

DESIGN DATA			
Traffic		Average Daily	
Current	2022	Pass: 365	Trucks: 81
		Total: 446	
Preventive Maintenance			

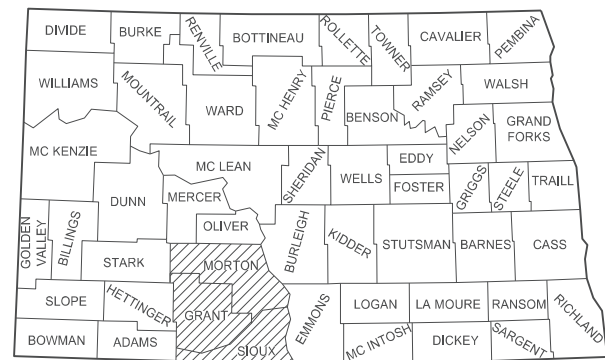
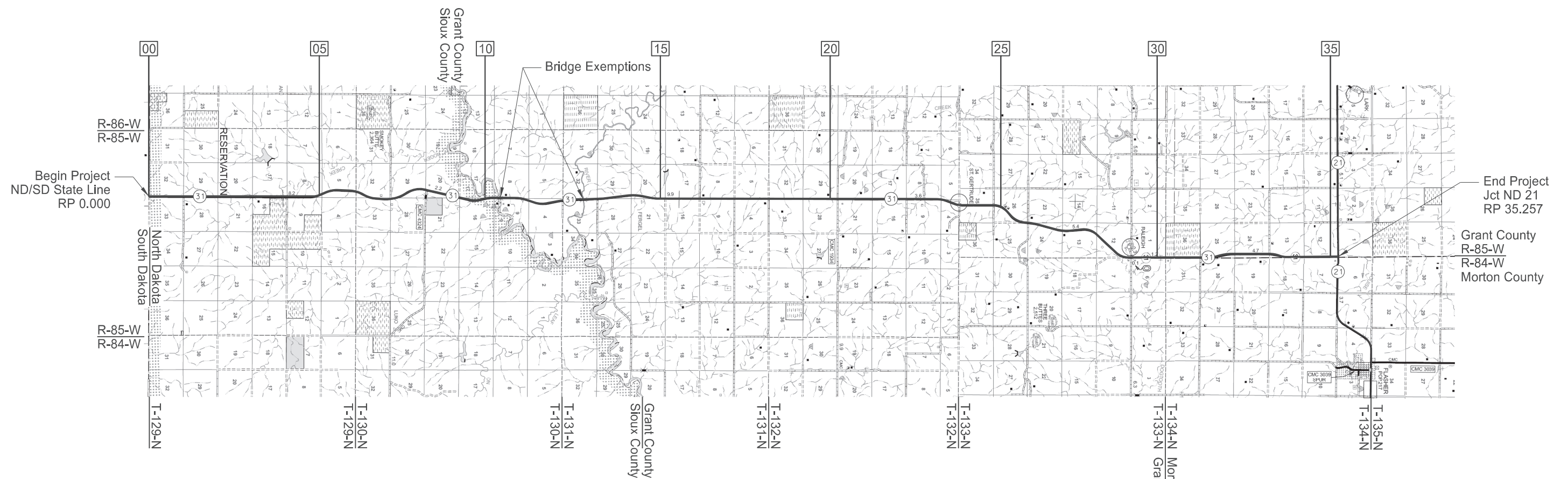
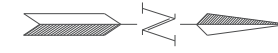
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	SS-1-031(022)000	23575	1	1

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SS-1-031(022)000
Sioux, Grant, & Morton Counties
State Line to ND 21
Micro Milling, Seal Coat

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	4/1/2023
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
SS-1-031(022)000	35.157	35.257
Bridge Exemptions	0.100	



DESIGNER Luke Nassers
DESIGNER Adam McMahon
DESIGNER

ND DEPARTMENT OF TRANSPORTATION
BISMARCK DISTRICT

Lawrence Gangl 01/26/24
Lawrence Gangl

NDDOT - BISMARCK DISTRICT

DATE 01/18/24

TABLE OF CONTENTS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-1-031(022)000	2	1

PLAN SECTIONS

LIST OF STANDARD DRAWINGS

Section	Page(s)	Description
1	1	Title Sheet
2	1	Table of Contents
6	1	Notes
8	1	Quantities
10	1	Basis of Estimate
20	1 - 2	General Details
30	1	Typical Sections
100	1 - 3	Work Zone Traffic Control

Number	Description
D-101-1, 2, 3, 4	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20, 21	Line Styles
D-101-30, 31, 32, 33	Symbols
D-704-3	Lane Markers (Spotting Tab For Seal Projects Only)
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube
D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post
D-704-9	Construction Sign Details - Terminal And Guide Signs
D-704-10	Construction Sign Details - Regulatory Signs
D-704-11, 11A	Construction Sign Details - Warning Signs
D-704-14	Construction Sign Punching And Mounting Details
D-704-20	Terminal And Seal Coat Sign Layouts
D-704-22	Construction Truck And Temporary Detour Layouts
D-704-26	Miscellaneous Sign Layouts
D-704-27	Mobile Operation (Pavement Marking)
D-704-33	Two-Lane Roadway Portable Rumble Strips
D-704-50	Portable Sign Support Assembly
D-704-56	Mobile Operation - Grinding Shoulder Rumble Strips
D-760-4	Rumble Strips Undivided Highways (Shoulders Less Than 4')
D-760-5	Saw Slotted Rumble Strips At Intersections
D-762-4	Pavement Marking
D-762-11	Short-Term Pavement Marking

SPECIAL PROVISIONS

Number	Description
SP 315(23)	TERO
SP 249(23)	Bituminous Seal Coat Special

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-1-031(022)000	6	1

401-P01 FOG SEAL: Apply the fog seal with the following requirements:

- Apply the fog seal after the final sweeping of the chip seal.
- The dilution of the fog seal is 50% water and 50% CSS-1H.

411-P01 MICRO-MILLING: This work consists of micro-milling a bituminous pavement surface.

Use micro-milling equipment equipped with:

- Elevation controls that are accurate to within 1/16 inch;
- A cutting head that will create grooves that are a maximum of 1/8 inch deep and with ridges between grooves that are 0.2 inches wide;
- A minimum of 60 teeth per foot.

Micro-mill to a depth of 1/2 inch by matching existing cross-slope and profile grade. If milling a lane in more than one pass, cross slope must be consistent between passes. A quarter-crown is not permitted. Micro-mill to a uniform surface texture. Taper the micro-milling at the end of each run to match the non-milled segments.

Sweep off dust, residue, and loose milled material from the surface before opening to traffic.

Such payment for "MICRO-MILL" is full compensation for furnishing all materials, equipment, hauling, labor, and incidentals to complete the work as specified. Include flagging and pilot car in bid price for Micro-Mill.

Plan quantity will be used as Method of Measurement for payment.

420-P01 SWEEPING: Use a vacuum or pickup sweeper to remove excess material accumulated along guardrail and bridge deck sections.

704-500 PORTABLE RUMBLE STRIPS (PRS): Use PRS made of rubber or engineered polymers.

Install PRS as part of the temporary traffic control when the following signs are also part of the required traffic control set up:

- "Be Prepared to Stop" (W3-4); and
- "Flagger" symbol (W20-7)

Install PRS that meet the following criteria:

- Have no adhesives or fasteners required for placement
- Have a manufacturer's speed rating that meets or exceeds the posted speed limit; and
- Each strip in the array must weigh a minimum of 100 pounds.

Use individual PRS constructed in one of the following manners:

- A single piece;
- Interlocking segments; or
- Two pieces hinged at the midpoint.

An installed array of PRS consists of a minimum of 3 individual strips.

Move rumble strips with the flagging operation. Do not place rumble strips on horizontal curves.

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "Portable Rumble Strips".

704-P01 TRAFFIC CONTROL FOR CHIP SEAL COAT: Provide traffic control consisting of a temporary lane closure, flagging, and a pilot car.

Traffic control device quantities are based on a single 6-mile limitation and the following list:

1. Standard D-704-20, layout's G & H, see sheet 100-2, 3 for locations;
2. Standard D-704-22. Layouts K and L; and
3. Standard D-704-33, Portable Rumble Strips.

704-P02 TRAFFIC CONTROL FOR CHIP SEAL COAT: Install and maintain a 55 MPH speed limit during and after the chip seal operation. Re-establish the speed limit to pre-construction condition after fog seal.

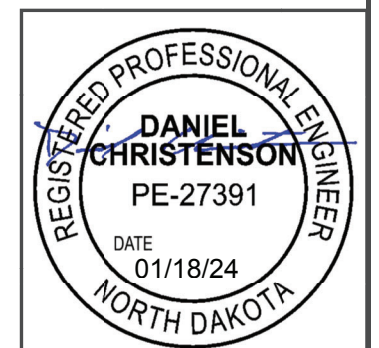
760-P01 RUMBLE STRIPS: Cut the shoulder, centerline, and intersection rumble strips a minimum of 14 days after completion of the Seal Coat.

Include the cost of fog seal, flagging, and pilot cars in the price bid for other items.

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

762-210 PERMANENT WATER BASED PAVEMENT MARKING: Replace the first paragraph of 762.04 C.2.b "Rate of Application" with the following:

Apply paint at a rate so that 1 gallon of paint will cover a 6 inch wide stripe for a length of 195 to 225 feet. Do not dilute paint, but the Engineer will allow a small quantity of naphtha thinner to flush out paint containers.



Estimated Quantities

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-1-031(022)000	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
411	0150	MICRO-MILL	SY	517862	517862
420	0405	SEAL COAT	SY	599903	599903
702	0100	MOBILIZATION	L SUM	1	1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	4987	4987
704	1048	PORTABLE RUMBLE STRIPS	EA	4	4
760	0010	RUMBLE STRIPS - INTERSECTION	SET	1	1
760	0025	SINUSOIDAL RUMBLE STRIP - ASPHALT SHOULDER	MILE	70.5	70.5
760	0027	SINUSOIDAL RUMBLE STRIP - ASPHALT CENTERLINE	MILE	35.25	35.25
762	0460	SHORT TERM PAINTED LINE-SEAL JOBS	LF	759335	759335
762	1106	PVMT MK PAINTED 6IN LINE	LF	522977	522977
762	1124	PVMT MK PAINTED 24IN LINE	LF	20	20

BASIS OF ESTIMATE

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-1-031(022)000	10	1

Seal Coat Materials

Fog Seal – 0.05 Gal/SY (0.10 Gal/SY Diluted)
 CRS2P Emulsified Asphalt – 0.40 Gal/SY
 Cover Coat Material CI 41 – 23lb/SY

Typical Section 1	
Micro-Mill RP 0.000 – RP 10.310 RP 10.400 – RP 12.710 RP 12.870 – RP 29.160 RP 29.250 – RP 35.257	Seal Coat RP 0.000 – RP 10.342 RP 10.378 – RP 12.766 RP 12.834 – RP 35.257
34.917 Miles	35.153 Miles

Material	Unit	Width (ft)	Qty/Mile	Qty/Mile	Totals
Seal Coat	SY	28	--	16,427	577,458
Micro-Mill (1/2 inch)	SY	24.4	14,315	--	499,837

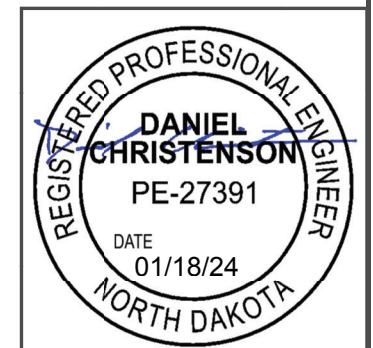
Rumble Strips	
Sinusoidal Rumble Strips – Asphalt Shoulder	70.5 Miles
Sinusoidal Rumble Strips – Asphalt Centerline	35.25 Miles
Guardrail Exemption (Install Centerline Rumble Strips only) RP 3.020 – 3.067, RP 9.600 – 9.606,	
Bridge Exemption RP 10.310 – RP 10.400 RP 12.710 – RP 12.870 RP 29.160 – RP 29.250	
Intersection Rumble Strips	1 set @ Jct ND 21

Widened Shoulder Areas (extra Micro-Mill and Seal Coat)

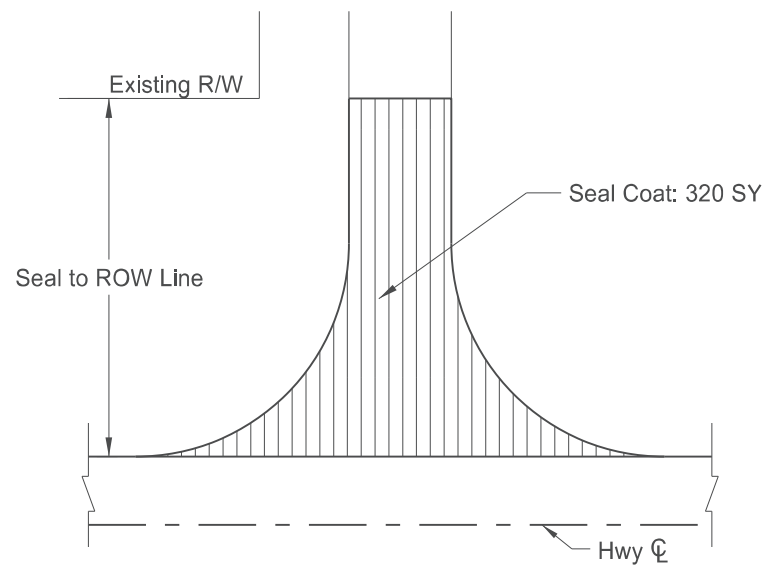
From (RP)	To (RP)	Distance (LF)	Left or Right	Extra Width (LF)	Area (SY)
4.657	4.937	1,478	Rt	4	657
5.140	5.450	1,637	Lt	4	728
5.890	6.159	1,420	Lt	4	631
6.359	6.619	1,373	Rt	4	610
6.809	7.097	1,520	Rt	4	676
7.236	7.463	1,199	Rt	4	533
7.639	8.085	2,355	Lt	4	1,047
9.447	9.747	1,584	Rt	4	704
9.916	10.126	1,109	Lt	4	493
10.787	11.113	1,712	Lt	4	761
11.389	11.739	1,848	Rt	4	821
12.560	12.710	792	Lt	5	440
12.560	12.710	792	Rt	5	440
12.834	13.060	1,193	Lt	5	663
12.834	13.060	1,193	Rt	5	663
14.150	14.426	1,457	Lt	4	648
14.815	14.964	787	Rt	4	350
Total (SY):					10,865

Temporary Pavement Marking		
Mainline	Basis	Quantity
Centerline Skips, Short Term Painted Line – Seal Jobs	Measured	42,907 LF
Centerline Barrier, Short Term Painted Line– Seal Jobs	Measured	108,960 LF
1 st Application after Micro-Mill 2 nd Application after Chip Seal 3 rd Application after Fog Seal	Total/App	151,867 LF
4 th Application after Rumble Strips 5 th Application After Rumble Strips are Fog Sealed	Total	759,335 LF

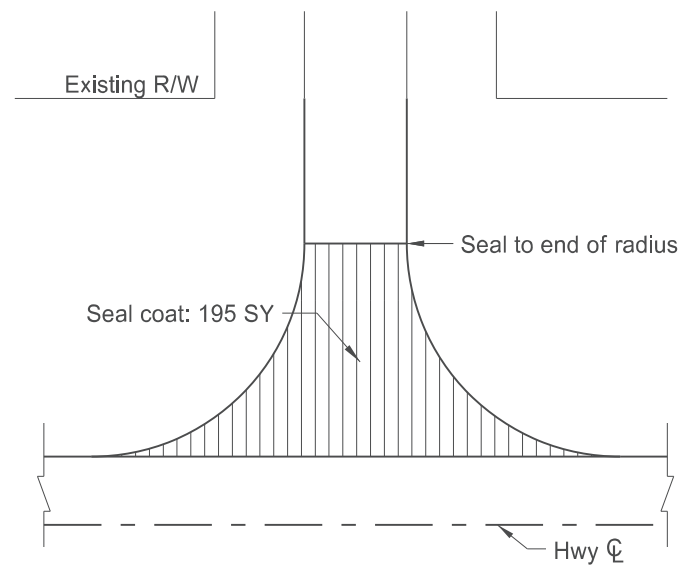
Permanent Pavement Marking		
Mainline	Basis	Quantity
Centerline Skips, Pvmt MK Painted 6 IN Line – Yellow	Measured	42,907 LF
Centerline Barrier, Pvmt MK Painted 6 IN Line – Yellow	Measured	108,960 LF
Edge Line, Pvmt MK Painted 6 IN Line - White	Measured	371,110 LF
Stop Bar, Pvmt MK Painted 24 IN Line – White @ Jct Hwy 31 & 21)	Measured	20 LF



