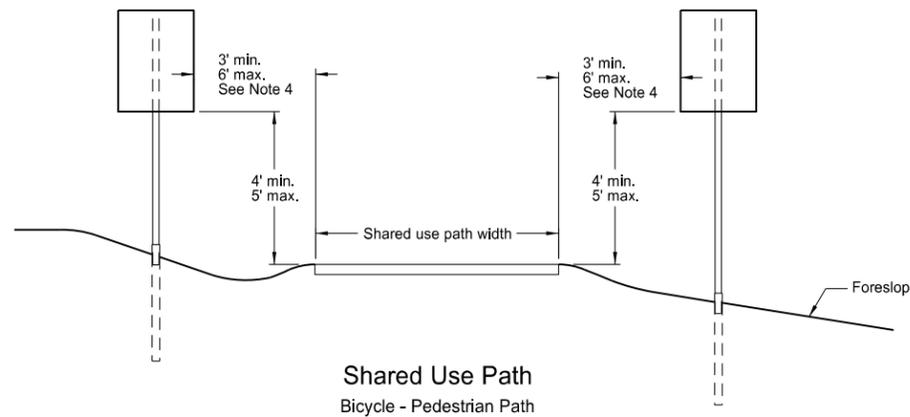
Typical Section (with curb)
Residential or Business District



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



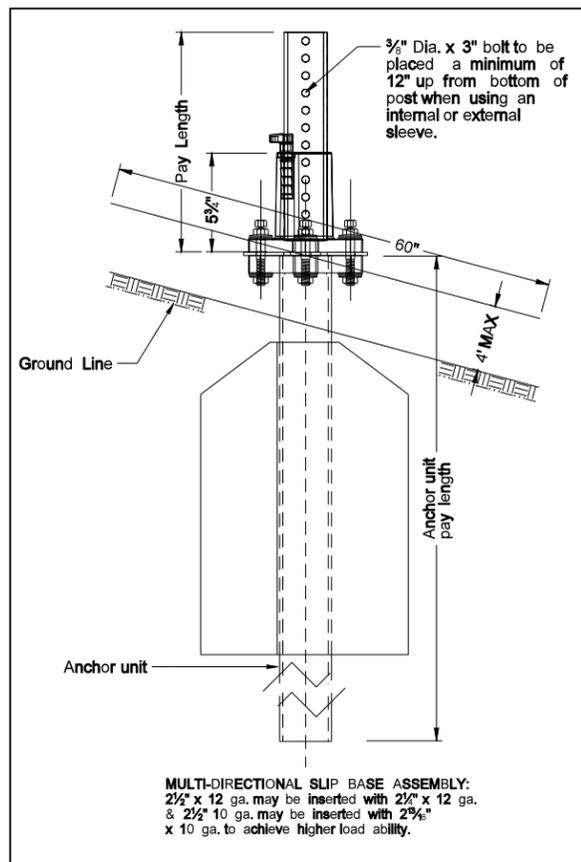
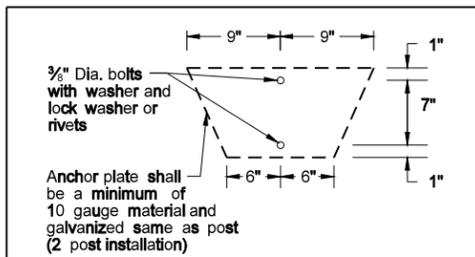
Shared Use Path
Bicycle - Pedestrian Path

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

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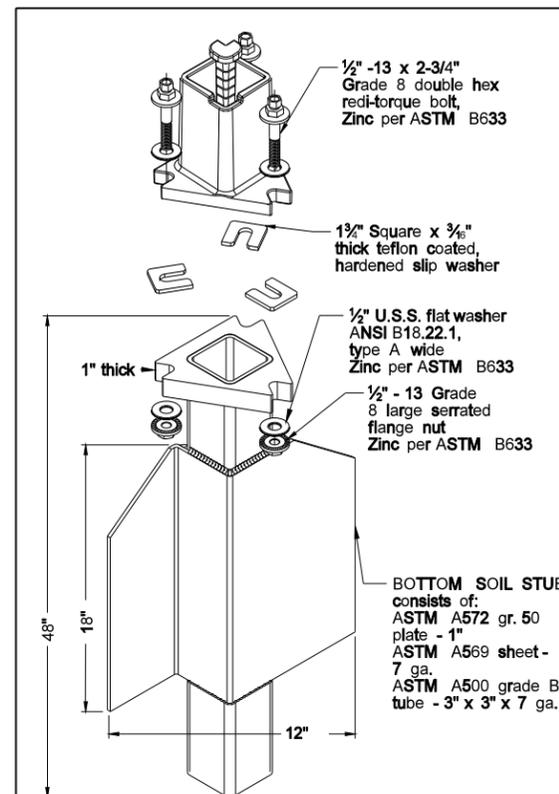
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)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

(B) - The 2 1/2", 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) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

