

DESIGN DATA			
Traffic	Average Daily		
Current	Pass: 3334	Trucks: 176	Total: 3510
Forecast	Pass: 4493	Trucks: 237	Total: 4730
Clear Zone Distance: 12'		Design Speed: 25 MPH	
Minimum Sight Dist. for Stopping: 155'		Bridges: N/A	
Sight Dist. for No Passing Zone: N/A			
Pavement Design Life 30 (years)			
Design Accumulated One-way Rigid ESALs: 383,000			

# JOB # 38 NORTH DAKOTA

## DEPARTMENT OF TRANSPORTATION

SS-8-018(071)075

Cass County  
City of Casselton  
ND 18/Langer Avenue  
PCC Reconstruction, Curb & Gutter reconstruction  
Signing, Striping, Storm Drain and Sidewalk reconstruction

STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	19479	1	1

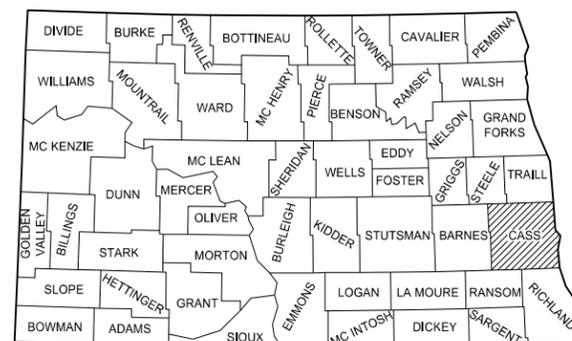
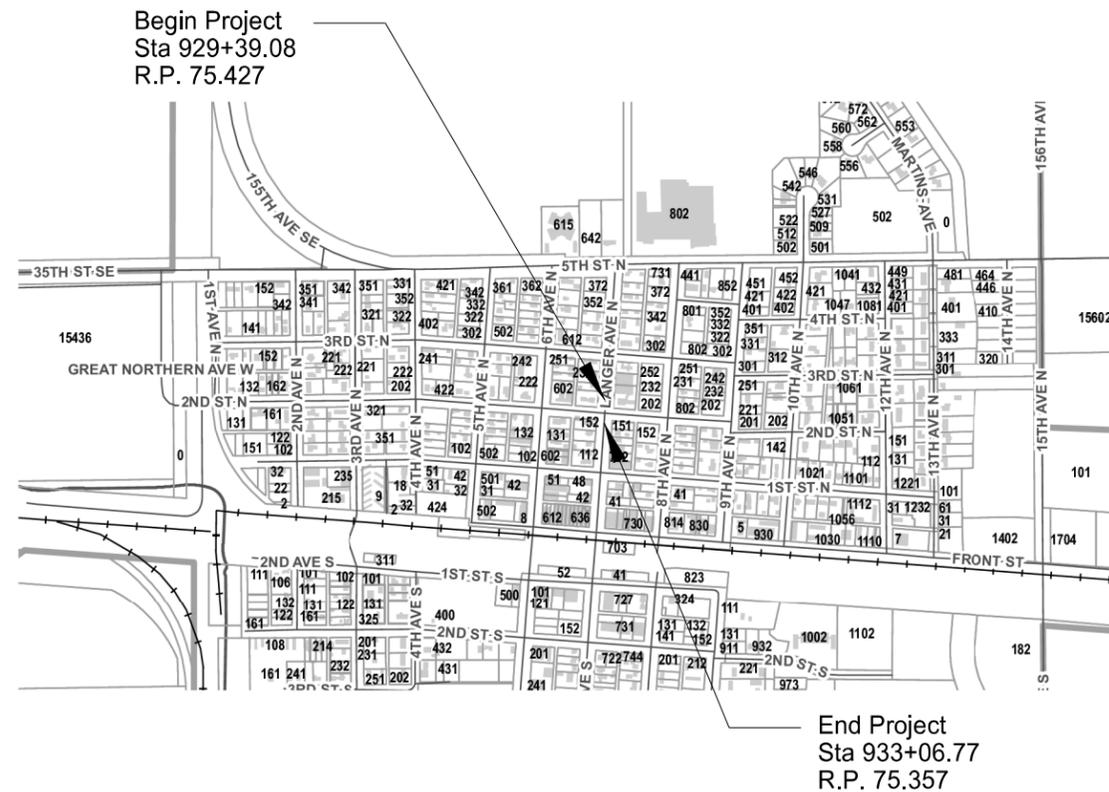
**GOVERNING SPECIFICATIONS:**

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SS-8-018(071)075	0.070	0.070

**LEGAL DESCRIPTION:**

Sec 35 T 120N R52W



STATE COUNTY MAP

DESIGNERS
Andrew H. Krog, PE
David A. Roedel, PE
Jon Atkins, PE

DISTRICT REVIEW
Kevin Gorder, PE /s/
DISTRICT NAME
APPROVED DATE 08/26/2014
Robert Fode, PE /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 08/21/2014
Andrew H. Krog, PE /s/
MOORE ENGINEERING, INC.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	2	1

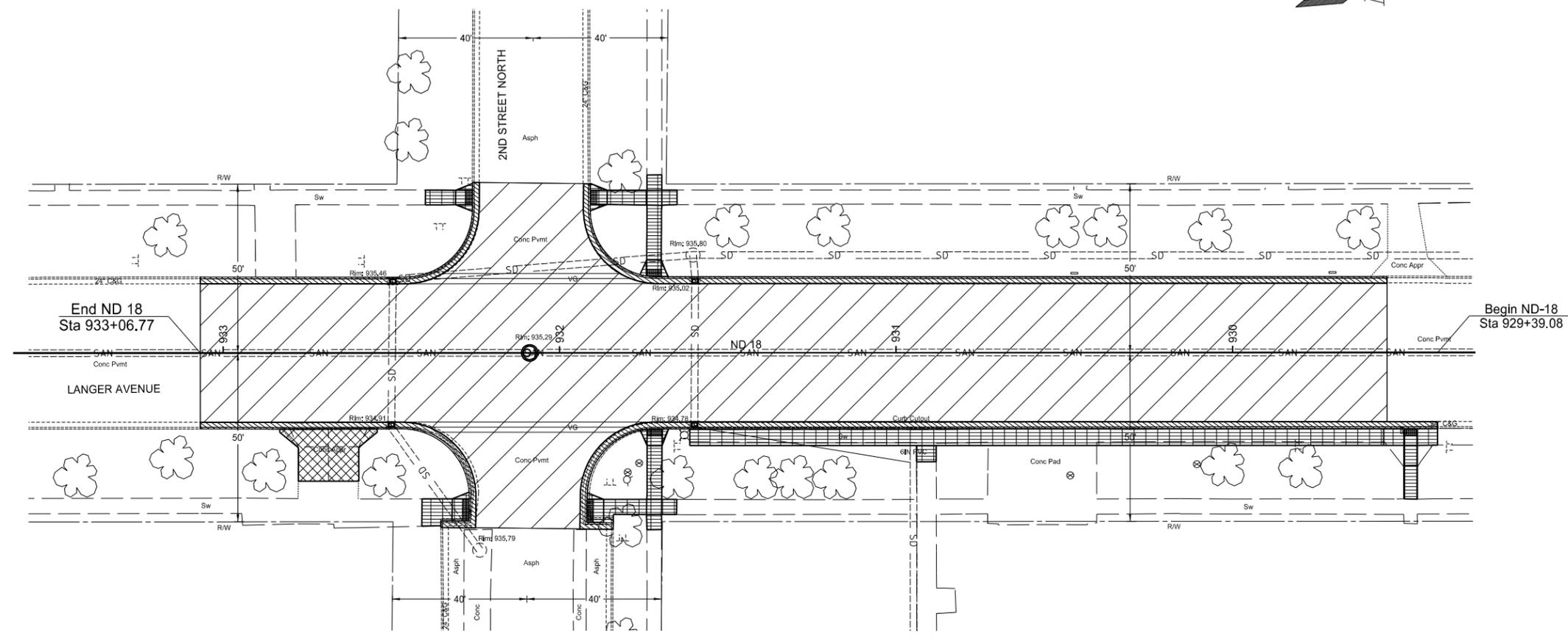
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D-750-3	Curb Ramp Details
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D-762-1	Pavement Marking Message Details

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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**LEGEND**

-  PCC Reconstruction
-  Curb & Gutter Reconstruction
-  Sidewalk Reconstruction and ADA Curb Ramps
-  Driveway Reconstruction

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Scope of Work  
ND 18 Intersection Reconstruction

## NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	6	1

### GENERAL NOTES

100-P01 DETOURS: The contractor shall maintain the streets used as detours and repair areas damaged by the detoured traffic. Upon completion of the project, the contractor shall restore the streets to a condition at least equal to that which existed at the time traffic was routed over them. Work shall be as deemed necessary by the engineer. The repair and maintenance of the detours will be paid for in accordance with Section 107.01 of the Standard Specifications - Haul Roads.

100-P02 CONSTRUCTION NOISE: The contractor will also ensure that construction activities are conducted during daylight hours only Monday through Saturday. Work will not be permitted on Sunday.

105-110 PAVEMENT SWEEPING: The contractor shall sweep new pavements before opening to traffic and for final acceptance. For this sweeping, the contractor shall furnish and utilize a vacuum type sweeper to control the dust. All costs connected with this work shall be included in the price bid of other items.

202-P01 REMOVAL OF PAVEMENT: Removal of pavement consists of removing concrete pavement, valley gutter, and aggregate base. Existing pavement thicknesses are assumed based on old sets of plans and maintenance data and are shown on the existing typical sections. All material become the property of the contractor.

202-P02 ABUTTING PAVEMENT: Where the new pavement will abut existing pavement, a full-depth vertical saw cut shall be made along the entire length of the joint. The material to be removed shall then be removed without disturbing the material that is designated to remain. The sawed edge shall be reasonably free of frays or spalls. The new pavement shall be placed so as to match the existing pavement and so as to provide a satisfactory surface profile. Any intermediate saw cuts performed to aid in the removal of pavements or for staging operations shall not be paid for separately. The areas to be sawed are shown on the removal sheets. Sawing of bituminous or concrete surfacing shall both be paid for as "Saw Concrete".

202-P03 EXCAVATION: A quantity of excavation will be required for the installation of the pay item "Aggregate Base Course CL 5" beyond the back of curb. The cost for all necessary excavation and wasting of material shall be included in the price bid for "Aggregate Base Course CL 5."

230-P01 SUBGRADE PREPARATION TYPE A: Subgrade preparation shall be performed to a depth of 12-inches in all locations. The subgrade shall be compacted in accordance with NDDOT Standard Specification 203.04.E.2.b, Compaction Control, Type A, ND T 99.

251-P01 SEEDING AND HYDRO-MULCHING: Contractor shall seed and hydro-mulch disturbed ground. The hydro-mulch shall be applied after the seed is drilled into the topsoil. Fertilizer shall be a mixture of 5-10-5 applied at a rate of 100 pounds per acre. The seed shall be watered for three weeks minimum after placement in order to provide sufficient moisture for growth as determined by the Engineer. All cost for labor, equipment, and materials necessary to complete the work will be included in the price bid for "Seeding Class III."

The seed mixture for permanent seeding shall be as follows:

Perennial Ryegrass-50 lb/acre  
Park Kentucky Bluegrass-50 lb/acre  
Durar hard Fescue-30 lb/acre

302-P01 TRIMMING BASE COURSE: Use surface tolerance Type B or C for the Base Course. Excess material removed from high points of the base course by the trimming operation shall be reincorporated into the base course. The contractor shall pave from the same string line as the trimming operation. The cost for providing the required grade and cross section shall be included in the unit price bid for "Aggregate Base Course CL 5".

704-P01 TRAFFIC CONTROL: The contractor will be required to maintain temporary traffic control devices at all times. The Traffic Control Devices List has been developed using the following layouts on the Standard Drawings and plan sheets for traffic control:

D-704-23, Layout Type Q as the basis of the detour signing layout.

708-P01 INLET PROTECTION SPECIAL: Inlet protection shall be placed per the details. The unit price bid for "Inlet Protection-Special" shall be considered full compensation for installing, cleaning, removing sediment, maintaining, replacing damaged devices and removing the devices from the project. All devices that are installed shall remain in place until the turf has been established. This work is considered normal maintenance and the contractor shall not be entitled to additional compensation.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	6	2

**NOTES**

714-P01 PIPE PVC 6IN DRAIN: Pipe shall be SDR 35. Locate and connect to the existing PVC drain pipe at location shown on the plans. Core a hole in the existing catch basin and connect the drain pipe to the catch basin using a rubber boot of the appropriate size. The described work and all necessary fittings and materials shall be considered incidental to the price bid for "Pipe PVC 6IN Drain".

722-P01 CASTING INLET - TYPE I: Existing castings shall be removed and replaced. Removed castings shall become property of the contractor. Removal of existing castings shall be included in the price bid for 'Casting Inlet - Type I'.

762-P01 METHYL METHACRYLATE PVMT MK: Methyl Methacrylate markings shall be grooved in the pavement. Groove depth shall be 120mils in depth with a light sand blast applied after grooving to rough up the surface. Material thickness shall be 120mils thick and fill the entire groove. Glass beads shall be applied at a minimum of 35 PSI to the marking using sand blasting machine.

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## ENVIRONMENTAL COMMITMENTS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	6	3

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

**Example if No Environmental Commitments Exist:**

Based on the NEPA documentation, no additional permits or environmental commitments have been identified beyond what is covered by the NDDOT's Standard Specification of Road and Bridge Construction.

Wetland Number	Cowardin Classification	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands	Impacts to Wetlands	
						Temp.	Perm.
**NO WETLANDS PRESENT**							
<b>TOTALS:</b>			<b>0.00</b>			<b>0.00</b>	<b>0.00</b>

\*A wetland Jurisdictional Determination was issued by the USACE on 09/26/2012; NWO-2012-2312-BIS.

**ESTIMATED QUANTITIES**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
103	0100	CONTRACT BOND	L SUM	1
202	0112	REMOVAL OF CONCRETE	SY	250
202	0119	SAW CONCRETE	LF	307
202	0130	REMOVAL OF CURB & GUTTER	LF	747
202	0137	REMOVAL OF PAVEMENT	SY	1865
202	0210	REMOVAL OF MANHOLES	EA	1
203	0109	TOPSOIL	CY	71
216	0100	WATER	M GAL	17
230	0300	SUBGRADE PREPARATION-TYPE A	STA	4.1
251	0300	SEEDING CLASS III	ACRE	0.72
253	0201	HYDRAULIC MULCH	ACRE	0.72
302	0120	AGGREGATE BASE COURSE CL 5	TON	787
550	0240	DOWELED CONTRACTION JOINT ASSEMBLY	LF	1080
550	0300	8IN NON-REINF CONCRETE PVMT CL AE-DOWELED	SY	1824
570	0424	DOWEL BARS	EA	82
702	0100	MOBILIZATION	L SUM	1
704	0100	FLAGGING	MHR	40
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1165
704	1052	TYPE III BARRICADE	EA	27
708	1540	INLET PROTECTION-SPECIAL	EA	4
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	2171
714	6590	PIPE PVC 6IN DRAIN	LF	65
722	0100	MANHOLE 48IN	EA	1
722	3455	CASTING INLET-TYPE 1	EA	4
748	0140	CURB & GUTTER-TYPE I	LF	747
748	1000	VALLEY GUTTER 36IN	LF	118
750	0115	SIDEWALK CONCRETE 4IN	SY	206
750	1000	DRIVEWAY CONCRETE	SY	35
750	2115	DETECTABLE WARNING PANELS	SF	56
754	0110	FLAT SHEET FOR SIGNS - TYPE XI REFLECTIVE SHEETING	SF	43
754	0206	STEEL GALV POSTS - TELESCOPING PERFORATED TUBE	LF	73.1
754	0592	RESET SIGN PANEL	EA	2
754	0593	RESET SIGN SUPPORT	EA	1
762	0110	EPOXY PVMT MK 4IN LINE-GROOVED	LF	554
762	0824	METHYL METHACRYLATE PVMT MK 24IN LINE	LF	192
762	1140	PVMT MK PAINTED CURB TOP & FACE	LF	42

**BASIS OF ESTIMATE**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	10	1

**Subgrade Preparation-Type A**

Sta 929+54.11 to Sta 933+06.77 = 352.66 LF  
2<sup>nd</sup> St.

East = 30'  
West = 28.25'

352.66' + 30' + 28.25' = 410.91'  
= 4.1 Stations

**Water**

20 Gal/Ton for Aggregate Base Course CL 5  
812 Tons x 20 Gal/Ton = 17 MGal

**Aggregate Base Course CL 5**

@ 1.875 Tons per CY

**Seeding & Hydraulic Mulch**

Estimated 4ft width along all replaced curb and sidewalk areas.  
See Section 75

**Topsoil**

Estimated 4ft width along all replaced curb and sidewalk areas and 6-inch depth  
324SY X 6IN = 54CY  
See Section 75

**Detectable Warning Panels**

Warning panel size at 2' X 4' = 8 SF/EA  
8 SF/EA X 7 EA = 56 SF

Description	Units	Quantity/Basis	Area	Total Quantity
Aggregate Base Course CL 5	TON	6in depth & 1.875 TON/CY	Paving Area = 1824 SY	570
		6in depth under curb plus 1' beyond curb plus 2:1 Slough	Curb Length 747ft X 0.065CY/ft	48.6
		Depth Varies & 1.875 TON/CY	Extra depth to raise grade on Langer Ave.	118.4
		4in depth & 1.875 TON/CY	Sidewalk Concrete Area = 206 SY Driveway Concrete = 35 SY	42.9 7.3
8in Non-Reinf Concrete PVMT CL AE-Doweled	SY	41ft Wide X 352.66ft Long	Langer Ave Sta 929+54.11 to Sta 933+06.77	1606.6
		Varies	2nd St West of Langer Ave	111.6
		Varies	2nd St East of Langer Ave	105.6
Geosynthetic Material Type R1	SY	Area	Paving Area + Curb & Gutter Length	2171

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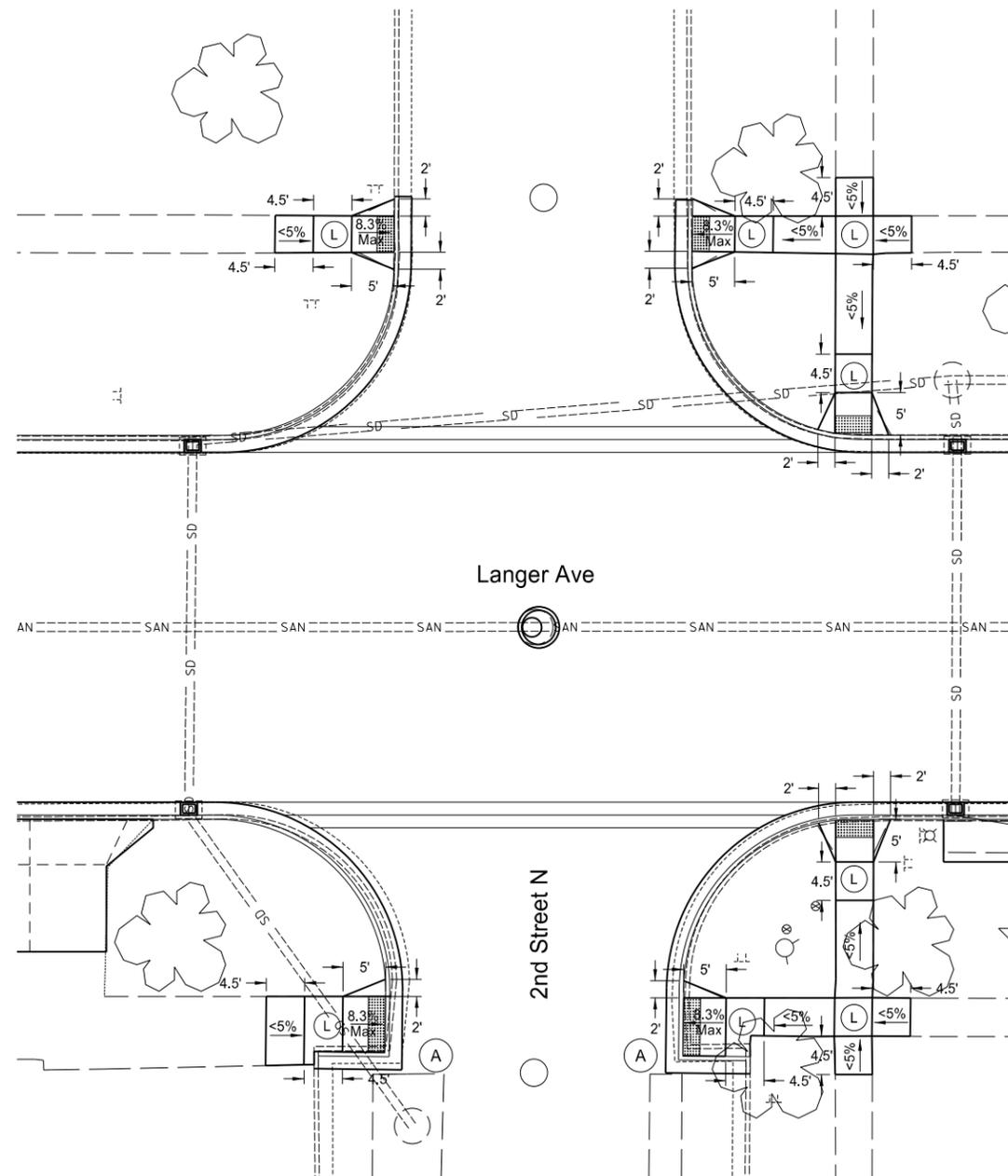
**BASIS OF ESTIMATE**

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	10	2

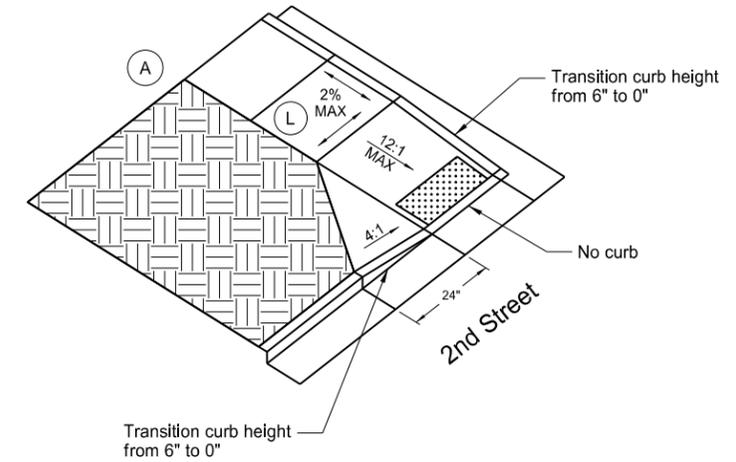
Description	Units	Quantity/Basis	Area	Total Quantity
Removal of Pavement (Approx. 8" Pavement Thickness, Approx. 4.75" Base Course Thickness)	SY	41ft Wide X 352.66ft Long	Langer Ave Sta 929+54.11 to Sta 933+06.77	1608.0
		Varies	2nd St West of Langer Ave	104.7
		Varies	2nd St East of Langer Ave	113.1
		Length X 3' Width	Valley Gutter Sta 931+78.88 Rt to Sta 932+37.92 Rt	19.8
			Valley Gutter Sta 931+79.86 Lt to Sta 932+38.89 Lt	19.9
Removal of Curb & Gutter	LF	Length	Curb & Gutter Sta 929+39.08 Lt to Sta 931+84.06 Lt	281.9
			Curb & Gutter Sta 929+54.11 Rt to Sta 931+91.00 Rt	255.8
			Curb & Gutter Sta 932+25.86 Rt to Sta 933+06.77 Rt	100.3
			Curb & Gutter Sta 932+35.29 Lt to Sta 933+06.77 Lt	108.9

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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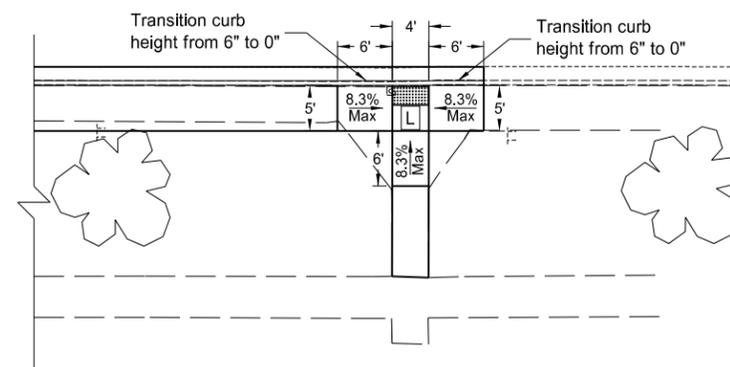
ADA Curb Ramp Details  
Langer Ave & 2nd St. N. Intersection



Curb Ramp Detail - Special  
Not to Scale

- (L) Upper Landing
- (L) Lower Landing

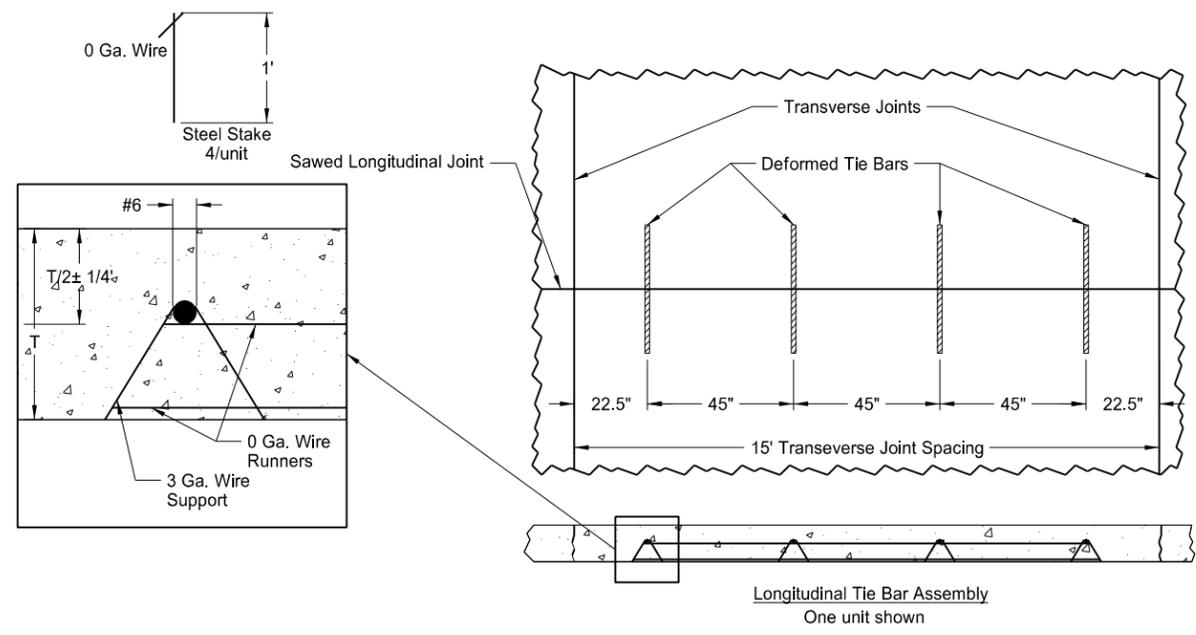
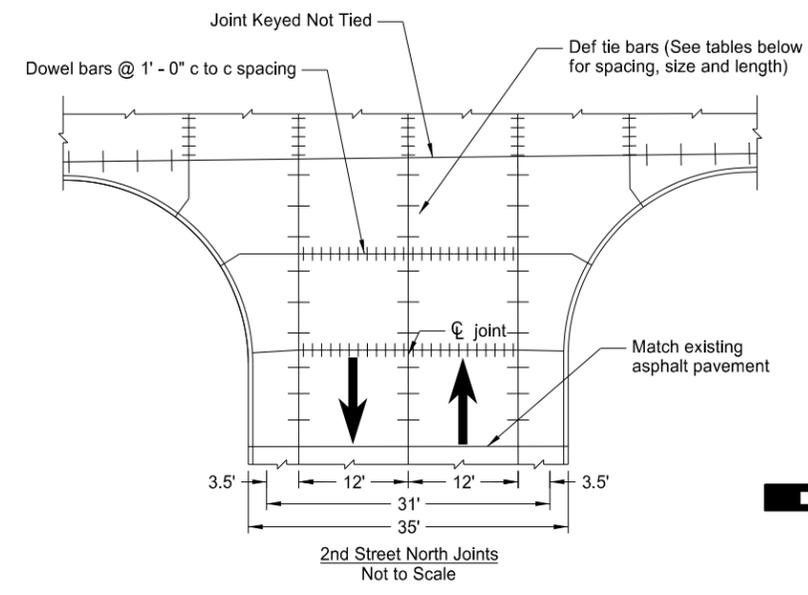
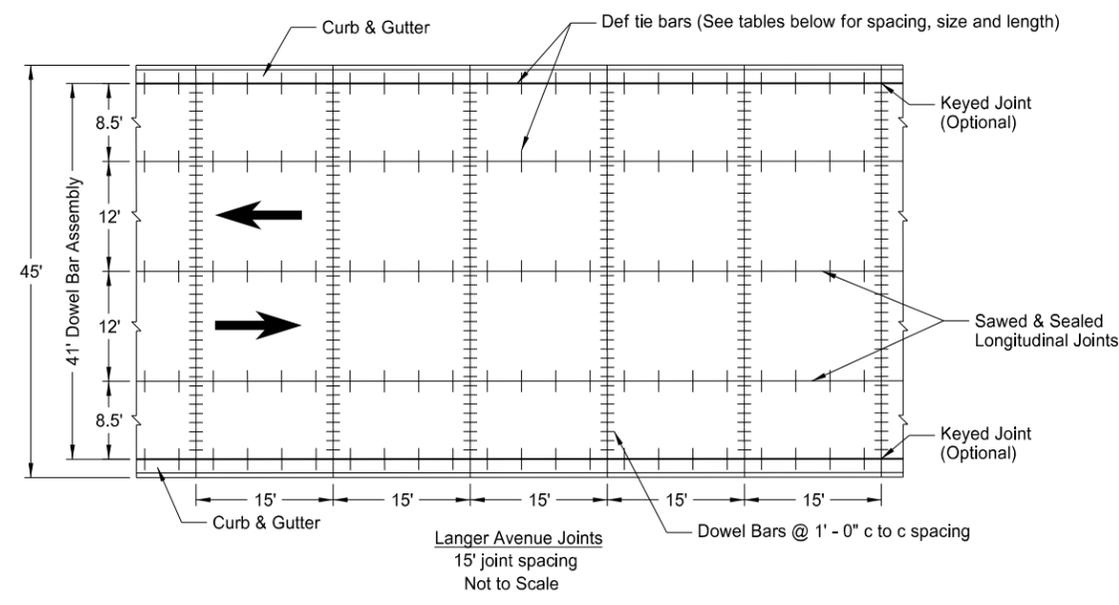
Note: Match existing sidewalk width.  
Min 4ft.