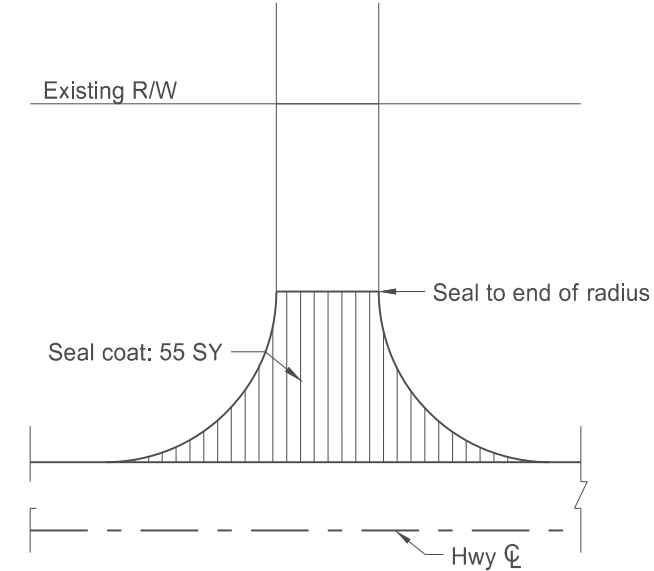
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-1-031(022)000	20	1



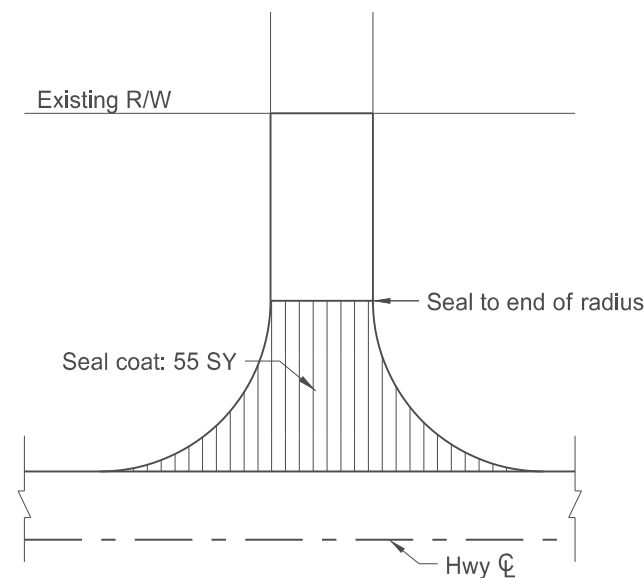
(1) Paved Section Line, County Road, or Paved Road



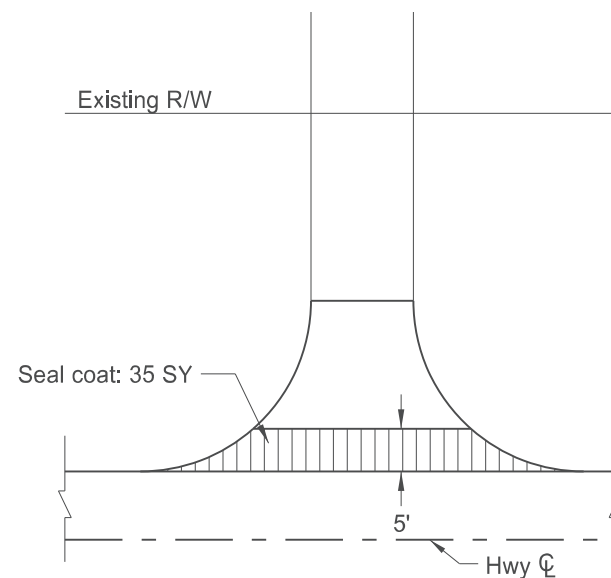
(2) Gravel Section Line, County Road, or Gravel Road



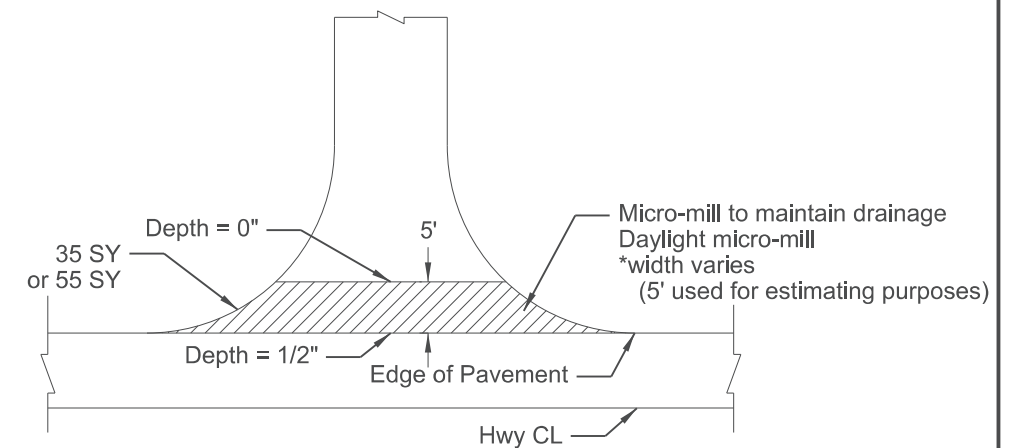
(3) Paved Private Drive Approach



(4) Gravel Private Drive Approach



(5) Field Drive Approach



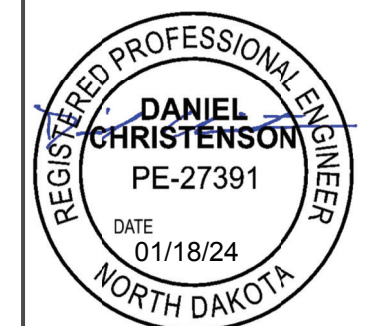
Approach Micro-milling

NOTES:

- Quantities have been included in the bid items "Seal Coat" and "Micro-Mill" in the "Estimate of Quantities" of the plans

BASIS OF ESTIMATE		(1)	(2)	(3)	(4)	(5)	TOTALS
ITEM	UNIT	Paved Road	Gravel Road	Paved Private Drive	Gravel Private Drive	Field Drive	
Number of Locations	#	4	24	1	21	126	176
Seal Coat (Per location)	SY	320	195	55	55	35	11,580
Micro-Mill (Per location)	SY	55	55	55	55	35	7,160

Approach Details
Seal Coat
ND 31 - State Line to ND 21

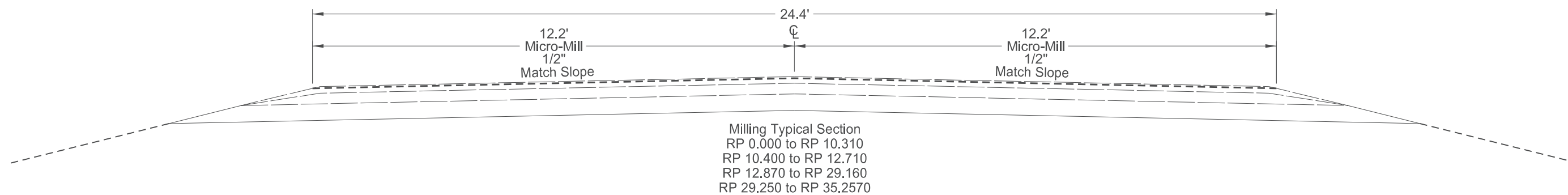
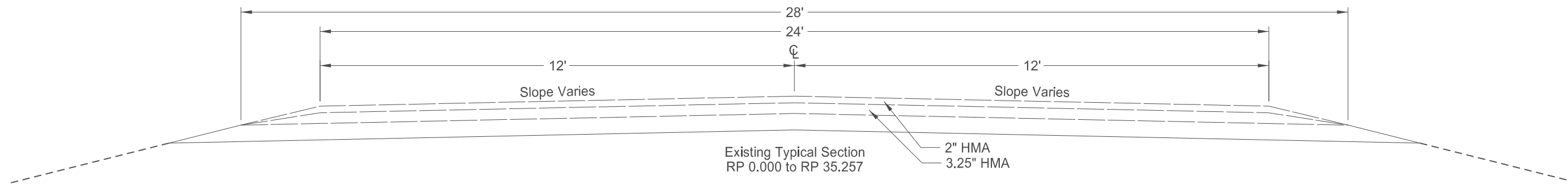


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-1-031(022)000	20	2

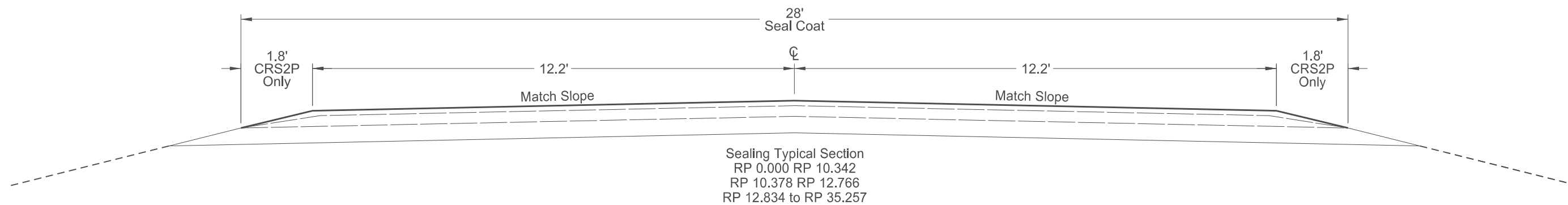
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0.0198	LT	(2) Gravel Section Line, County Road, or Gravel Road	12.0713	LT	(5) Field Drive Approach	20.0064	LT	(5) Field Drive Approach	27.4588	RT	(5) Field Drive Approach
0.0198	RT	(5) Field Drive Approach	12.1981	RT	(2) Gravel Section Line, County Road, or Gravel Road	20.1896	RT	(1) Paved Section Line, County Road or Paved Road	27.9765	LT	(5) Field Drive Approach
0.3236	RT	(5) Field Drive Approach	12.1981	LT	(2) Gravel Section Line, County Road, or Gravel Road	20.1896	LT	(5) Field Drive Approach	28.1164	LT	(5) Field Drive Approach
0.5197	LT	(5) Field Drive Approach	12.6303	LT	(4) Gravel Private Drive Approach	20.5872	LT	(5) Field Drive Approach	28.2123	LT	(5) Field Drive Approach
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3.2069	RT	(4) Gravel Private Drive Approach	13.2163	LT	(5) Field Drive Approach	20.8781	RT	(5) Field Drive Approach	28.4232	LT	(5) Field Drive Approach
3.2613	LT	(5) Field Drive Approach	13.6694	RT	(5) Field Drive Approach	21.0051	RT	(5) Field Drive Approach	28.9993	RT	(1) Paved Section Line, County Road or Paved Road
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3.9990	LT	(5) Field Drive Approach	14.6739	RT	(5) Field Drive Approach	21.6451	RT	(5) Field Drive Approach	29.2161	RT	(2) Gravel Section Line, County Road, or Gravel Road
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6.8200	RT	(5) Field Drive Approach	15.7127	RT	(5) Field Drive Approach	22.657	LT	(5) Field Drive Approach	29.8325	RT	(5) Field Drive Approach
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7.0928	RT	(4) Gravel Private Drive Approach	16.2947	RT	(4) Gravel Private Drive Approach	23.1991	RT	(5) Field Drive Approach	30.2217	LT	(5) Field Drive Approach
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11.5918	RT	(5) Field Drive Approach	19.9382	RT	(4) Gravel Private Drive Approach	26.9481	RT	(4) Gravel Private Drive Approach	35.1807	RT	(5) Field Drive Approach
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Approach Locations Seal Coat ND 31 - State Line to ND 21	
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-1-031(022)000	30	1

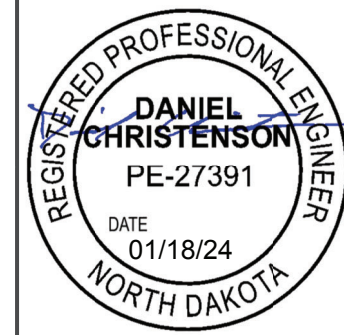


Total Distance: 34.917 Miles

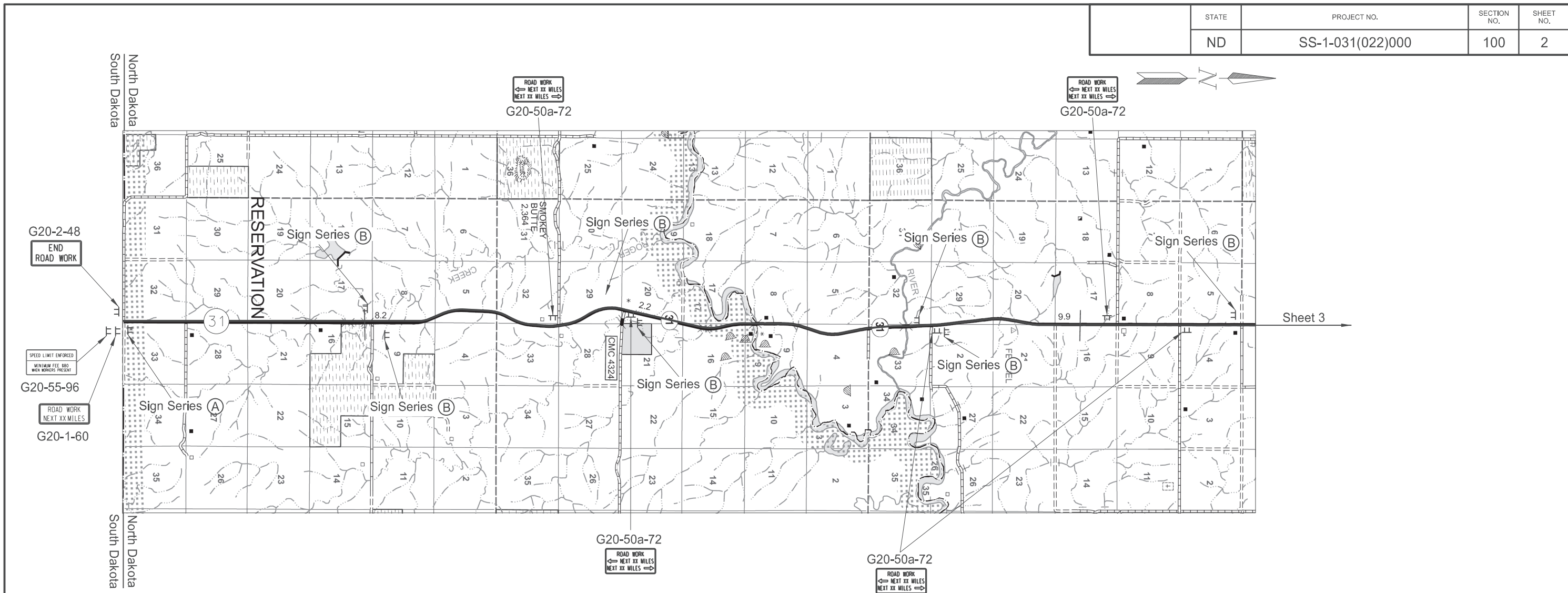


Total Distance: 35.153 Miles

Typical Sections
Seal Coat
ND 31 - State Line to ND 21



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-1-031(022)000	100	2



Sign Series (A)
(1 series, this page)

W8-12-48 (Skid Mount)	R4-1-48	W3-5-48	W22-8-48 NEXT 00 MILES	R2-1-48 MINIMUM FEE \$80
			W20-52P-54	R2-1aP-24

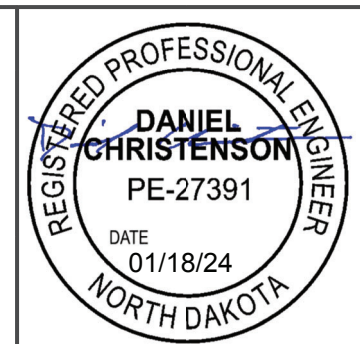
Sign Series (B)
(7 series, this page)

W8-12-48 (Skid Mount)	R4-1-48	R2-1-48 MINIMUM FEE \$80	W22-8-48 NEXT 00 MILES
		R2-1aP-24	W20-52P-54