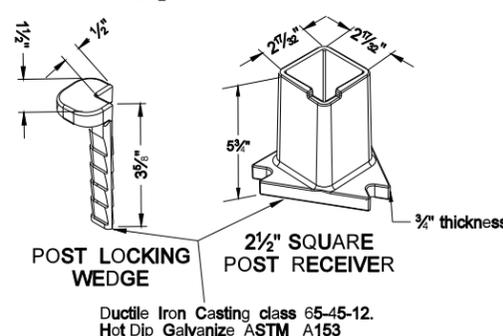


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube

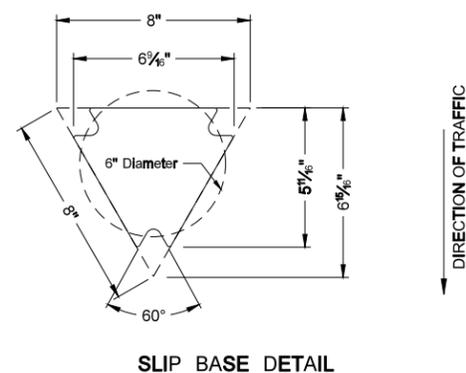


SLIP BASE FOR 2 1/2" POST



2 1/2" SQUARE POST RECEIVER

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



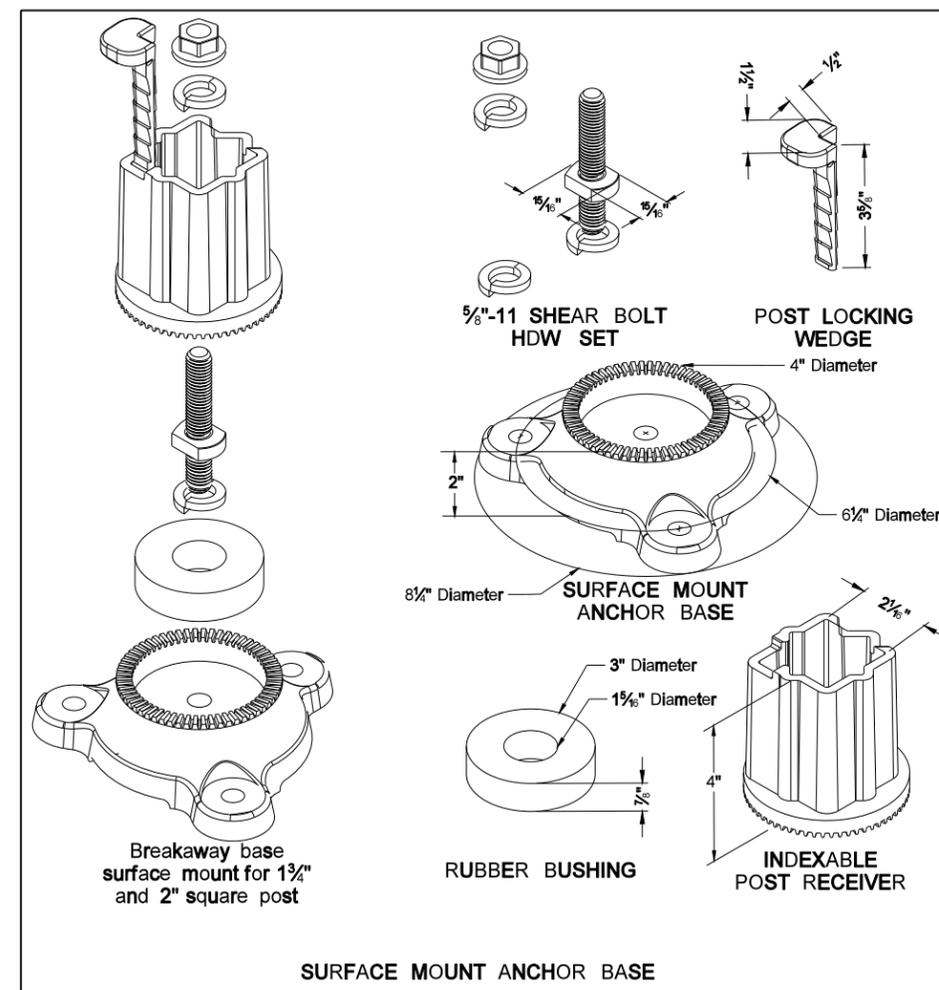
SLIP BASE DETAIL

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
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/2 x 2 1/2	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783

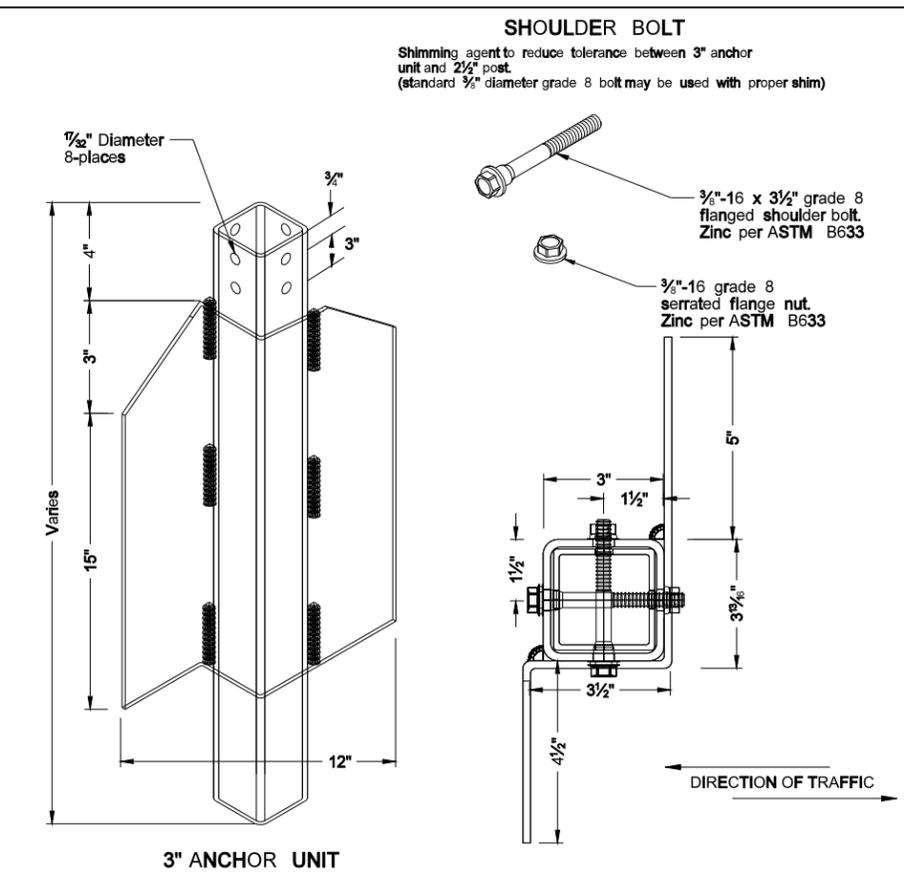
The 2 3/8" size 10 gauge is shown as 2.19" size on the plans; The 2 1/2" size is shown as 2.51" size on the plans.

NOTE:

- 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.
- Anchor material shall be 7 gauge H.R.P.O. Commercial quality ASTM A569 and 3" x 3" x 7" gauge 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.
- When used in concrete sidewalk, anchor shall be the same concept without the wings.
- Four post signs shall have over 8" between the first and fourth posts.
- Installation procedures as per manufacturers recommendation.
- Concrete fasteners for surface mount breakaway base shall be a minimum 1/2" diameter x 4" grade 8.



SURFACE MOUNT ANCHOR BASE



3" ANCHOR UNIT

SHOULDER BOLT
 Shimming agent to reduce tolerance between 3" anchor unit and 2 1/2" post. (standard 3/8" diameter grade 8 bolt may be used with proper shim)