ADA Curb Ramp Details  
Sta 929+47.08 Lt

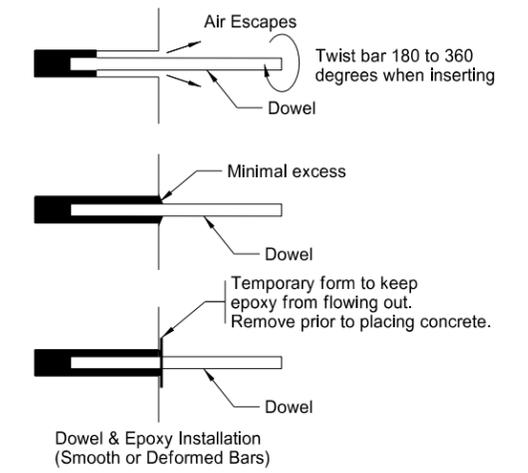
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General Details  
ND 18 Intersection Reconstruction  
ADA Curb Ramp Details

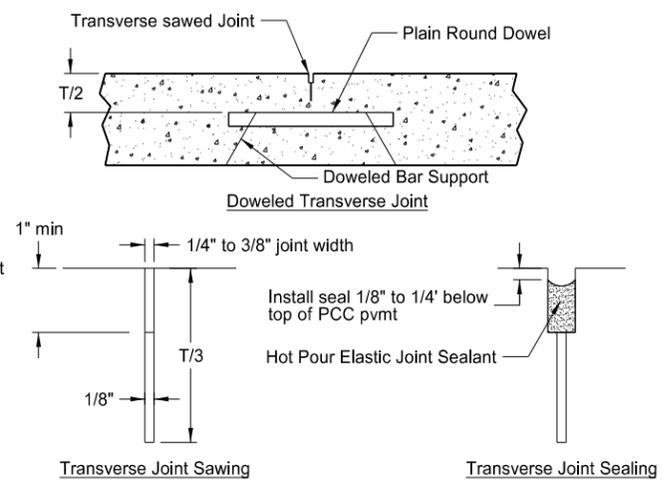
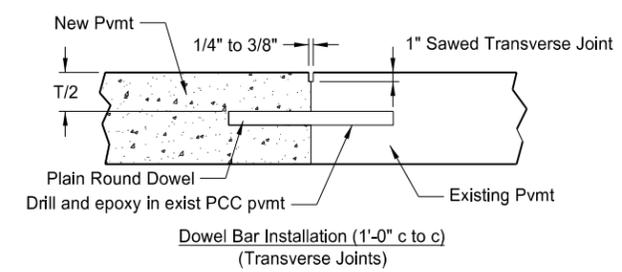
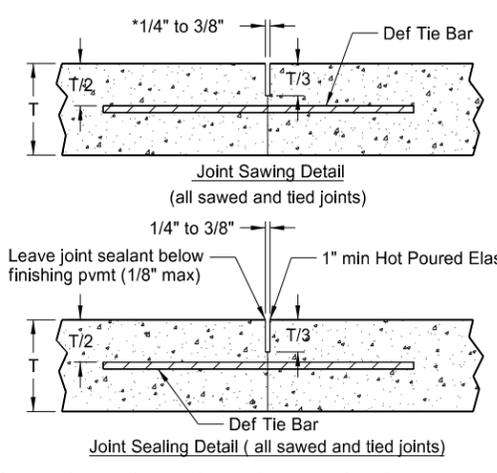
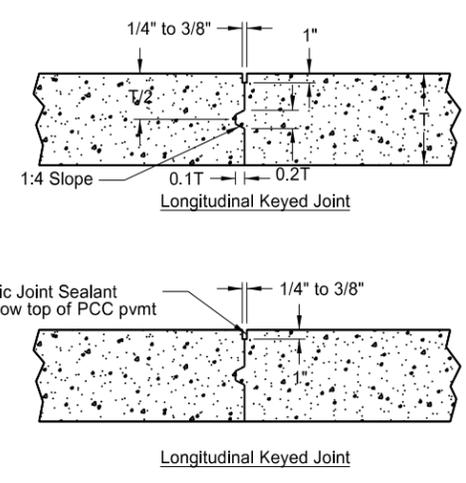


Longitudinal Joint Tie Bar Size and Length**	
Pavement Depth	8"
Langer Avenue	# 6 Bar x 36"
2nd Street North	# 6 Bar x 36"

\*\*Tie Bar Lengths listed are for Grade 40 Steel. See Std D-550-2 for Grade 60 Steel.



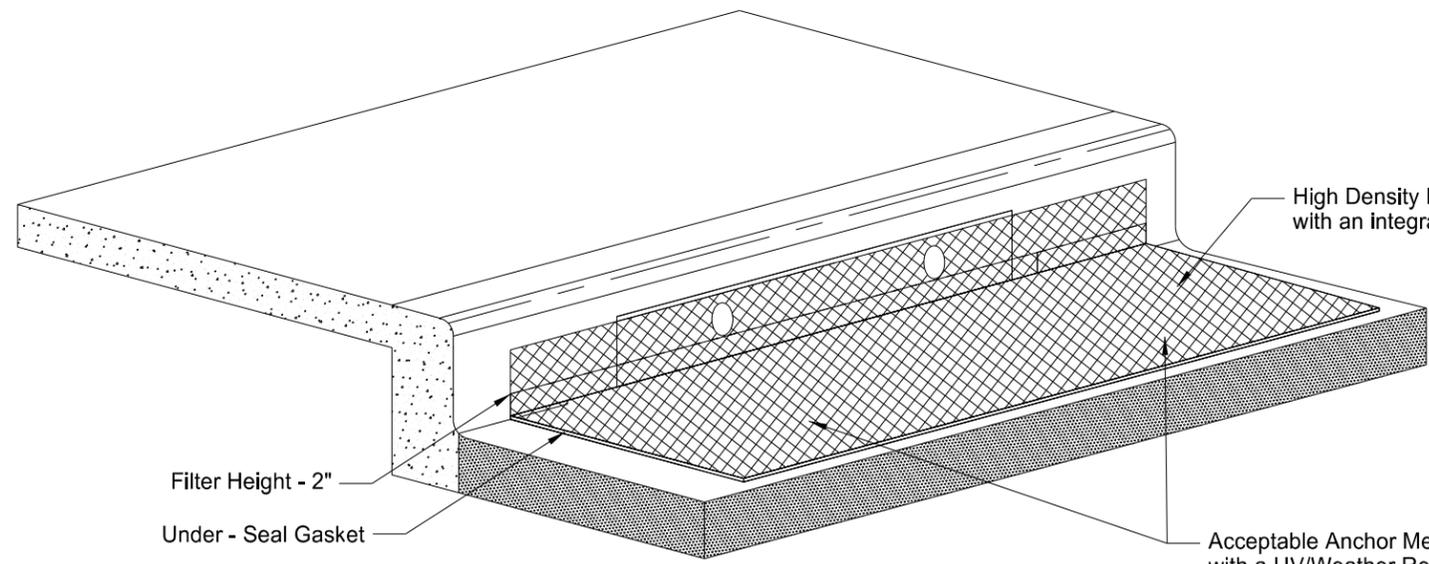
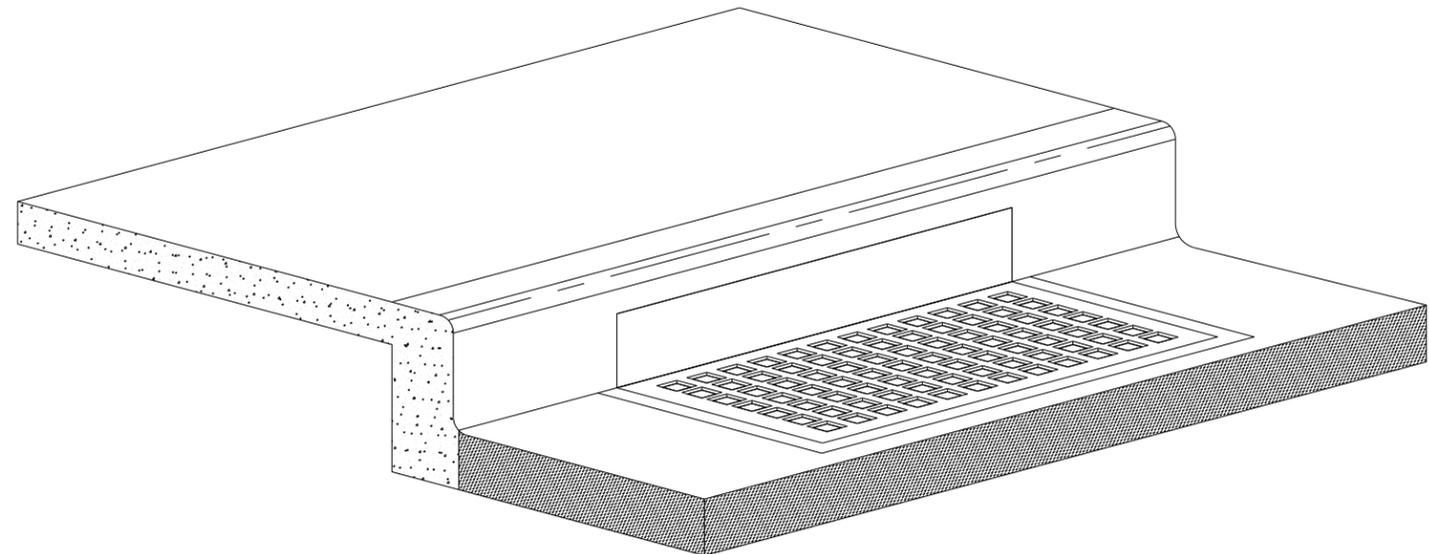
Notes:  
T = Pavement Thickness  
Dowel bars shall be 1 1/4" x 18" for T = 10" or less.  
Dowel bars shall be 1 1/2" x 18" for T greater than 10".



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**General Details**  
**ND 18 Intersection Reconstruction**  
**PCC Pavement Joint Details**

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-8-018(071)075	20	3



Inlet Protection Device

Installation Notes:

1. Place device tightly against drain opening and cover entire grate. The device should extend at least 2 inches past grate toward street.
2. Overlap the segments at longer openings.
3. Anchor the device so that water cannot flow behind it.

General Notes:

1. Inlet Protection shall be maintained or replaced at the direction of the engineer.
2. Manufactured alternatives may be substituted at the direction of the engineer.
3. When removing or maintaining inlet protection, care shall be taken so that fabric does not fall into the inlet. Any material falling into the inlet shall be removed immediately.
4. Inlet protection is to be used (and reused) as needed to prevent material from entering inlets as the work progresses through the project.

High Density Polyethylene (HDPE) high flow jacket filter (8,000 opening per SY) with an integrated 425 um (micron meter) fine filter particle mesh

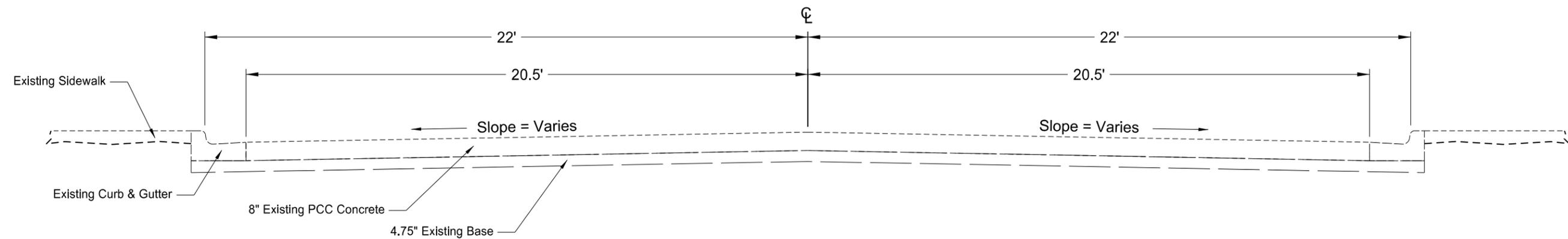
Filter Height - 2"  
Under - Seal Gasket

Acceptable Anchor Method: Fasten to inlet casting grate with a UV/Weather Resistant Plastic Cable Zip Ties - 16 to 24 in. Install zip ties at each corner of the inlet near the perimeter and two additional zip ties near the middle of the casting. Punch hole through filter and run cable tie downward around grate and back up to fasten.

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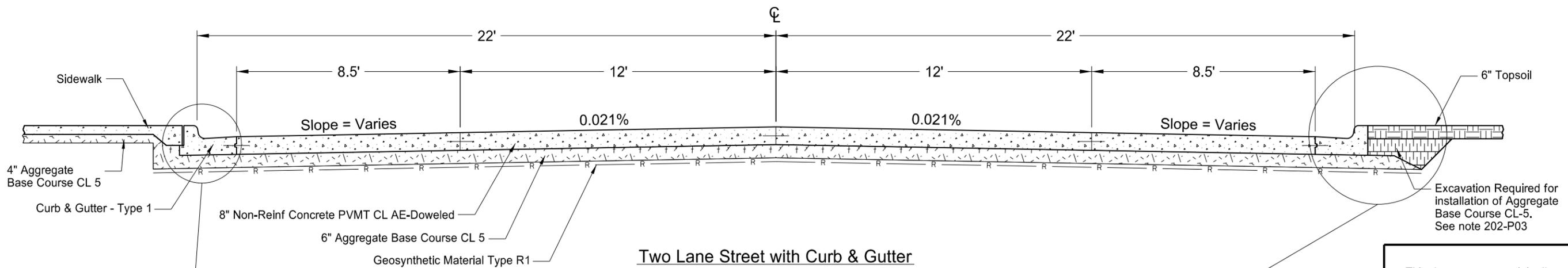
General Details  
ND 18 Intersection Reconstruction  
Inlet Protection Device

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	30	1



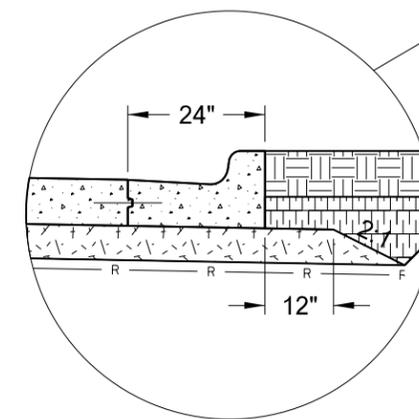
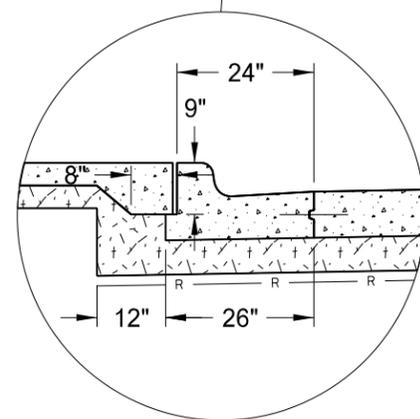
**Existing Two Lane Street with Curb & Gutter**  
Sta 929+54.11 to Sta 933+06.77

Not to Scale



**Two Lane Street with Curb & Gutter**  
Sta 929+54.11 to Sta 933+06.77

Not to Scale

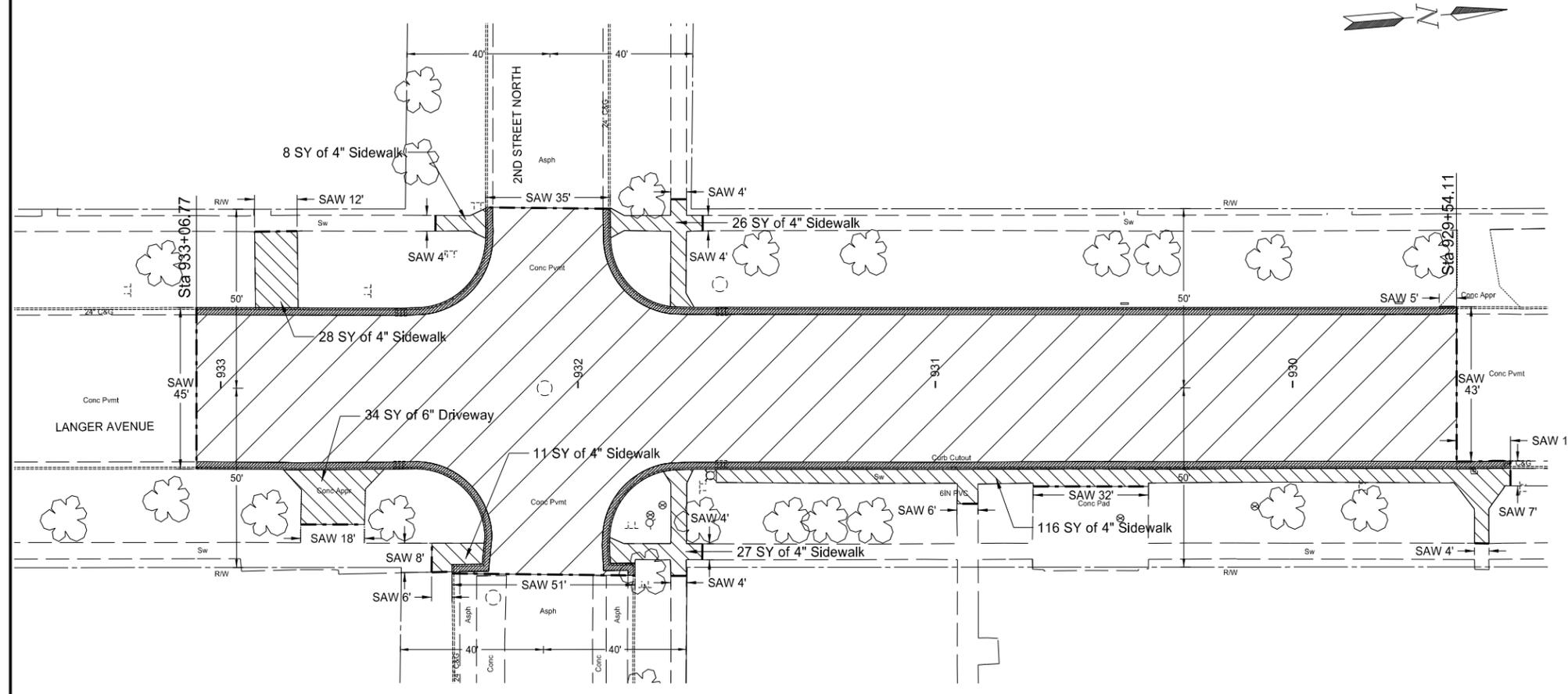


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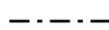
Typical Sections  
ND 18 Intersection Reconstruction

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	40	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0112	REMOVAL OF CONCRETE		
		Sta 929+545.11 to Sta 933+06.77	250	SY
202	0119	SAW CONCRETE		
		Sta 929+39.08 Lt to Sta 929+39.08 Lt	7	LF
		Sta 929+39.08 Lt to Sta 929+54.11 Lt	15	LF
		Sta 929+45.10 Lt to Sta 929+49.12 Lt	4	LF
		Sta 929+54.11 Lt to Sta 929+54.11 Rt	43	LF
		Sta 929+54.11 Rt to Sta 929+58.97 Rt	5	LF
		Sta 930+40.40 Lt to Sta 930+72.66 Rt	32	LF
		Sta 930+88.09 Lt to Sta 930+93.94 Lt	6	LF
		Sta 931+65.08 Rt to Sta 931+65.09 Rt	4	LF
		Sta 931+65.20 Lt to Sta 930+65.26 Lt	4	LF
		Sta 931+69.59 Rt to Sta 931+74.01 Rt	4	LF
		Sta 931+69.70 Lt to Sta 931+74.07 Lt	4	LF
		Sta 931+84.06 Lt to Sta 932+35.29 Lt	51	LF
		Sta 931+91.00 Rt to Sta 932+25.86 Rt	35	LF
		Sta 932+35.29 Lt to Sta 932+40.98 Lt	6	LF
		Sta 932+39.83 Rt to Sta 932+39.89 Rt	4	LF
		Sta 932+40.89 Lt to Sta 932+40.98 Lt	8	LF
		Sta 932+59.77 Lt to Sta 932+77.61 Lt	18	LF
		Sta 932+78.56 Rt to Sta 932+90.55 Rt	12	LF
		Sta 933+06.77 Lt to Sta 933+06.77 Rt	45	LF
202	0130	REMOVAL OF CURB & GUTTER		
		Sta 929+54.11 Rt to Sta 931+91.00 Rt	256	LF
		Sta 929+39.08 Lt to Sta 931+84.06 Lt	282	LF
		Sta 932+25.86 Rt to Sta 933+06.77 Rt	100	LF
		Sta 932+35.29 Lt to Sta 933+06.77 Lt	109	LF
202	0137	REMOVAL OF PAVEMENT		
		Sta 929+54.11 to Sta 933+06.77	1865	SY



**LEGEND**

-  Removal of Pavement
-  Removal of Curb & Gutter
-  Concrete Sidewalk Removal
-  Saw Cut

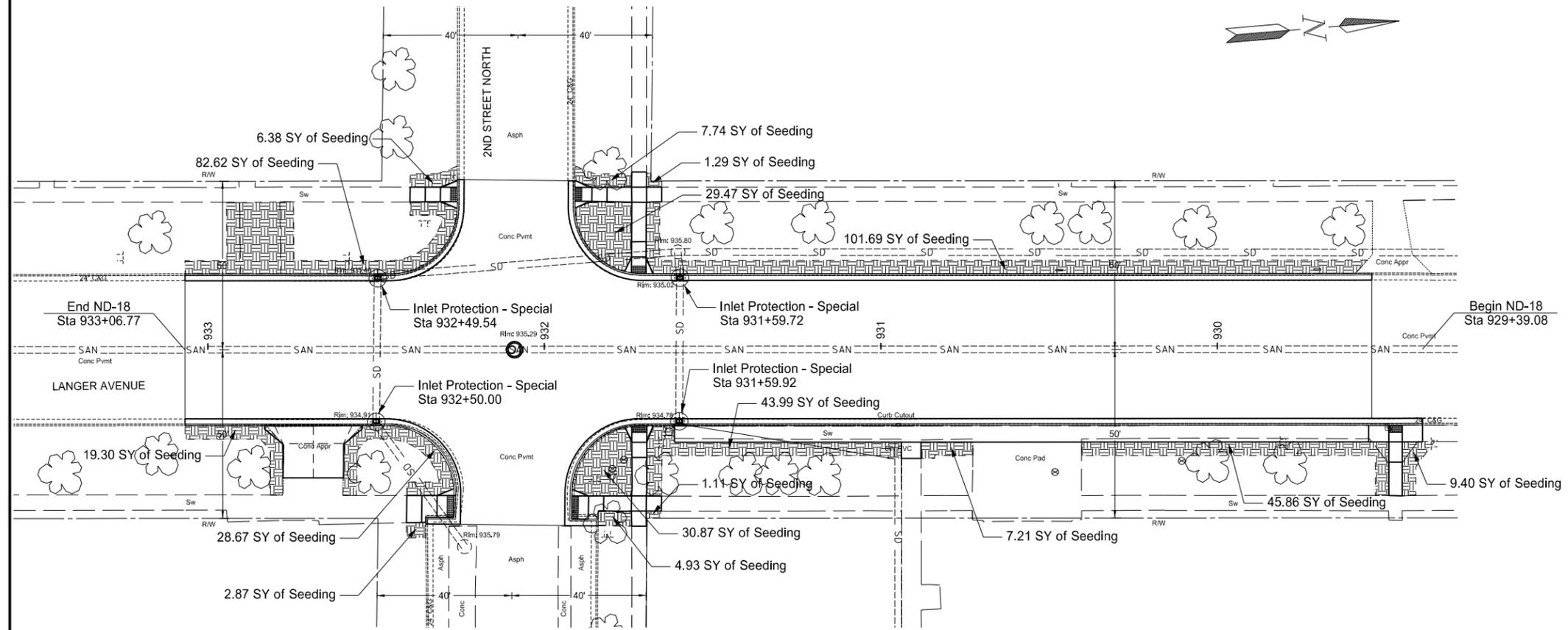
**Notes:**

1. The limits of "Removal of Pavement" on the 2nd Street approaches shall be up to the edge of existing bituminous pavement.
2. Sidewalk pavement shall be sawcut and removed to an existing transverse joint location.

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Removals  
 ND 18 Intersection Reconstruction

SPEC	CODE	BID ITEM	QUANTITY	UNIT
203	0109	TOPSOIL	71	CY
251	0300	SEEDING CLASS III	0.72	ACRE
253	0201	HYDRAULIC MULCH	0.72	ACRE
708	1540	INLET PROTECTION - SPECIAL		
		Sta 931+59.72 Rt	1	EA
		Sta 931+59.92 Lt	1	EA
		Sta 932+49.54 Rt	1	EA
		Sta 932+50.00 Lt	1	EA



**LEGEND**

 Seeding & Hydraulic Mulch

 Inlet Protection - Special

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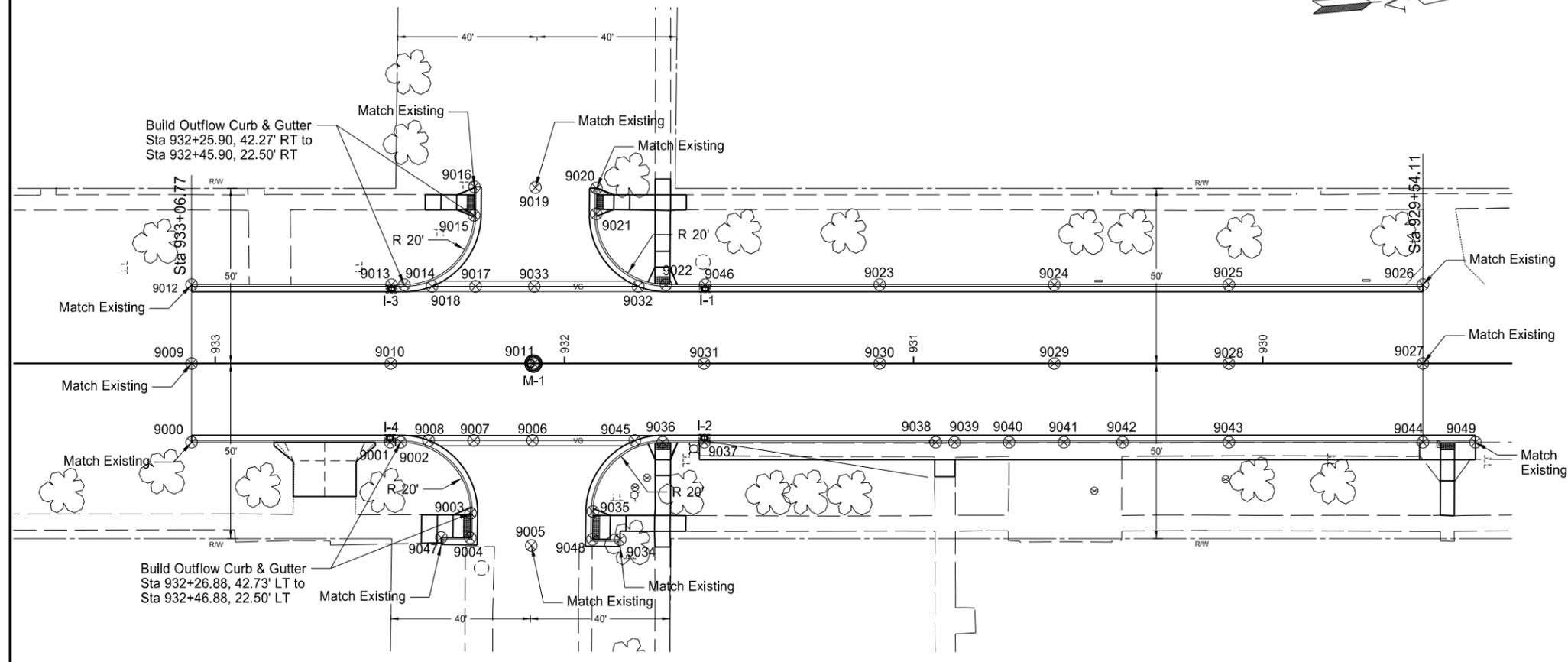
Wetlands, Erosion Control and Seeding  
ND 18 Intersection Reconstruction

**ND-18 Survey Points**

	Northing	Easting	Station	Offset	Elev	Desc
9000	104236.13	197266.34	Sta 933+06.77	22.50' LT	936.14	*TBC
9001	104292.79	197271.11	Sta 932+49.91	22.50' LT	935.88	*TBC
9002	104295.82	197271.37	Sta 932+46.88	22.50' LT	935.78	PT/*TBC
9003	104314.05	197293.20	Sta 932+26.88	42.73' LT	935.67	PC
9004	104313.37	197300.24	Sta 932+26.96	49.80' LT	936.24	*TBC
9005	104330.60	197303.90	Sta 932+09.48	52.00' LT	936.08	CL
9006	104333.46	197274.03	Sta 932+09.14	22.00' LT	935.12	VG
9007	104316.69	197272.62	Sta 932+25.97	22.00' LT	935.22	VG
9008	104303.81	197271.54	Sta 932+38.89	22.00' LT	935.31	VG
9009	104238.02	197243.92	Sta 933+06.77	0.00' RT	936.26	CL
9010	104294.83	197248.71	Sta 932+49.76	0.00' RT	935.89	CL
9011	104335.56	197252.13	Sta 932+08.89	0.00' RT	935.63	CL
9012	104239.91	197221.50	Sta 933+06.77	22.50' RT	936.26	*TBC
9013	104296.94	197226.30	Sta 932+49.54	22.50' RT	935.96	*TBC
9014	104300.56	197226.61	Sta 932+45.90	22.50' RT	935.93	PT/*TBC
9015	104322.15	197208.58	Sta 932+25.90	42.27' RT	935.50	PC
9016	104322.93	197200.42	Sta 932+25.81	50.47' RT	936.03	*TBC
9017	104320.88	197228.82	Sta 932+25.47	22.00' RT	935.26	VG
9018	104308.48	197227.78	Sta 932+37.92	22.00' RT	935.36	VG
9019	104340.35	197202.09	Sta 932+08.31	50.27' RT	935.85	CL
9020	104357.77	197203.76	Sta 931+90.81	50.07' RT	935.90	*TBC
9021	104357.07	197211.06	Sta 931+90.89	42.73' RT	935.34	PT
9022	104375.30	197232.90	Sta 931+70.90	22.50' RT	934.95	PC
9023	104436.27	197238.03	Sta 931+09.72	22.50' RT	935.68	*TBC
9024	104486.09	197242.22	Sta 930+59.72	22.50' RT	935.96	*TBC
9025	104535.92	197246.42	Sta 930+09.72	22.50' RT	936.24	*TBC
9026	104591.33	197251.08	Sta 929+54.11	22.50' RT	936.55	*TBC
9027	104589.44	197273.50	Sta 929+54.11	0.00' RT	936.42	CL
9028	104534.03	197268.84	Sta 930+09.72	0.00' RT	936.12	CL
9029	104484.21	197264.65	Sta 930+59.72	0.00' RT	935.85	CL
9030	104434.38	197260.45	Sta 931+09.72	0.00' RT	935.59	CL
9031	104384.24	197256.23	Sta 931+60.04	0.00' RT	935.32	CL
9032	104367.31	197232.73	Sta 931+78.88	22.00' RT	934.99	VG
9033	104337.66	197230.23	Sta 932+08.63	22.00' RT	935.12	VG
9034	104356.11	197304.34	Sta 931+84.03	50.30' LT	936.01	*TBC
9035	104348.97	197295.68	Sta 931+91.87	42.27' LT	935.39	PT
9036	104370.56	197277.66	Sta 931+71.87	22.50' LT	934.96	PC
9037	104382.46	197278.66	Sta 931+59.93	22.50' LT	935.28	*TBC
9038	104448.48	197284.22	Sta 930+93.67	22.50' LT	935.71	*TBC
9039	104453.84	197284.67	Sta 930+88.29	22.50' LT	935.74	*TBC
9040	104469.41	197285.98	Sta 930+72.67	22.50' LT	935.80	*TBC
9041	104485.07	197287.30	Sta 930+56.96	22.50' LT	935.86	*TBC
9042	104501.83	197288.71	Sta 930+40.14	22.50' LT	935.92	*TBC
9043	104532.14	197291.26	Sta 930+09.72	22.50' LT	936.05	*TBC
9044	104587.56	197295.92	Sta 929+54.11	22.50' LT	936.28	*TBC
9045	104362.64	197276.49	Sta 931+79.86	22.00' LT	934.90	VG
9046	104386.45	197233.84	Sta 931+59.71	22.50' RT	935.40	*TBC
9047	104305.08	197299.45	Sta 932+35.29	49.71' LT	936.32	*TBC
9048	104348.21	197303.58	Sta 931+91.96	50.21' LT	935.70	*TBC
9049	104602.53	197297.19	Sta 929+39.08	22.50' RT	936.31	*TBC

\*TBC = Top Back Curb  
 Note:  
 1. PC & PT elevations are given at the gutter flowline.  
 2. Elevations are to finished surface.