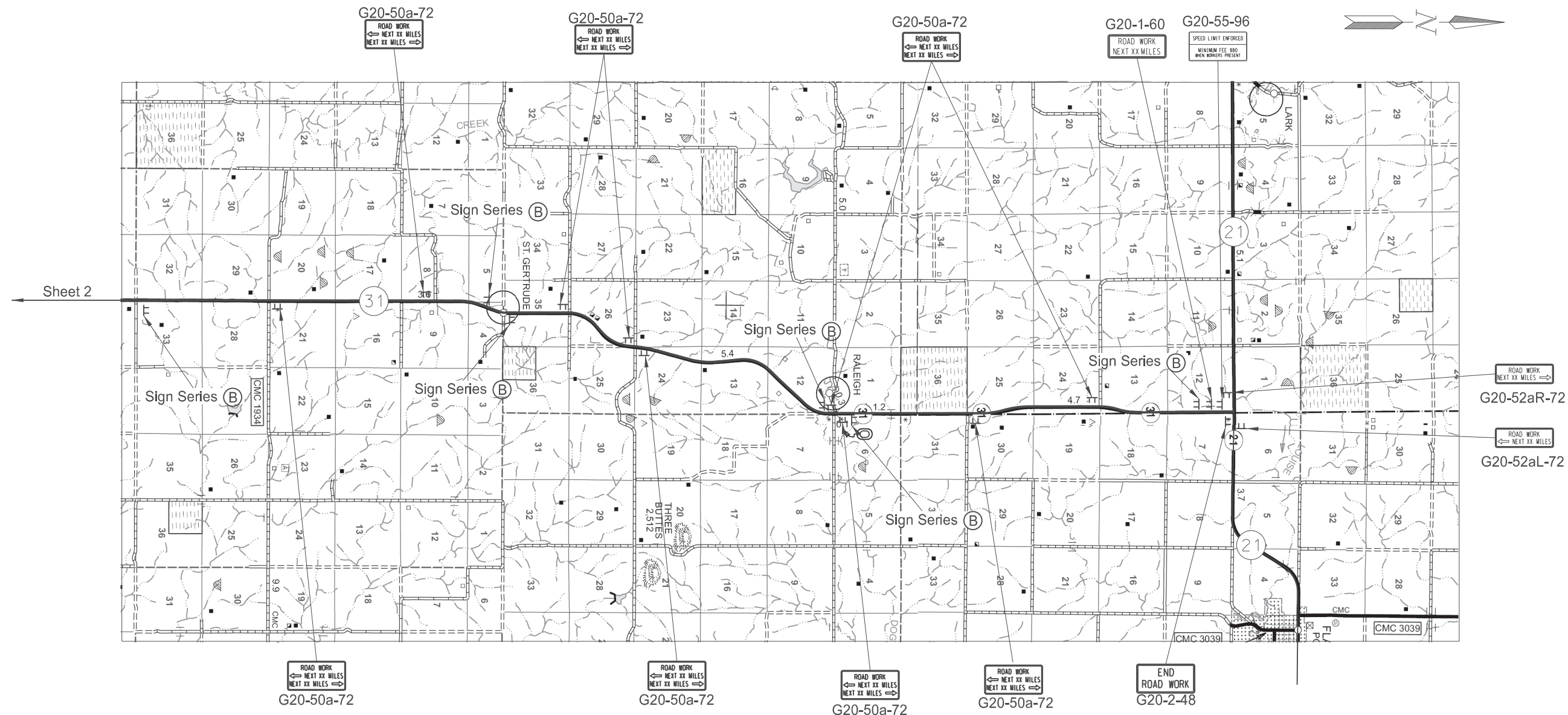
W8-12-48
(Place additional signs according to D-704-20 Note #6)
10 additional signs provided.
Skid Mount Sign.

Work Zone Traffic Control
Seal Coat

ND 31 - State Line to ND 21



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-1-031(022)000	100	3



Sign Series (A)
(0 series this page)

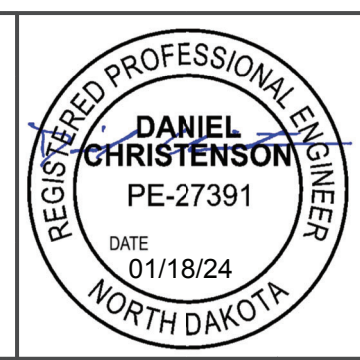
W8-12-48 (Skid Mount)	R4-1-48	W3-5-48	W22-8-48 NEXT 00 MILES	R2-1-48 MINIMUM FEE \$80
			W20-52P-54	R2-1aP-24

Sign Series (B)
(6 series this page)

W8-12-48 (Skid Mount)	R4-1-48	R2-1-48 MINIMUM FEE \$80	W22-8-48 NEXT 00 MILES	
		R2-1aP-24	W20-52P-54	

NO CENTER LINE
W8-12-48
(Place additional signs according to D-704-20 Note #6)
10 additional signs provided.
Skid Mount Sign.

Work Zone Traffic Control
Seal Coat
ND 31 - State Line to ND 21



NDDOT ABBREVIATIONS

D-101-1

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

Abn abandoned
 Abut abutment
 Adj adjusted
 Aggr aggregate
 Ahd ahead
 ARV air release valve
 Align alignment
 Al alley
 Alt alternate
 Alum aluminum
 ADA Americans with Disabilities Act
 & 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

C Gdrl cable guardrail
 Calc calculate
 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
 Ch chain
 Chnlk chain-link
 Ch Blk channel block
 Ch Ch channel change
 Chk check
 Chsld chiseled
 Cir circle
 Cl class
 Clnt clean-out
 Clr clear
 Cl&gr clearing & grubbing
 Comb. combination
 Coml commercial
 Compr compression
 CADD computer aided drafting & design
 Conc concrete
 CECB concrete erosion control blanket
 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
 CSFES corrugated steel flared end section
 CSP corrugated steel pipe
 CSTES corrugated steel traversable end section
 Co County
 Crse course
 Ct Court
 Xarm cross arm
 Xbuck cross buck
 Xsec cross sections
 Xing crossing
 Xrd crossroad
 Crn crown

Culv culvert
 C&G curb & gutter
 CI curb inlet
 CR curb ramp
 C cut
 Dd Ld dead load
 Defl deflection
 Defm deformed
 DInt delineate
 DIntr delineator
 Depr depression
 Desc description
 Det detail
 DWP detectable warning panel
 Dtr detour
 Dia or \emptyset 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

FOS factor of safety
 Fed Federal
 FP feed point
 Fn fence
 Fn P fence post
 FO fiber optic
 FD field drive
 F fill
 FAA fine aggregate angularity
 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
 Fnd found
 Fdn foundation
 Frac fractional
 Frwy freeway
 Frt front
 FF front face
 F Disp fuel dispenser
 FFP fuel filler pipes
 FLS fuel leak sensor
 Furn furnish/ed

Bk back
 BF back face
 Balc balcony
 B Wire barbed wire
 Barr barricade
 Btry battery
 BI beehive inlet
 Beg begin
 BG below grade
 BM bench mark
 Bkwy bikeway
 Bit bituminous
 Blk block
 BH bore hole
 Bot bottom
 Blvd Boulevard
 Bndry boundary
 Brkwy breakaway
 Br bridge
 Bldg building
 Bus. business
 BV butterfly valve
 Byp bypass

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
 Evgr evergreen
 Exc excavation
 Exst existing
 Exp expansion
 Expy Expressway
 E external of curve
 Extru extruded

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
05-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



08/16/22

NDDOT ABBREVIATIONS

D-101-2

Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	Lvng	leveling	OC	organic content	Rlwy	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Recy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location			RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	PMT	pad mounted transformer	Ref	reference
Gdrl	guardrail	Lp	loop	Pg	pages	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pntd	painted	RM	reference monument
		Lum	luminaire	Pr	pair	RP	reference point
				Pnl	panel	Refl	reflectorized
H Plg	H piling			Pk	park	RCB	reinforced concrete box
Hdwl	headwall	Mb	mailbox	PSD	passing sight distance	RCES	reinforced concrete end section
Ht	height	ML	main line	Pvmt	pavement	RCFES	reinforced concrete flared end section
Hel	helical	MH	manhole	Ped	pedestal	RCP	reinforced concrete pipe
HDPE	high density polyethylene	Mkd	marked	Ped	pedestrian	RCPS	reinforced concrete pipe sewer
HM	high mast	Mkr	marker	PPP	pedestrian pushbutton post	RCTES	reinforced concrete traversable end section
HP	high pressure	Mkg	marking	Pen.	penetration	Reinf	reinforcement
HPS	high pressure sodium	MA	mast arm	Perf	perforated	Res	reservation
HTCG	high tension cable guardrail	Matl	material	Per.	perimeter	Res	residence
Hwy	highway	Max	maximum	Perm	permanent	Ret	retaining
Hor	horizontal	MC	meander corner	PL	pipeline	Rev	reverse
HBP	hot bituminous pavement	Meas	measure	PI	place	Rt	right
HMA	hot mix asphalt	Mdn	median	P&P	plan & profile	R/W	right of way
Hyd	hydrant	MD	median drain	PL	plastic limit	Riv	river
Ph	hydrogen ion content	MC	medium curing	Pl or \bar{P}	plate	Rd	road
		MGS	Midwest Guardrail System	Pt	point	Rdbd	road bed
		MM	mile marker	PE	polyethylene	Rdwy	roadway
Id	identification	MP	mile post	PVC	polyvinyl chloride	RWIS	roadway weather information system
Incl	inclinometer tube	Min	minimum	PCC	Portland Cement concrete	Rk	rock
IMH	inlet manhole	Misc	miscellaneous	PP	power pole	Rt	route
ID	inside diameter	Mon	monument	Preempt	preemption		
Inst	instrument	Mnd	mound	Prefab	prefabricated		
Intchg	interchange	Mtbl	mountable	Prfmd or Pref	performed		
Intmdt	intermediate	Mtd	mounted	Prep	preparation		
Intscn	intersection	Mtg	mounting	Press.	pressure		
Inv	invert	Mk	muck	PRV	pressure relief valve		
IP	iron pipe			Prestr	prestressed		
				Pvt	private		
				PD	private drive		
Jt	joint	Neop	neoprene	Prod.	production/produce		
Jct	junction	Ntwk	network	Prog	programmed		
		N	North	Prop.	property		
		NE	North East	Prop Ln	property line		
		NW	North West	Ppsd	proposed		
		NB	Northbound	PB	pull box		
		No. or #	number				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



NDDOT ABBREVIATIONS

D-101-3

Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	South East	TERO	tribal employment rights ordinance
SW	South West	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike	VG	valley gutter
SB	split barrel sample	Vap	vapor
SH	sprinkler head	Vert	vertical
SV	sprinkler valve	VCP	vitrified clay pipe
Sq	square	Vol	volume
Stk	stake	VSFS	vehicle speed feedback sign
Std	standard		
N	standard penetration test	Wkwy	walkway
Std Specs	standard specifications	W	water content
Stm L	steam line	WGV	water gate valve
SEC	steel encased concrete	WL	water line
SMA	stone matrix asphalt	WM	water main
SSD	stopping sight distance	WMV	water main valve
SD	storm drain	W Mtr	water meter
St	street	WSV	water service valve
SPP	structural plate pipe	WW	water well
SPPA	structural plate pipe arch	Wrng	wearing
Str	structure	WIM	weigh in motion
Subd	subdivision	W	west
Sub	subgrade	WB	westbound
Sub Prep	subgrade preparation	Wrng	wiring
Ss	subsoil	W/	with
SS	supplement specification	W/o	without
Supp	supplemental	WC	witness corner
Surf	surfacing		
Surv	survey		
Sym	symmetrical		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

08/16/22

NDDOT ABBREVIATIONS

D-101-4

MEASUREMENTS

ac acres
 A ampere
 Bd Ft board feet
 Cd candela
 cm centimeter
 C coulomb
 CF cubic feet
 m3 cubic meter
 m3/s cubic meters per second
 CY cubic yard
 CY/mi cubic yards per mile
 D or Deg degree
 F Fahrenheit
 F farad
 ft feet/foot
 Gal gallon
 G giga
 Ha hectare
 H henry
 Hz hertz
 hr hour(s)
 in inch
 J joule
 K kelvin
 kN kilo newton
 kPa kilo pascal
 kg kilogram
 kg/m3 kilogram per cubic meter
 km kilometer
 K Kip(s)
 LF linear foot
 L litre
 Lm lumen
 L sum lump sum
 Lx lux
 M Hr man hour
 M mega
 m meter
 m/s meters per second
 mi mile
 mL milliliter
 mm millimeter
 mm/hr millimeters per hour
 n nano
 N newton
 Pa pascal
 lb pounds
 sec seconds
 S siemens
 SF square feet
 km2 square kilometer
 m2 square meter
 SY square yard
 Sta Yd station yards
 SI Systems International

T tesla
 T/mi tons per mile
 V volt
 W watt
 Wb weber

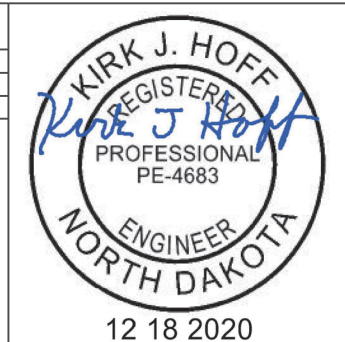
SURVEY DESCRIPTIONS

Az azimuth
 Bs backsight
 Brg bearing
 BP Cap blue plastic cap
 BS both sides
 BC brass cap
 CS curve to spiral
 Eq equation
 E external of curve
 FS far side
 FB field book
 Fs foresight
 Geod geodetic
 GIS Geographical Information System
 GPS Global Positioning System
 HI height of instrument
 IM iron monument
 I Pn iron pin
 LS Land Surveyor (licensed)
 LSIT Land Surveyor In Training
 L length of curve
 LC long chord
 LB level book
 Mer meridian
 M mid ordinate of curve
 NGS National Geodetic Survey
 NS near side
 Obsn observation
 Off Loc office location
 OP Cap orange plastic cap
 PK Parker-Kalon nail
 P Cap plastic cap
 PP Cap pink plastic cap
 PCC point of compound curve
 PC point of curve
 PI point of intersection
 PRC point of reverse curvature
 PT point of tangent
 POC point on curve
 POT point on tangent
 RTP random traverse point
 Rge range
 RP Cap red plastic cap
 SC spiral to curve
 ST spiral to tangent
 Sta station
 SE superelevation
 Tan tangent
 T tangent (semi)
 TS tangent to spiral
 Twp township
 TB transit book
 TP traverse point
 TP turning point
 USC&G US Coast & Geodetic Survey
 USGS US Geologic Survey
 VC vertical curve
 WGS World Geodetic System
 YP Cap yellow plastic cap
 Z zenith

SOIL TYPES

Cl clay
 Cl F clay fill
 Cl Hvy clay heavy
 Cl Lm clay loam
 Co S coal slack
 C Gr coarse gravel
 CS coarse sand
 FS fine sand
 Gr gravel
 Lig Co lignite coal
 Lig Sl lignite slack
 Lm loam
 Rk rock
 Sd sand
 Sdy Cl sandy clay
 Sdy Cl Lm sandy clay loam
 Sdy Fl sandy fill
 Sdy Lm sandy loam
 Sc scoria
 Sh shale
 Si Cl silt clay
 Si Cl Lm silty clay loam
 Si Lm silty loam

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	Sheet Added - Continued from D-101-3



NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated General Contractors of America
 ALL PL Alliance Pipeline
 ALL SEAS WU All Seasons Water Users Association
 AMOCO PI Amoco Pipeline Company
 AMRDA HESS Amerada Hess Corporation
 AT&T AT&T Corporation
 B PAW Bear Paw Energy Incorporated
 BAKER ELEC Baker Electric
 BASIN ELEC Basin Electric Cooperative Incorporated
 BEK TEL Bek Communications Cooperative
 BELLE PL Belle Fourche Pipeline Company
 BLM Bureau of Land Management
 BNSF Burlington Northern Santa Fe Railway
 BOEING Boeing
 BRNS RWD Barnes Rural Water District
 BURK-DIV ELEC Burke-Divide Electric Cooperative
 BURL WU Burleigh Water Users
 CABLE ONE Cable One
 CABLE SERV Cable Services
 CAP ELEC Capital Electric Cooperative Incorporat
 CASS CO ELEC Cass County Electric Cooperative
 CASS RWU Cass Rural Water Users Incorporated
 CAV ELEC Cavalier Rural Electric Cooperative
 CBLCOM Cablecom Of Fargo
 CENEX PL Cenex Pipeline
 CENT PL WATER DIST Central Pipe Line Water District
 CENT PWR ELEC Central Power Electric Cooperative
 CENTURYLINK CenturyLink
 COE Corps of Engineers
 CONS TEL Consolidated Telephone
 CONT RES Continental Resource Inc
 CPR Canadian Pacific Railway
 D O E Department Of Energy
 DAK CARR Dakota Carrier Network
 DAK CENT TEL Dakota Central Telephone
 DAK RWD Dakota Rural Water District
 DGC Dakota Gasification Company
 DICKEY R NET Dickey Rural Networks
 DICKEY RWU Dickey Rural Water Users Association
 DICKEY TEL Dickey Telephone
 DNRR Dakota Northern Railroad
 DOME PL Dome Pipeline Company
 DVELEC Dakota Valley Electric Cooperative
 DVMW Dakota, Missouri Valley & Western
 ENBRDG Enbridge Pipelines Incorporated
 ENVENTIS Enventis Telephone
 EQUINOR Equinor Pipeline
 FALK MNG Falkirk Mining Company
 FHWA Federal Highway Administration
 G FKS-TRL WD Grand Forks-traill Water District
 GETTY TRD & TRAN Getty Trading & Transportation
 GLDN W ELEC Golden West Electric Cooperative
 GRGS CO TEL Griggs County Telephone
 GTR RAMSEY WD Greater Ramsey Water District