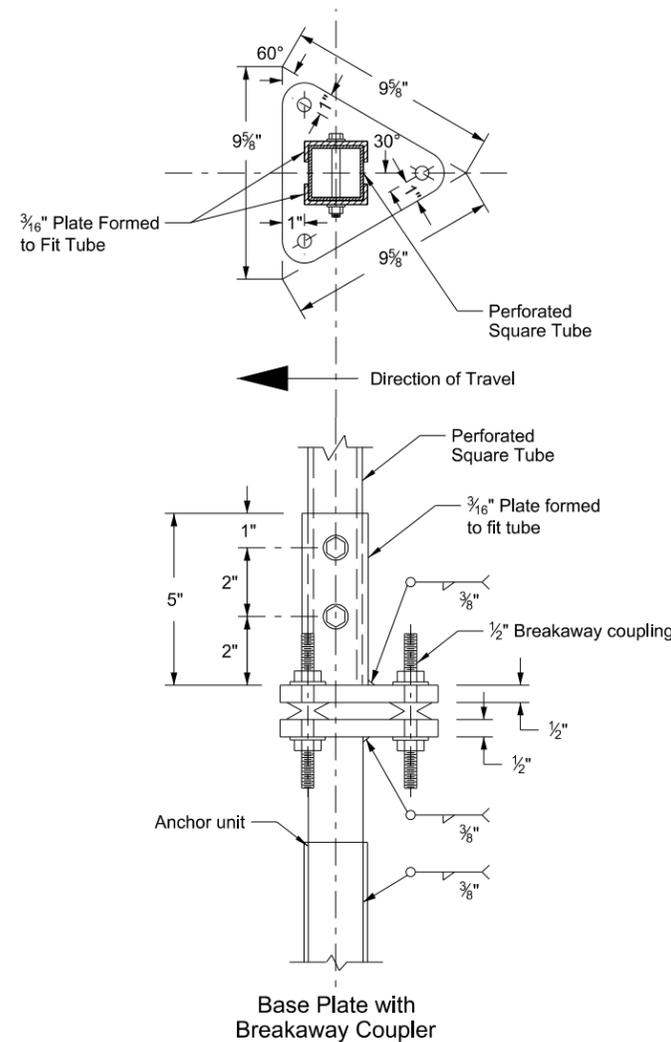
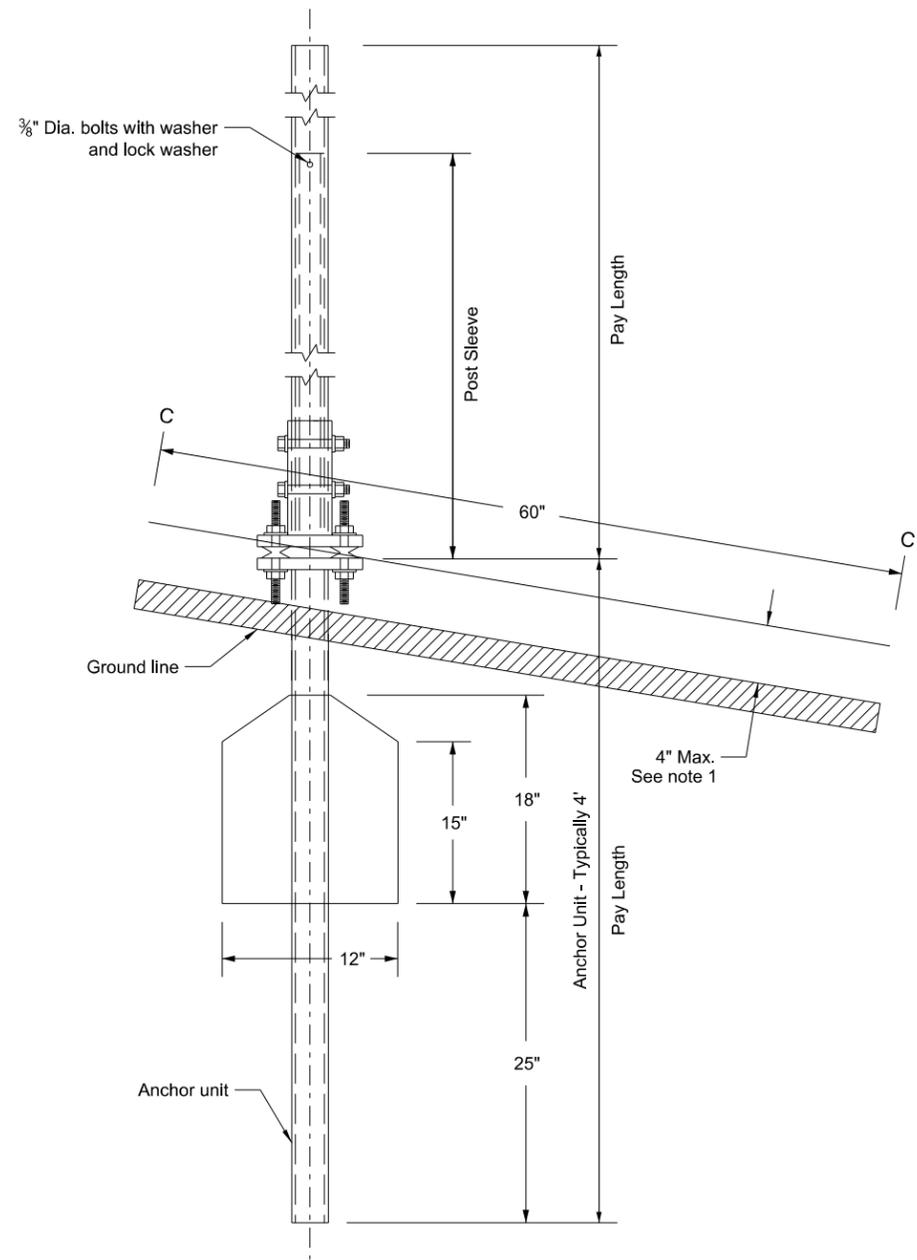
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE

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Breakaway Coupler System for Perforated Tubes

Notes:

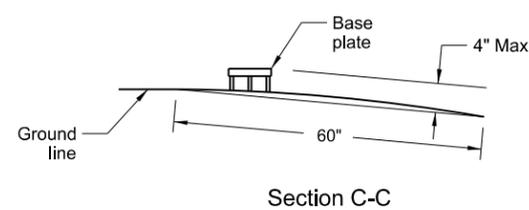
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
- Anchor unit shall be the same size as the post and shall have the same specification as the post.
- Four post signs shall have over 8' between the first and fourth post.
- 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.



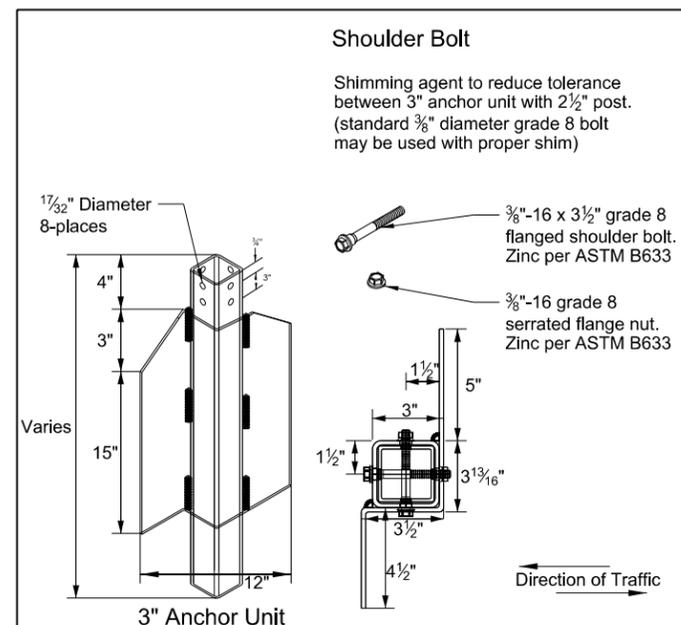
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2	12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

(B) - The 2 1/2" 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



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.