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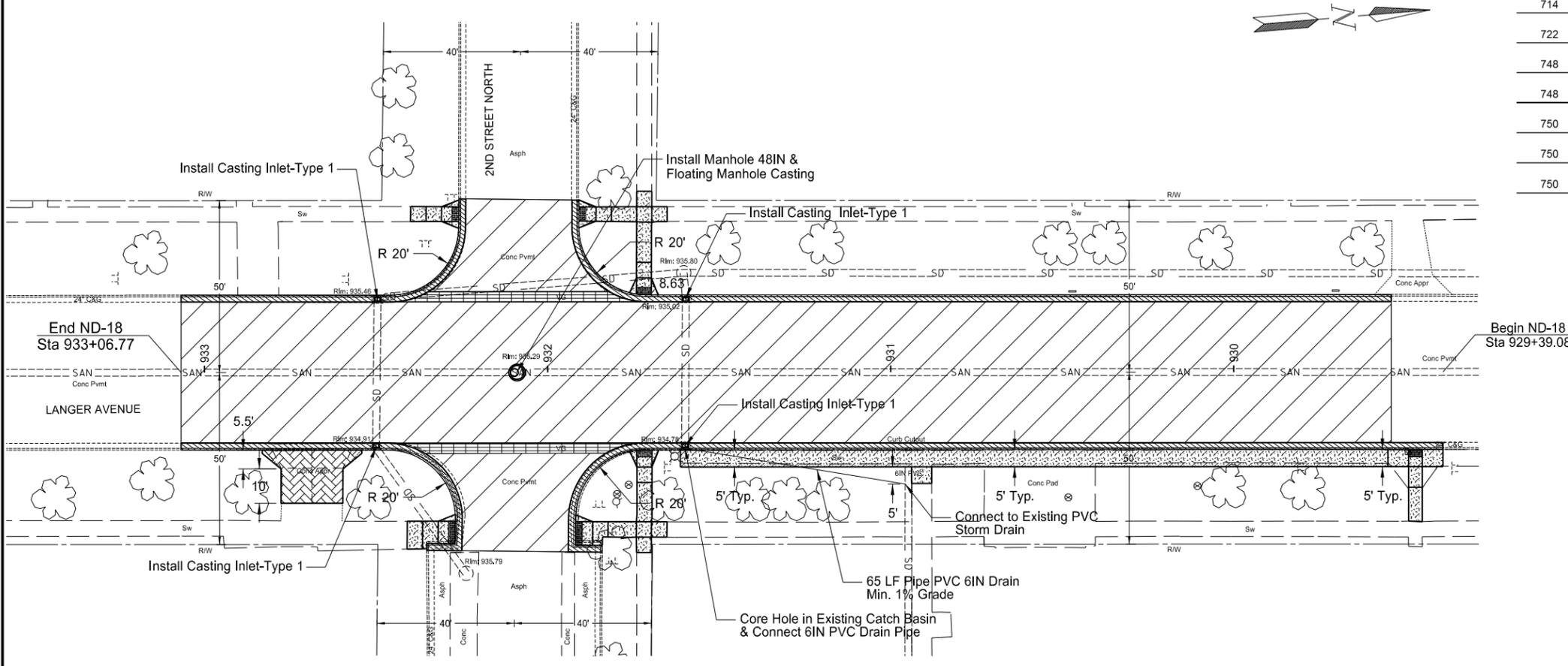
NO.	DESCRIPTION & LOCATION	ELEV
1	"X" Chisled in the top of the North Side of the storm sewer lift station near the SE corner of Lot 29, Block 1, Martin's First Addition	936.32

	Station	Offset	Rim Elev
I-1	Sta 931+59.72	21.34' RT	934.90
I-2	Sta 931+59.93	21.26' LT	934.78
I-3	Sta 932+50.00	21.38' RT	935.46
I-4	Sta 932+49.54	21.22' LT	935.38
M-1	Sta 932+09.31	0.03' LT	935.63

Survey Data Layouts  
 ND 18 Intersection Reconstruction  
 Survey Data Points

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	90	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
230	0300	SUBGRADE PREPARATION - TYPE A	4.1	STA
302	0120	AGGREGATE BASE COURSE CL 5	787	TON
550	0300	8IN NON-REINF CONCRETE P/MT CL AE-DOWELED	1824	SY
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	2171	SY
714	6590	PIPE PVC 6IN DRAIN	65	LF
722	3455	CASTING INLET-TYPE 1	4	EA
748	0140	CURB & GUTTER - TYPE I	747	LF
748	1000	VALLEY GUTTER 36IN	118	LF
750	0115	SIDEWALK CONCRETE 4IN	206	SY
750	1000	DRIVEWAY CONCRETE	35	SY
750	2115	DETECTABLE WARNING PANELS	56	SF



**LEGEND**

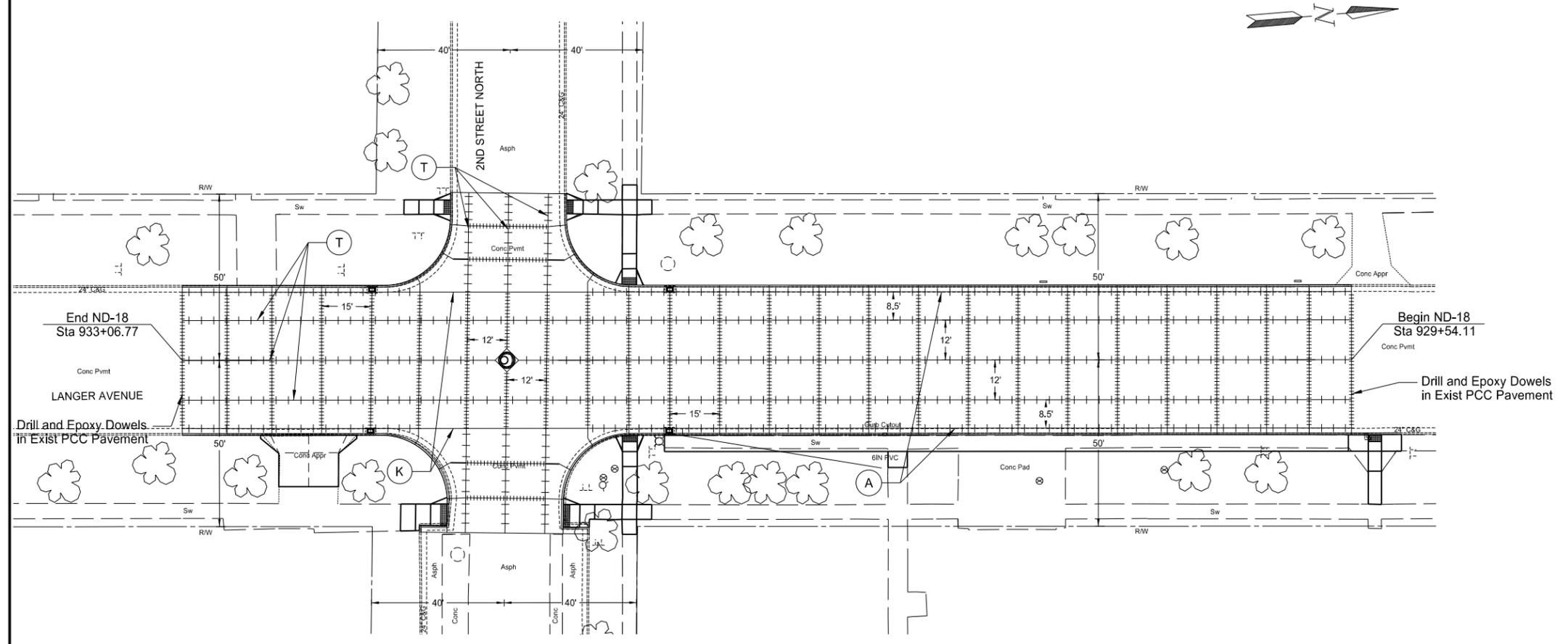
	8IN Non-Reinf Concrete P/mt CL AE-Doweled		Sidewalk Concrete 4IN
	Curb & Gutter - Type I		Detectable Warning Panels
	Valley Gutter 36IN		
	Driveway Concrete		

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Paving Layouts  
ND 18 Intersection Reconstruction  
Paving Layout

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	90	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
550	0240	DOWELED CONTRACTION JOINT ASSEMBLY	1080	LF
570	0424	DOWEL BARS	82	EA



**NOTES:**

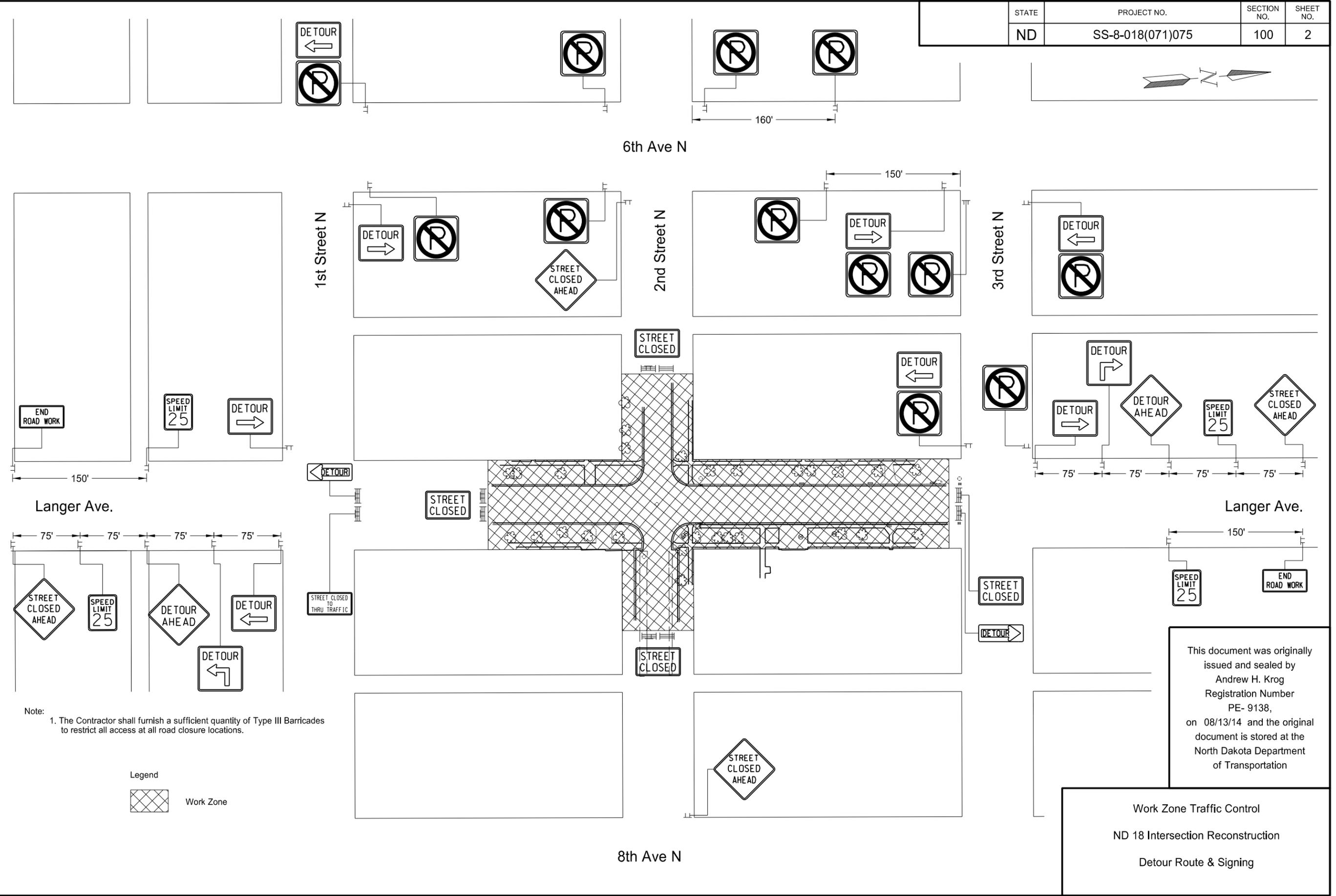
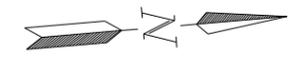
- (K) Keyed Joint Not Tied
  - (A) Curb and Gutter (All): No. 3 tie bars, 1'-6" @ 4' c to c (Continuous)
  - (T) Tied Joint
  - Doweled Joint
- Transverse Joint Spacing - 15' Average
- Dowel bars will be drilled and epoxied into place where existing pavement abuts new pavement or curb and gutter. These Dowel Bars will be measured and paid under the bid item 'Dowel Bars - EA'.

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Paving Layouts  
 ND 18 Intersection reconstruction  
 Paving Joint Layout



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	100	2



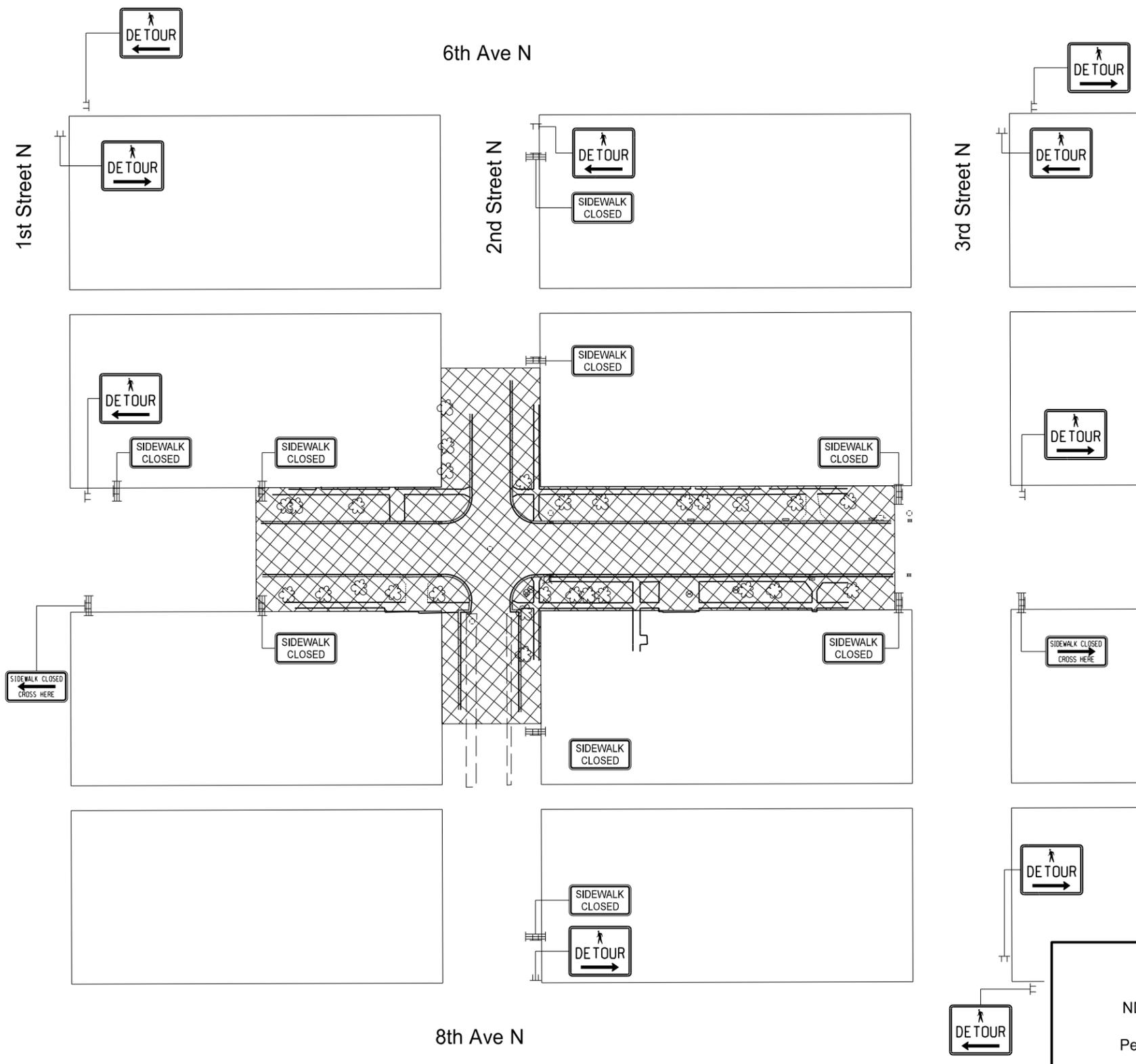
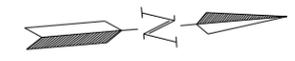
Note:  
 1. The Contractor shall furnish a sufficient quantity of Type III Barricades to restrict all access at all road closure locations.

Legend  
 Work Zone

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Work Zone Traffic Control  
 ND 18 Intersection Reconstruction  
 Detour Route & Signing

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	100	3



Legend  
 Work Zone

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Work Zone Traffic Control  
 ND 18 Intersection Reconstruction  
 Pedestrian Detour Route & Signing

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SS-8-018(071)075	110	1

Sta/RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Support Size	Max Post Len LF	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			1st LF	2nd LF	3rd LF	4th LF								
929+81 Lt		7		1.5		8.7			2 x 2 12 ga	25.5					1	4	2.25 x 2.25 12 ga					
930+16 Rt	SA A			8.8		11.4			2.5 x 2.5 12 ga	12.3					1	4	3 x 3 7 ga					
931+64 Lt	SA A								2.5 x 2.5 12 ga									2	1			
931+66 Rt	SA A			8.8		11.4			2.5 x 2.5 12 ga	12.3					1	4	3 x 3 7 ga					
932+58 Rt		19		6.3		10.2			2.25 x 2.25 12 ga	11.6					1	4	2.5 x 2.5 12 ga					
933+27 Lt	SA A			8.8		11.4			2.5 x 2.5 12 ga	12.3					1	4	3 x 3 7 ga					
<b>Sub Total</b>			0.0	34.2		<b>Total</b> 53.1								<b>Total</b> 20				2	1	0		
<b>Grand Total</b>			0.0	34.2		<b>Total</b> 53.1								<b>Total</b> 20				2	1	0		

Basis of Estimate  
Sign Support Lengths

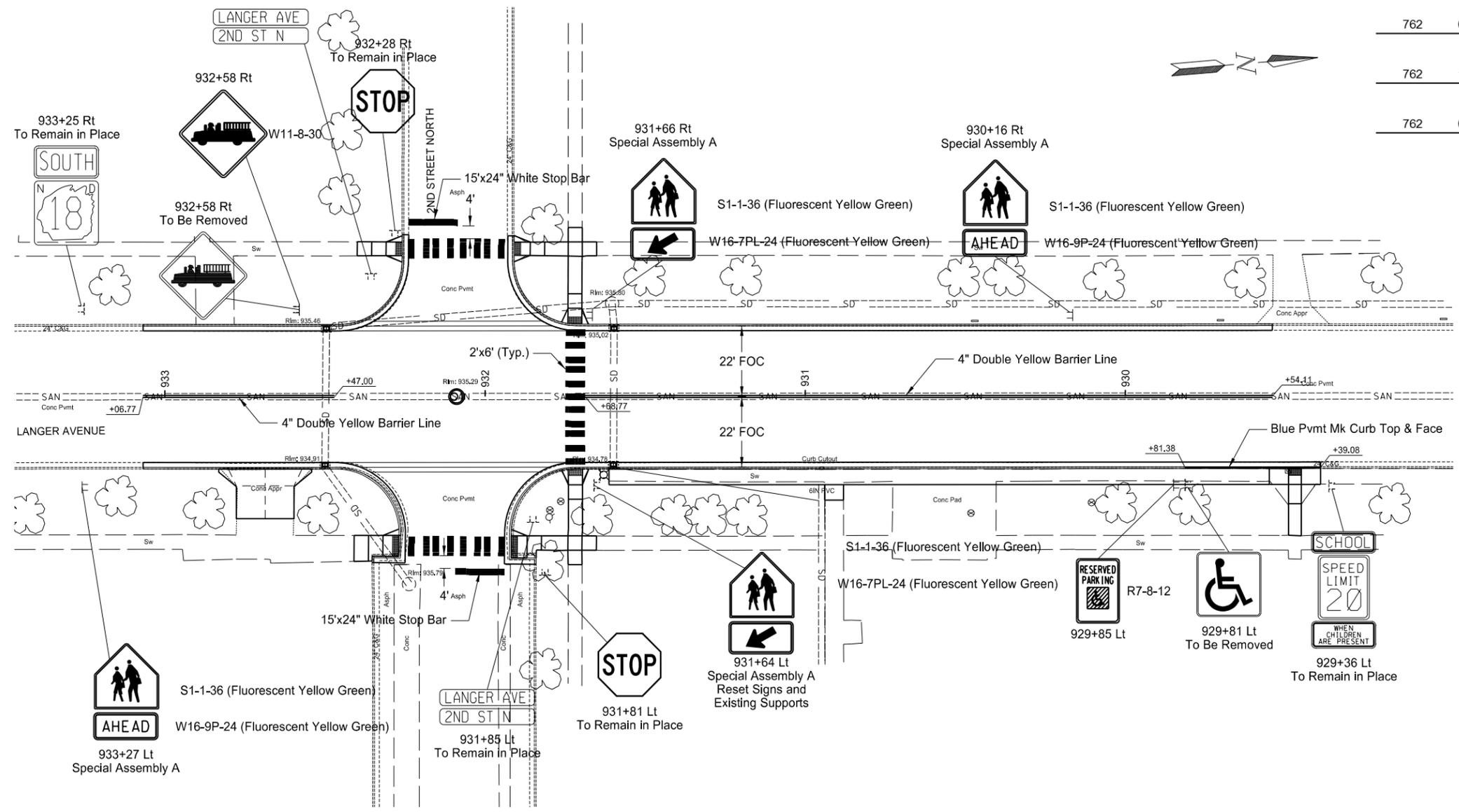
The sign support lengths have been calculated using the following vertical clearances:

- Areas where parking and/or pedestrian movement will occur - 84"
- Urban/rural expressway and freeway - 84" (Offset - 60")
- Rural Roadway - 60"
- Bike route - 60"

<p>This document was originally issued and sealed by Andrew H. Krog, Registration Number 9138, on 8/13/2014 and the original document is stored at the North Dakota Department of Transportation</p>	<p>Sign Summary Perforated Tube  Langer Ave &amp; 2nd St Casselton</p>
--	--

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-8-018(071)075	110	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
754	0592	RESET SIGN PANEL	2	EA
754	0593	RESET SIGN SUPPORT	1	EA
762	0110	EPOXY PVMT MK PAINTED 4IN LINE-GROOVED 4" Double Barrier - Yellow	554	LF
762	1140	PVMT MK PAINTED CURB TOP & FACE Blue	42	LF
762	0824	METHYL METHACRYLATE PVMT MK 24IN LINE 24" Stop Bar - White 24" Crosswalks - White	30 162	LF LF

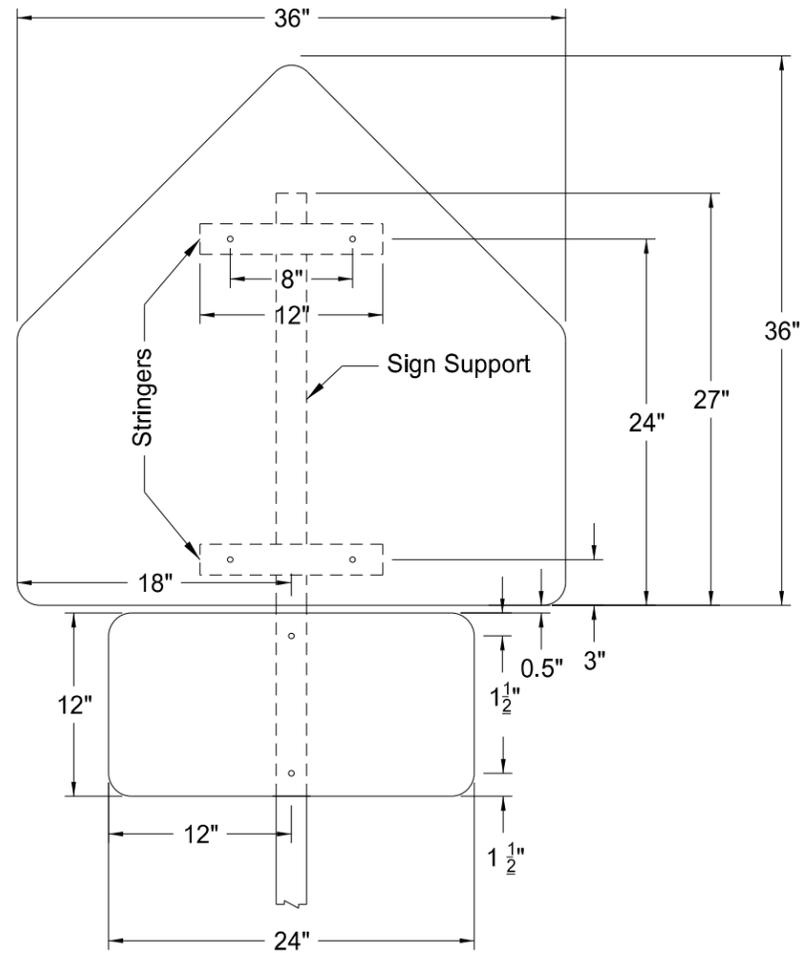


Note: Surface preparation shall be included with all painting & striping. Surfaces shall be clean and free of concrete curing compounds.

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Signing  
 ND 18 Intersection Reconstruction  
 Signing and Pavement Marking

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-8-018(071)075	110	3



**SPECIAL ASSEMBLY A**  
NO SCALE

NOTES:  
Design Area: 8.8 SF  
Pay Area: 8.8 SF

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Signing  
ND 18 Intersection Reconstruction  
Special Assemblies

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

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NDDOT ABBREVIATIONS

D-101-3

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

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

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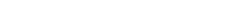
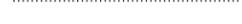
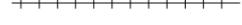
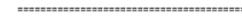
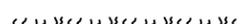
Line Styles

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

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Line Styles

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

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Symbols

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

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Symbols

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

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# Symbols

D-101-32

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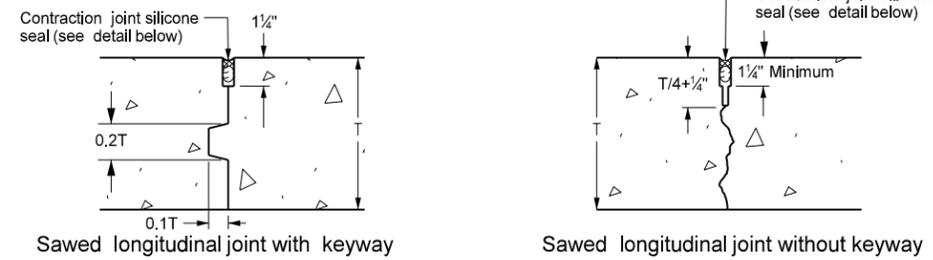
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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DATE	CHANGE

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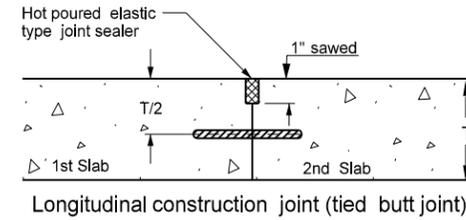
# LONGITUDINAL JOINT DETAILS

D-550-2

## UNTIED JOINTS (silicone seal)

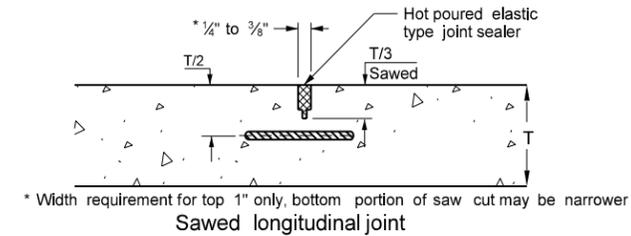
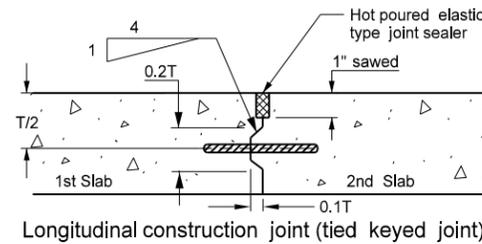
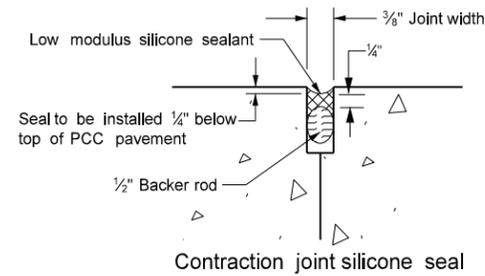


## TIED JOINTS (hot poured elastic seal)



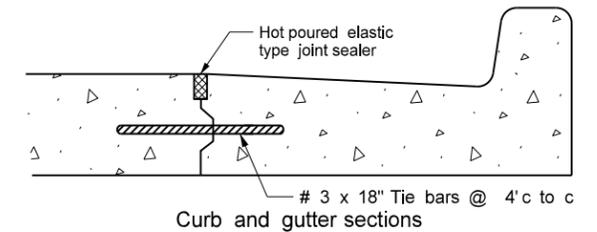
Notes:

1. The hot poured elastic type joint sealer shall be in accordance with Section 826.02A.2 of the Standard Specifications.
2. The longitudinal joint and seal shall be included in the price bid for the P.C.C. pavement.
3. Tie bars shall not be placed within 18 inches of a transverse skewed joint.
4. Where tie bars are installed bent and later straightened, Grade 40 steel shall be used.
5. Tie bar spacing can be increased up to 10% to facilitate construction.
6. Tie Bars shall be at a 48 inch maximum spacing.
7. A "Warp" joint is a sawed joint or a construction joint with a keyway.
8. A "Butt joint" is a construction joint with no keyway.