GT PLNS NAT GAS Great Plains Natural Gas Company
 HALS TEL Halstad Telephone Company
 IDEA1 Idea1
 INT-COMM TEL Inter-Community Telephone Company
 KANEB PL Kaneb Pipeline Company
 KEM ELEC Kem Electric Cooperative Incorporated
 KOCH GATH SYS Koch Gathering Systems Incorporated
 LKHD PL Lakehead Pipeline Company
 LNGDN RWU Langdon Rural Water Users Incorporated
 LWR YELL R ELEC Lower Yellowstone Rural Electric
 MCKNZ CON McKenzie Consolidated Telcom
 MCKENZ ELEC McKenzie Electric Cooperative
 MCKNZ WRD McKenzie County Water Resource District
 MCLEOD McLeod USA
 MCLN ELEC McLean Electric Cooperative
 MCLN-SHRDN R WAT McLean-Sheridan Rural Water
 MDU Montana-dakota Utilities
 MIDCO MidContinent Communications
 MIDSTATE TEL Midstate Telephone Company
 MINOT CABLE Minot Cable Television
 MINOT TEL Minot Telephone Company
 MISS VALL COMM Missouri Valley Communications
 MISS W W S Missouri West Water System
 MNKOTA PWR Minnkota Power
 MOR-GRAN-SOU ELEC Mor-gran-sou Electric Cooperative
 MOUNTRAIL-WILLI ELEC Mountrail-williams Electric Cooperative
 MRE LBTY TEL Moore & Liberty Telephone
 MUNICIPAL City Water And Sewer
 MUNICIPAL City Of '.....'
 N CENT ELEC North Central Electric Cooperative
 N VALL W DIST North Valley Water District
 ND PKS & REC North Dakota Parks And Recreation
 ND TEL North Dakota Telephone Company
 NDDOT North Dakota Department of Transportation
 NDSU SOIL SCI DEPT NDSU Soil Science Department
 NEMONT TEL Nemont Telephone
 NODAK R ELEC Nodak Rural Electric Cooperative
 NOON FRMS TEL Noonan Farmers Telephone Company
 NPR Northern Plains Railroad
 NSP Northern States Power
 NTH PRAIR RW Northern Prairie Rural Water Association
 NTHN BRDR PL Northern Border Pipeline
 NTHN PLNS ELEC Northern Plains Electric Cooperative Incorporated
 NTHWSTRN REF Northwestern Refinery Company
 NW COMM Northwest Communication Cooperation
 NWRWD Northwest Rural Water District
 ONEOK Oneok gas
 OSHA Occupational Safety and Health Administration
 OTTR TL PWR Otter Tail Power Company
 PAAP Plains All American Pipeline
 P L E M Prairielands Energy Marketing
 POLAR COM Polar Communications
 PVT ELEC Private Electric
 QWEST Qwest Communications
 R&T W SUPPLY R & T Water Supply Association

RED RIV COMM Red River Rural Communications
 RESVTN TEL Reservation Telephone
 ROBRTS TEL Roberts Company Telephone
 R-RIDER ELEC Roughrider Electric Cooperative
 RRVW Red River Valley & Western Railroad
 S CENT REG WD South Central Regional Water District
 S E W U South East Water Users Incorporated
 SCOTT CABLE Scott Cable Television Dickinson
 SHERDN ELEC Sheridan Electric Cooperative
 SHEYN VLY ELEC Sheyenne Valley Electric Cooperative
 SKYTECH Skyland Technologies Incorporated
 SLOPE ELEC Slope Electric Cooperative Incorporated
 SOURIS RIV TELCOM Souris River Telecommunications
 ST WAT COMM State Water Commission
 STATE LN WATER State Line Water Cooperative
 STER ENG Sterling Energy
 STUT RWU Stutsman Rural Water Users
 SW PL PRJ Southwest Pipeline Project
 T M C Turtle Mountain Communications
 TCI TCI of North Dakota
 TESORO GHG PLNS PL Tesoro High Plains Pipeline
 TRI-CNTY WU Tri-County Water Users Incorporated
 TRL CO RWU Traill County Rural Water Users
 UNTD TEL United Telephone
 UPPR SOUR WUA Upper Souris Water Users Association
 US SPRINT U.S. Sprint
 USAF MSL CABLE U.S.A.F. Missile Cable
 USFWS US Fish and Wildlife Service
 USW COMM U.S. West Communications
 VRNDRY ELEC Verendrye Electric Cooperative
 W RIV TEL West River Telephone Incorporated
 WAPA Western Area Power Administration
 WAWSA Western Area Water Supply Authority
 WEB W. E. B. Water Development Association
 WILLI RWA Williams Rural Water Association
 WILSTN BAS PL Williston Basin Interstate Pipeline Company
 WLSH RWD Walsh Water Rural Water District
 WOLVRTN TEL Wolverton Telephone
 XLENER Xcel Energy
 YSVR Yellowstone Valley Railroad

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
05-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



LINE STYLES

D-101-20

Existing Topography

- Existing Ground Void
- Existing Cemetery Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter

- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts

Proposed Topography

- 3-Cable w Posts
- Flow
- Fence
- Remove Line
- Wall
- Retaining Wall (Plan View)
- W-Beam w Posts
- High Tension Cable Guardrail with Posts

Existing Utilities

- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Existing Culvert
- Existing Telephone Line
- Existing TV Line
- Existing Water or Steam Line
- Existing Under Drain
- Existing Slotted Drain
- Existing Conduit
- Existing Conductor
- Existing Down Guy Wire Down Guy
- Existing Underground Vault or Lift Station

Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

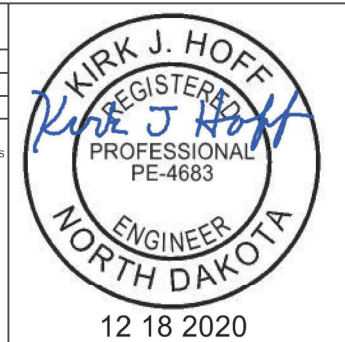
Traffic Utilities

- Conductor
- Fiber Optic
- Existing Loop Detector
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Micro Loop Detector
- Micro Loop Detector
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm

Sign Structures

- Existing Overhead Sign Structure
- Existing Overhead Sign Structure Cantilever
- Overhead Sign Structure Cantilever

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14 REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups General Revisions
12-18-20	



LINE STYLES

D-101-21

Right Of Way

- Easement
- Existing Easement
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Existing Right of Way Not State Owned
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines
- Sight Distance Triangle Line
- Dimension Leader

Boundary Control

- ////// Existing City Corporate Limits or Reservation Boundary
- Existing State or International Line
- Existing Township
- Existing County
- Existing Section Line
- Existing Quarter Section Line
- Existing Sixteenth Section Line
- Existing Centerline
- Tangent Line

Cross Sections and Typical

- Existing Ground
- Existing Topsoil (Cross Section View)
- void - void - void - v Existing Ground Void (Not Surveyed)
- Existing Concrete
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar

Geotechnical

- D ----- D ----- Geotextile Fabric Type D
- **Geo** ----- **Geo** ----- Geogrid
- R ----- R ----- Geotextile Fabric Type R
- R ----- R ----- Geotextile Fabric Type R1
- RR ----- RR ----- Geotextile Fabric Type RR
- S ----- S ----- Geotextile Fabric Type S

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

- Centerline Pavement Marking
- ===== Barrier with Centerline Pavement Marking
- ===== Barrier Pavement Marking
- - - - - Stripe 4 IN Dotted Extension White
- - - - - Stripe 8 IN Dotted Extension White
- - - - - Stripe 8 IN Lane Drop

Pavement Joints

- ===== Doweled Joint
- +++++ Tie Bar 30 Inch 4 Foot Center to Center
- +++++ Tie Bar 18 Inch 3 Foot Center to Center
- +++++ Tie Bar at Random Spacing

Bridge Details

- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Existing Conditions Object
- Centerline Main
- Centerline Secondary
- Excavation Limits
- Proposed Ground
- Sheet Piling

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- s ----- s ----- Floating Silt Curtain
- SF ----- SF ----- Silt Fence
- Excavation Limits
- Fiber Rolls

Environmental

- Wetland Mitigation
- Existing Wetland Easement USFWS
- Existing Wetland Jurisdictional
- Existing Wetland
- Tree Row

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups General Revisions
12-18-20	



SYMBOLS



North Arrow (Half Scale)



Alignment Data Point



Alignment Monument



Spot Elevation



Existing Miscellaneous Spot



Existing Access Control Arrow



Existing Benchmark



Reset USGS Marker



Iron Monument Found



Iron Pin R/W Monument



Property Corner



Iron Pin Reference Monument



Right of Way Marker (Exst, Ppsd, Reset)



Existing Federal Reference Corner



Existing Section Corner (Full, Quarter, Sixteenth, Meander)



Existing Witness Corner



Existing Control Point (CP, GPS-RTK, TRI)



Existing Traverse PI Aerial Panel



Existing Reference Marker Point NGS



Existing EFB Misc



Existing Bush or Shrub



Existing Large Evergreen Tree



Existing Small Evergreen Tree



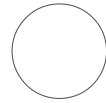
Existing Large Tree



Existing Small Tree



Existing Tree Trunk



Cairn or Stone Circle



Existing Artifact



Existing Satellite Dish



Existing Weather Station



Existing Windmill or Tower



Reinforced Pavement



Continuous Split Barrel Sample



Flight Auger Sample



Split Barrel Sample



Thinwall Tube Sample



Standard Penetration Test



Inclinometer Tube



Excavation Unit



Existing Ground Water Well Bore Hole

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

Professional Engineer Seal for Kirk J. Hoff, North Dakota, PE-4683, dated 12 18 2020.

SYMBOLS

D-101-31

		Flexible Delineator		Highway Sign (Exst, Ppsd)
		Flexible Delineator Type A (Exst, Ppsd)		Mile Post Type A (Exst-Ppsd-Reset)
		Flexible Delineator Type B (Exst, Ppsd)		Mile Post Type B (Exst, Ppsd)
		Flexible Delineator Type C (Exst, Ppsd)		Mile Post Type C (Exst, Ppsd)
		Flexible Delineator Type D (Exst, Ppsd)		Object Marker Type I (Exst, Ppsd)
		Flexible Delineator Type E (Exst, Ppsd)		Object Marker Type II (Exst, Ppsd)
	Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)		Object Marker Type III (Exst, Ppsd)	
	Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)		Existing Reference Marker	
	Delineator Type C (Exst, Ppsd, Diamond Grade)		Road Closure Gate 18 Ft (Exst, Ppsd)	
	Delineator Type D (Exst, Ppsd, Diamond Grade)		Road Closure Gate 28 Ft (Exst, Ppsd)	
	Delineator Type E (Exst, Ppsd, Diamond Grade)		Road Closure Gate 40 Ft (Exst, Ppsd)	
	Barricade (Type I, Type II, Type III)		Existing Railroad Battery Box	
			Existing RR Profile Spot	
			Existing Railroad Crossbuck	
	Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)		Existing Railroad Frog	
			Existing Mailbox (Private, Federal)	
	Delineator Drums			
	Flagger			
	Tubular Marker			
	Traffic Cone			
	Back to Back Vertical Panel Sign			

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

KIRK J. HOFF
 REGISTERED
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 12 18 2020

SYMBOLS

	Existing Luminaire		High Mast Light Standard 3 Luminaire (Exst, Ppsd)		Existing Traffic Signal Standard
	Luminaire LED		High Mast Light Standard 4 Luminaire (Exst, Ppsd)		Pull Box (Exst-Ppsd-Undefined)
	Existing Light Standard Luminaire		High Mast Light Standard 5 Luminaire (Exst, Ppsd)		Intelligent Transportation Pull Box (Exst, Ppsd)
	Relocate Light Standard		High Mast Light Standard 6 Luminaire (Exst, Ppsd)		Transformer (Exst, Ppsd)
	Light Standard Light LED Luminaire		High Mast Light Standard 7 Luminaire (Exst, Ppsd)		Power Pole (Exst-Ppsd-with Transformer)
	Light Standard 35 Watt High Pressure Sodium Vapor Luminaire		High Mast Light Standard 8 Luminaire (Exst, Ppsd)		Wood Pole (Exst, Ppsd)
	Light Standard 50 Watt High Pressure Sodium Vapor Luminaire		High Mast Light Standard 9 Luminaire (Exst, Ppsd)		Pedestrian Push Button Post (Exst, Ppsd)
	Light Standard 70 Watt High Pressure Sodium Vapor Luminaire		High Mast Light Standard 10 Luminaire (Exst, Ppsd)		Existing Pole
	Light Standard 100 Watt High Pressure Sodium Vapor Luminaire		Overhead Sign Structure Load Center (Exst, Ppsd)		Existing Telephone Pole
	Light Standard 150 Watt High Pressure Sodium Vapor Luminaire		Traffic Signal Controller (Exst, Ppsd)		Existing Post
	Light Standard 200 Watt High Pressure Sodium Vapor Luminaire		Pad Mounted Traffic Signal Controller (Exst, Ppsd)		Connection Conductor (Ground, Neutral, Phase 1, Phase 2)
	Light Standard 250 Watt High Pressure Sodium Vapor Luminaire		Flashing Beacon (Exst, Ppsd)		
	Light Standard 310 Watt High Pressure Sodium Vapor Luminaire		Concrete Foundation (Exst, Ppsd)		
	Light Standard 400 Watt High Pressure Sodium Vapor Luminaire		Pipe Mounted Flasher (Exst, Ppsd)		
	Light Standard 700 Watt High Pressure Sodium Vapor Luminaire		Pad Mounted Feed Point (Exst, Ppsd)		
	Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire		Pipe Mounted Feed Point with Pad (Exst, Ppsd)		
	Emergency Vehicle Detector		Pole Mounted Feed Point (Exst, Ppsd)		
	Video Detection Camera		Junction Box (Exst, Ppsd)		
			Existing Pedestrian Head with Number		
			Existing Signal Head		
			Pole Mounted Head		
			Existing Lighting Standard Pole		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions

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12 18 2020

SYMBOLS

D-101-33

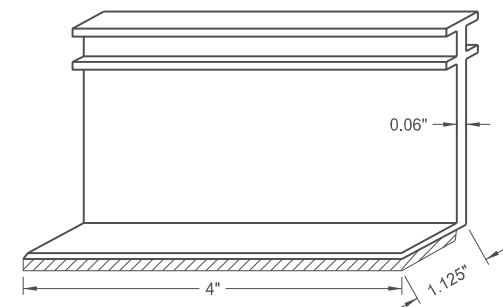
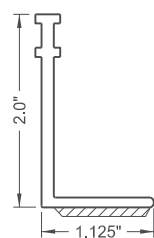
			Existing Manhole (Electrical, Gas, Telephone)		Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
			Water Manhole (Exst, Exst with Valve)		
			Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)		Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
			Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)		
			Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)		Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined
			Force Main Storm Drain Manhole (Exst, Exst with Valve)		
			Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)		Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined
			Existing Water Appurtenance		
			Sprinkler Head (Exst, Ppsd)		Pump Sanitary, Storm Drain, Exst Water
			Fire Hydrant (Exst, Ppsd)		
			Cleanout (Exst Sanitary, Underdrain)		Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Catch Basin Inlet (Round, Square)		Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Curb Inlet (Round, Square)		
			Existing Slotted Reinforced Concrete Pipe		
			Catch Basin (Riser 30 Inch, Beehive, Type A)		Existing Utility Marker
			Inlet Mountable Curb (Type A, Type B)		Existing Meter
			Inlet Saddle Base (Type 1, Type 2)		Existing Fuel Dispensers
			Inlet Special (Catch Basin, Type 1, Type A)		Existing Fuel Filler Pipes
			Inlet (Tee, Type 1, Type 2, Type 2 Double)		Existing Fuel Leak Sensors
			Median Drain		
			Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

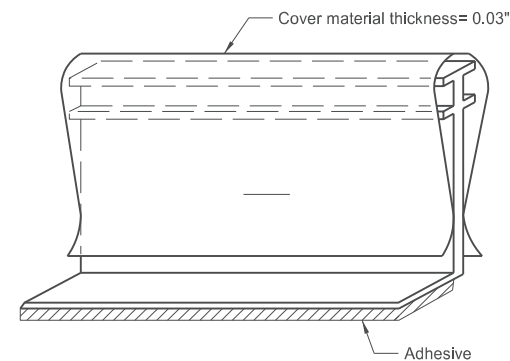
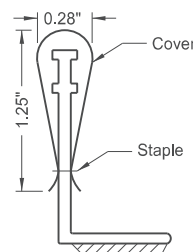
LANE MARKERS (Spotting Tab for Seal Projects only)

Notes:

1. Install lane line markers as shown, prior to beginning the seal coat.
2. Attach cover to vertical part of marker so traffic does not cause it to detach, but it can be easily removed manually.
3. Remove protective covers immediately after seal coat is applied.
4. Remove markers after permanent pavement marking is installed.
5. Use marker body and cover manufactured from polyurethane material.
6. Marker types:
 Type Y - Yellow body and cover with yellow reflective tape on both sides.
 Type W - White body and cover with white reflective tape on one side.
7. Use retroreflective tape with a minimum reflectance of 1200 candle power per foot-candle per square foot, using a .1 degree observation angle and 0 degree entrance angle.
8. Use adhesive conforming to AASHTO M 237.