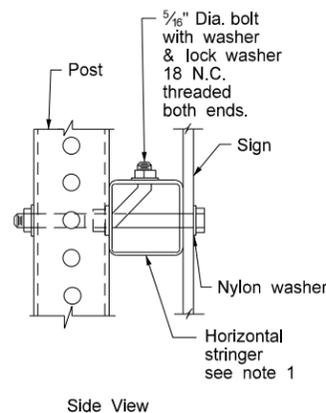
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

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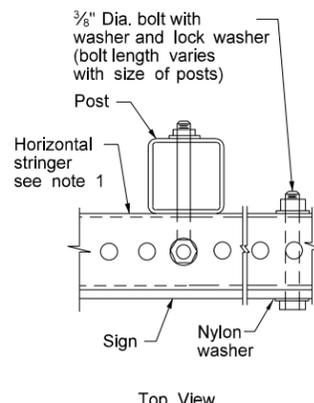
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/16" ± 1/65" and 10 gauge thickness.
- 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.
- 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.
- 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.

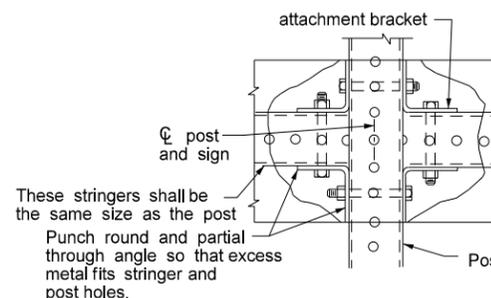


Side View



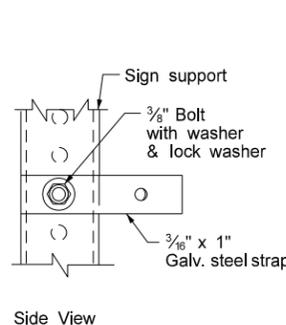
Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

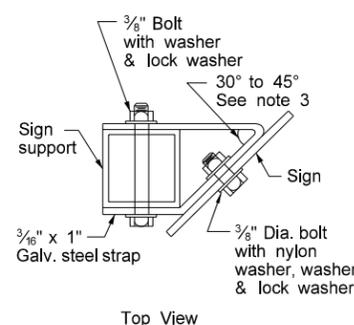


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

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

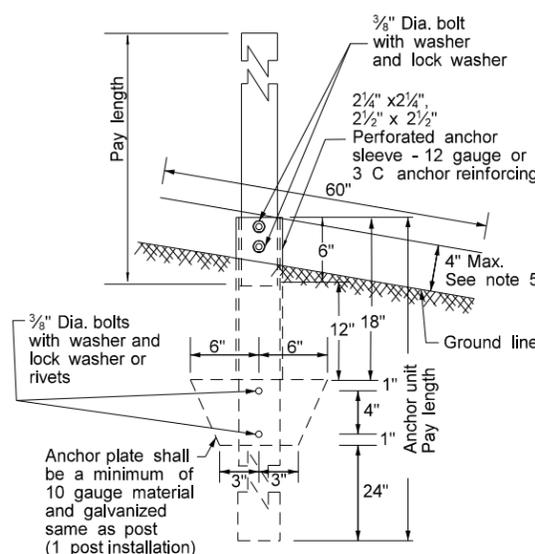


Side View

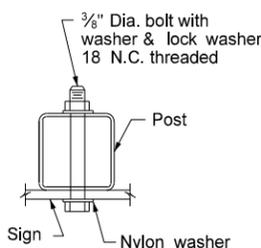


Top View

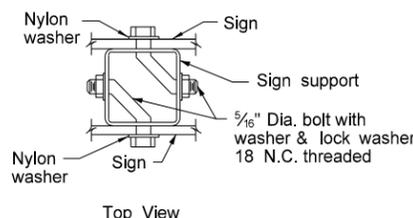
STRAP DETAIL



ANCHOR UNIT AND
POST ASSEMBLY

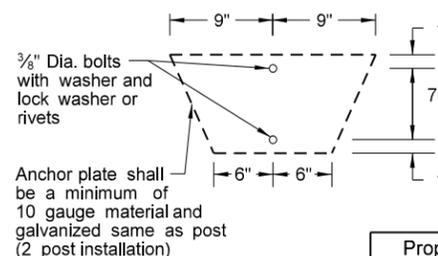


BOLT MOUNTING



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
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783

The 2 3/8" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size is shown as 2.51" size on the plans.

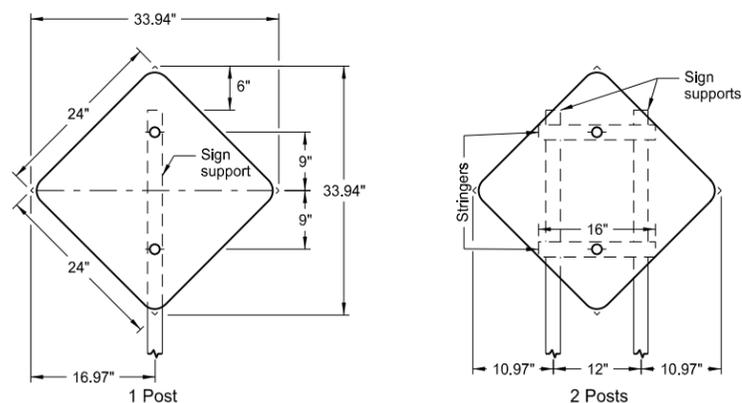
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2 1/2(D)	12	Yes		7
1	2 1/2	12	2 1/4	12	Yes		7
2	2 1/2	10			Yes		7
2	2 1/4	12	2 1/2(D)	12	Yes		7
2	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/2	12			Yes		7
3 & 4	2 1/2	10			Yes		7
3 & 4	2 1/2	12	2 1/4	12	Yes		7
3 & 4	2 1/4	12	2 1/2(D)	12	Yes		7
3 & 4	2 1/2	10	2 3/8	10	Yes		7

(B) - The 2 1/2", 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) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