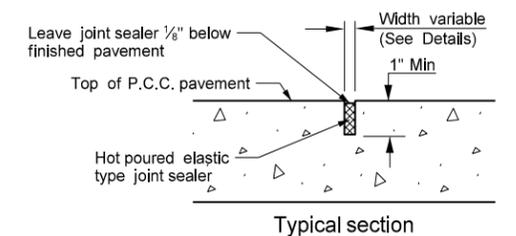


## TIEBAR SPACINGS (In)

DIST TO FREE EDGE (FT)	JOINT TYPE	P.V.M.T THICKNESS	TIEBAR SPACINGS (In)																																																			
			# 3 BAR						# 4 BAR						# 5 BAR						# 6 BAR																																	
			GRADE 40				GRADE 60				GRADE 40				GRADE 60				GRADE 40				GRADE 60				GRADE 40				GRADE 60																							
			24"				30"				24"				36"				30"				42"				36"				48"																							
			4	6	8	10	4	6	8	10	12	14	8	10	12	14	16	8	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	19	22	24	10	12	14	16	19	22	24				
6"	WARP		48	39	29	24	48	48	44	35	29	25	48	42	35	30	26	48	48	48	45	39	28	26	48	48	47	41	30	27	48	48	48	48	45	41	48	48	48	48	48	43	39	48	48	48	48	48	48	48				
	BUTT		37	27			48	42	31	25			37	29	24			48	44	37	32	27			46	39	33	29			48	48	48	43	32	29	48	48	48	48	35	30	27	48	48	48	48	48	45	41				
8"	WARP		48	37	28		48	48	42	33	28	24	48	39	33	28	24	48	48	48	42	37	27	24	48	48	44	38	28	25	48	48	48	48	42	38	48	48	48	48	47	40	37	48	48	48	48	48	48	48				
	BUTT		39	26			44	39	29			35	27				48	48	47	41	30	27		44	36	31	27			48	48	47	41	30	27	48	48	45	39	33	28	26	48	48	48	48	48	48	42	39				
8 1/2"	WARP		48	35	26		48	48	39	31	26		47	37	31	26		48	48	47	40	35	25		48	48	42	36	26	24	48	48	48	48	40	36	48	48	48	48	44	38	35	48	48	48	48	48	48	48				
	BUTT		37	24			48	37	27			33	26				48	40	33	28	25			41	34	29	25			48	48	44	39	28	25	48	48	42	37	31	26	24	48	48	48	48	47	40	37					
9"	WARP		48	33	25		48	48	37	30	25		44	35	29	25		48	48	44	38	33	24		48	46	39	34	25		48	48	48	48	38	34	48	48	48	48	42	36	33	48	48	48	48	48	48	48				
	BUTT		35				48	35	26			31	25				47	37	31	27			39	32	27	25			48	48	42	37	27	24	48	48	42	37	27	24	48	47	40	35	29	25	48	48	48	48	44	38	35	
9 1/2"	WARP		48	31			48	47	35	28			42	34	28	24		48	48	42	36	31			48	44	37	33	24		48	48	48	48	36	33	48	48	48	48	40	34	31	48	48	48	48	48	48	48				
	BUTT		33				48	33	25			29	24				45	36	29	25			37	31	26	24			48	46	40	35	25		48	45	38	33	28	24	48	48	48	48	48	48	48	48	48	48	48	48	48	48
10"	WARP		45	30			48	45	34	27			40	32	26			48	48	40	34	30			48	42	36	31			48	48	47	34	31	48	48	48	45	38	33	30	48	48	48	48	48	48	48					
	BUTT		32				48	32	24			28					42	34	28	24			35	29	25			48	44	38	33	24	48	42	36	32	27	48	48	48	48	40	34	31	48	48	48	48	48	48	48			
10 1/2"	WARP		43	28			48	43	32	26			38	31	25			48	46	38	33	28			48	40	34	30			48	48	48	45	32	30	48	48	48	43	36	31	28	48	48	48	48	48	48	47				
	BUTT		30				46	30				27					40	32	27				34	28	24			48	42	36	32		48	40	35	30	25	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
11"	WARP		41	27			48	41	31	24			48	44	36	31	27	48	44	36	31	27			46	38	32	28			48	48	47	41	34	31	48	48	47	41	34	30	27	48	48	48	48	48	48	48				
	BUTT		29				44	29				25					39	31	25				32	27				48	40	35	30		46	39	33	29	24	48	48	48	48	48	48	48	48	48	48	48	48	48	48			
11 1/2"	WARP		39	26			48	39	29			35	28				48	42	35	30	26			44	36	31	28			48	48	47	41	30	27	48	48	45	40	33	28	26	48	48	48	48	48	48	48					
	BUTT		27				42	27				25					37	30	25				31	25				46	39	33	29		45	37	32	28		48	48	48	48	48	48	48	48	48	48	48	48	48	48			
12"	WARP		38	25			48	38	28			33	27				48	40	33	29	25			42	35	30	26			48	48	45	39	28	26	48	48	43	38	32	27	25	48	48	48	48	48	48	48					
	BUTT		27				40	27				35	28				35	28					29	25				44	37	32	27		42	35	30	27		48	48	45	40	34	31	48	48	48	48	48	48	48				
12 1/2"	WARP		36	24			48	36	27			32	26				48	39	32	27	24			40	33	29	25			48	48	43	38	27	25	48	48	41	36	30	26	24	48	48	48	48	48	48	48					
	BUTT		25				38	25				34	27				34	27					28					42	35	30	27		41	34	29	25		48	48	44	38	32	28	25	48	48	48	48	48	48	48			
13"	WARP		35				48	35	26			31	25				47	37	31	26				39	32	28	24			48	48	42	36	26	24	48	47	40	35	29	25	48	48	48	48	48	48	48						
	BUTT		25				37	25				33	26				33	26					27					41	34	29	25		39	33	28	25		48	48	42	37	31	27	24	48	48	48	48	48	48	48			
13 1/2"	WARP		34				48	34	25			30	24				45	36	30	25				37	31	27			48	47	40	35	25		48	45	38	34	28	24	48	48	48	48	48	48	48							
	BUTT		24				35	24				32	25				32	25					26					38	32	27	24		38	32	27	24		48	47	40	35	30	26	24	48	48	48	48	48	48	48			
14"	WARP		32				48	32	24			29					43	35	29	25				36	30	26			48	45	39	34	24		48	43	37	32	27		48	48	48	48	48	48	48							
	BUTT		24				34					30	25				30	25					25					38	32	27	24		36	30	26			48	46	39	34	29	25	48	48	48	48	48	48	48				
14 1/2"	WARP		31				47	31				28					42	33	28	24				35	29	25			48	44	37	33	24		48	42	36	31	26		48	48	48	48	48	48	48							
	BUTT		33				47	31				28					29						25					37	31	26			35	29	25			48	44	38	33	28	24	48	48	48	48	48	48	48				



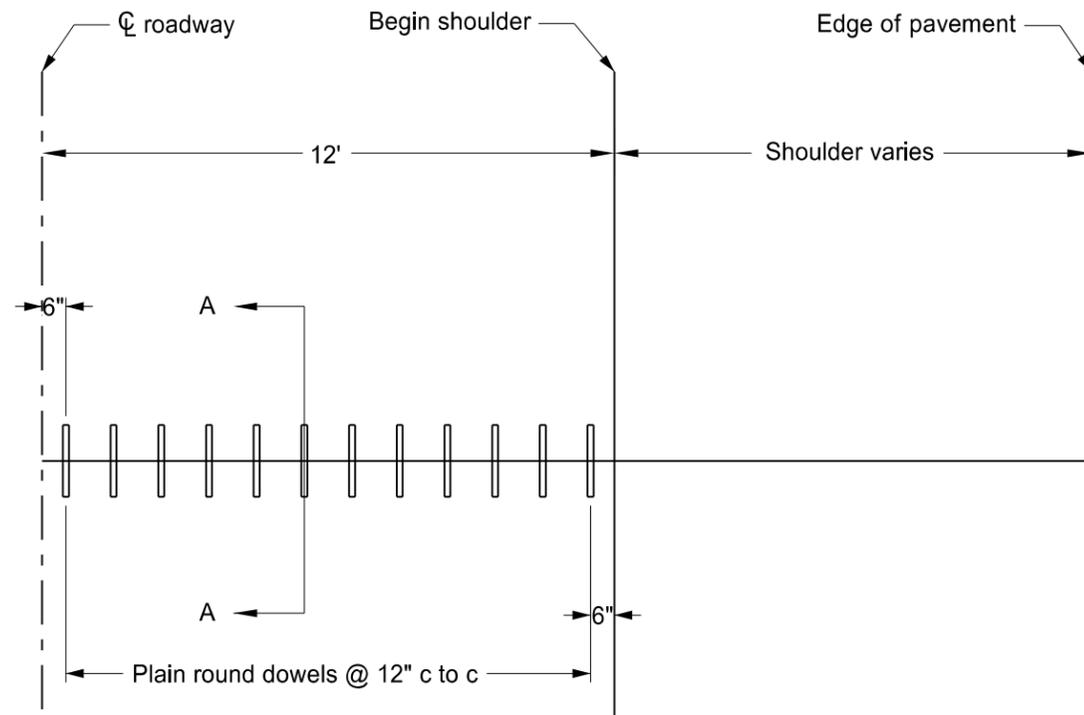
## JOINT SEALER DETAILS



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
10/23/2012	Expanded Tie Bar Table

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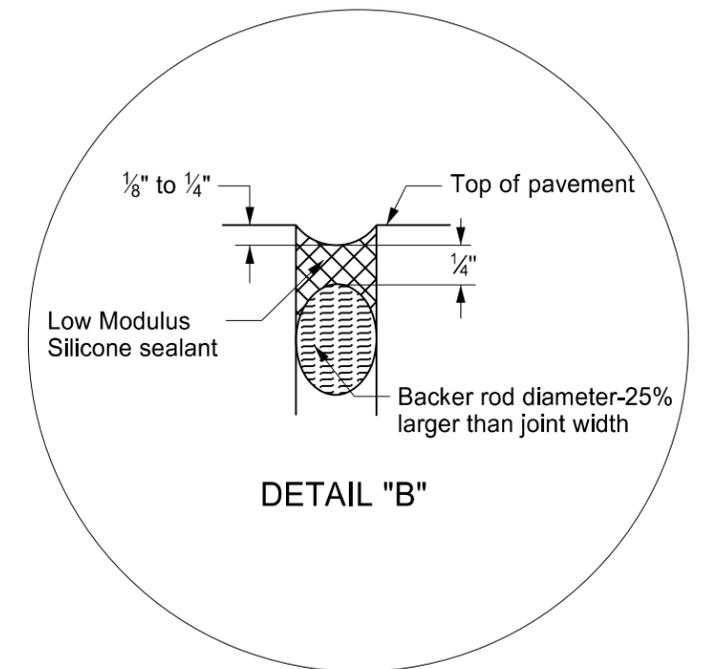
TRANSVERSE CONTRACTION JOINT DETAILS



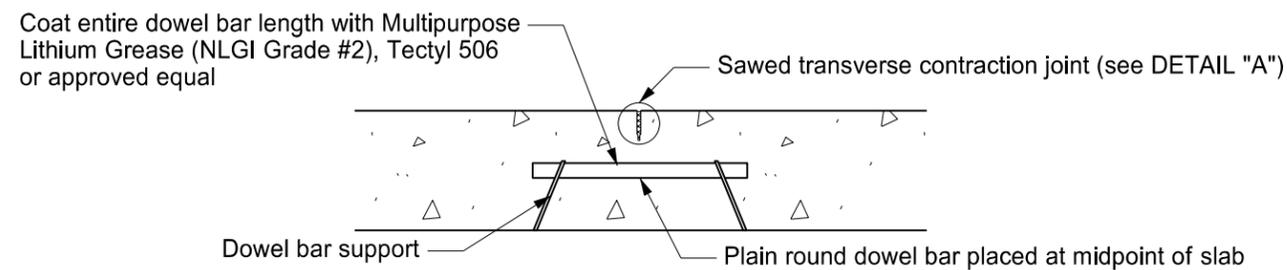
CONTRACTION JOINT DOWEL ASSEMBLY  
(1/2 roadway shown)

Notes

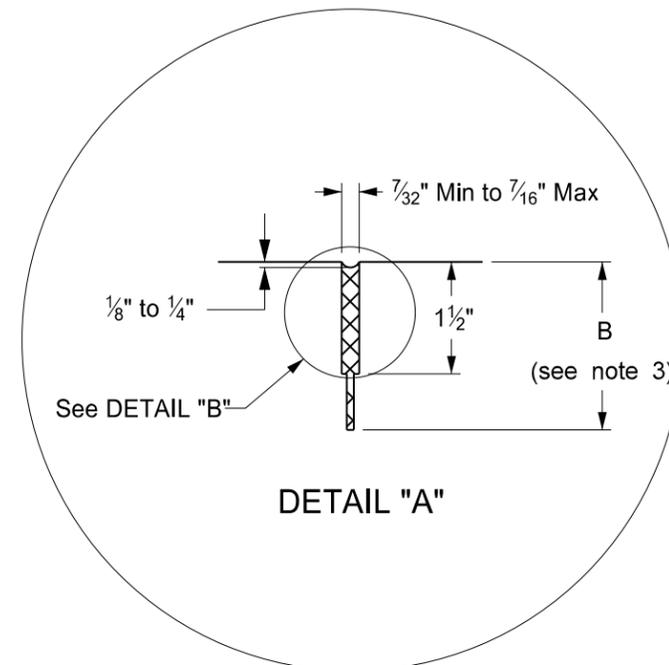
1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3.  $B = T/4 + 1/4"$  for AE or YE for non-dowelled concrete pavement or  $B = T/3$  for high early or dowelled concrete pavement



DETAIL "B"



SECTION A-A



DETAIL "A"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference

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CONSTRUCTION SIGN DETAIL

D-704-5

<b>SIGN NUMBER</b>	G20-10-108	<b>STATION(S):</b>		<b>AREA:</b>	36.0 Sq.Ft.	
<b>WIDTH x HEIGHT</b>	9'-0" x 4'-0"					
<b>BORDER WIDTH</b>	1.25" (Inset 0.75")					
<b>CORNER RADIUS</b>	3"					
<b>MOUNTING</b>	Ground					
<b>BACKGROUND</b>	TYPE: IV Reflective COLOR: Fluorescent Orange					
<b>LEGEND/BORDER</b>	TYPE: Non-Refl COLOR: Black					
<b>SYMBOL</b>		<b>X</b>	<b>Y</b>	<b>WID</b>	<b>HT</b>	<b>ANGLE</b>
		42.1	6.2	24	4	0

Dimensions are in inches.tenths      Letter locations are panel edge to lower left corner

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

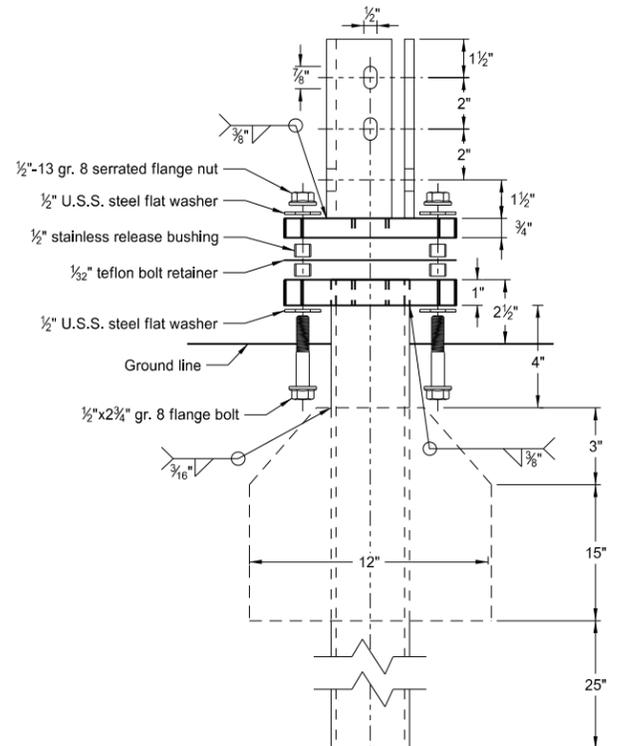
Notes:

1. Sign shall be placed a distance of 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

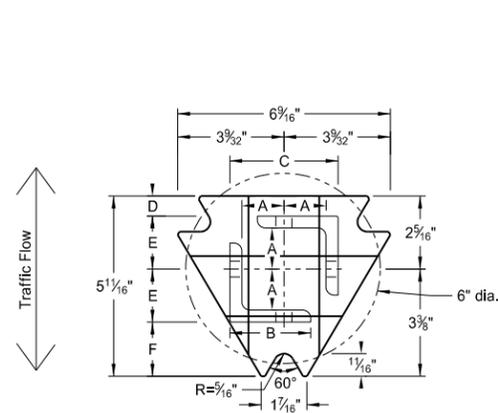
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV

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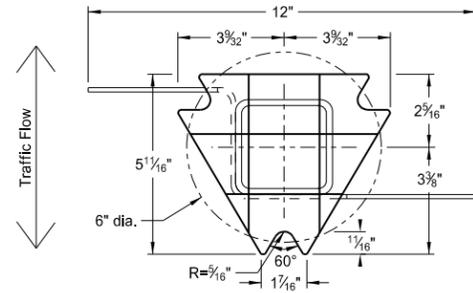


Multi-Directional Slip Base Assembly

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

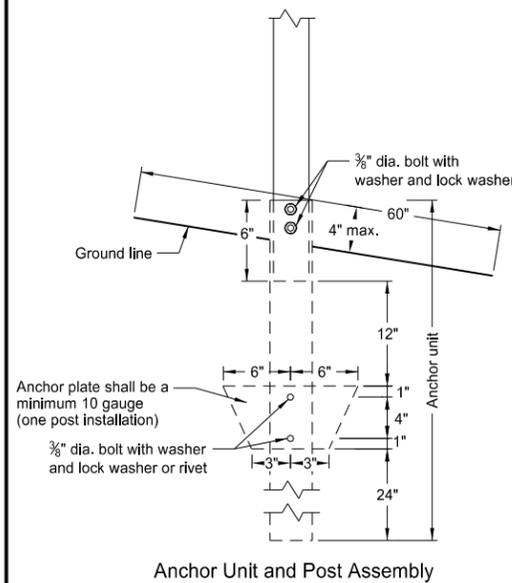
Notes:

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.

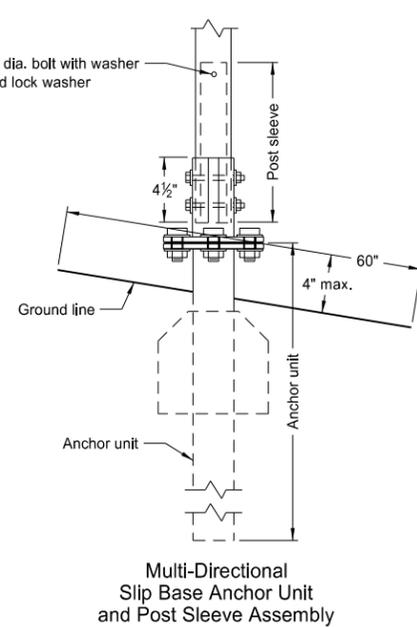
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	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. <sup>4</sup>	Cross Sec. Area in. <sup>2</sup>	Section Modulus in. <sup>3</sup>
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

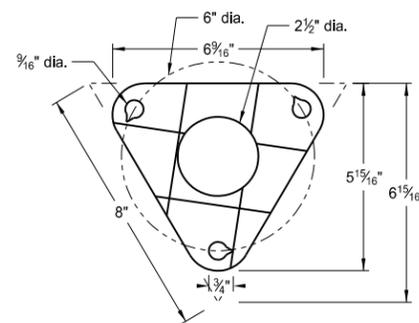
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



Anchor Unit and Post Assembly

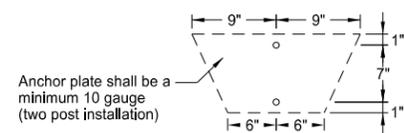


Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



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

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

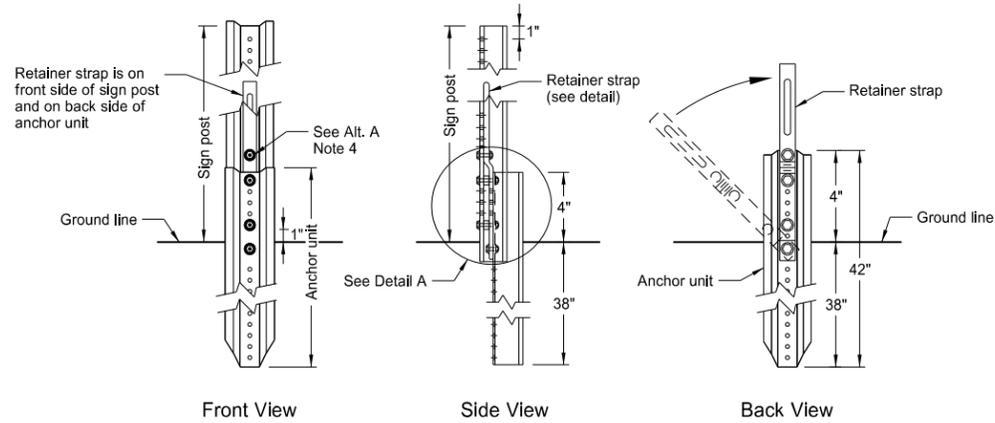
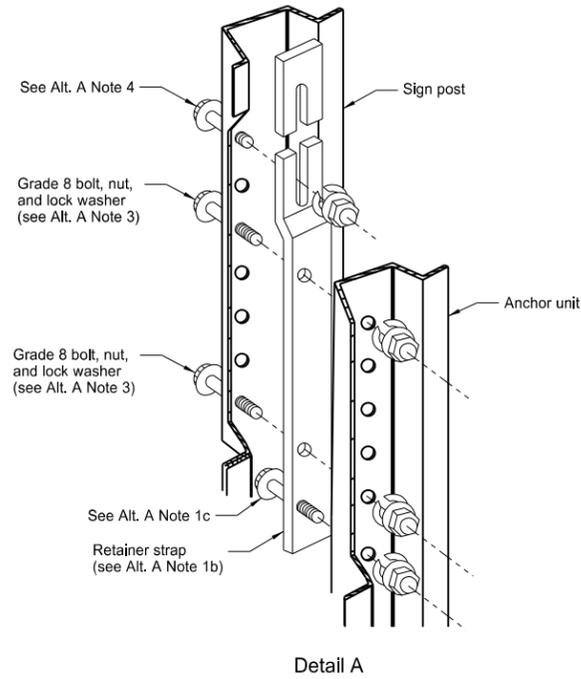


Anchor plate shall be a minimum 10 gauge (two post installation)

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

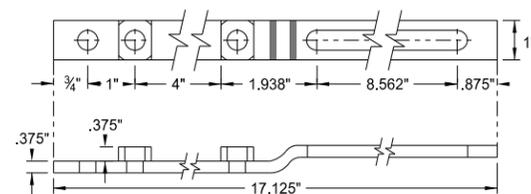
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U-Channel Post

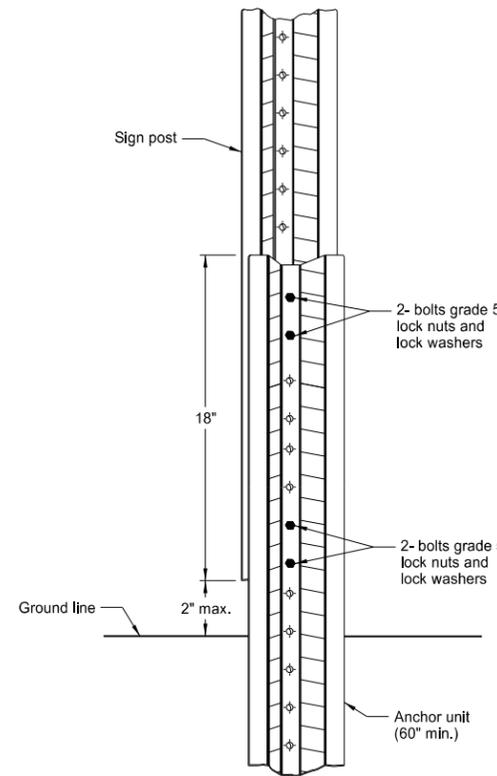


Breakaway U-Channel Detail Alternate A

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

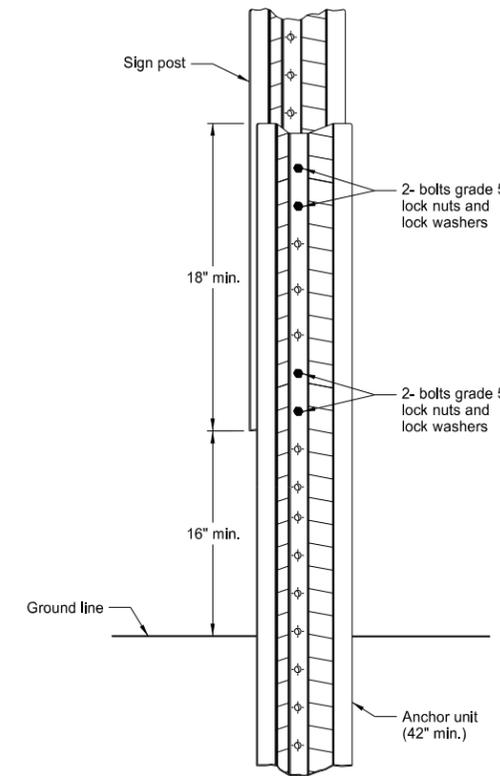


Retainer Strap Detail



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:

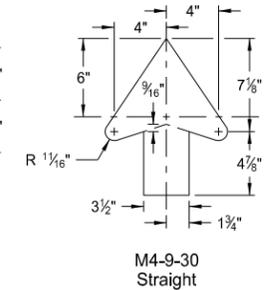
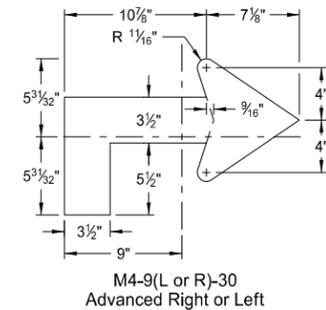
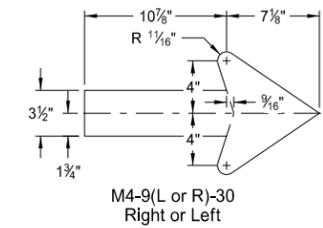
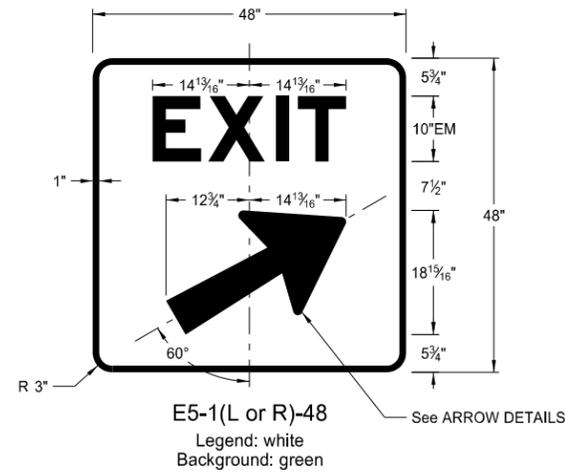
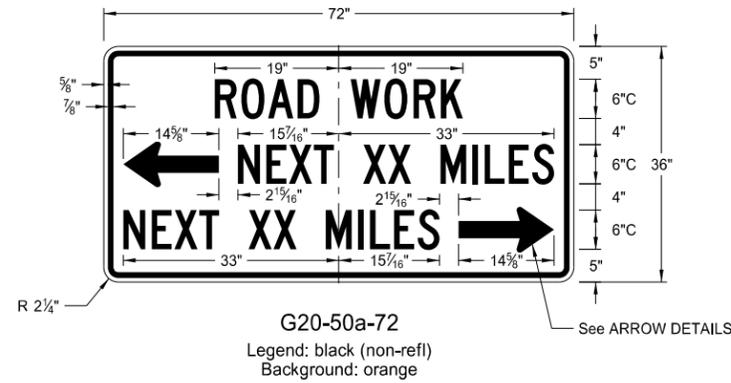
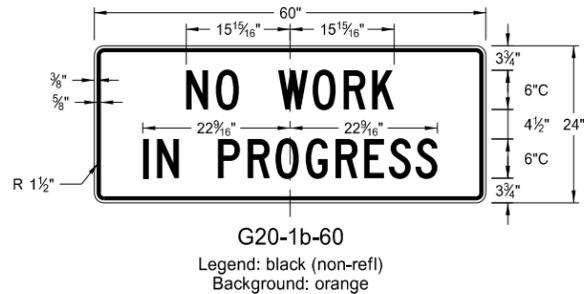
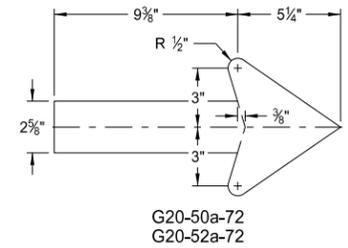
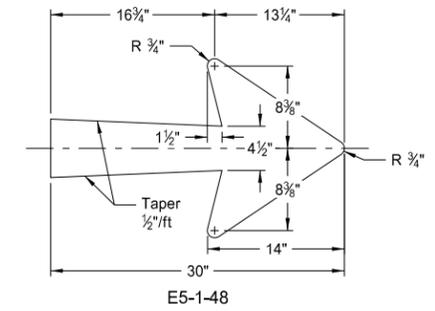
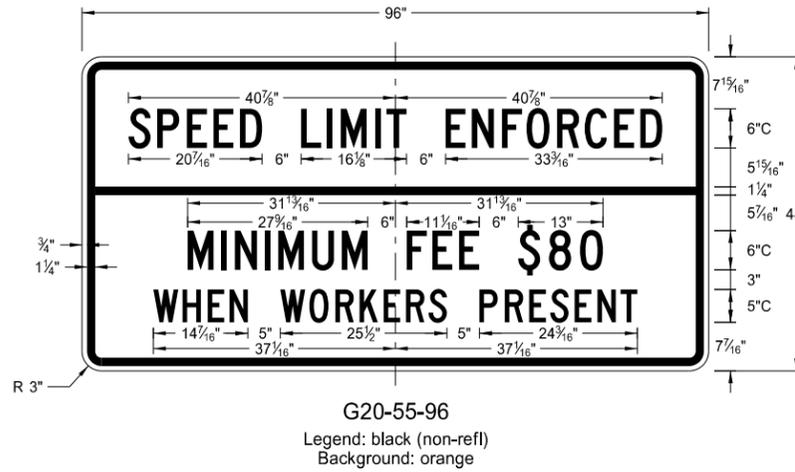
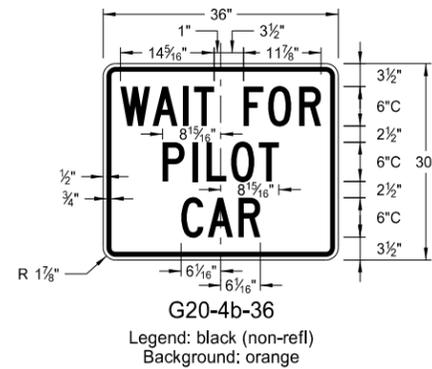
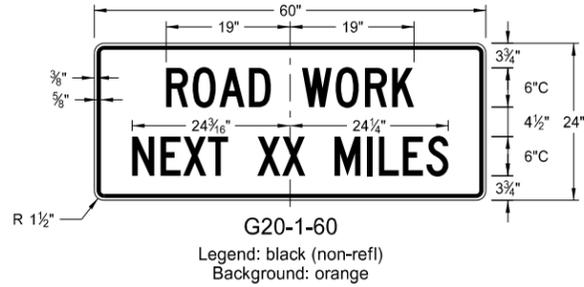
1. a) Drive anchor unit to within 12" of ground level.  
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.  
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.  
d) Rotate strap 90° to left.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