Marker Body



Marker Body with Protective Cover

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

Perforated Tube

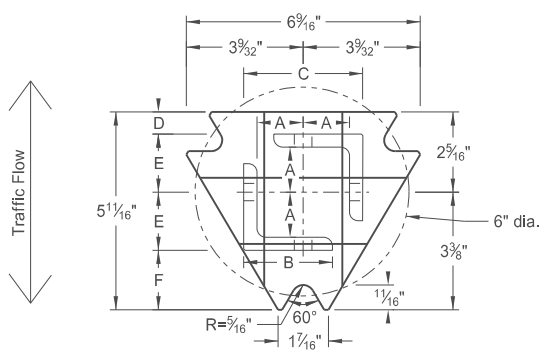
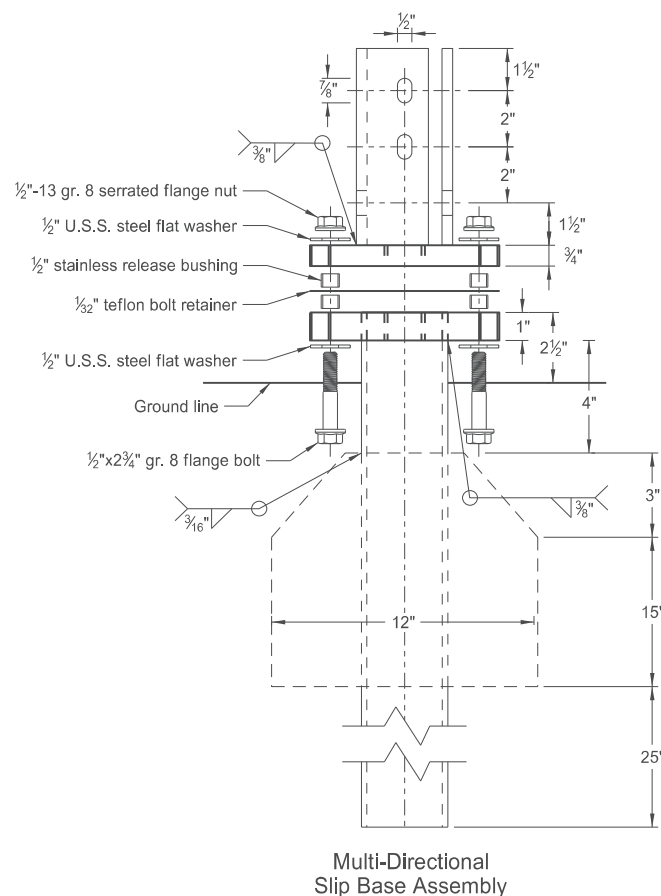
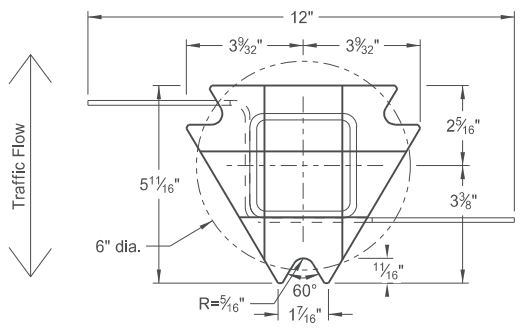
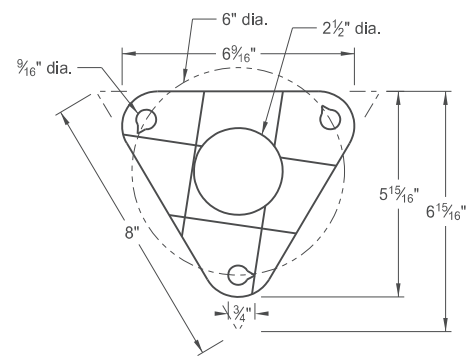


Plate - ASTM A572 grade 50
 Angle Receiver - 2 1/2" x 2 1/2" x 3/8" ASTM A36 structural angle



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



Bolt Retainer - 1/32" Reprocessed Teflon

Notes:

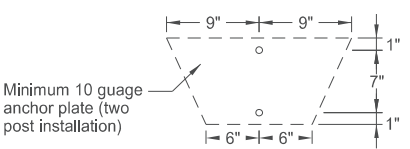
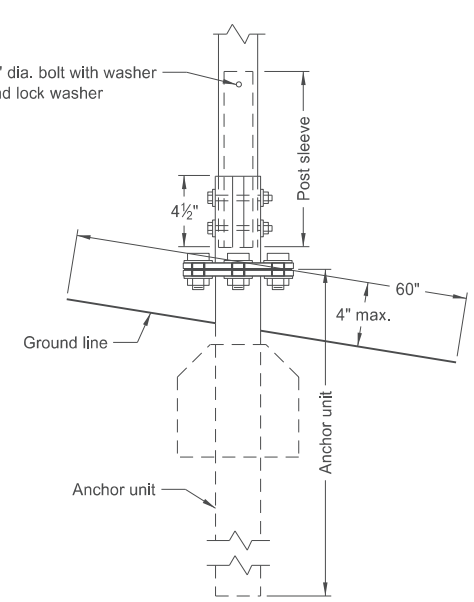
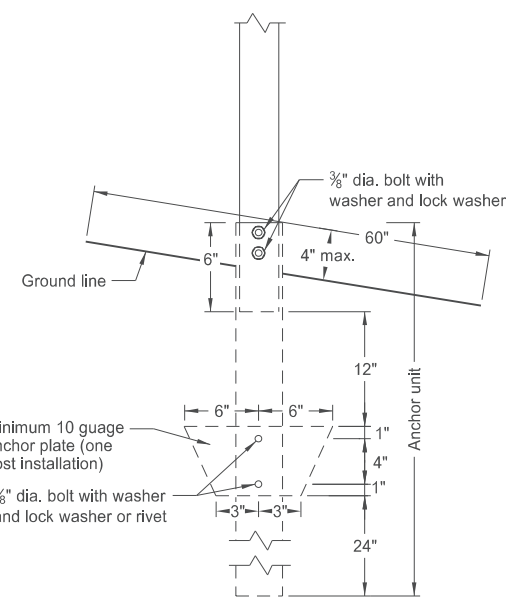
1. Torque slip base bolts as specified by manufacturer.
2. Use anchor with 43.9 KSI yield strength and 59.3 KSI tensile strength.
3. Provide 4" vertical clearance for anchor or breakaway base. Measure the 4"x60" measurement above and below post location and back and ahead of post.
4. In concrete sidewalk, use same anchor without wings.
5. Provide more than 7' between the first and fourth posts of a four post sign.

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 1/2	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

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

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16" x 10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 33/64"	1 7/8"
2 1/2" x 10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

- (A) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.
 (B) For additional wind load, insert the 2 3/16" x 10 ga. into 2 1/2" x 10 ga.



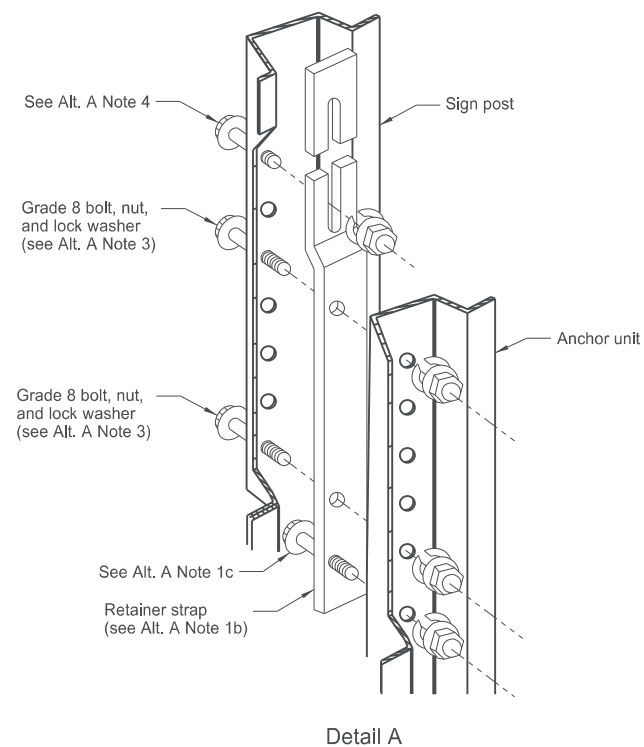
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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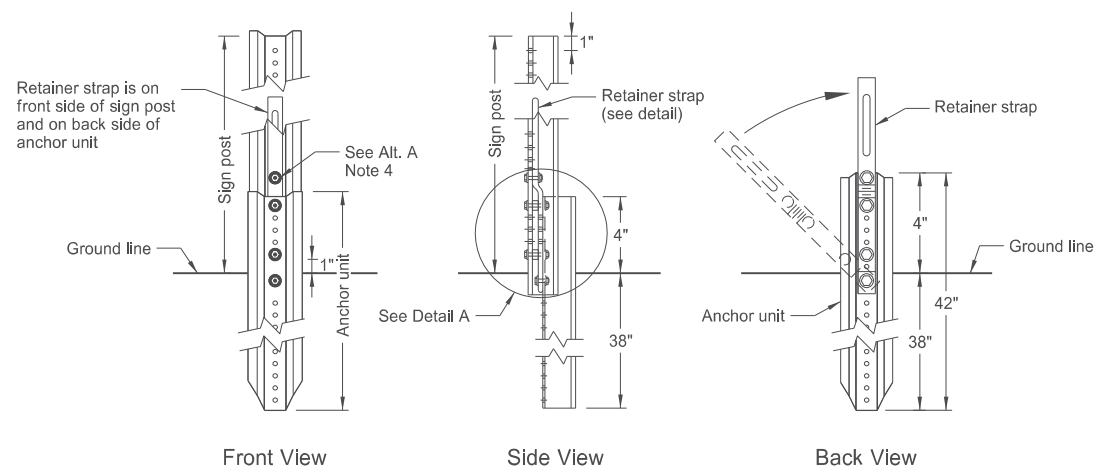
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



Detail A



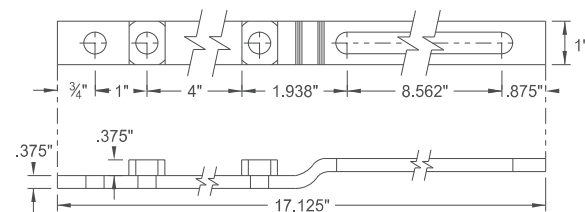
Front View

Side View

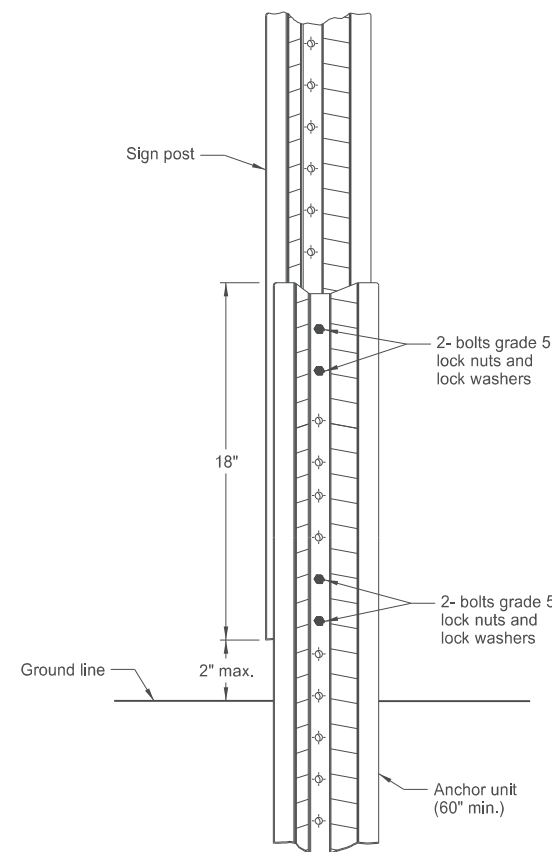
Back View

Breakaway U-Channel Detail Alternate A

Install a maximum of 2 posts within 7'.

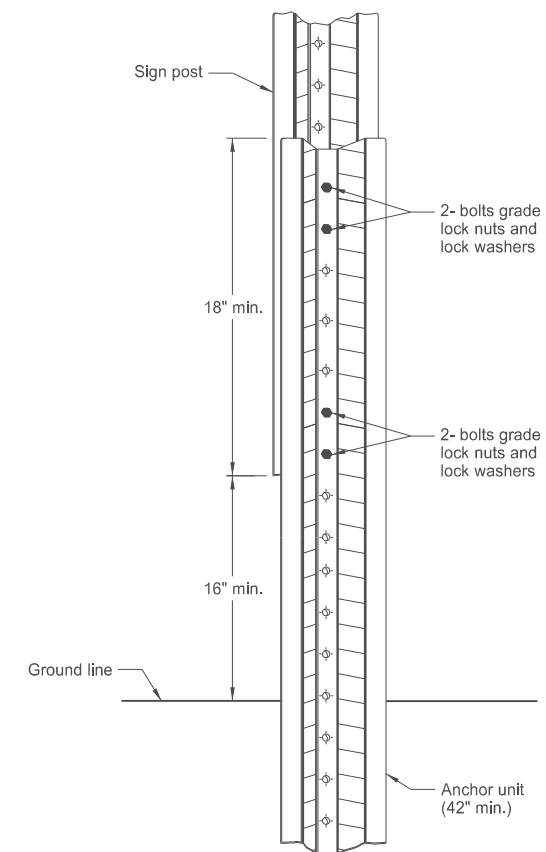


Retainer Strap Detail



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

Install a maximum of 3 posts within 7'.



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

Install a maximum of 3 posts within 7'.