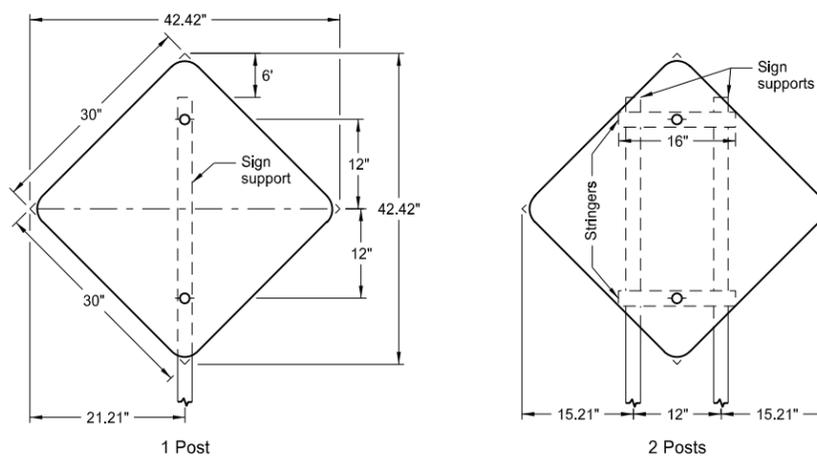
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3

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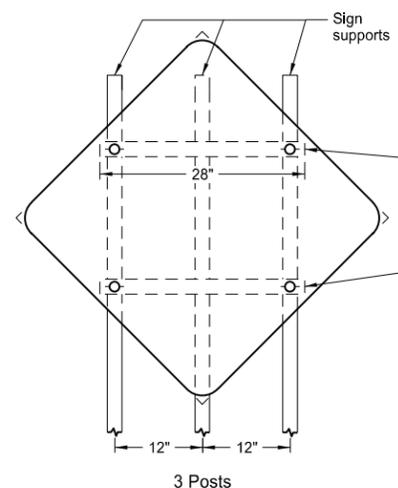
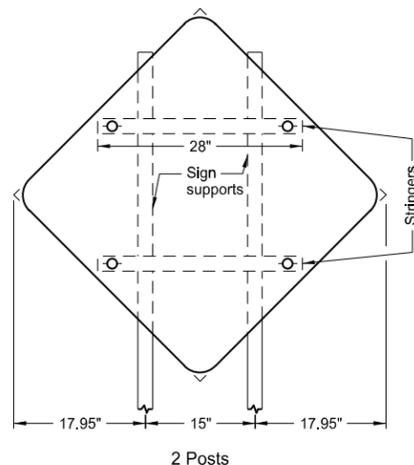
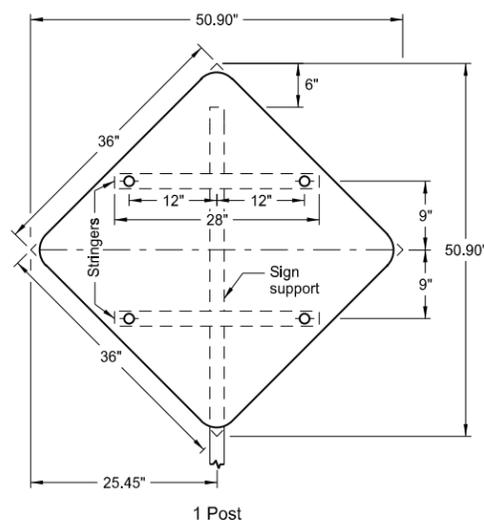
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



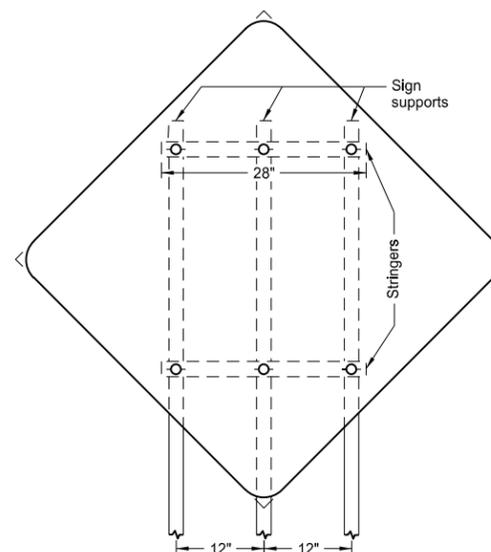
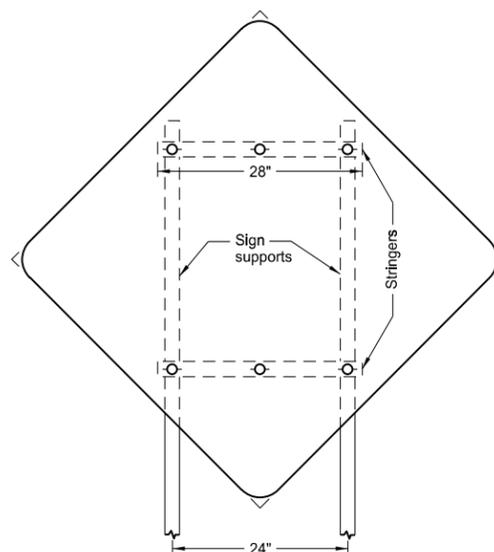
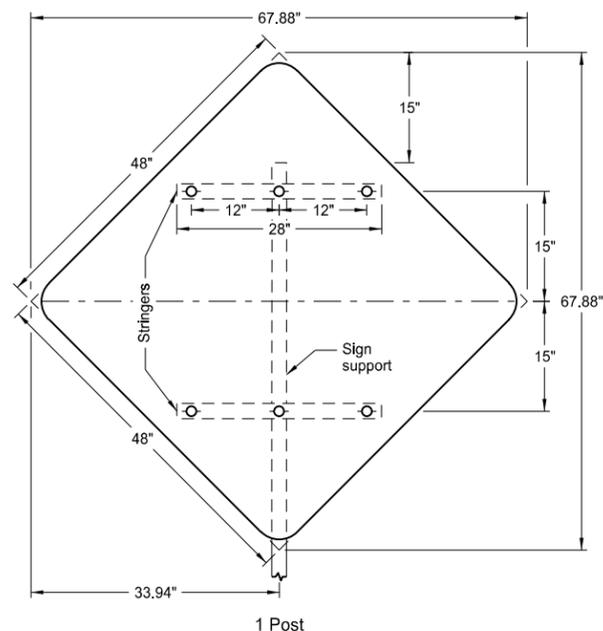
Assembly No. 18



Assembly No. 19



Assembly No. 20



Assembly No. 21

Notes:

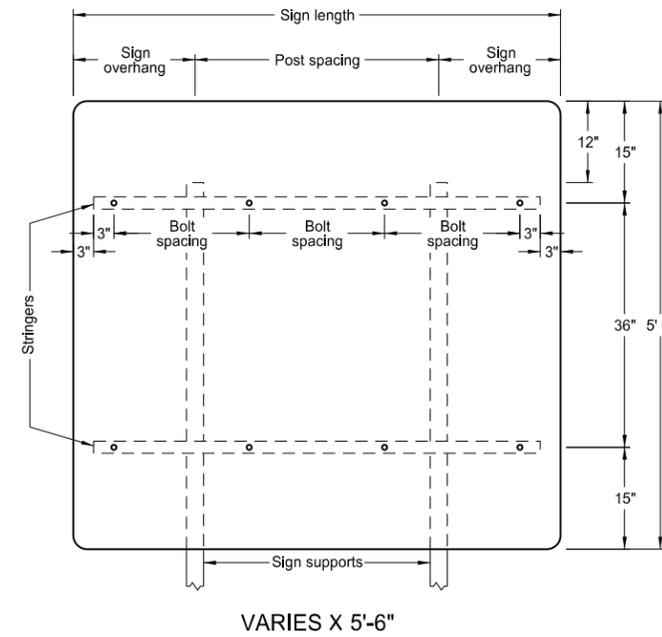
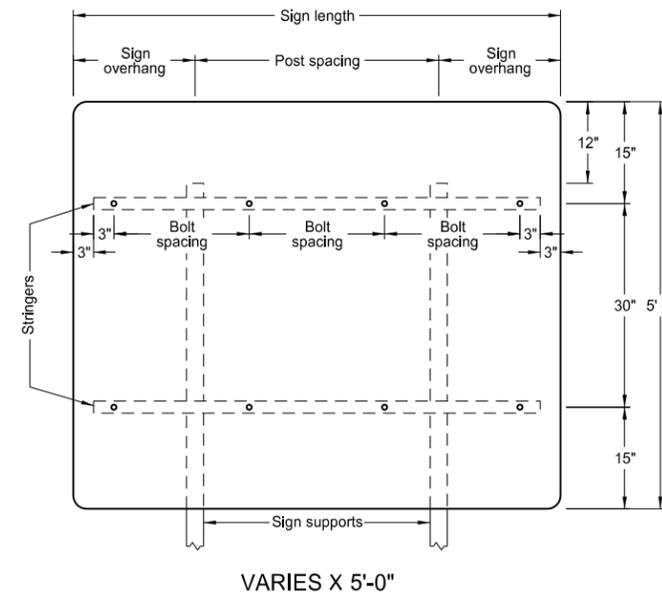
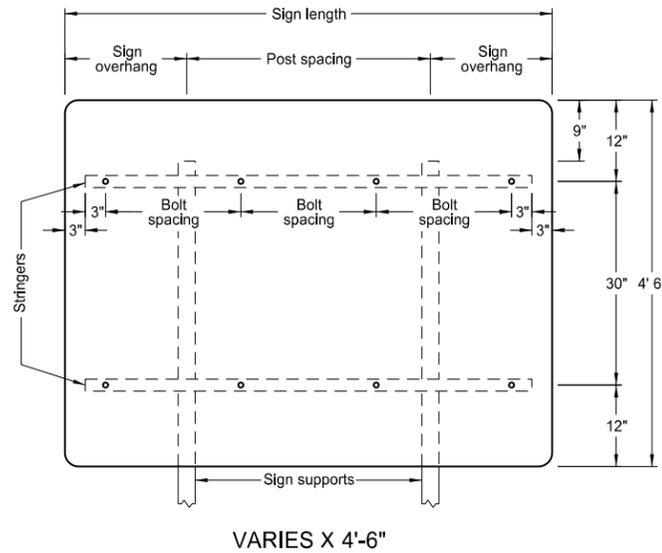
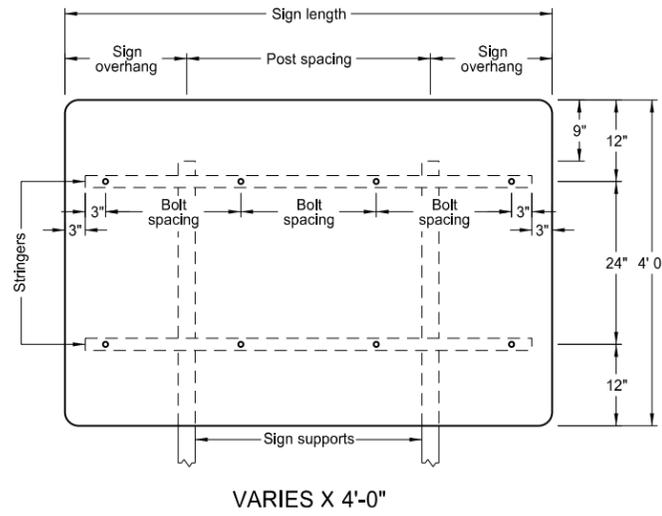
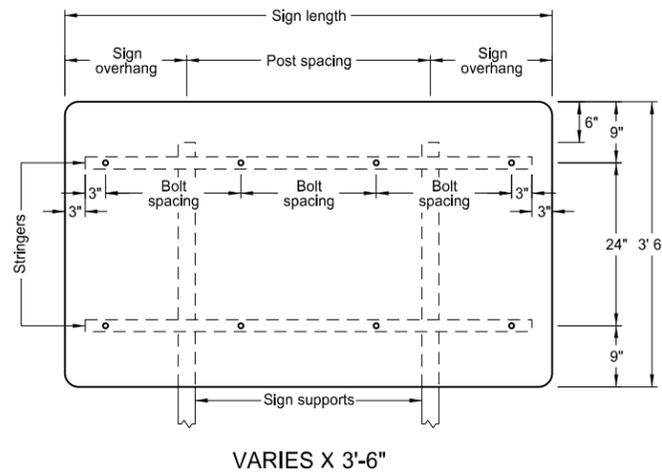
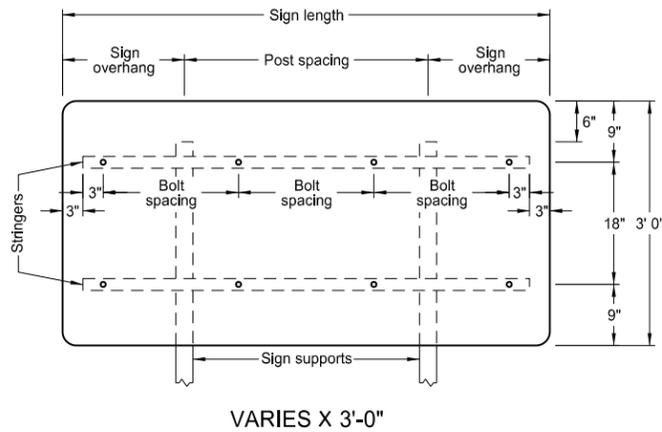
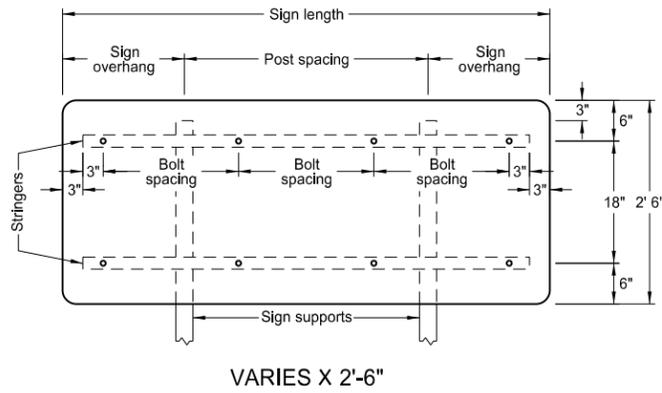
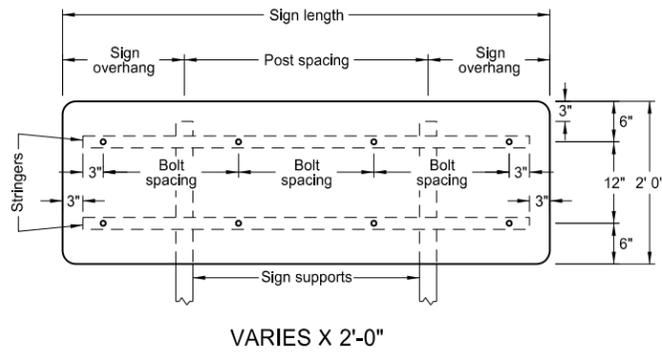
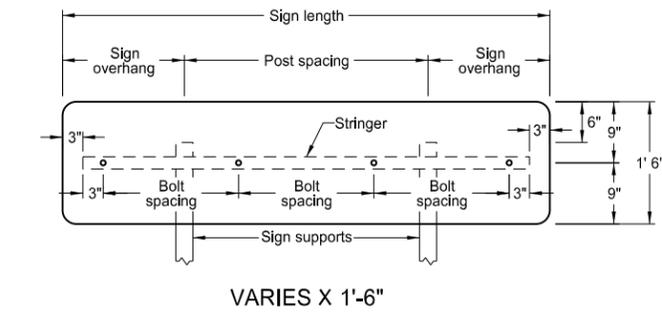
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.