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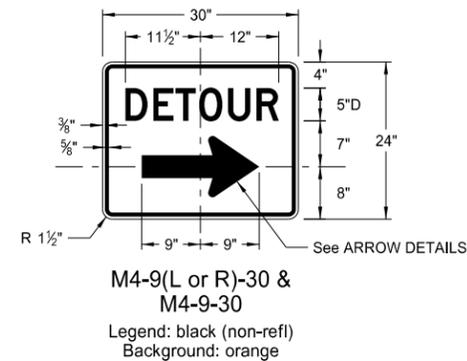
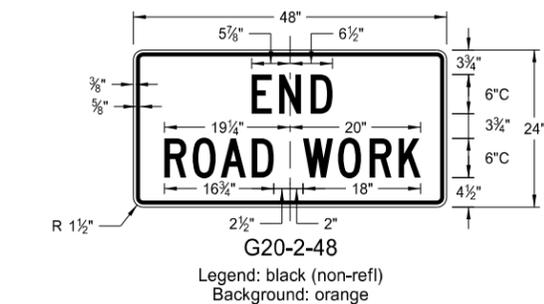
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CONSTRUCTION SIGN DETAILS  
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

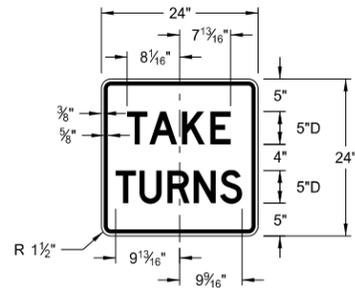
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

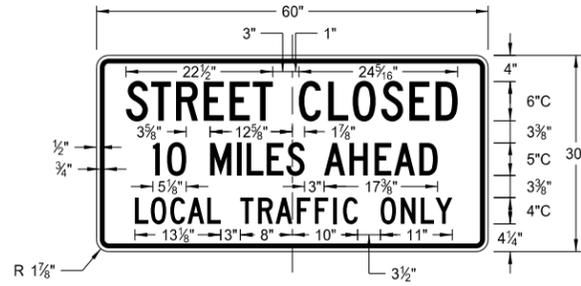
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CONSTRUCTION SIGN DETAILS  
REGULATORY SIGNS

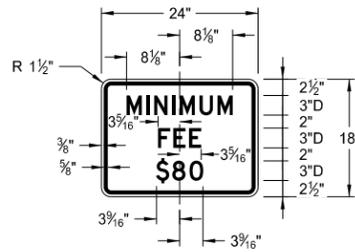
D-704-10



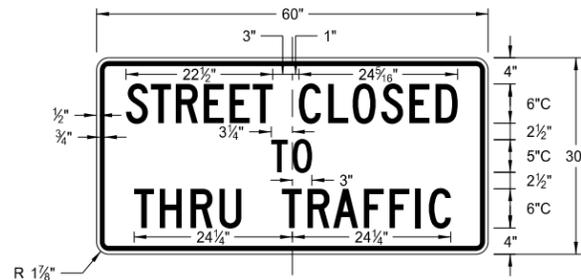
R1-50-24  
Legend: black (non-refl)  
Background: white



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

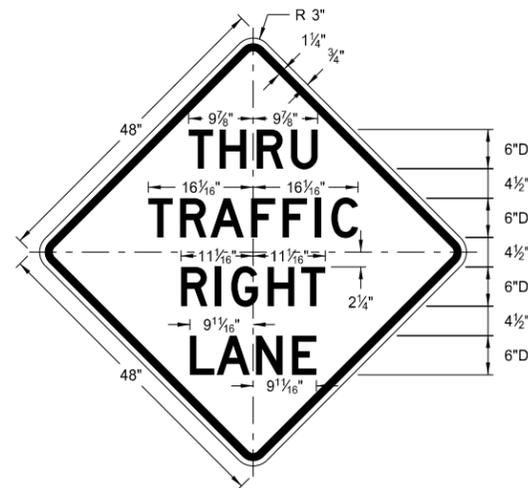
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
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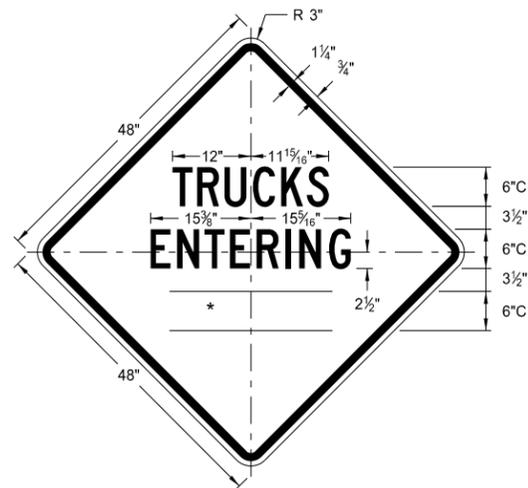
CONSTRUCTION SIGN DETAILS  
WARNING SIGNS

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

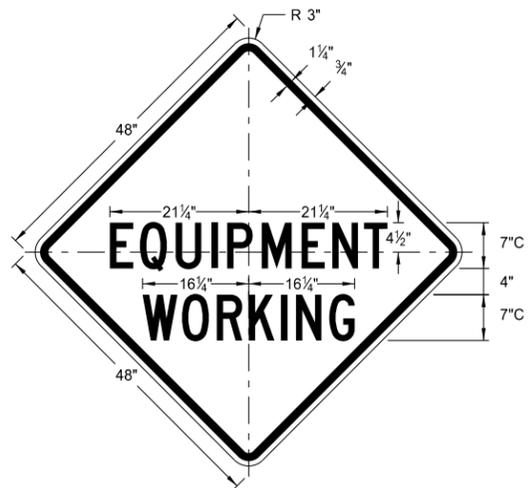
\* DISTANCE MESSAGES



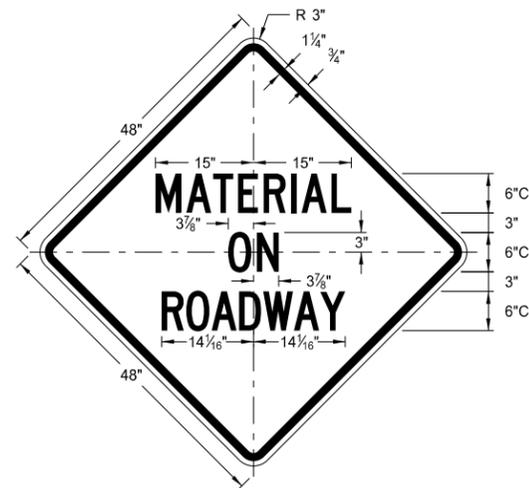
W5-8-48  
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Background: orange



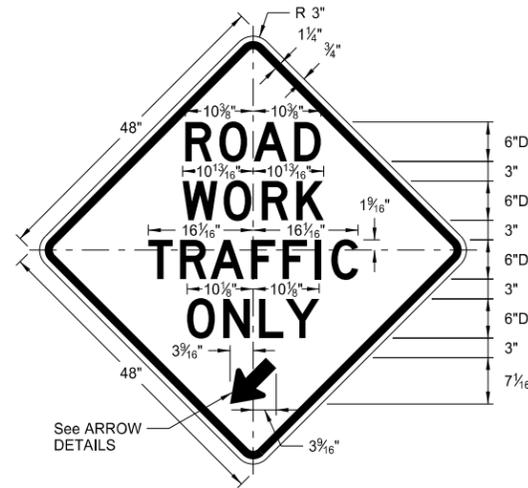
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Background: orange



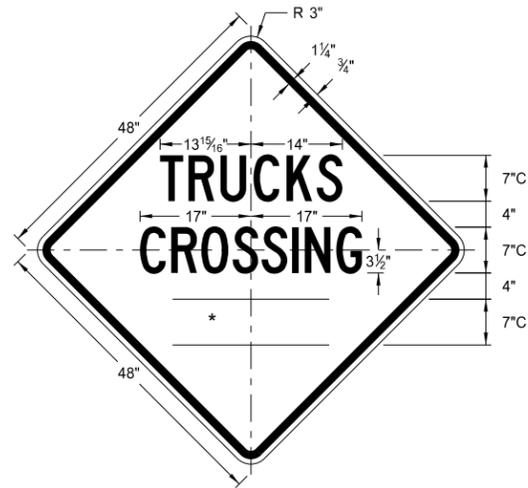
W20-51-48  
Legend: black (non-refl)  
Background: orange



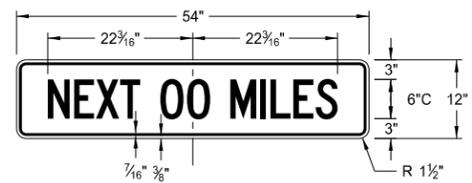
W21-51-48  
Legend: black (non-refl)  
Background: orange



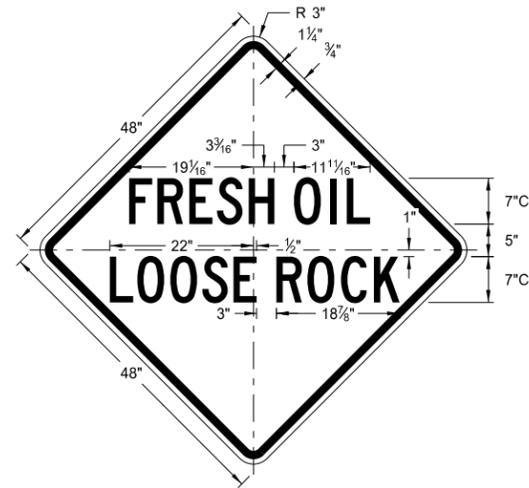
W5-9-48  
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Background: orange



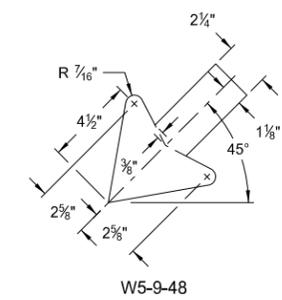
W8-55-48  
Legend: black (non-refl)  
Background: orange



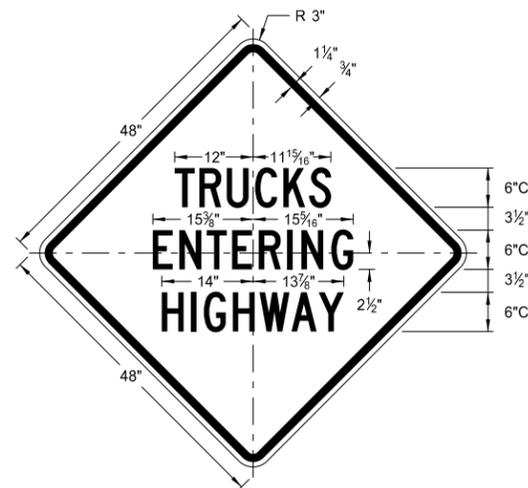
W20-52-54  
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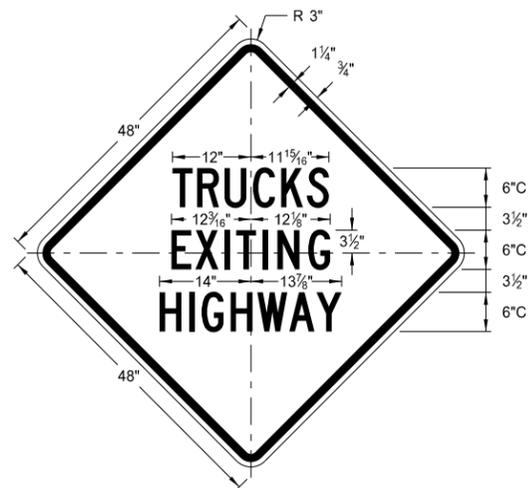
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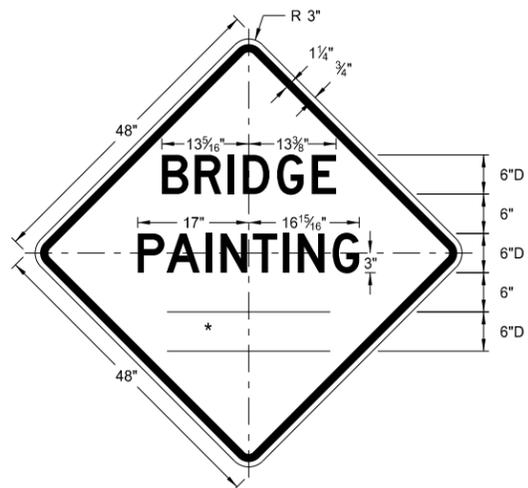
W5-9-48  
ARROW DETAILS



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



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

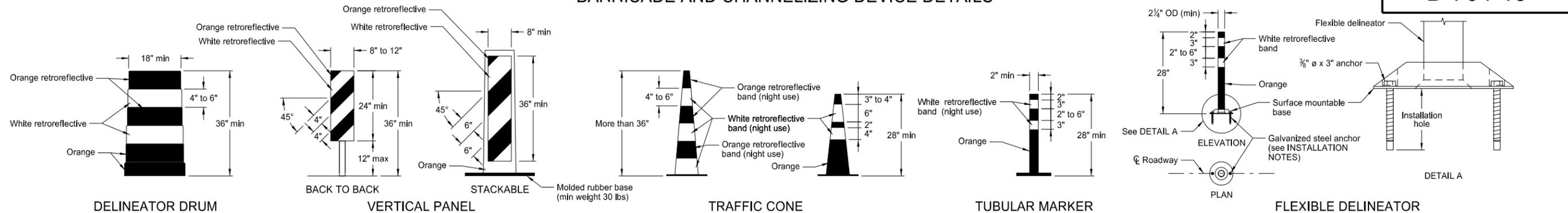


W21-50-48  
Legend: black (non-refl)  
Background: orange

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



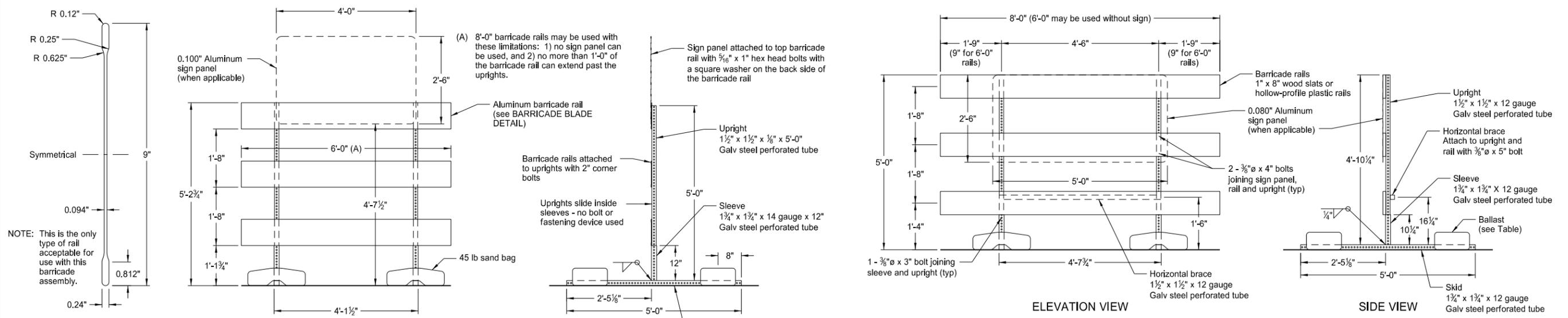
- INSTALLATION NOTES:**
1. Drill installation holes to diameter and depth as required by manufacturer's specifications.
  2. For removal, remove anchors and fill installation hole with an epoxy designed to bond to pavement surface.
  3. In lieu of bolted down base, the contractor may use an 8" x 8" butyl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



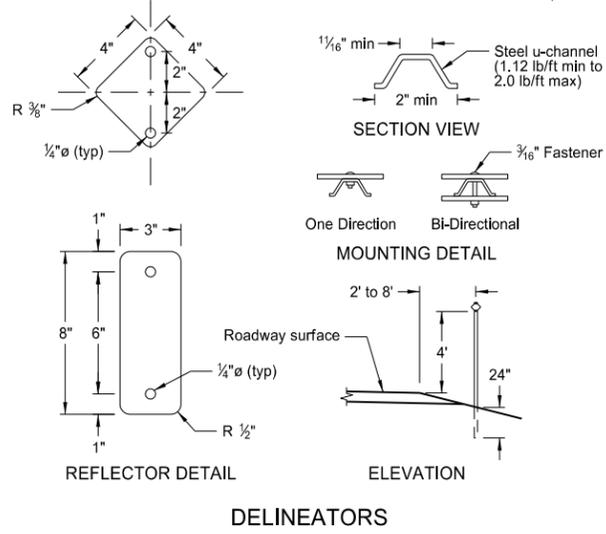
BARRICADE BLADE DETAIL

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

BARRICADE RAIL DETAILS

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

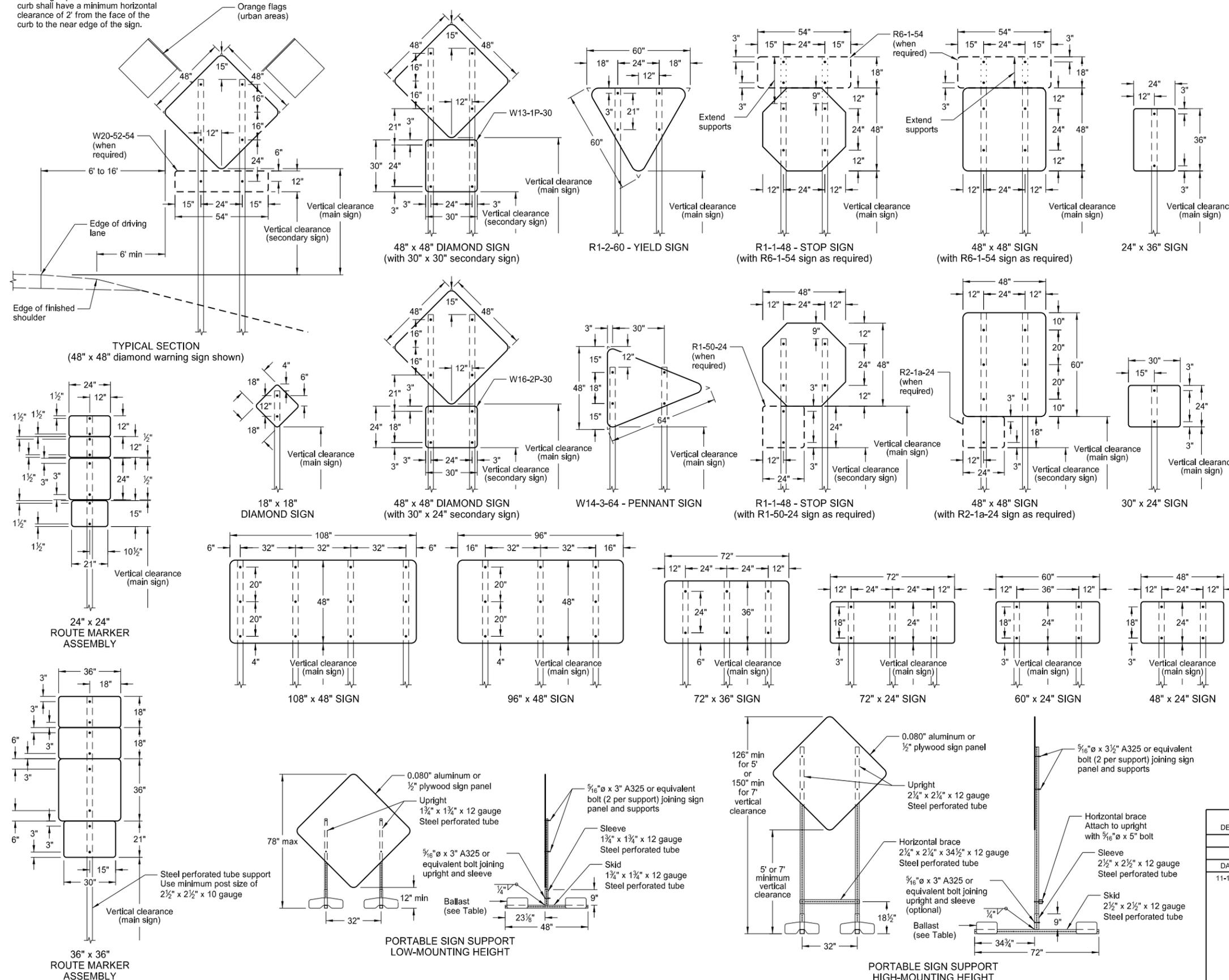
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

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



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

Signs over 50 square feet should be installed on 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.

2. 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.

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)

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

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

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

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

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforeseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-5 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have a maximum surface area of 16 square feet.

MINIMUM BALLAST  
 (For each side of sign support base)

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

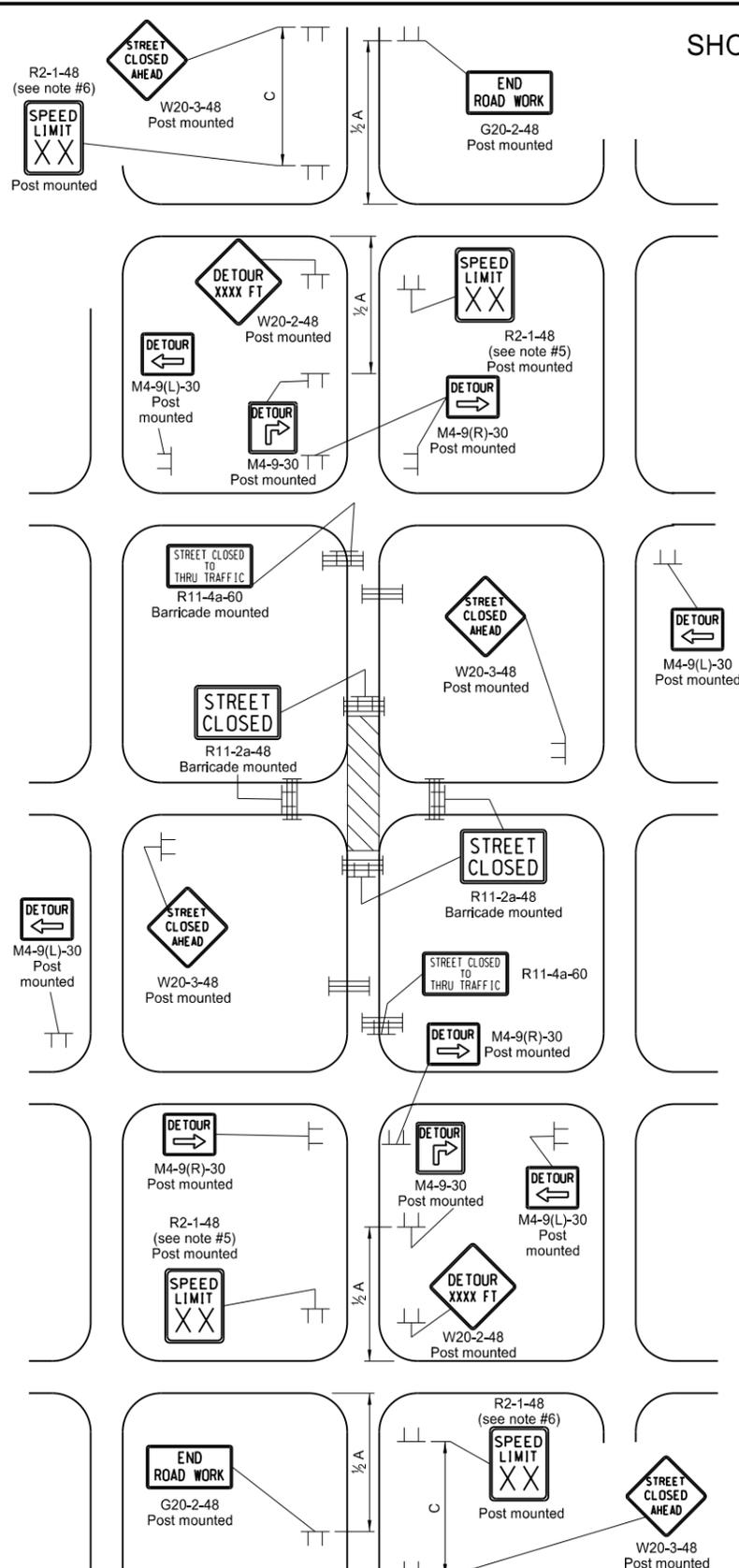
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

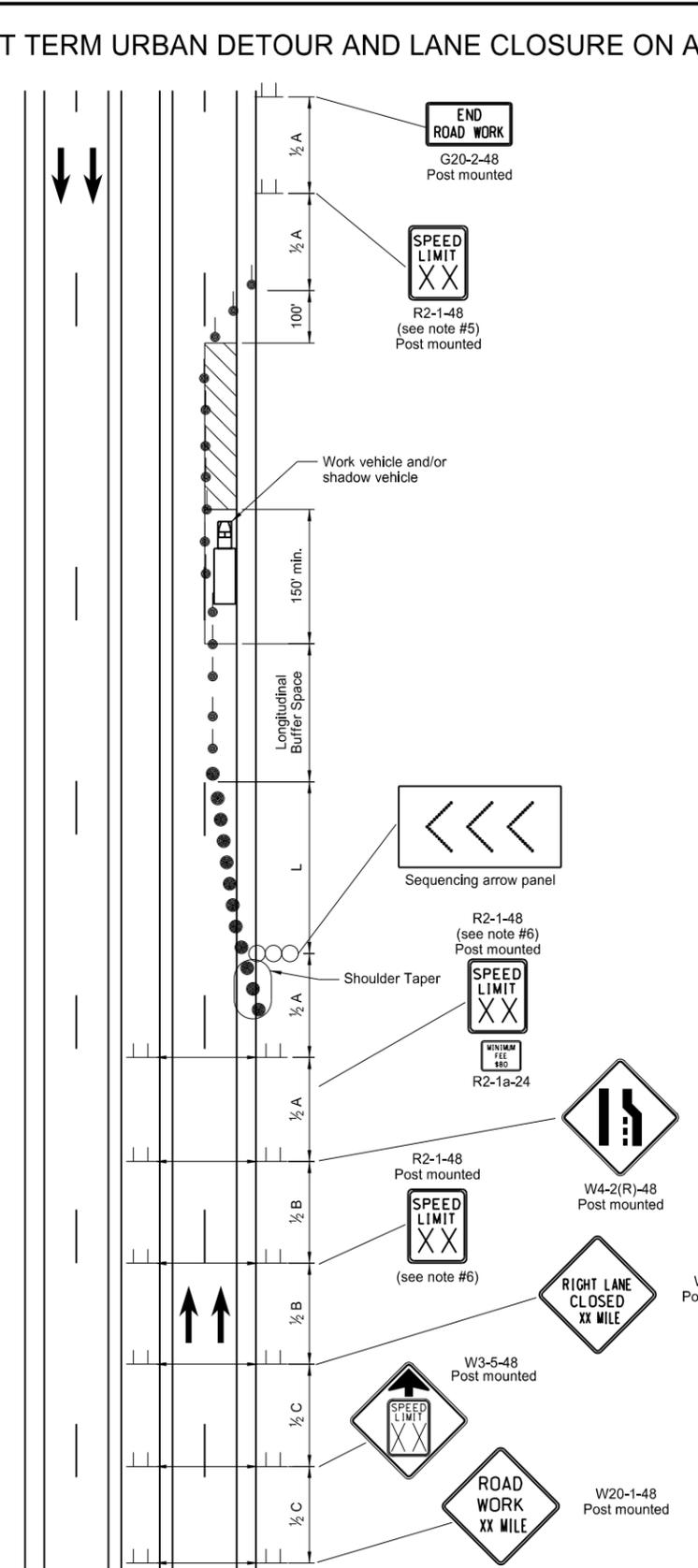
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 on 11/14/13 and the original document is stored at the  
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 of Transportation

# SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23



**TYPE Q**  
**DETOUR FOR A CLOSED STREET**  
 Where city streets are used for detouring traffic.  
 Urban projects do not require the G20-55-96 and R2-1a-24 signs.



**TYPE P**  
**STATIONARY LANE CLOSURE ON A DIVIDED HIGHWAY**  
 4 lane divided roadway where 1/2 of roadway is closed.  
 Short-term (more than 1 hour within a single daylight period.)