Alternate A Steps of Installation:

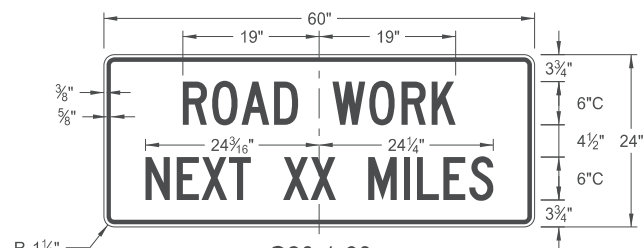
- Drive anchor unit to within 12" of ground level.
 - Establish proper assembly by lining up bottom hole of retainer strap with 6th hole from the top of the anchor unit.
 - Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
 - Rotate strap 90° to left.
- Drive anchor unit to 4" above ground.
 - Rotate strap to vertical position.
- 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.
 - Alternately tighten two connector bolts.
- Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
- Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17 10-03-19	Updated to active voice New Design Engr PE Stamp

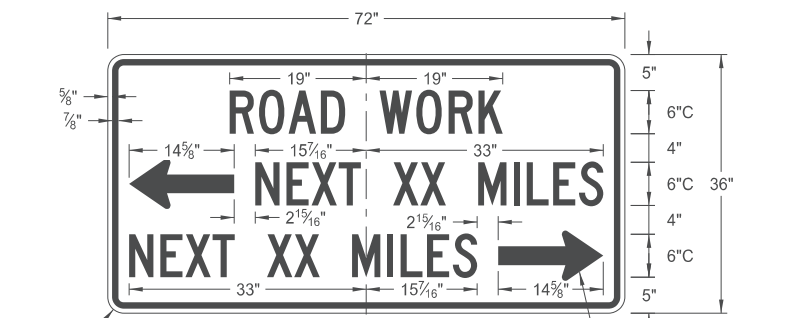
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

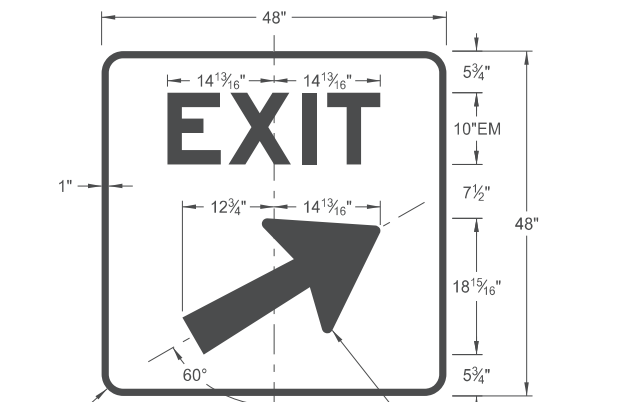
D-704-9



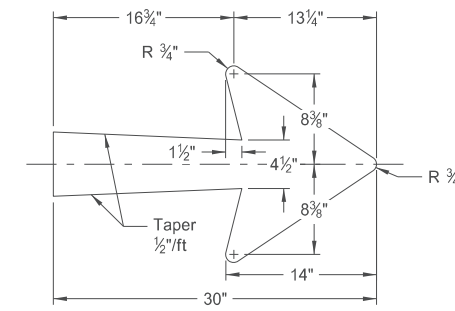
G20-1-60
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Background: orange



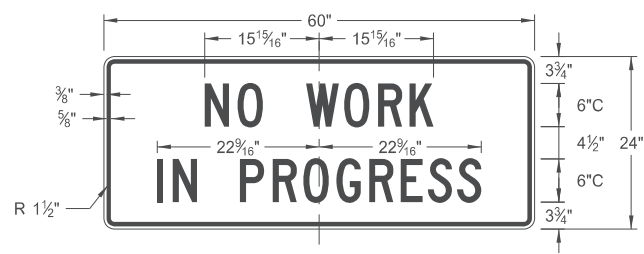
G20-50a-72
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Background: orange



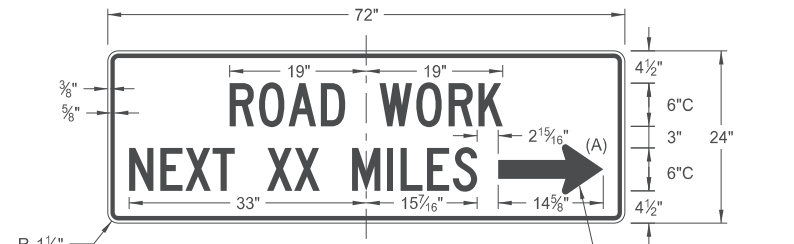
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



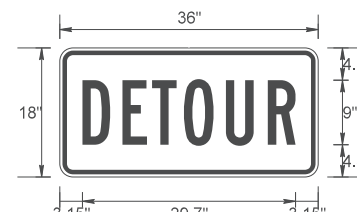
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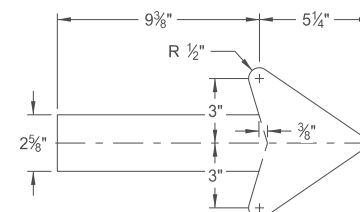
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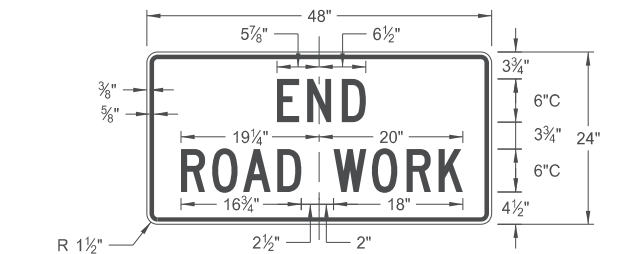
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Background: orange



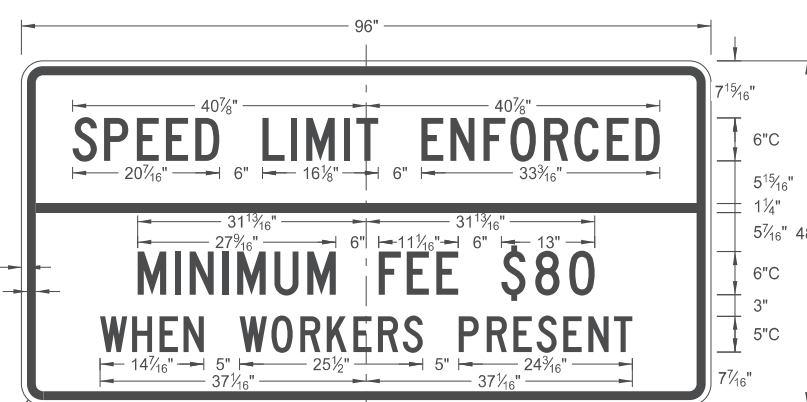
M4-8-36
Legend: black (non-refl)
Background: orange



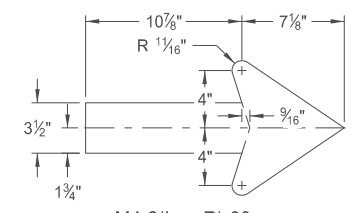
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G20-52a-72



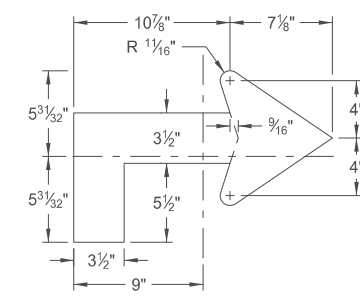
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Background: orange



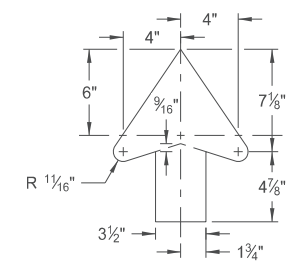
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Background: orange



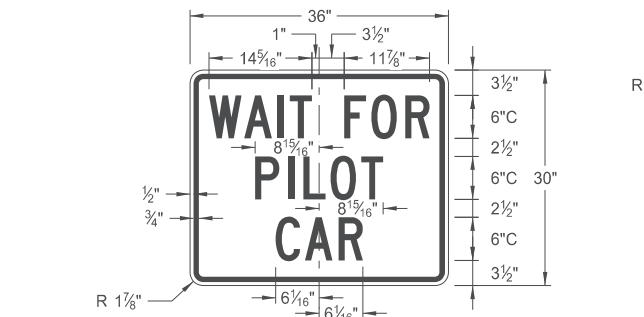
M4-9(L or R)-30
Right or Left



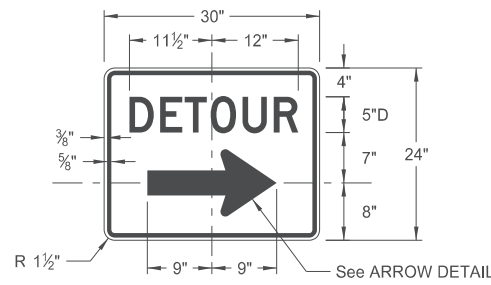
M4-9(L or R)-30
Advanced Right or Left



M4-9-30
Straight



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

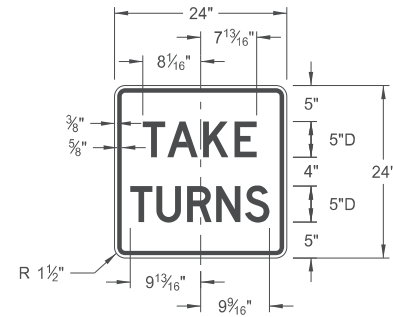


M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

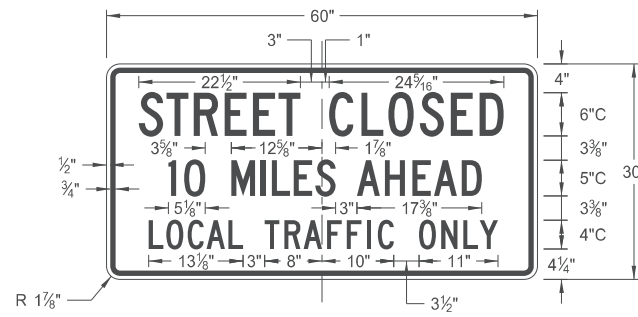
ARROW DETAILS
NOTES:
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 10/03/19 and the original document is stored at the North Dakota Department of Transportation
8-13-13		
REVISIONS		
DATE	CHANGE	
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp	

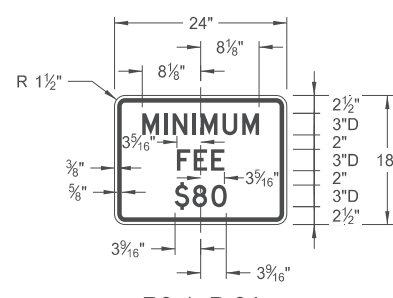
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



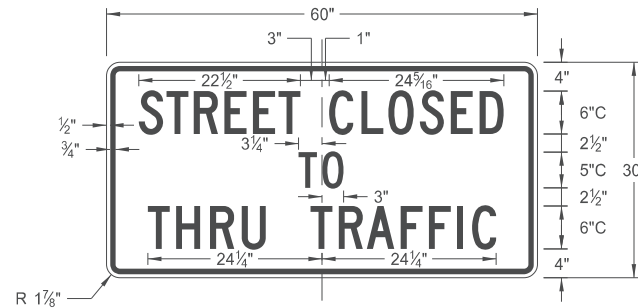
R1-50P-24
Legend: black (non-refl)
Background: white



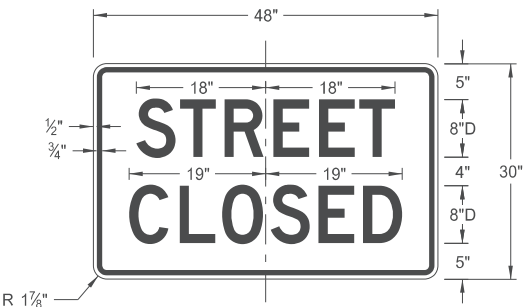
R11-3c-60
Legend: black (non-refl)
Background: white



R2-1aP-24
Legend: black (non-refl)
Background: white



R11-4a-60
Legend: black (non-refl)
Background: white

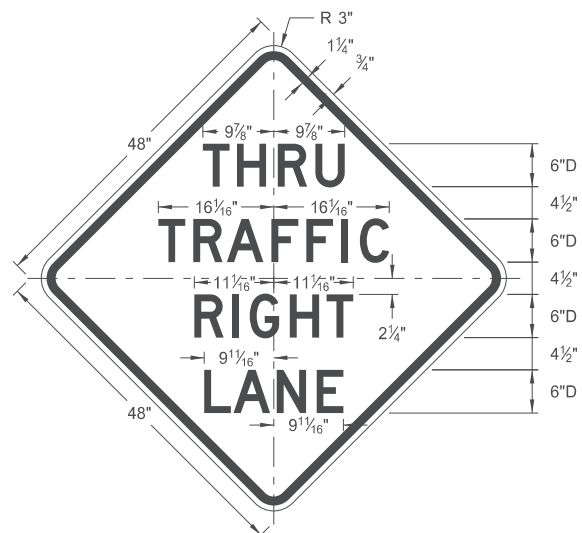


R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

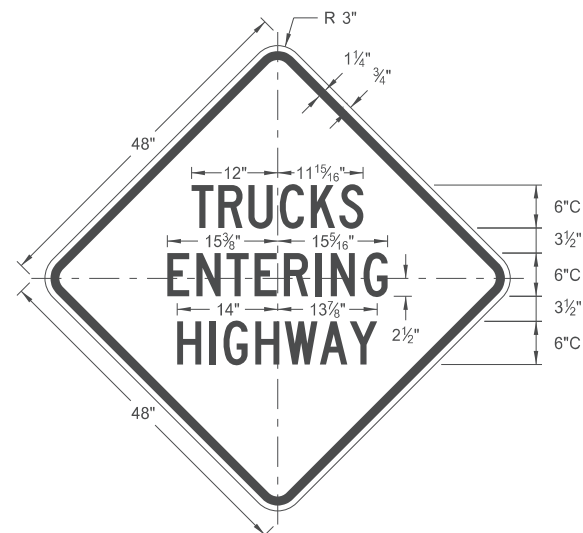
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS



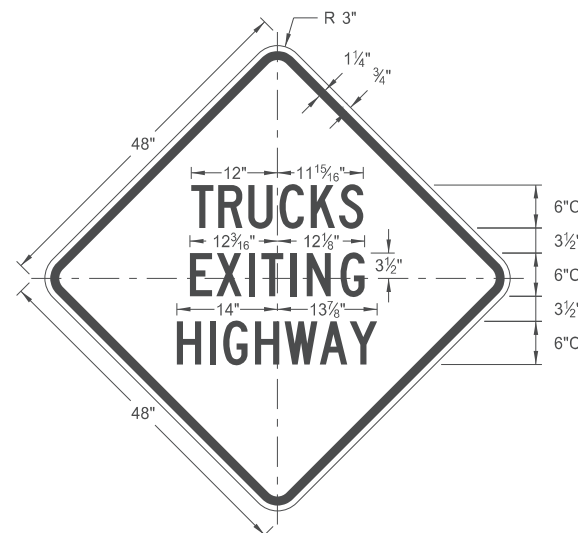
W5-8-48

Legend: black (non-refl)
Background: orange



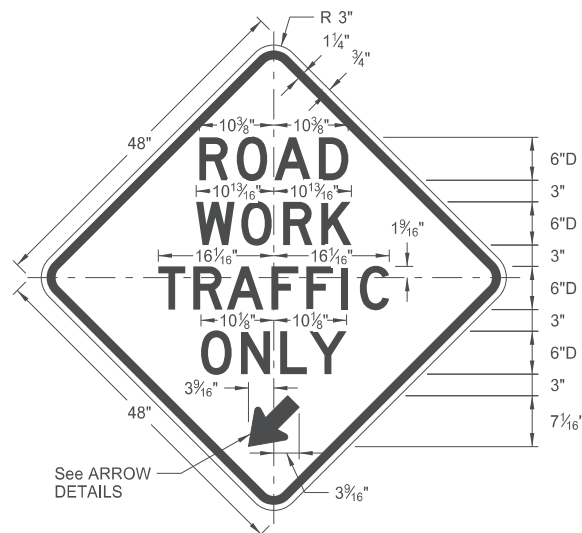
W8-53-48

Legend: black (non-refl)
Background: orange



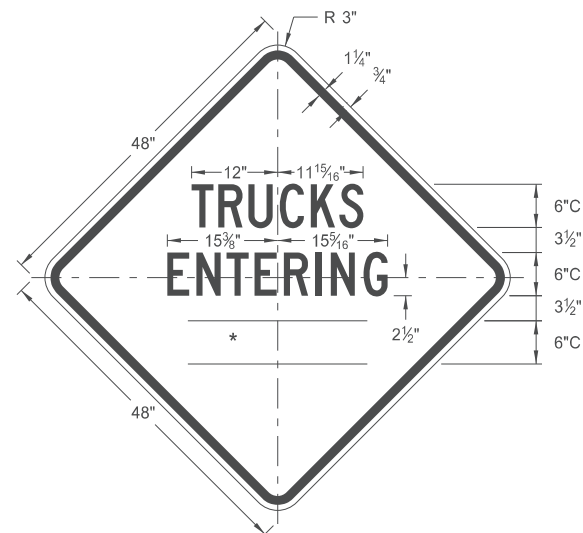
W8-56-48

Legend: black (non-refl)
Background: orange



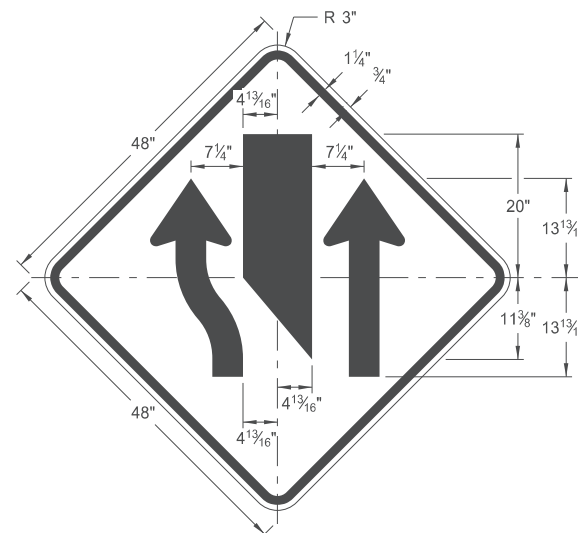
W5-9-48

Legend: black (non-refl)
Background: orange



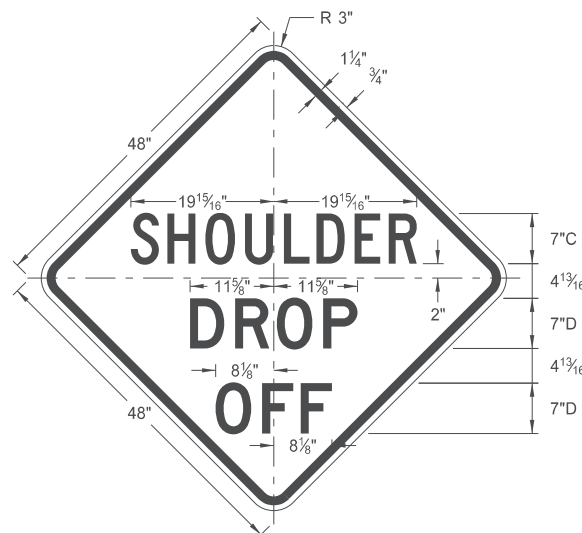
W8-54-48

Legend: black (non-refl)
Background: orange



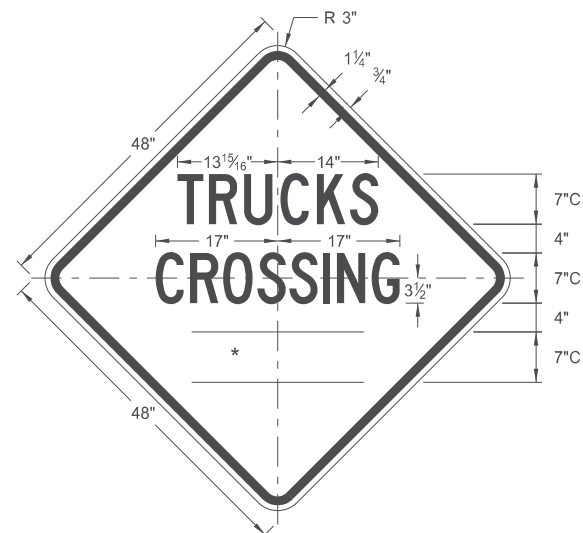
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