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



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"

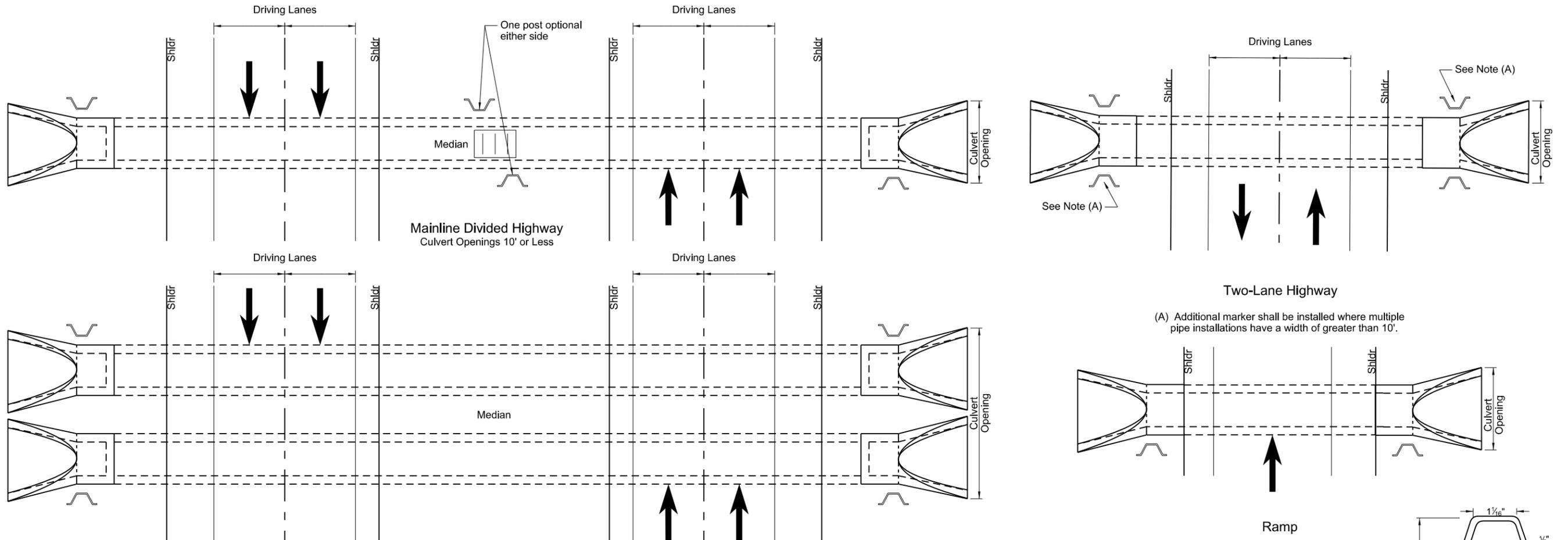
- Notes:
1. The minimum sign backing material thickness shall be 0.100 inch.
 2. Perforated square tube stringer shall be 1½" x 1½".
 3. All holes shall be punched round for ⅜" bolt.

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

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OBJECT MARKERS - CULVERTS

D-754-83

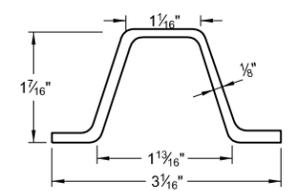


Post Location

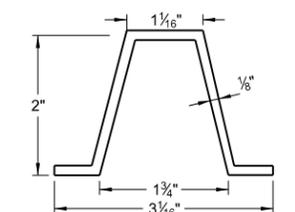
Mainline Divided Highway Culvert Openings Greater than 10' Multiple Installations