- Notes
- Variables
    - S = Numerical value of speed limit or 85th percentile.
    - W = The width of 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.
  - Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
  - Delinicator drums used for tapering traffic shall be spaced at dimension "S". Delinicator drums or tubular markers used for tangents shall be spaced at 2 times "S".
  - Sequencing Arrow Panels
    - Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room the panel should be moved closer to the work area so that it can be placed on the roadway surface.
    - 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 1/2 B.
  - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
  - Existing speed limit signs within a reduced speed zone shall be covered.
  - Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
  - Intersection control for Type Q may have to be changed on detour. The Engineer in the field shall determine what control is necessary.
  - Where necessary, safe speed to be determined by the Engineer. When parking is present, signs shall be placed so they are entirely visible above parked vehicles or placed at the edge of the parking area so they are visible to oncoming traffic. These signs may be skid mounted when placed on the roadway surface.
  - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.

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

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

	Type III barricade		Work area
	Sign		Sequencing arrow panel
	Delineator Drum		Tubular Markers

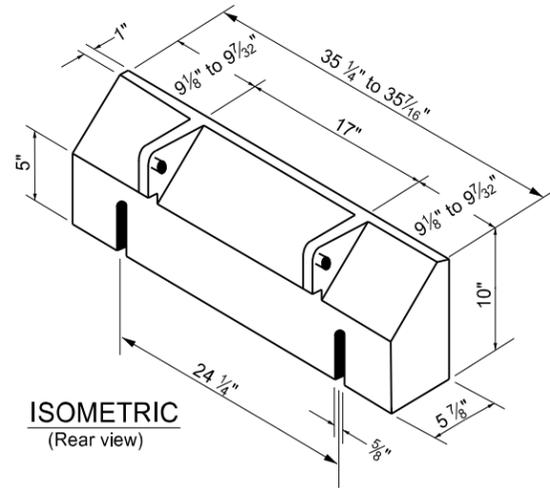
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
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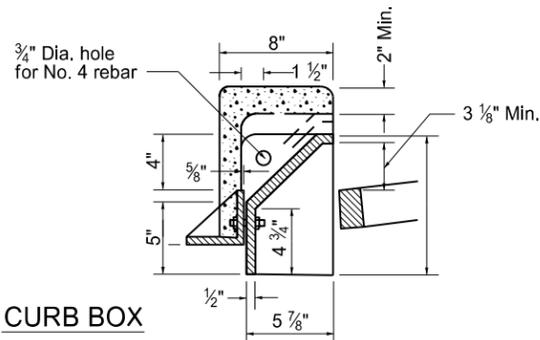
INLET - TYPE 2

D-722-2

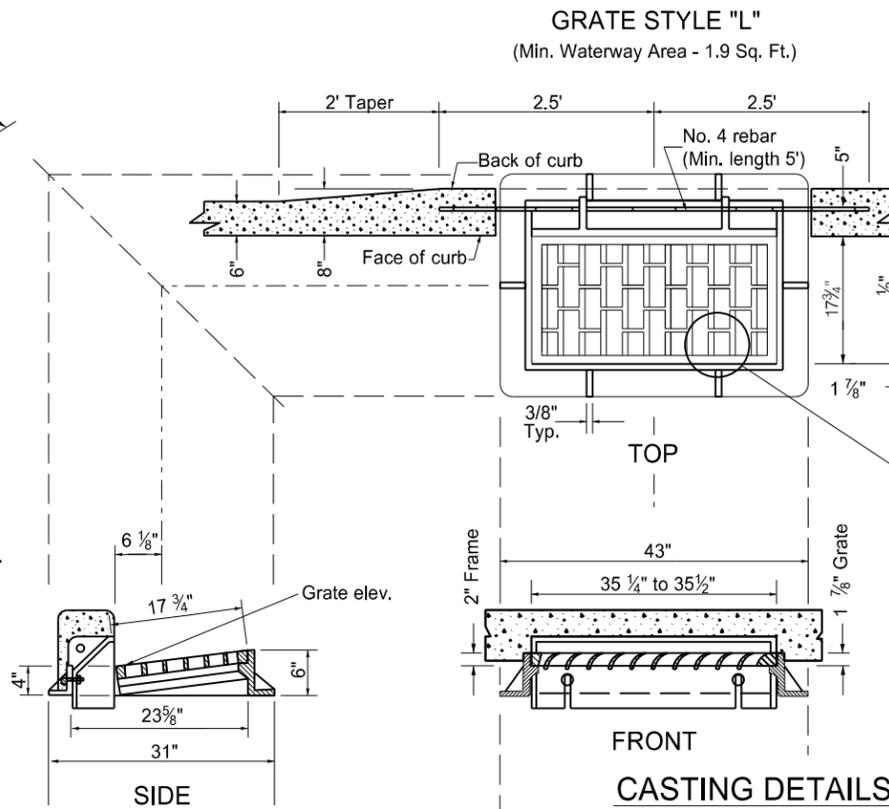
Pay Items  
 Inlet - Type 2 .....Ea.  
 Inlet - Type 2, Double.....Ea.



ISOMETRIC  
(Rear view)

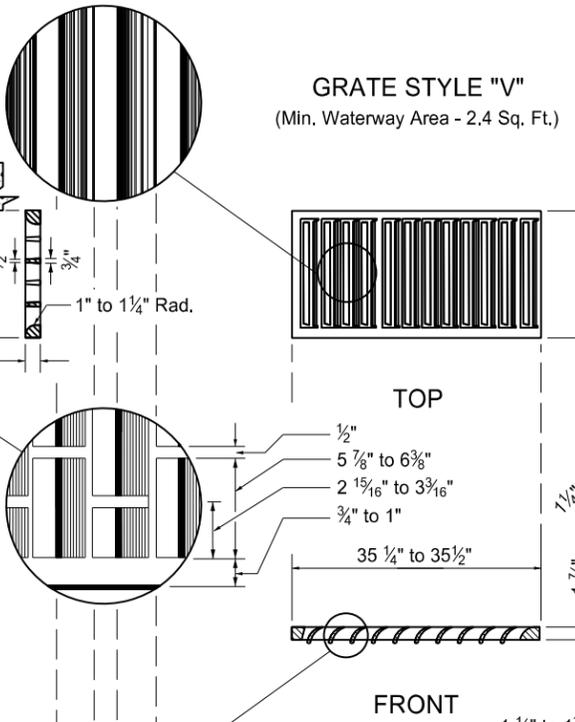


CURB BOX



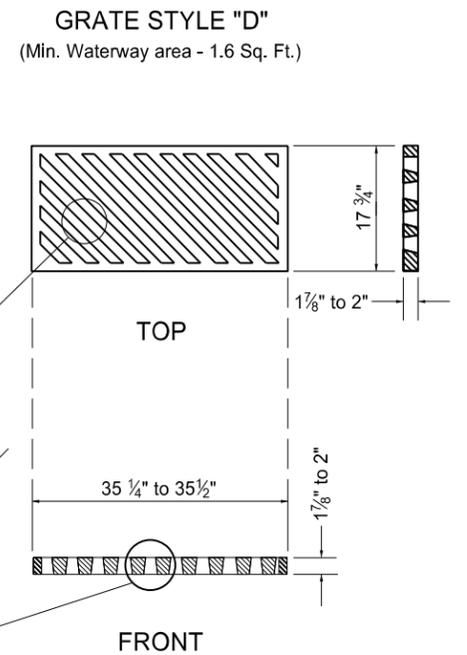
GRATE STYLE "L"  
(Min. Waterway Area - 1.9 Sq. Ft.)

CASTING DETAILS



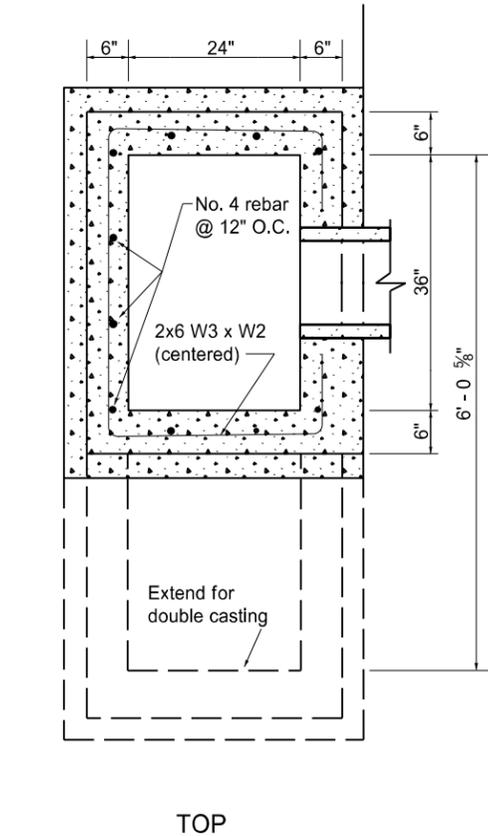
GRATE STYLE "V"  
(Min. Waterway Area - 2.4 Sq. Ft.)

FRONT

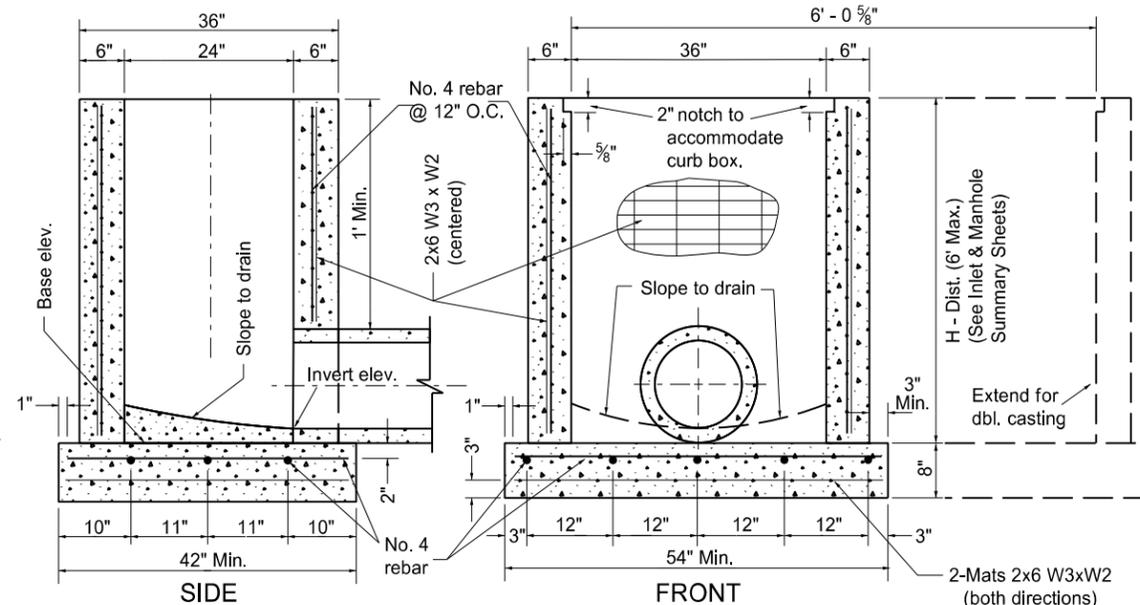


GRATE STYLE "D"  
(Min. Waterway area - 1.6 Sq. Ft.)

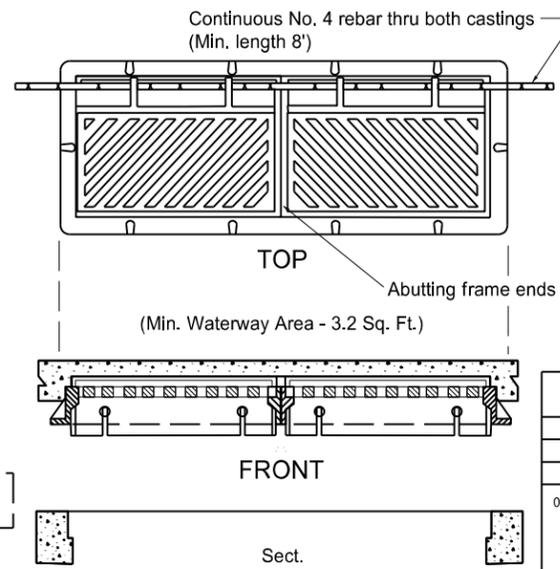
FRONT



TOP



RISER DETAILS



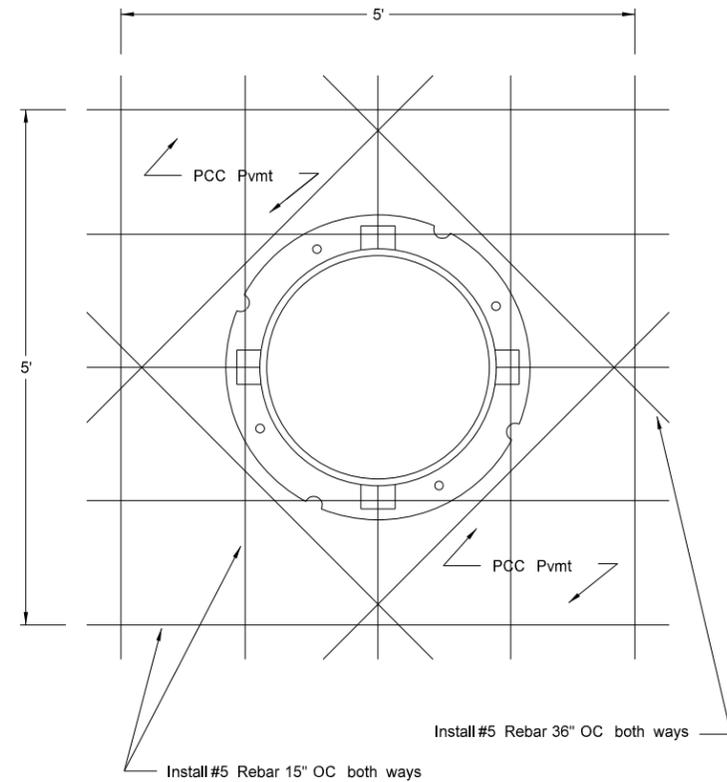
INLET - TYPE 2 - DOUBLE

- Notes:
1. Drainage structure castings shall be manufactured in accordance with AASHTO M306. Metal used in the manufacture of castings shall conform to AASHTO M105 Class 35B.
  2. Other castings, similar in dimension, may be used if the casting conforms to the riser section and has the grate style as specified in the plans. If modifications to the inlet riser are required to accommodate similar castings, the contractor must receive written approval from the engineer.
  3. Precast risers shall be constructed in accordance with ASTM C858.
  4. The contractor shall have the option of using precast or poured in place bases. Cast in place concrete shall be Class AE-3. Construction shall be in accordance with section 722 of the Standard Specifications.
  5. On projects with P.C.C. pavement, all inlet risers or barrels shall be constructed 4 to 5 inches below final elevation and adjusted to final grade 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.
  6. Welded wire reinforcing fabric shall conform to AASHTO M55 Grade 65.
  7. The deformed reinforcing steel shall conform to AASHTO M31.

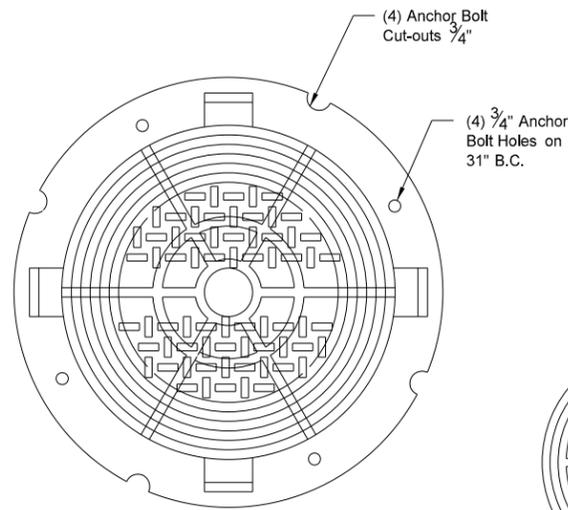
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
07-07-14	Revised Note 4

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

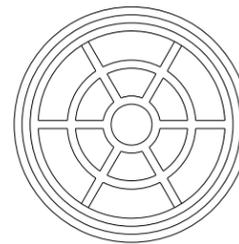
FLOATING MANHOLE CASTING



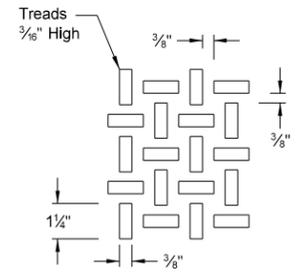
PLAN VIEW



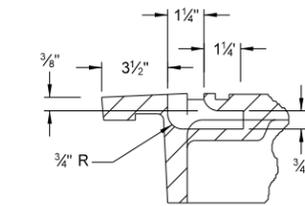
MATERIAL: Cast Gray Iron ASTM A-48, Class 35B  
 FINISH: No Paint  
 WEIGHT: Approximately 642 Lb/Unit



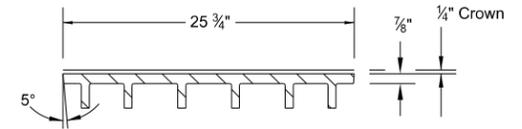
BOTTOM DETAIL  
 LID ONLY



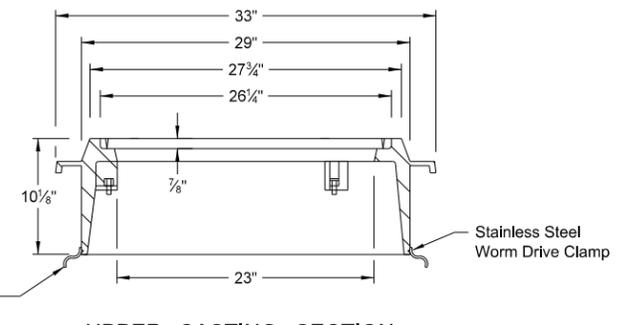
SURFACE DETAIL



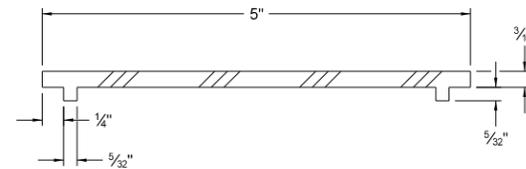
CONCEALED PICK DETAIL



LID SECTION

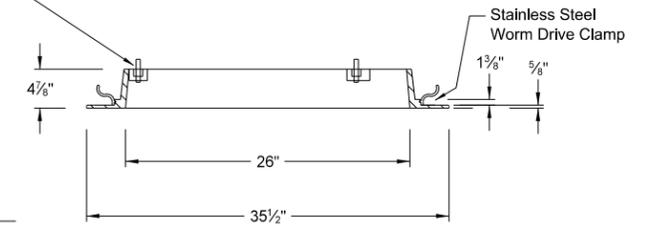


UPPER CASTING SECTION

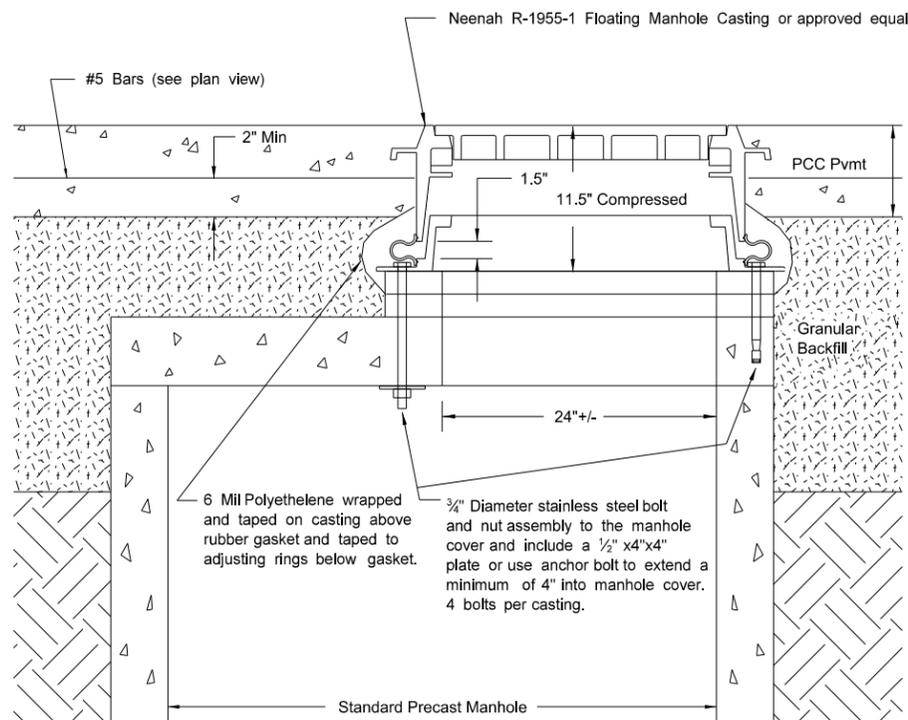


SECTION OF EXTRUDED NEOPRENE GASKET

(3) 5/8"-11 x 5/2" Grade 8 Steel Hex Bolts, Nuts W/ (2) Washers Ea Zinc Plated



LOWER CASTING SECTION



ELEVATION VIEW OF CONNECTION TO STANDARD PRECAST MANHOLE -TYPICAL

NOTES:

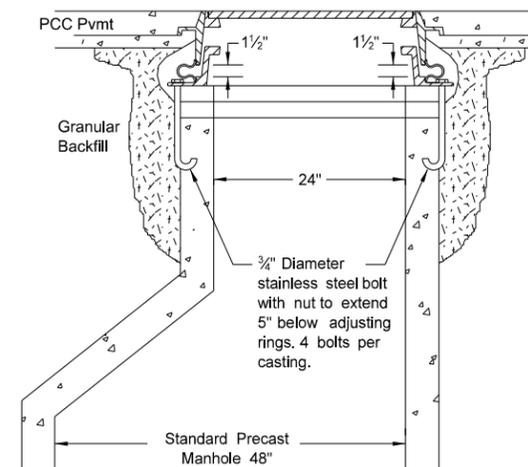
Bed frame in mortar, install precast two-inch rings, and plaster inside and out with mortar.

When installing an existing box out, drill #5 rebar into existing pavement 6" deep - 15" OC - bars to be 20" long.

Length of anchor bolts to vary with number of adjusting rings.

Installation cost at existing locations shall be included in price bid for manhole castings.

Installation cost at new manhole locations shall be included in the price bid for manholes.

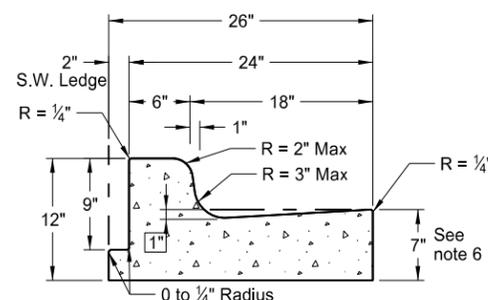


ELEVATION VIEW OF CONNECTION TO CONICAL MANHOLE - TYPICAL

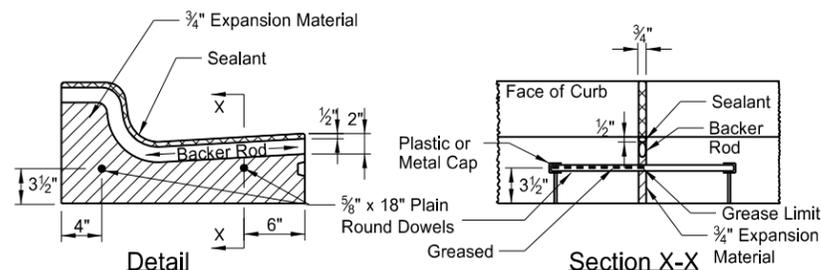
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-19-2010	
REVISIONS	
DATE	CHANGE

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**ROGER WEIGEL**  
 Registration Number  
 PE-2930,  
 on 7-19-10 and the original document is stored at the  
 North Dakota Department  
 of Transportation

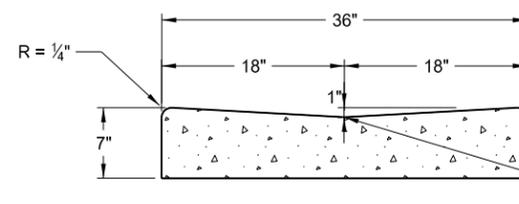
Curb & Gutter and Valley Gutter



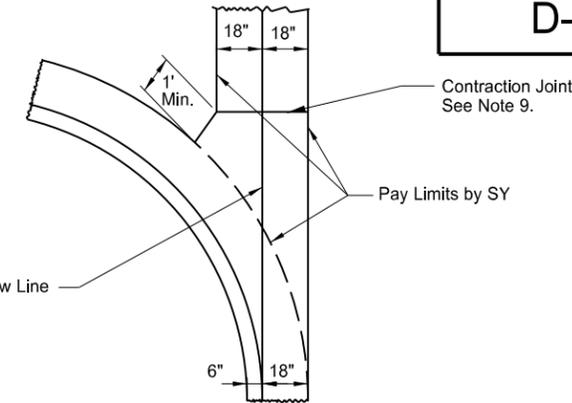
**Curb & Gutter Type 1 (Sec. A & B)**  
Adjacent to Concrete Sidewalk,  
Median, or Parking Lot.  
(Sec. A shown. See Sec B for  
additional details.)



**Isolation Joint**



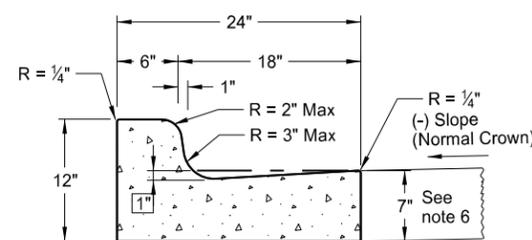
**36" Concrete Valley Gutter Detail**



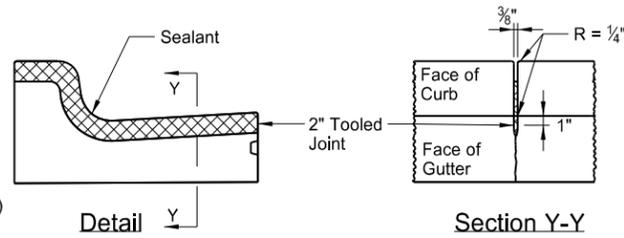
**36" Concrete Valley Gutter Plan**

**NOTES:**

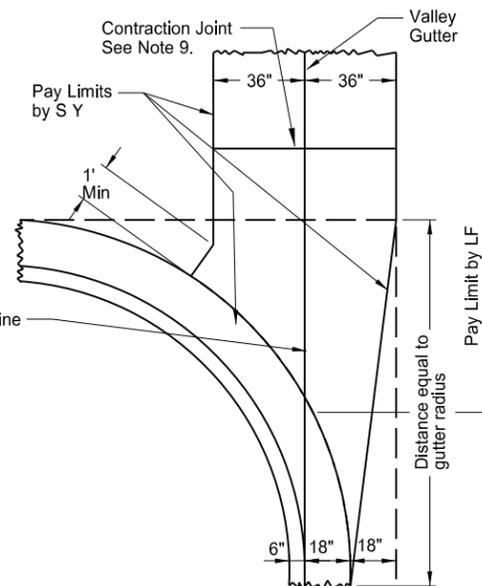
1. Curb and Gutter Type 1 (Sec. A & B) to be used. Section "A" to be used with (-) pavement slopes and section "B" to be used with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Isolation joint material shall be 3/4"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



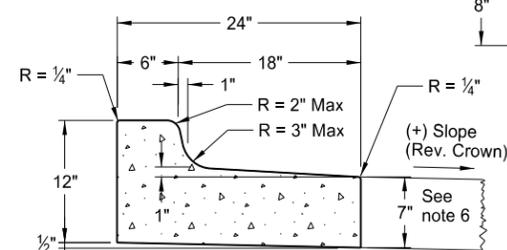
**Curb & Gutter Type 1 (Sec. A)**



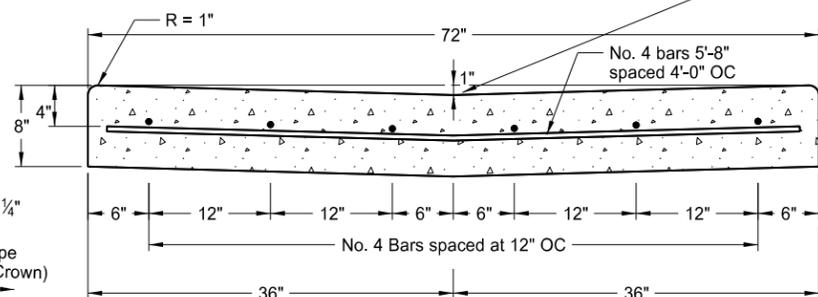
**Contraction Joint**  
(10' Max Spacing)



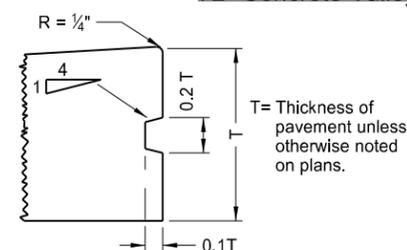
**72" Concrete Valley Gutter Detail**



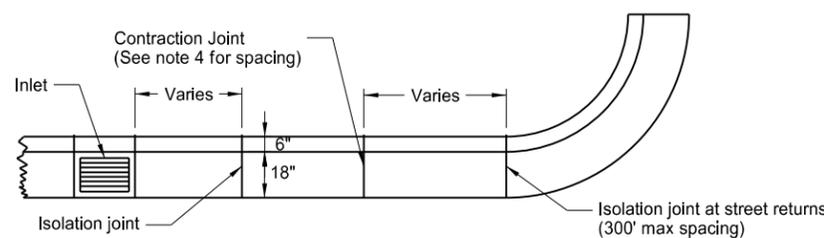
**Curb & Gutter Type 1 (Sec. B)**



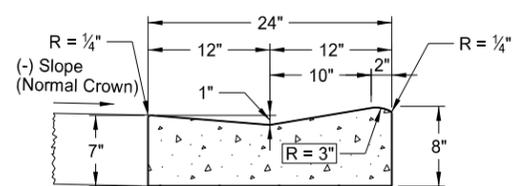
**72" Concrete Valley Gutter Detail**



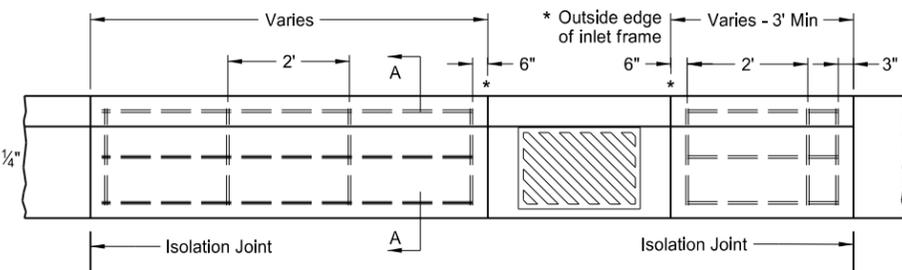
**Keyway Detail for Curb & Gutter**  
(To be used with PCC Pavement and Drives)