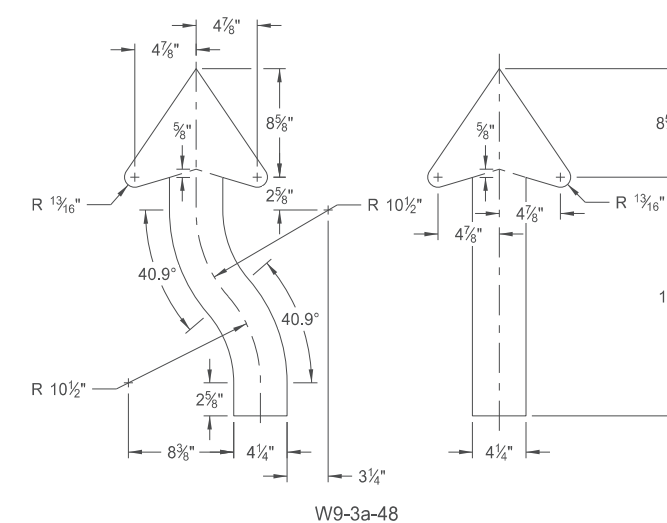
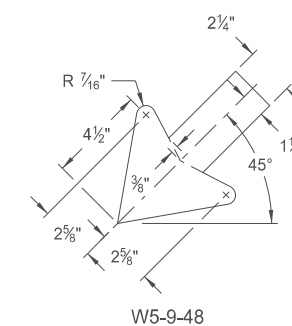


W8-55-48

Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES

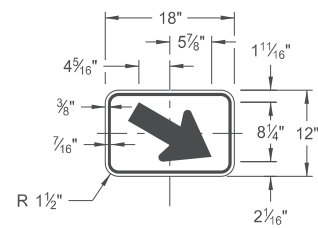


ARROW DETAILS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

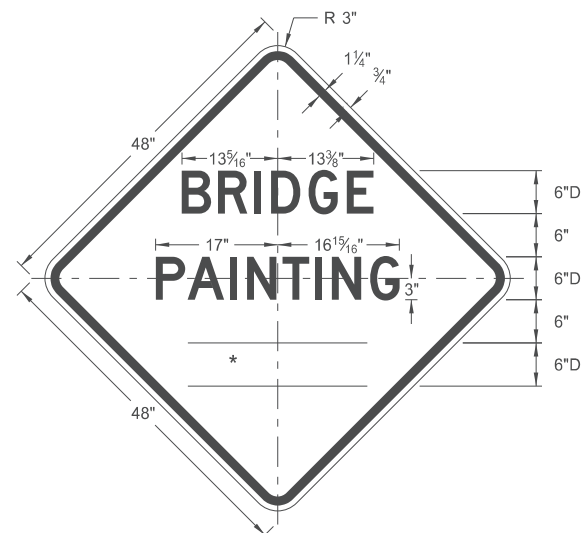
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS



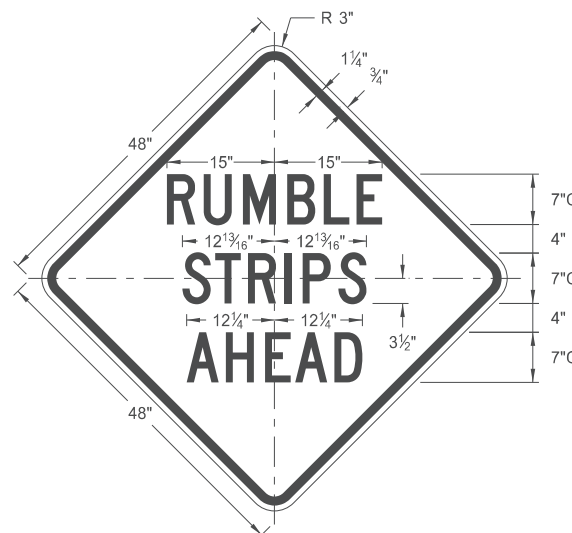
W16-7aP-18

Legend: black (non-refl)
Background: orange



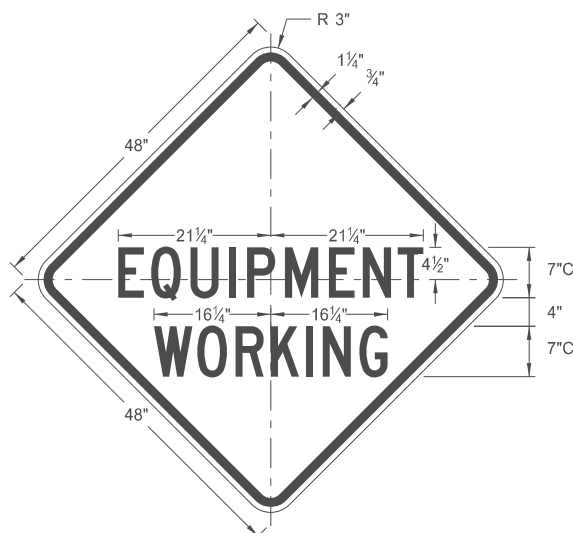
W21-50-48

Legend: black (non-refl)
Background: orange



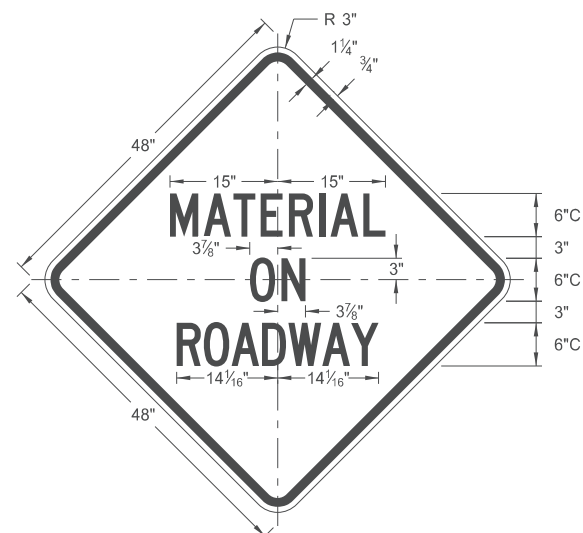
W21-53-48

Legend: black (non-refl)
Background: orange



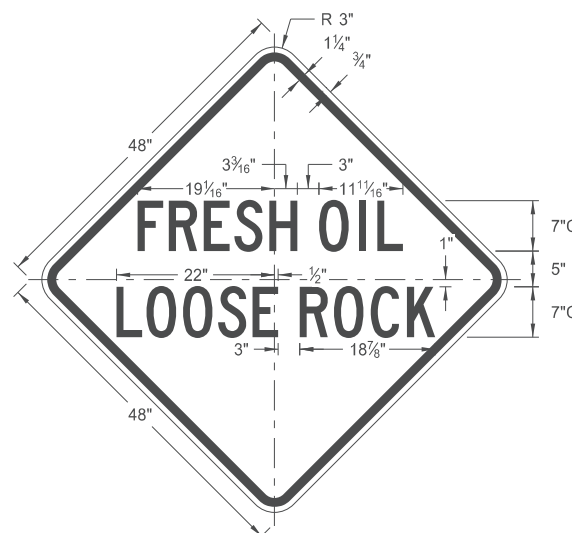
W20-51-48

Legend: black (non-refl)
Background: orange



W21-51-48

Legend: black (non-refl)
Background: orange

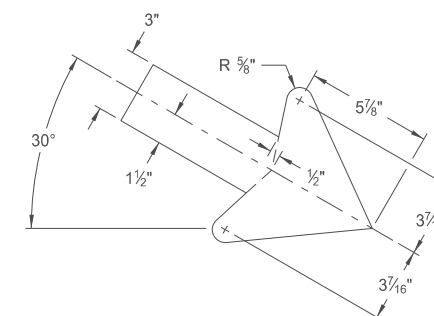


W22-8-48

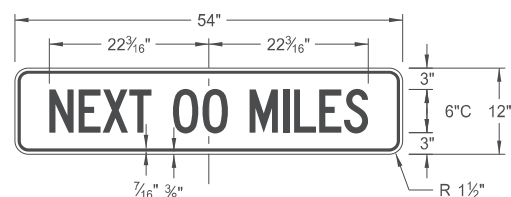
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES

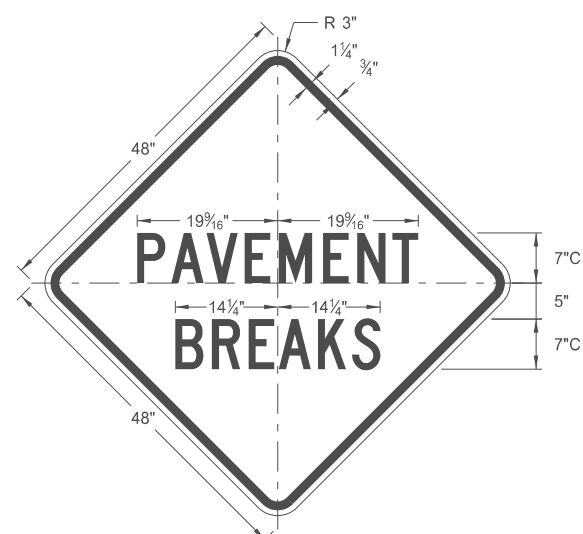


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange



W21-52-48

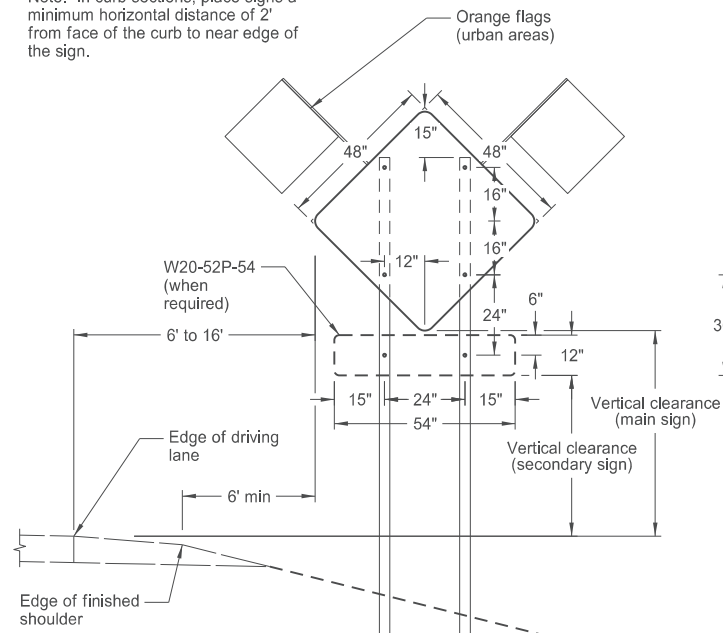
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.

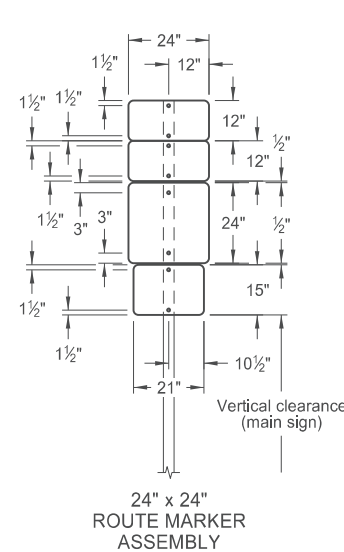
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

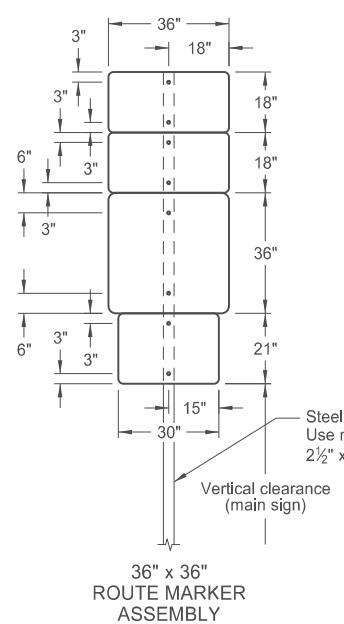
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



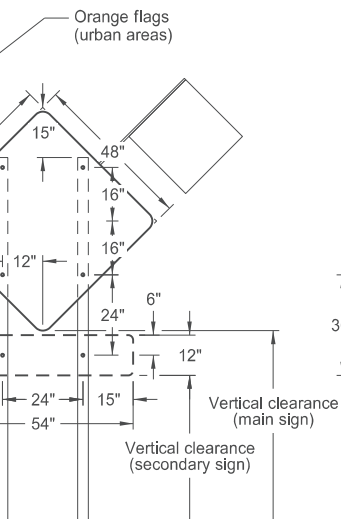
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



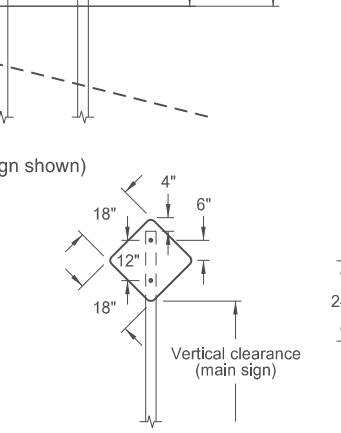
24" x 24" ROUTE MARKER ASSEMBLY



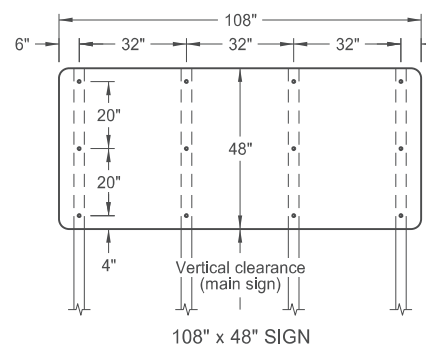
36" x 36" ROUTE MARKER ASSEMBLY



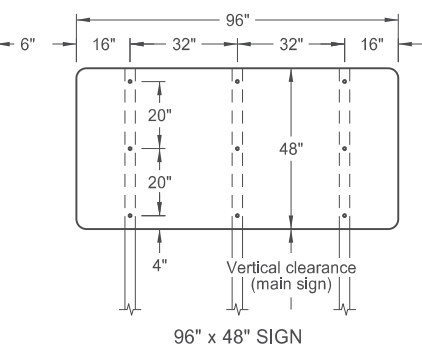
18" x 18" DIAMOND SIGN



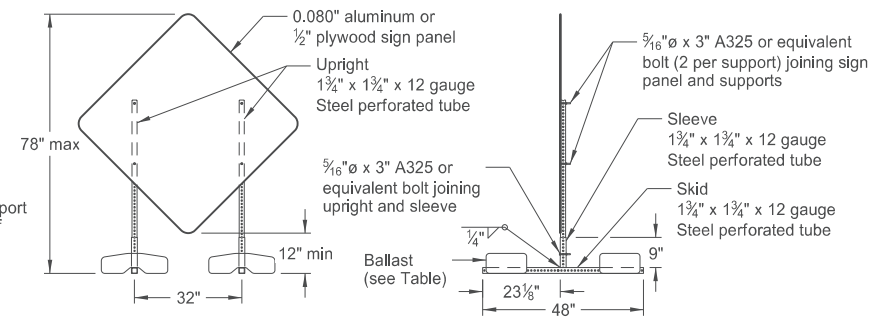
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