Top 12 inches painted black

Top 12 inches painted black



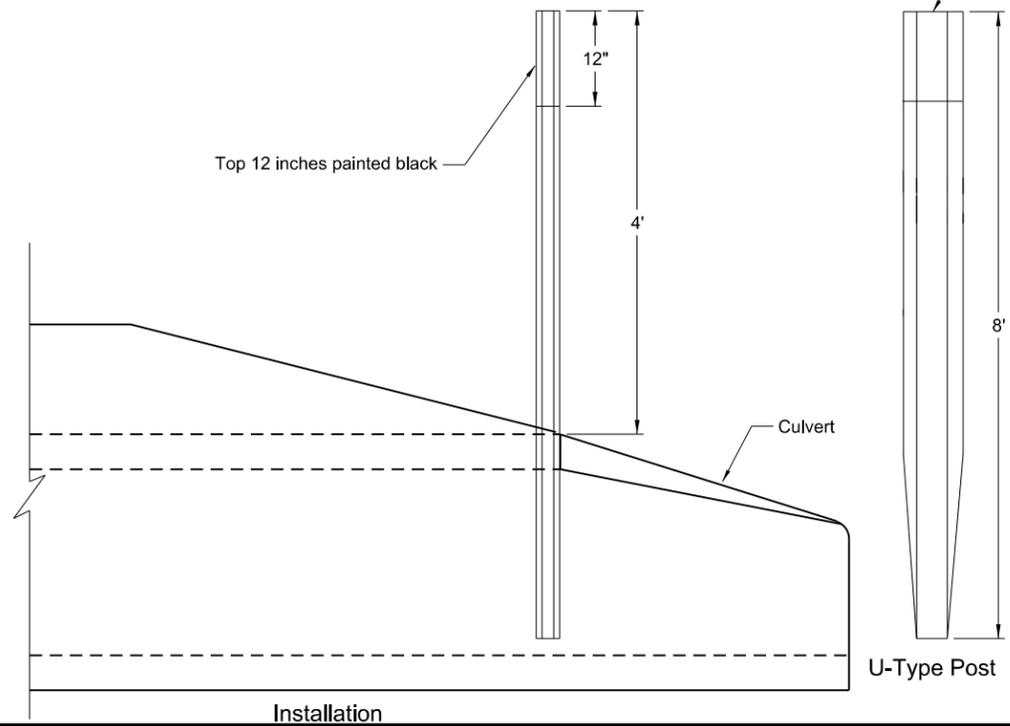
Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

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".

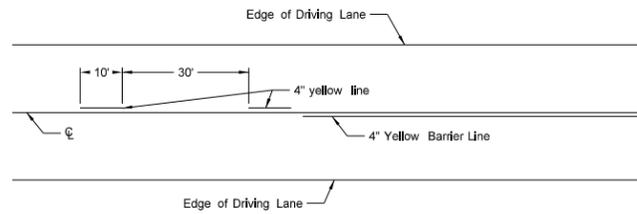


Installation

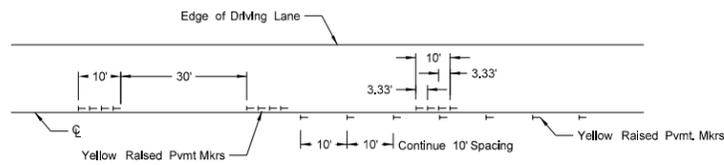
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION 8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes

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SHORT-TERM PAVEMENT MARKING

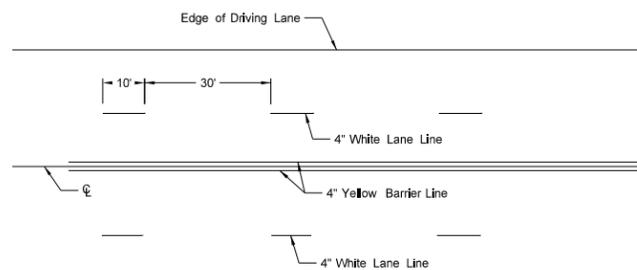


Painted or Tape Lines

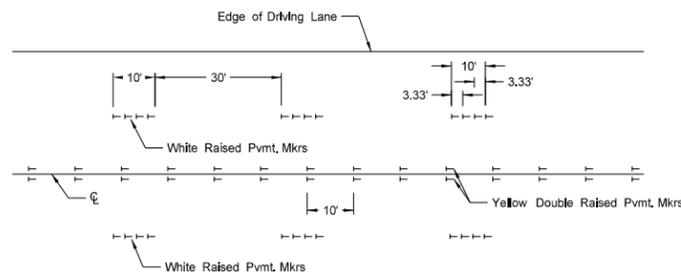


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

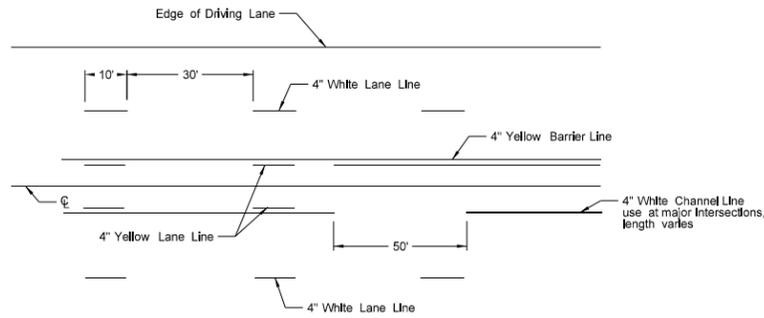


Painted or Tape Lines

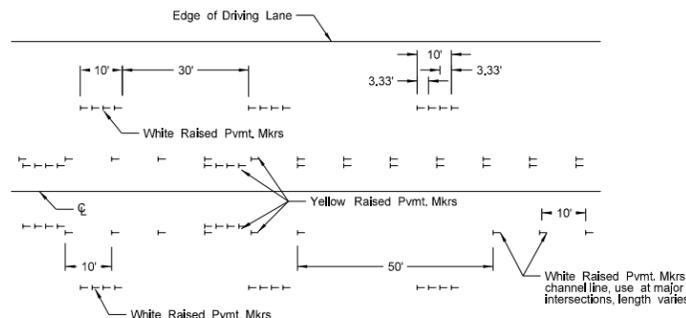


Raised Pavement Markers

FOUR LANE ROADWAY

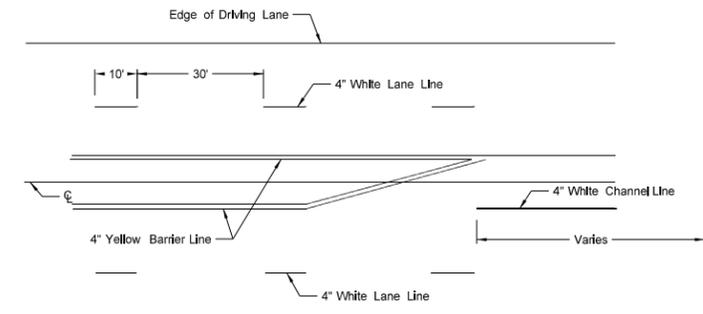


Painted or Tape Lines

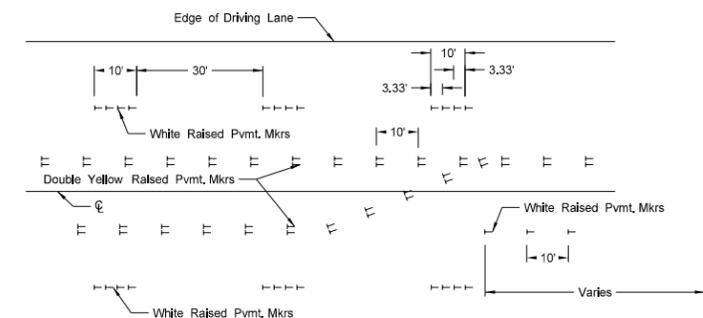


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

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

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

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