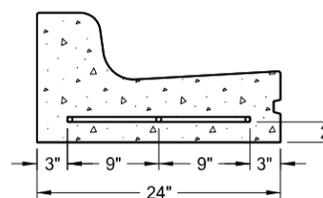
**Joint Location Detail**



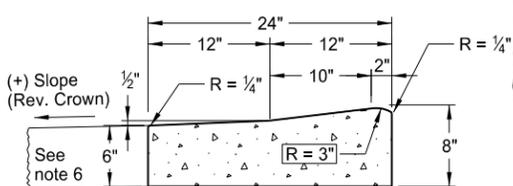
**Mountable Curb & Gutter Type 1 (Sec. A)**



**Curb & Gutter Reinforcing at Inlets**



**Section A-A**



**Mountable Curb & Gutter Type 1 (Sec. B)**

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

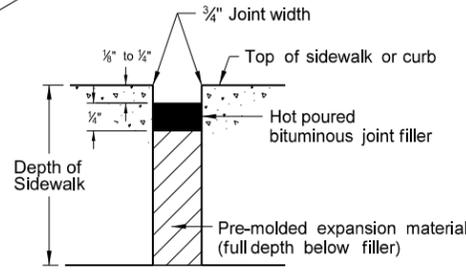
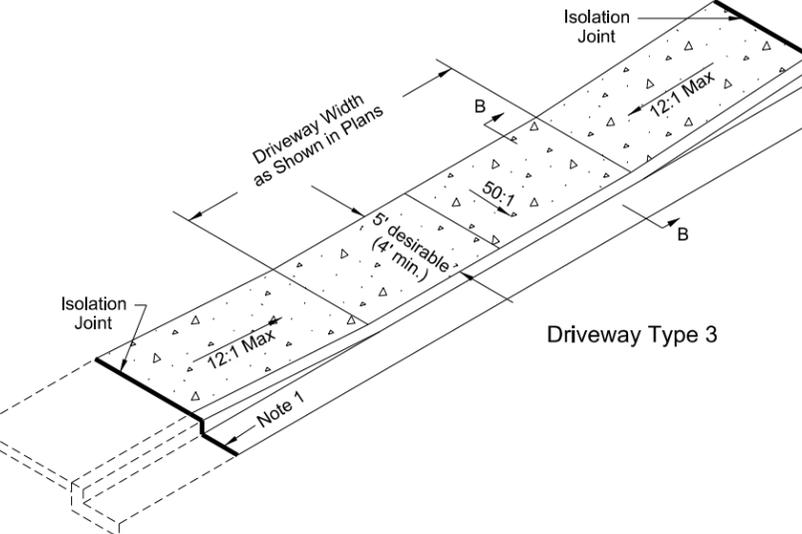
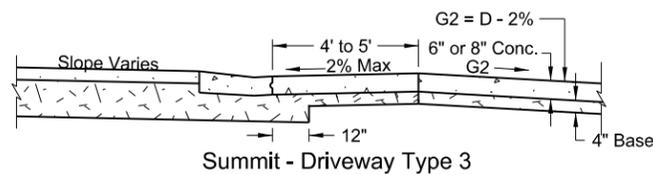
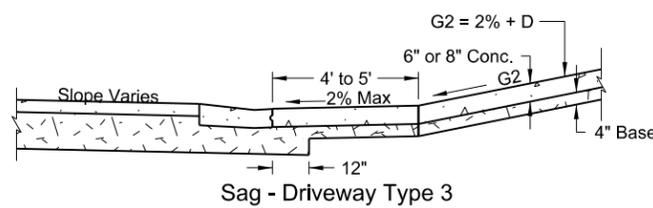
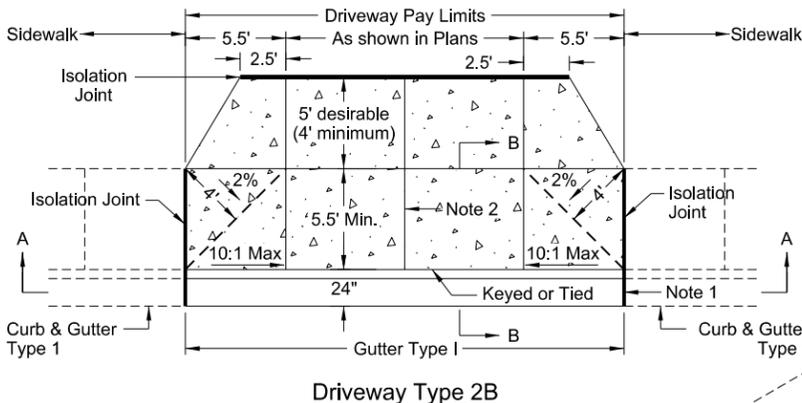
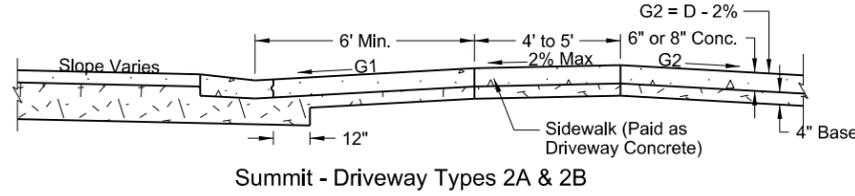
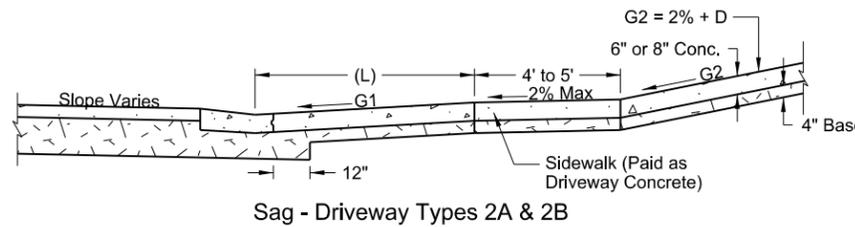
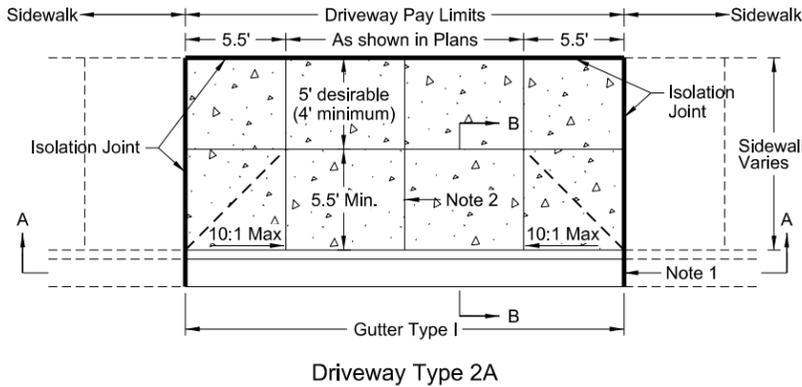
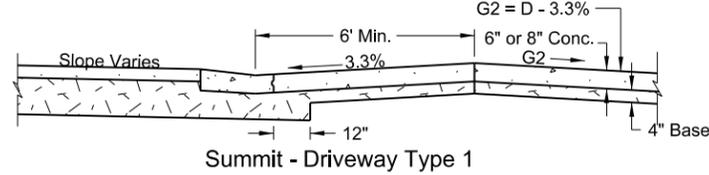
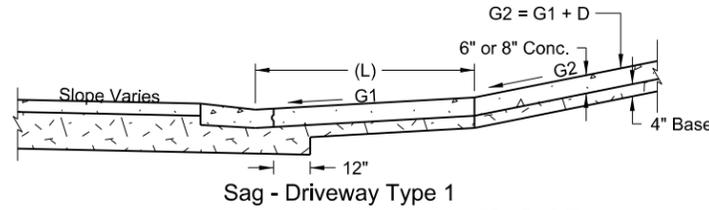
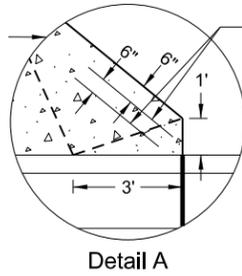
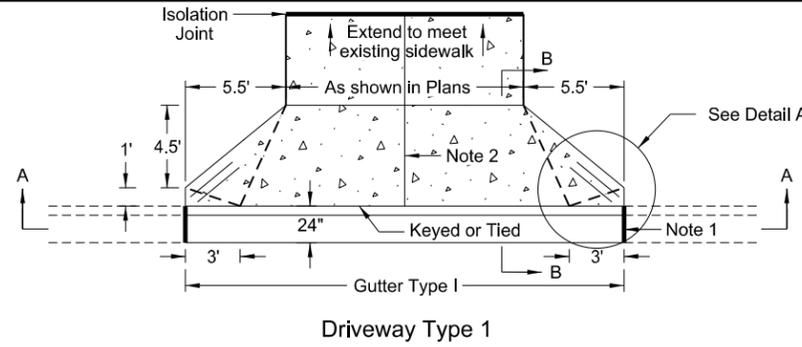
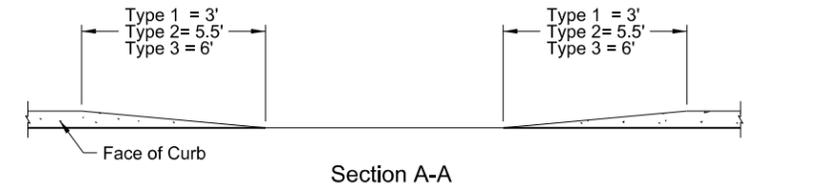
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE

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Roger Weigel  
Registration Number  
PE-2930,  
on 08/07/2013 and the original document is stored at the  
North Dakota Department  
of Transportation

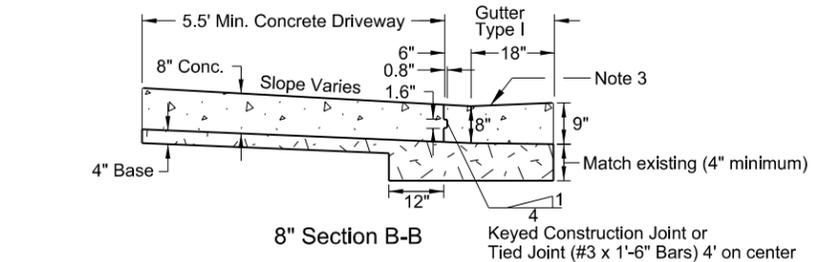
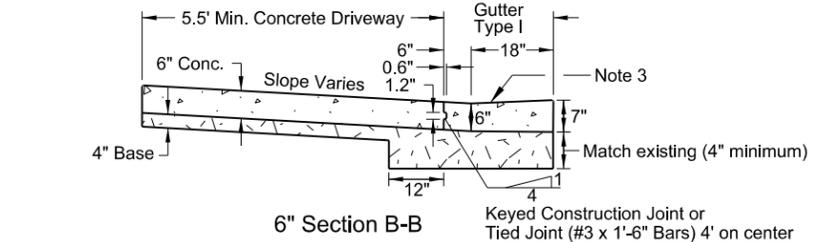
CONCRETE DRIVEWAY - URBAN

NOTES:

- See Standard D-748-1 for curb and gutter isolation joint detail. On PCC roadways, the curb and gutter joints should match those of the pavement as much as practical.
- Joint Spacing: 1 Center contraction joint to be used on all driveways 20' width or less, 2 center contraction joints for driveways > 20' to 30' width, and 3 center contraction joints for driveways greater than 30' width.  
The contraction joints may be sawed or a grooved joint, and shall be a minimum of 1/3 the depth of the concrete.  
Isolation joints should also be used between separately poured concretes, or between old and new concrete.  
All joints shall be sealed with hot pour bituminous filler or low modulus silicone. The sealant shall be installed and tooled in accordance with the manufacturer's recommendations.  
All costs for labor, equipment, and material necessary to construct and seal joints shall be included in the price bid for the driveway.
- Gutter-Type 1 shall be paid for at the unit price bid for "Curb and Gutter-Type 1".
- 6" Driveway to be used unless otherwise specified.
- 4" base material shall be placed under the concrete driveway. All labor and materials necessary to place the base material shall be included in the price bid for Salvage Base Course or Aggregate Base Course CL 5.
- Sidewalk that falls behind a driveway shall be constructed to the same thickness as the driveway and shall be paid for as driveway concrete.



Typical Isolation Joint Seal (longitudinal and transverse)



Driveway ADT	Grade G1		Dimension (L) ft.		Grade Changes (D)	
	Desirable	Maximum	Desirable	Maximum	Desirable	Maximum
(0-500)	5%	12% or controlled by vehicle clearance	12	6	6%	15% or controlled by vehicle clearance
(500-1500)	3%	8%	20	20	3%	6%
(> 1500)	2%	5%	40	40	0%	3%

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-13-2014	
REVISIONS	
DATE	CHANGE

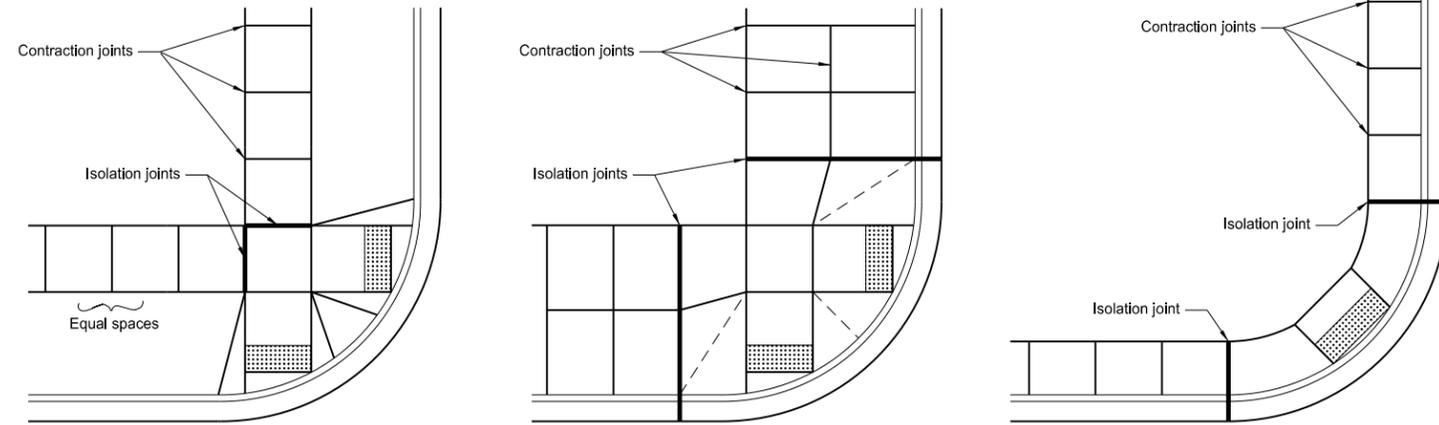
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# SIDEWALK

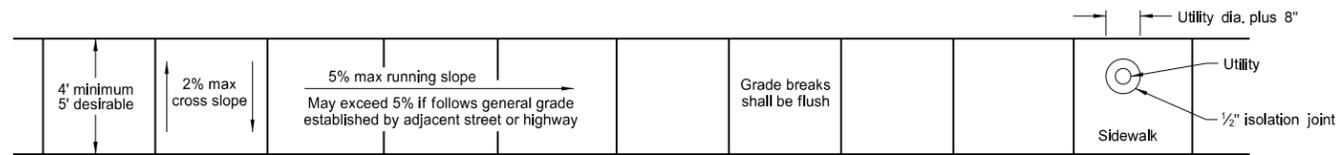
D-750-2

**NOTES:**

1. Curb ramp and detectable warning panel layouts are for informational purposes only. See Standard Drawing D-750-3 for curb ramp and detectable warning panel details.
2. Joint Spacing: Transverse contraction joint spacing shall vary from 4' to 6' to create approximate square panels. Longitudinal contraction joints shall be used where the sidewalk width is 8' or greater, and shall be spaced at half the sidewalk width. The contraction joints may be sawed or a grooved joint, and shall be a minimum of 1/3 the depth of the concrete. When the sidewalk is adjacent to the curb & gutter, the sidewalk joint spacing shall be varied to match up with the curb & gutter joints. Isolation joints should also be used between separately poured concretes, or between old and new concrete. The cost for all labor, equipment, and material necessary to construct contraction and isolation joints shall be included in the price bid for sidewalk concrete.
3. 4" sidewalk concrete thickness to be used unless otherwise specified in the plans.
4. 4" base material thickness to be used unless otherwise specified in the plans. All labor and materials necessary to place the base material shall be included in the price bid for "Salvage Base Course" or "Aggregate Base Course CL 5."
5. Landscaping is preferred to modify existing ground slope changes as needed. If not possible, such as adjacent buildings, a vertical curb may be used as shown in the detail below. The curb will be paid for at the unit price bid for the item "Curb - Type I" per lineal foot.

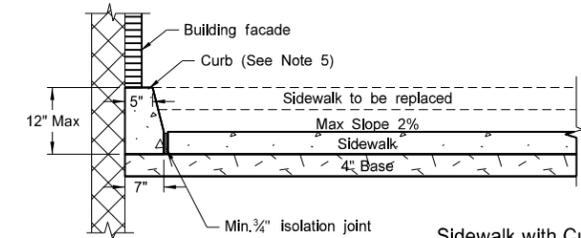


Typical Joint Layouts

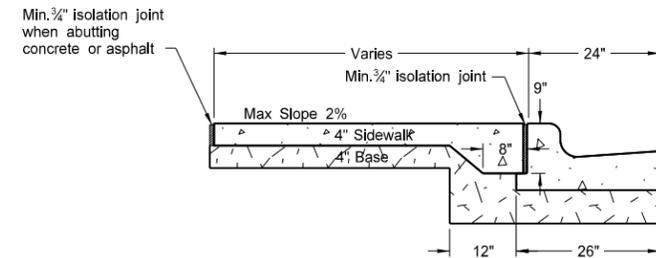


Sidewalk Width and Grade

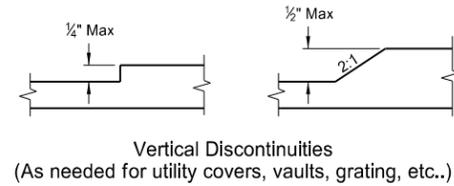
Utility Blockout



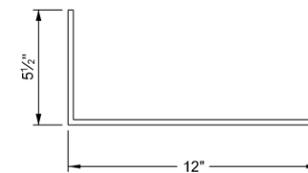
Sidewalk with Curb Detail (Building face application)



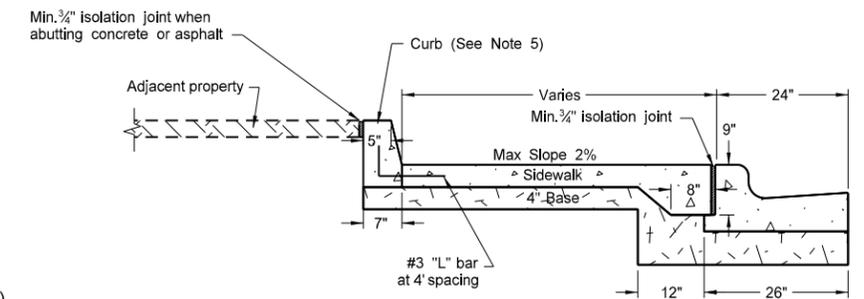
Sidewalk Detail (Installed adjacent to curb and gutter)



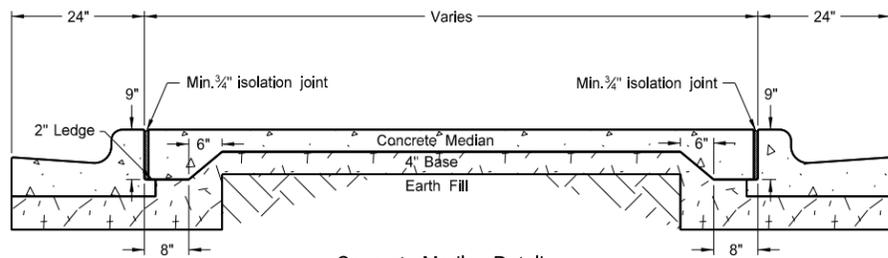
Vertical Discontinuities (As needed for utility covers, vaults, grating, etc..)



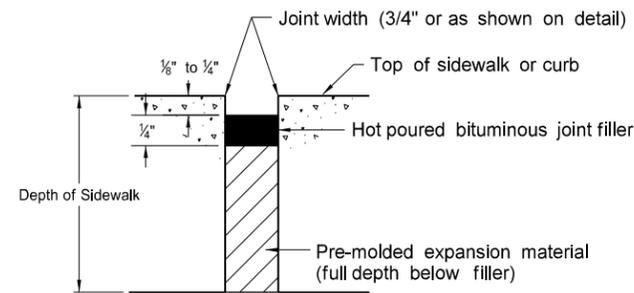
"L" Bar Detail #3 Bar



Sidewalk with Curb Detail (Adjacent property application)



Concrete Median Detail



Typical Isolation Joint Seal (longitudinal and transverse)

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
11-26-13	
REVISIONS	
DATE	CHANGE

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# CURB RAMP DETAILS

D-750-3

+More Right of Way

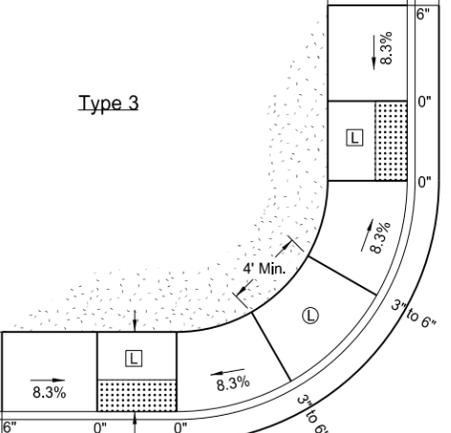
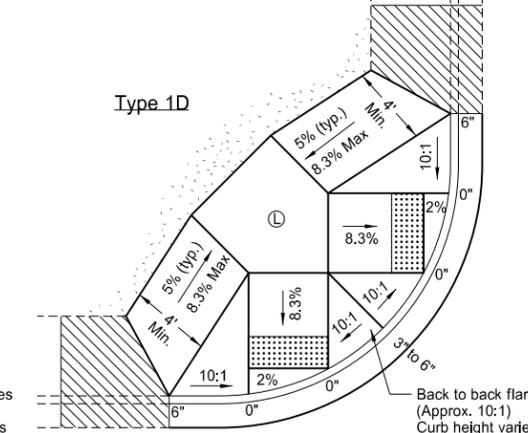
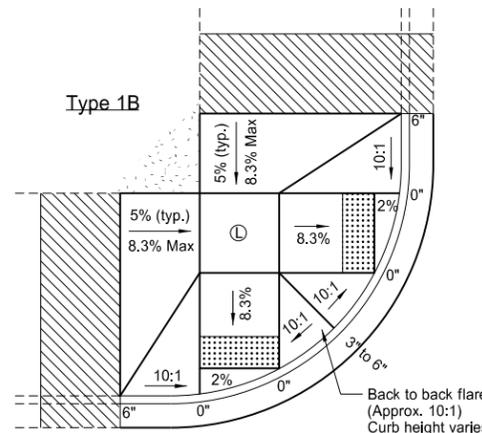
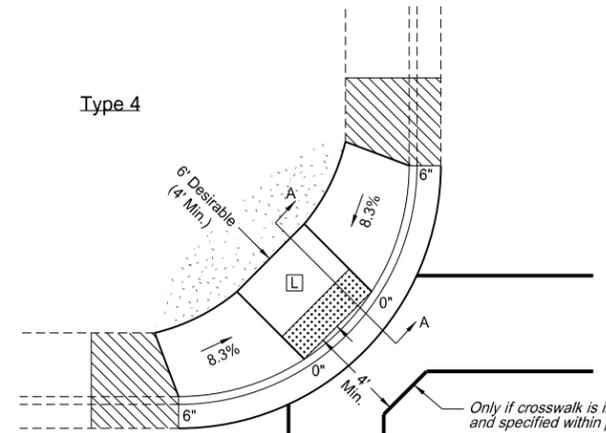
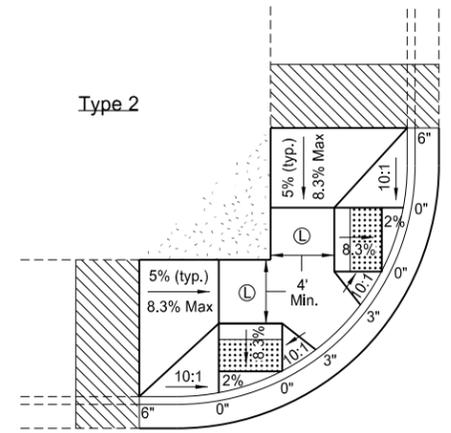
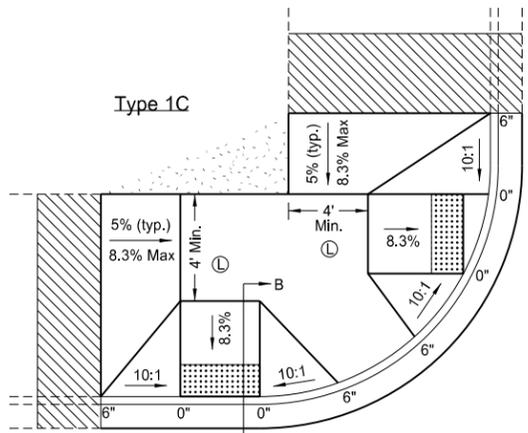
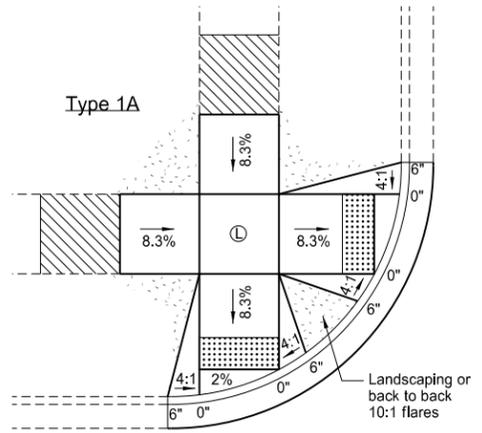
Less Right of Way

**NOTES:**

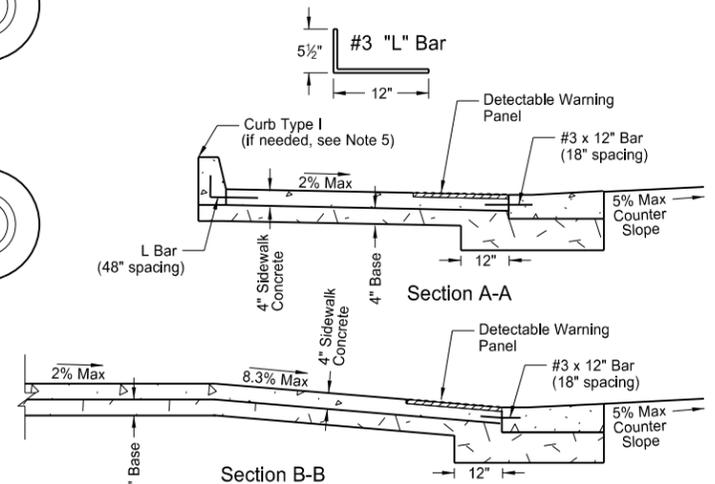
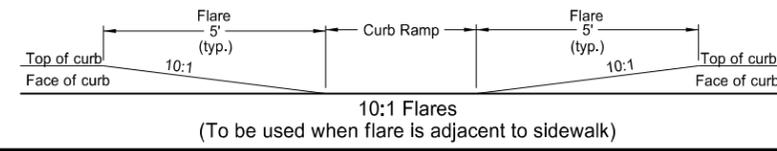
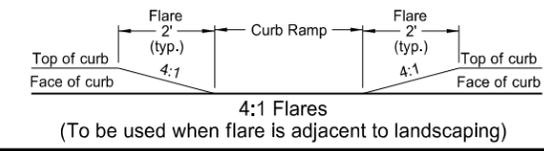
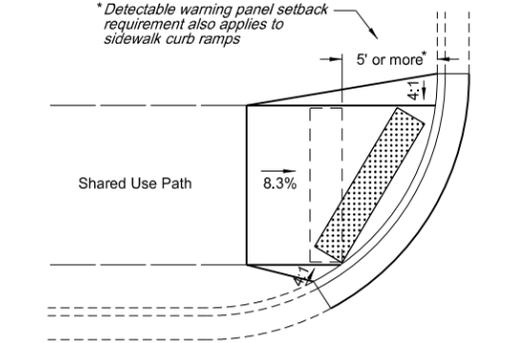
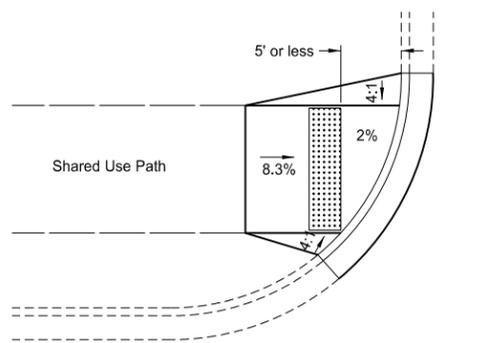
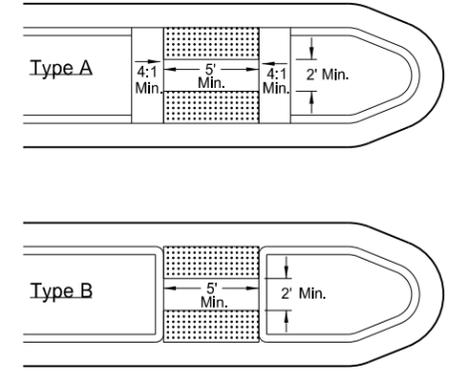
- Ramp width is defined as the useable portion of the ramp, excluding flares if used.  
Curb ramp width should match the existing sidewalk width. 4' width minimum.  
Ramp width for shared-use paths should match the existing shared use path width.  
Ramp length shall be maximum of 15'.
- Landings shall be a minimum of 4' x 4' and shall have a max 2% slope in any direction. Landings are desirably 5' x 5' or larger.
- Detectable warning panels shall match the ramp width. Radial panels may also be used. The detectable warning panel may be located within the lower landing.
- The pedestrian access route shall be continuous 4' min. width. Max 2% cross slope applies to all concrete, excluding flares.
- Landscaping is preferred to modify existing ground slope changes as needed. If not possible, such as adjacent buildings, a vertical curb may be used as shown in the detail below. The curb will be paid for at the unit price bid for the item "Curb - Type I" per lineal foot.

**LEGEND:**

- : Detectable Warning Panel
- : Landscaping
- : Transitional tie-in segment if needed for retrofits. Max grade slope 8.3%.
- : Upper Landing
- : Lower Landing
- 0", 3", or 6" : Curb Height
- 8.3% : All slopes shown are max grades. Flatter slopes may be used.



**Median Refuge Islands (Cut-Through)**



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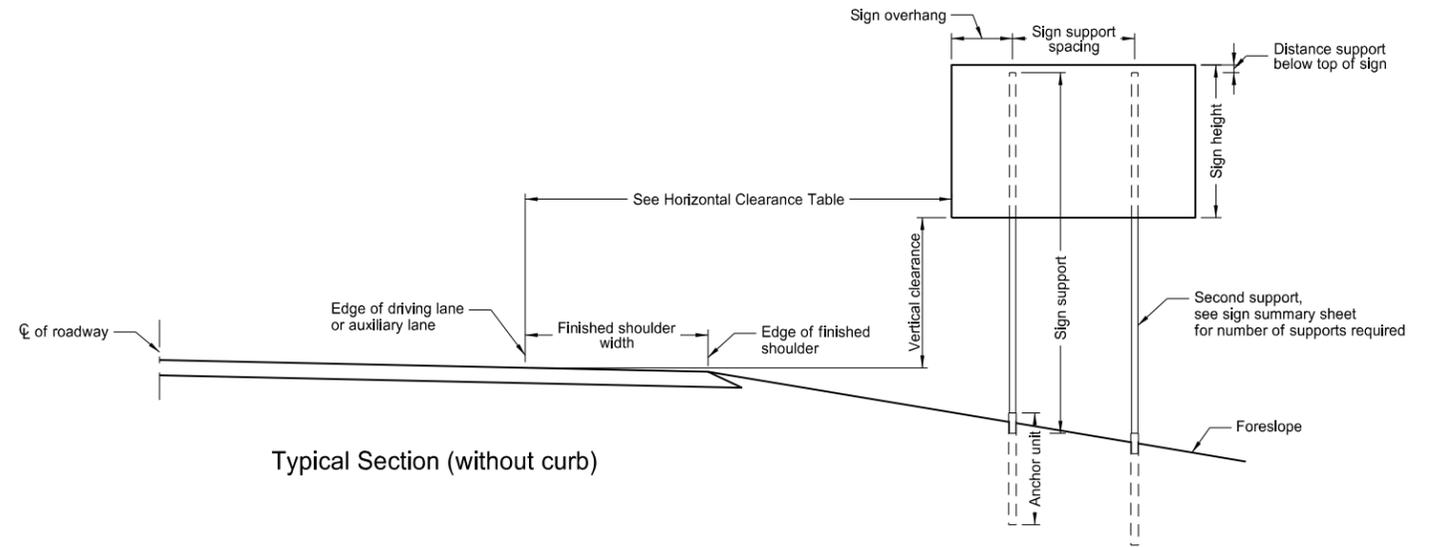
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# PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

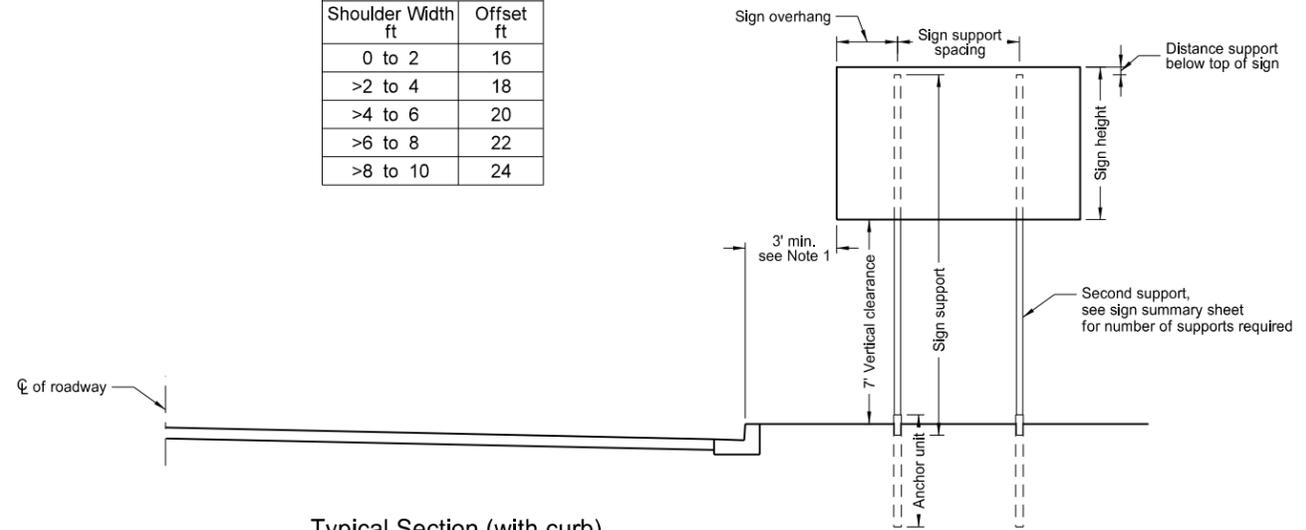
**Notes:**

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'.
- Directional signs on expressways shall be installed with a minimum height of 7'. If the secondary sign is mounted below another sign, the major sign shall be installed at least 8' and the secondary sign shall be installed at least 5' above the edge of the driving lane.
- All route signs, warning signs, and regulatory signs on expressways shall be at least 7' above the edge of the driving lane.
- 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.

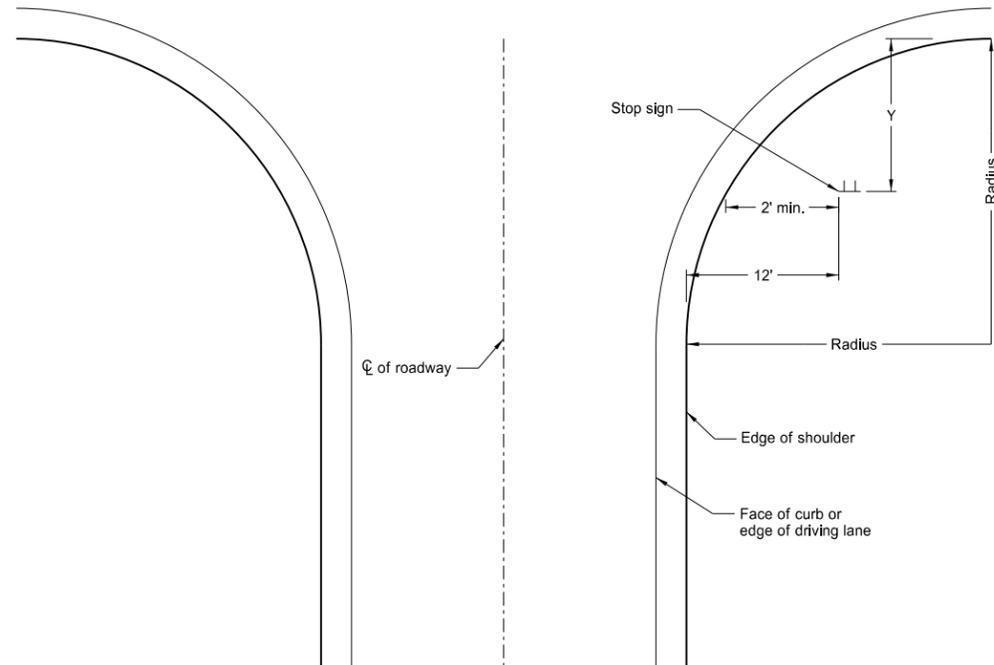


Typical Section (without curb)

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



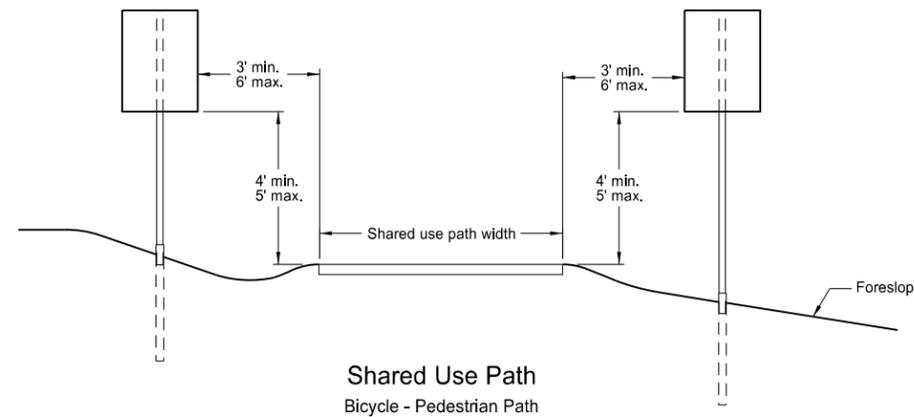
Typical Section (with curb)  
Residential or Business District



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



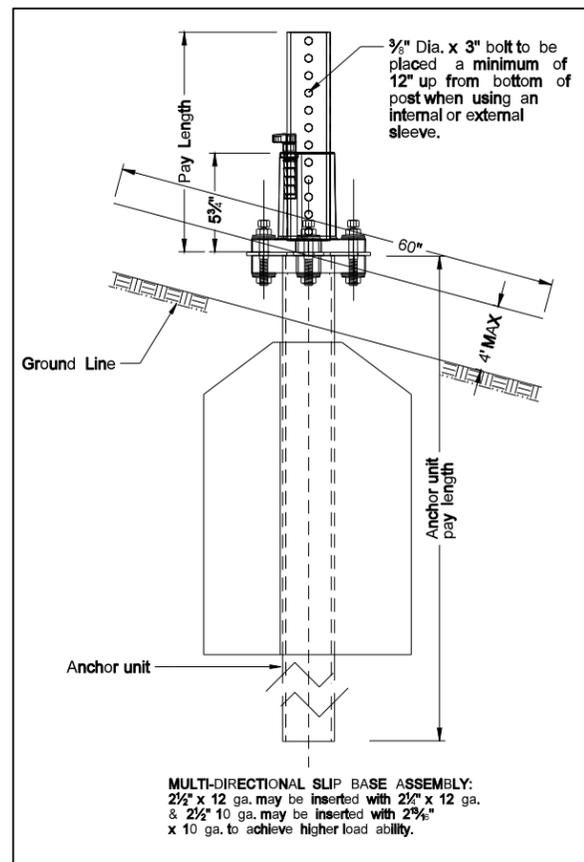
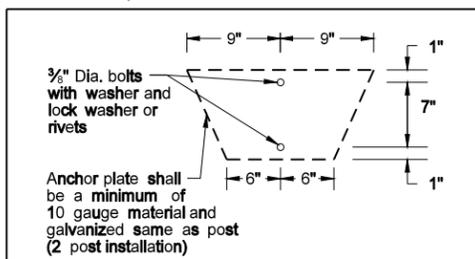
Shared Use Path  
Bicycle - Pedestrian Path

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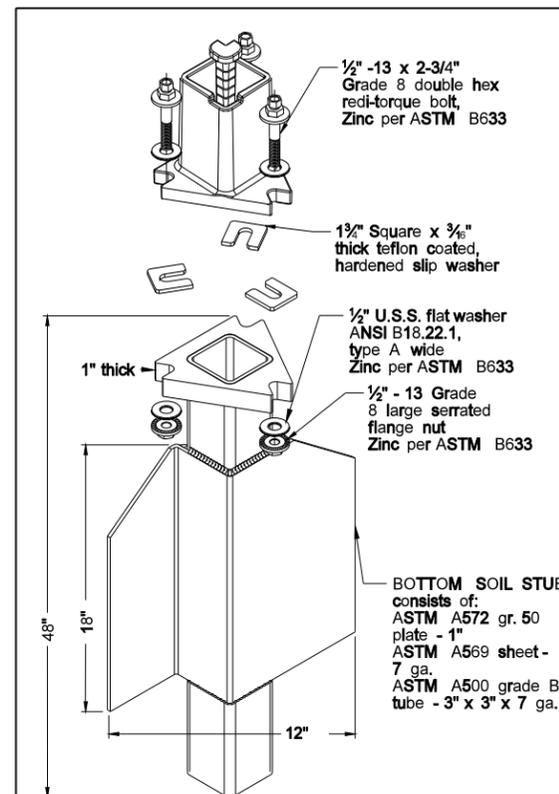
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)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

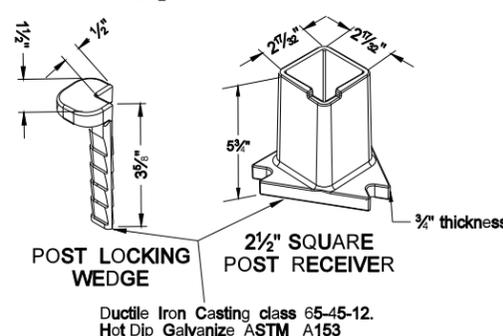


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:  
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube

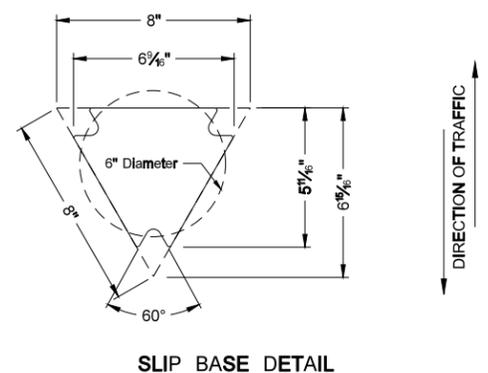


SLIP BASE FOR 2 1/2" POST



2 1/2" SQUARE POST RECEIVER

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



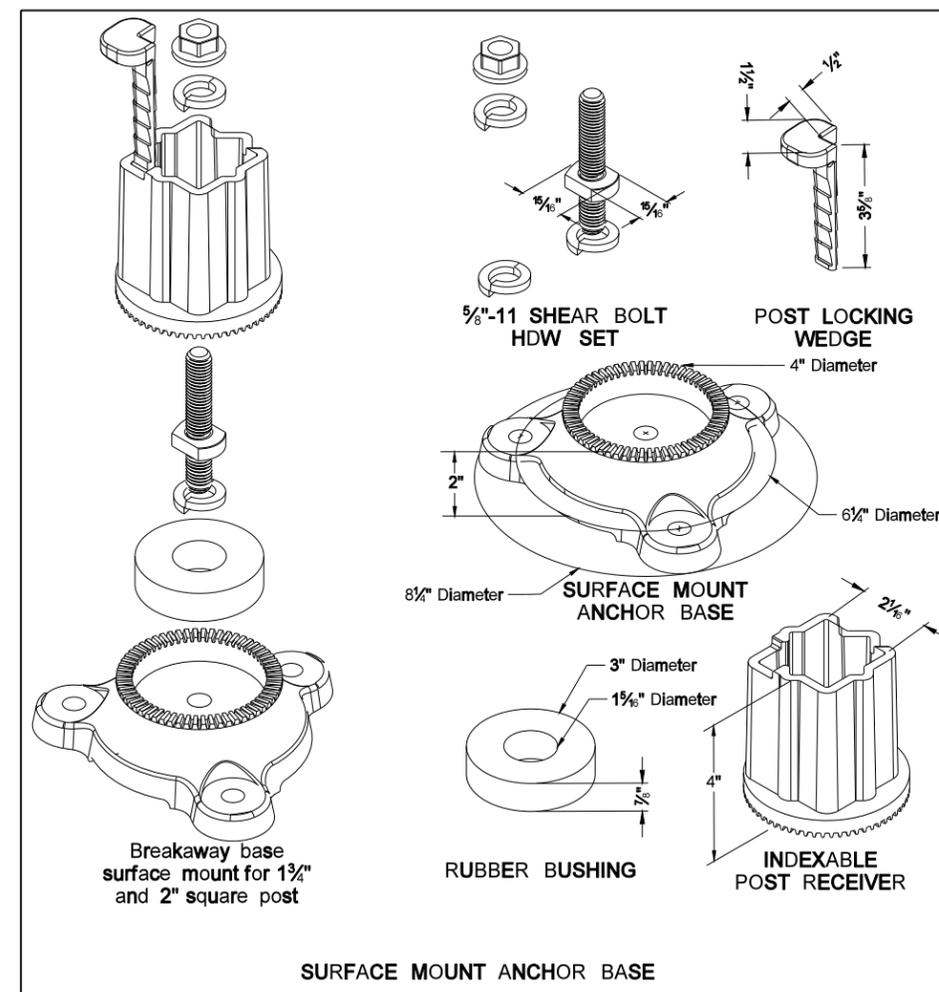
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. <sup>4</sup>	Cross Sect. Area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/2 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.



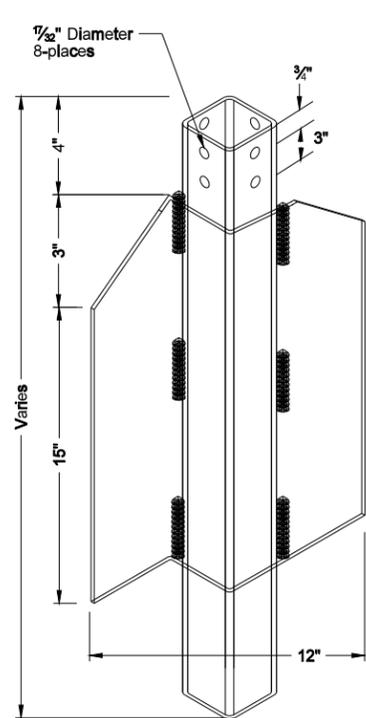
SURFACE MOUNT ANCHOR BASE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
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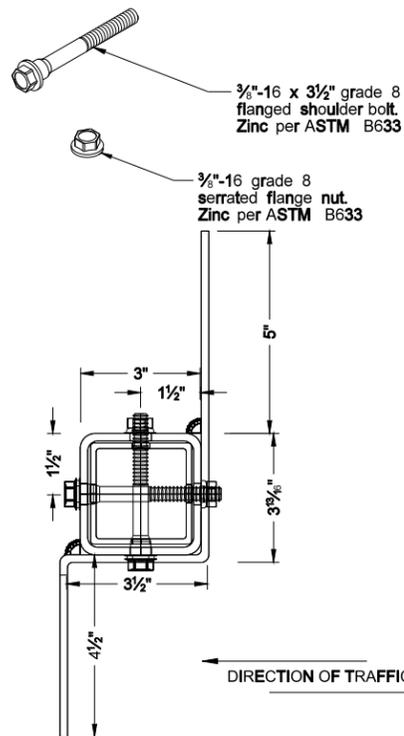
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SHOULDER BOLT

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)



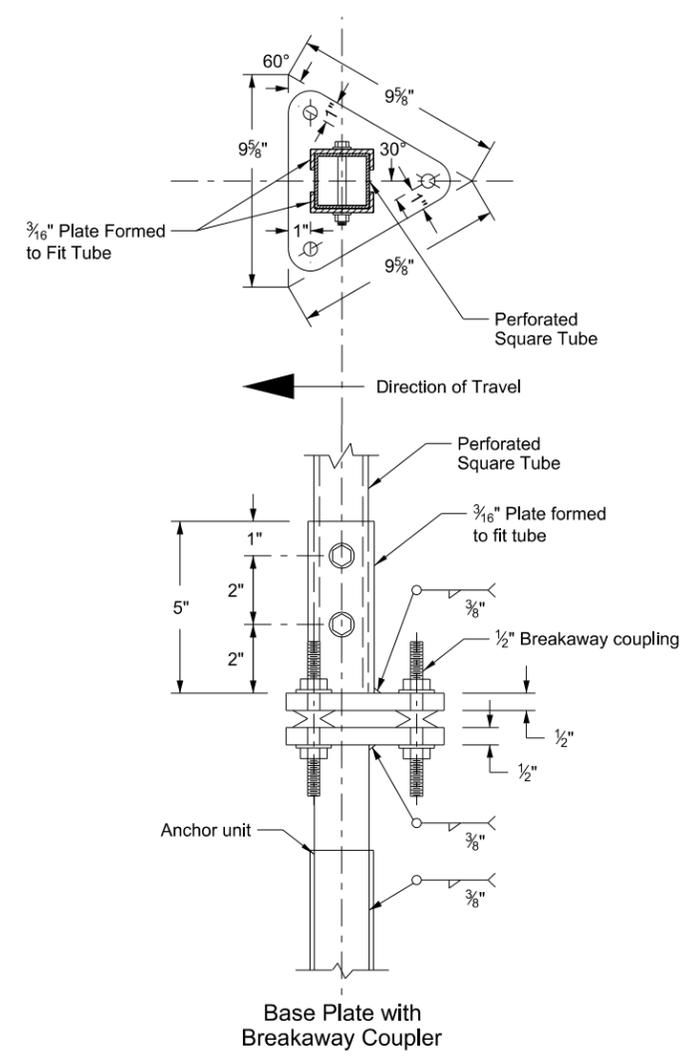
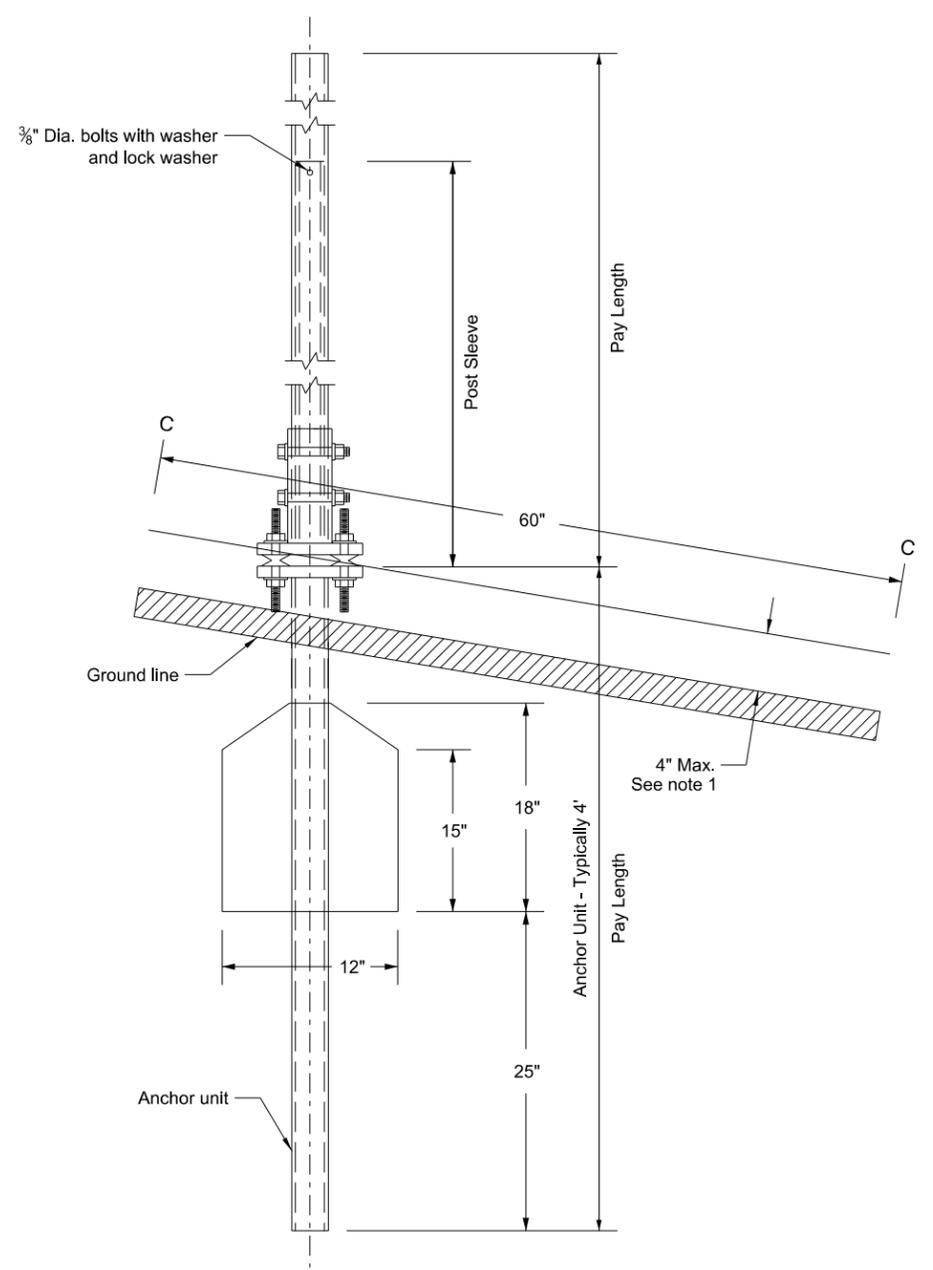
3" ANCHOR UNIT



DIRECTION OF TRAFFIC

Breakaway Coupler System for Perforated Tubes

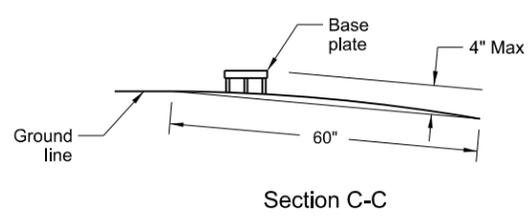
- Notes:
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
  - Anchor unit shall be the same size as the post and shall have the same specification as the post.
  - Four post signs shall have over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



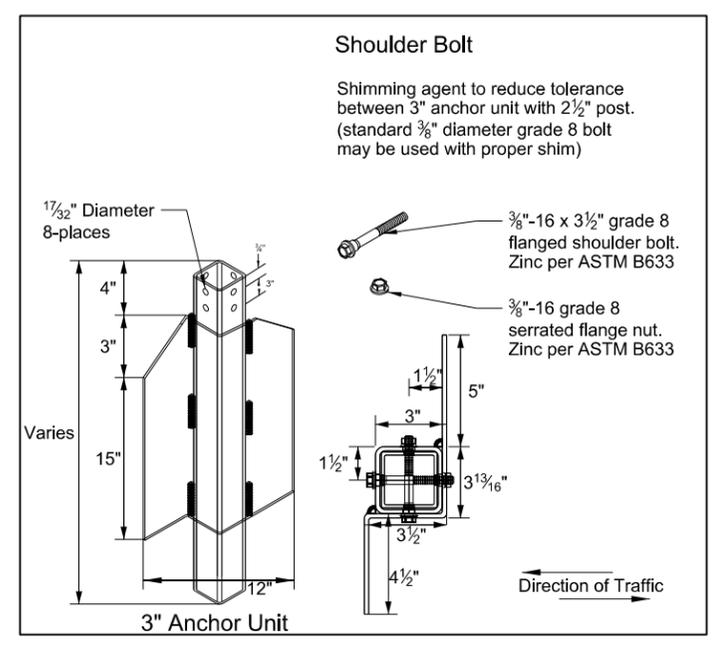
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2	12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



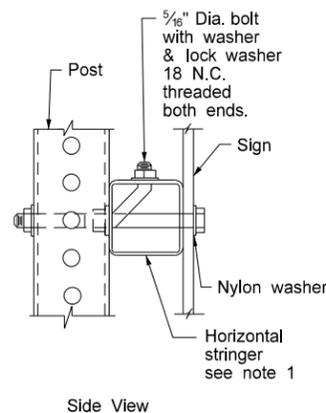
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10-3-2013	
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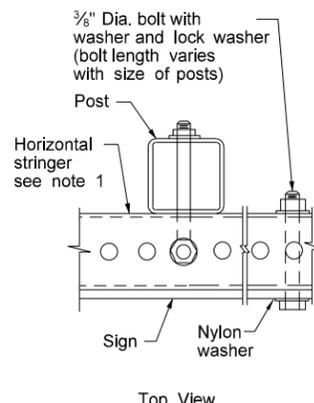
Mounting Details Perforated Tube

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.

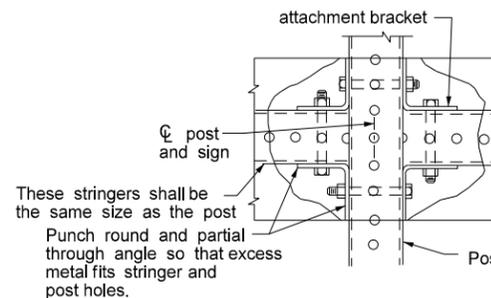


Side View



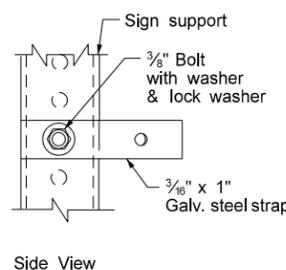
Top View

STRINGER MOUNTING  
(WITH STRINGER IN FRONT OF POST)

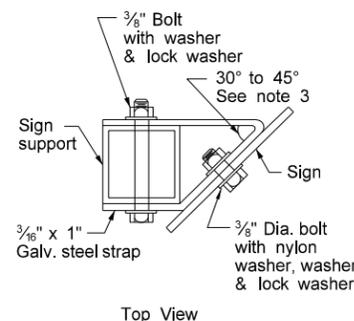


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

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

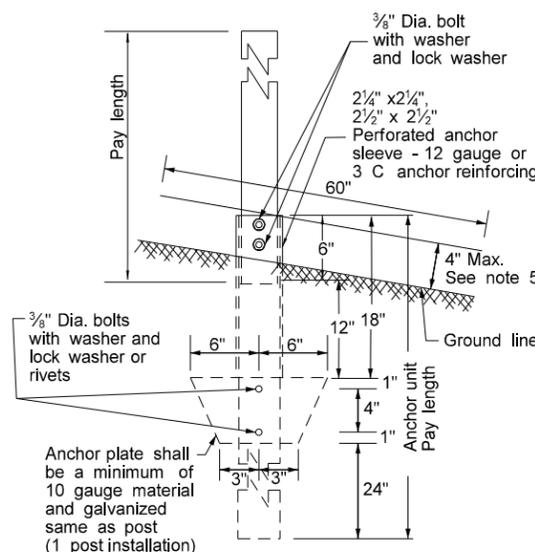


Side View

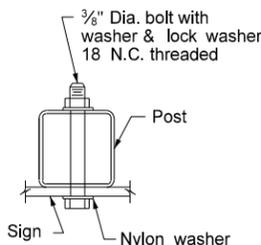


Top View

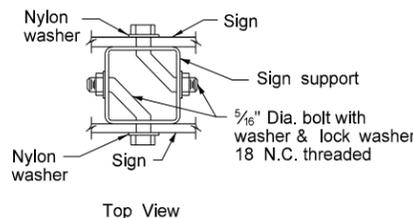
STRAP DETAIL



ANCHOR UNIT AND  
POST ASSEMBLY

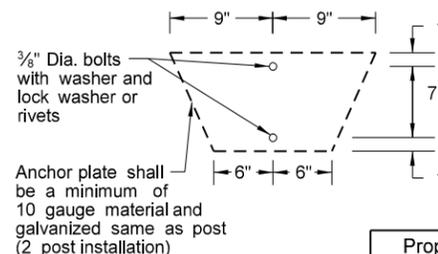


BOLT MOUNTING



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. <sup>4</sup>	Cross Sect. area In. <sup>2</sup>	Section Modulus In. <sup>3</sup>
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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	
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DATE	CHANGE
7-8-14	Revised Note 3

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