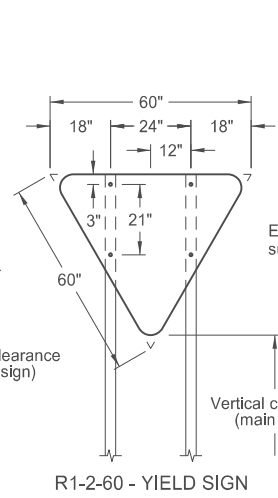
108" x 48" SIGN



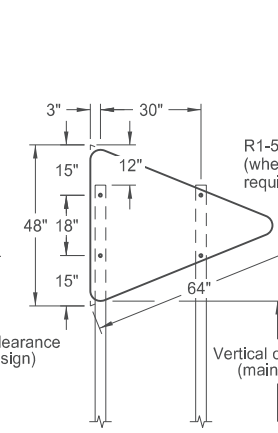
96" x 48" SIGN



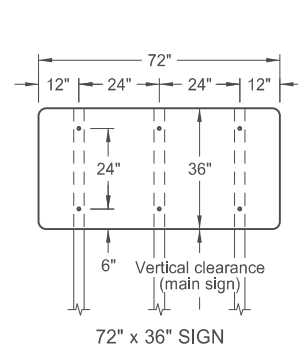
PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



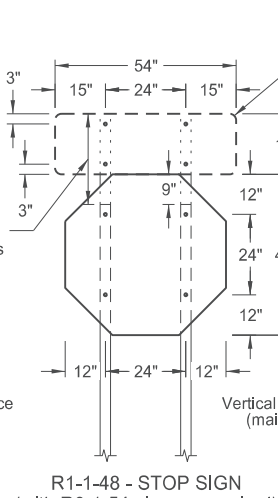
R1-2-60 - YIELD SIGN



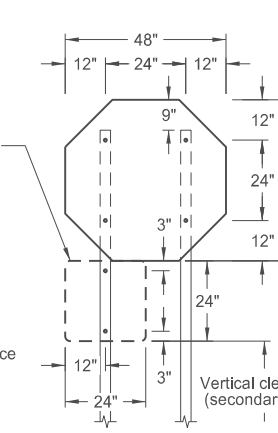
W14-3-64 - PENNANT SIGN



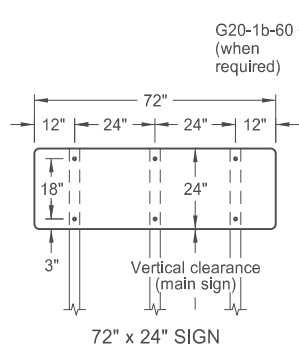
72" x 36" SIGN



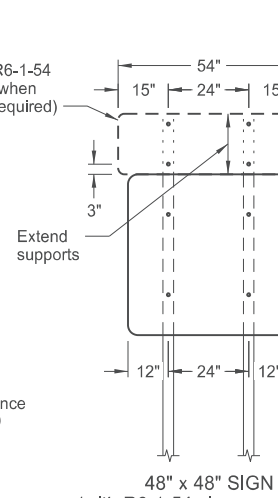
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



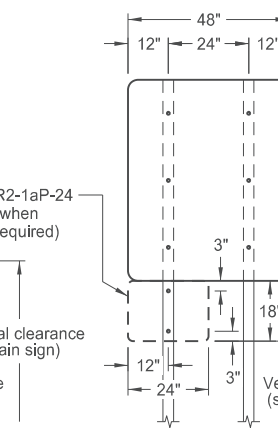
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



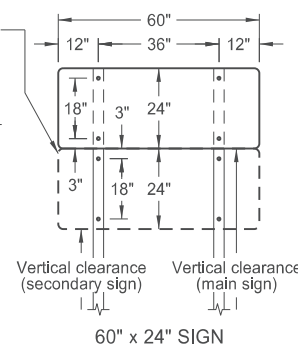
72" x 24" SIGN



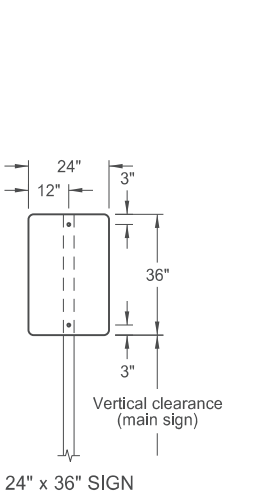
48" x 48" SIGN
(with R6-1-54 sign as required)



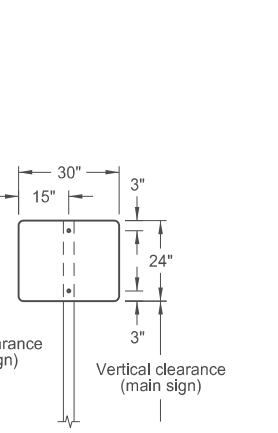
48" x 48" SIGN
(with R2-1aP-24 sign as required)



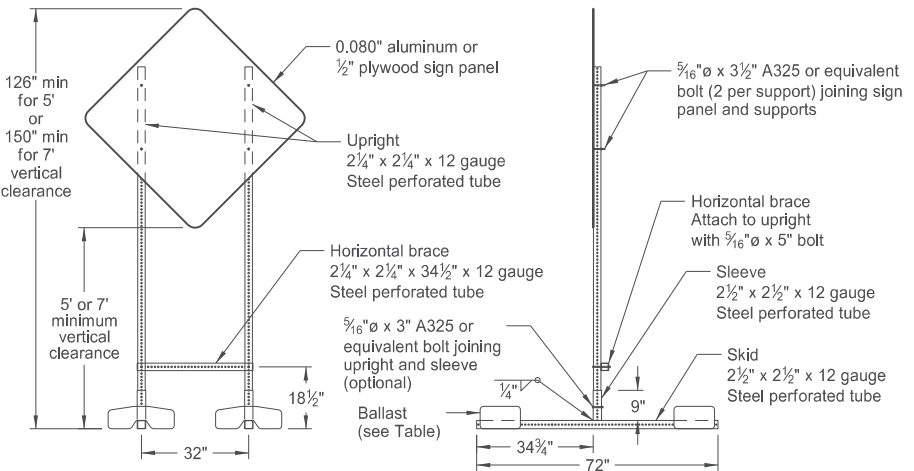
60" x 24" SIGN



24" x 36" SIGN



30" x 24" SIGN



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

- Sign Supports: Galvanize or paint supports. 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, minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes based on a wind speed of 55 MPH.

Place signs over 50 square feet on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 5/16" bolts.
- Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)
- Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

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

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

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

Provide a minimum clearance of 7'-0" from the ground at the post for signs with an area exceeding 50 square feet.

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

Use of low-mounting height (minimum 12" vertical clearance) portable signs for 5 days or less, is allowed 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. Use of R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 is allowed for longer than 5 days.

Restrict signs mounted on portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT details to a maximum surface area of 16 square feet.

MINIMUM BALLAST
(For each side of sign support base)

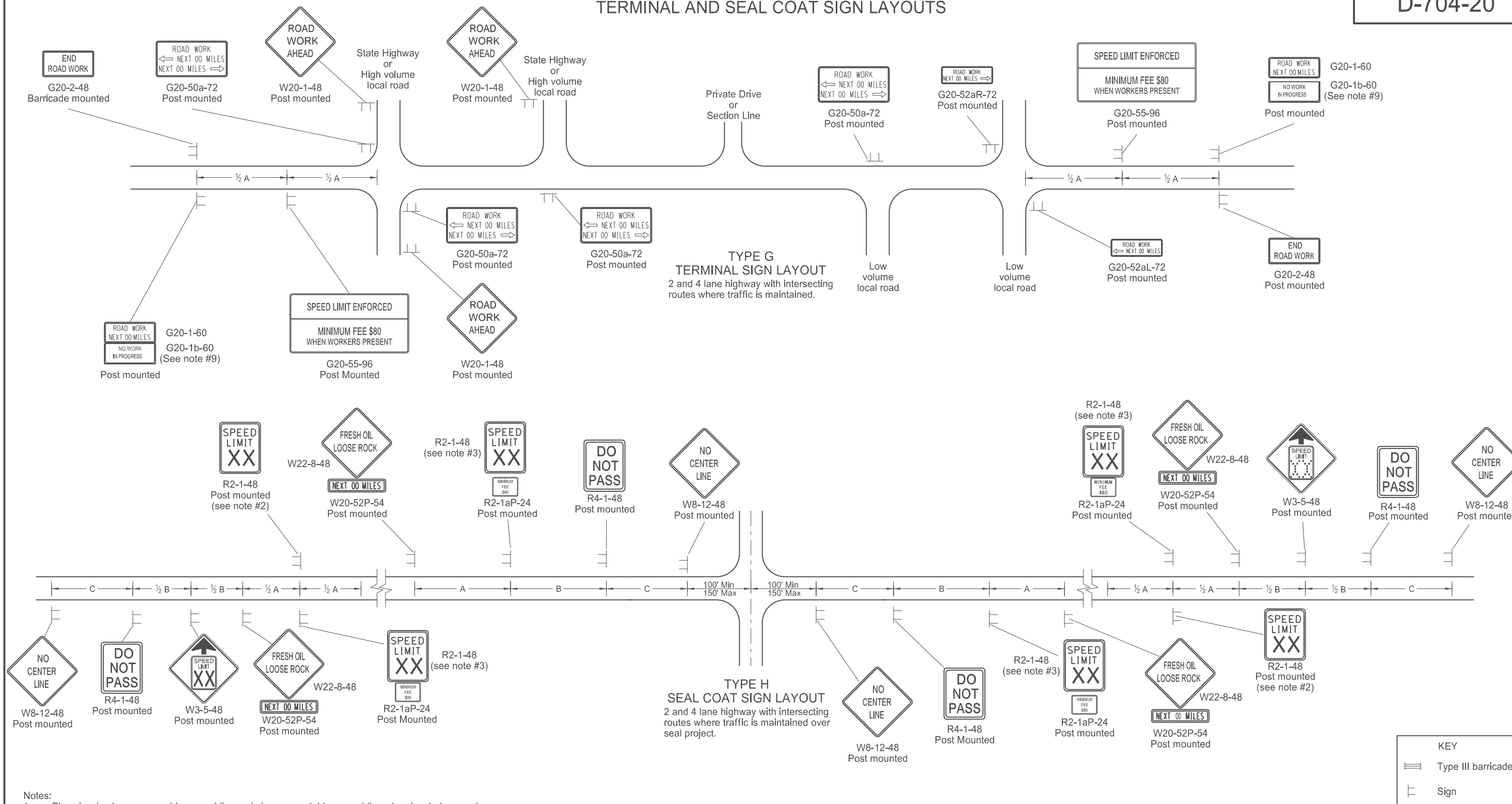
Sign Panel Mounting Height (ft)	Number of 25 lb sandbags for 4' x 4' sign panel
1'	6
5'	8
7'	10

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

This document was originally issued and sealed by
Kirk J Hoff,
Registration Number
PE-4683,
on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

TERMINAL AND SEAL COAT SIGN LAYOUTS



- Notes:
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 - Determine the exact speed limit in the field, based on location and conditions.
 - Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
 - Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
 - Install sign G20-1b-60 when work is suspended for winter.
 - Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
 - Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated notes & sign numbers
11-01-19	Updated note & sign
12-08-21	Switched order of Road Work and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



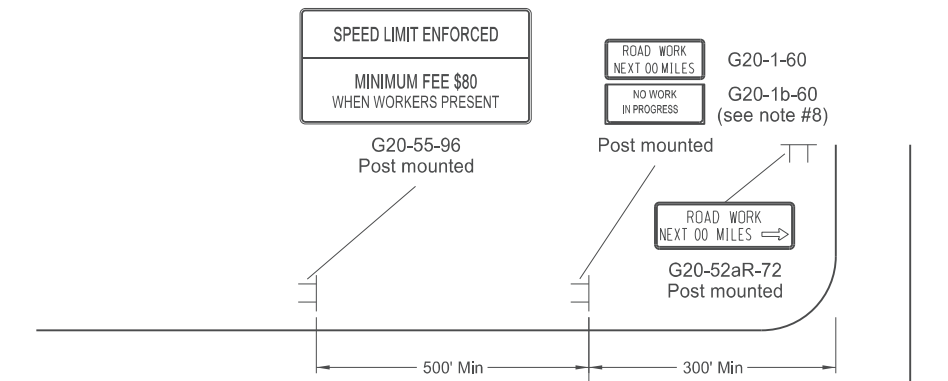
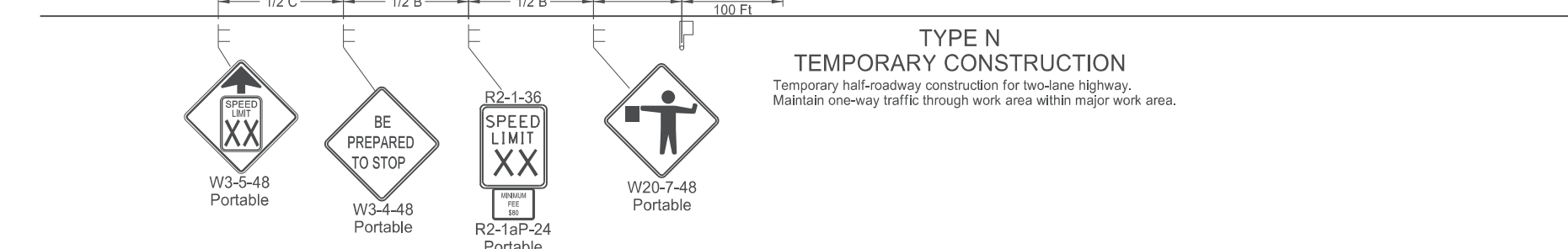
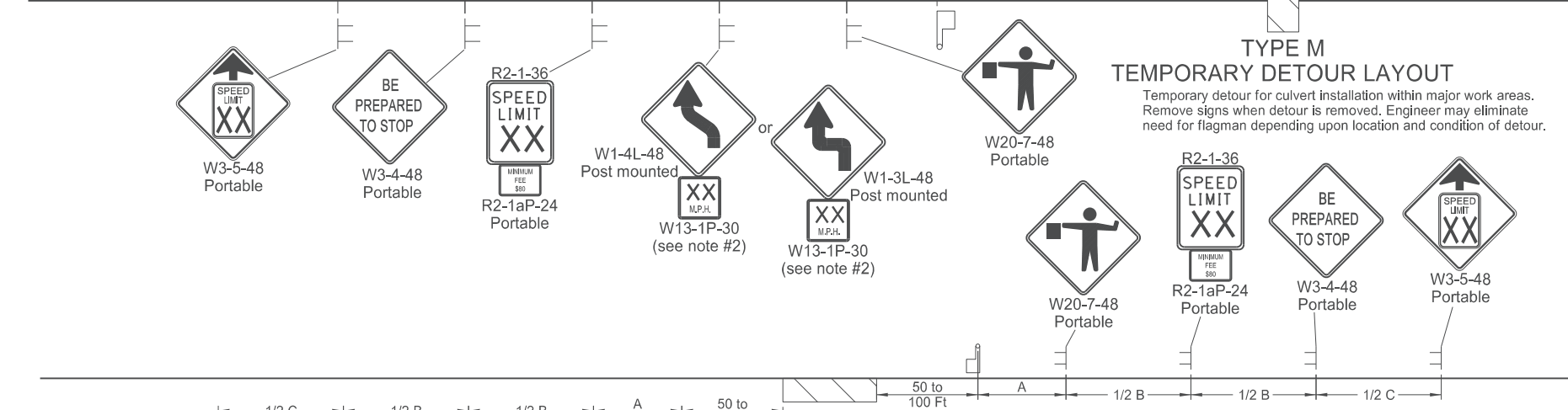
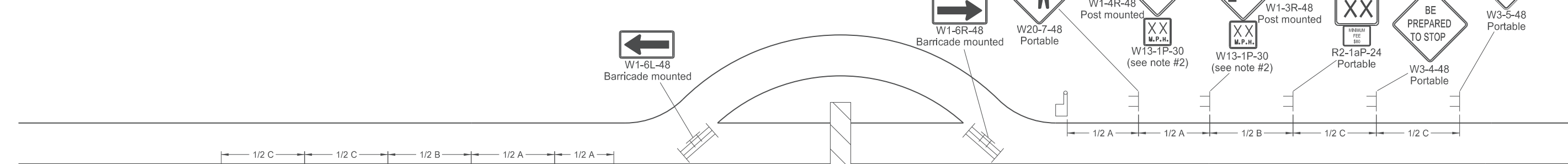
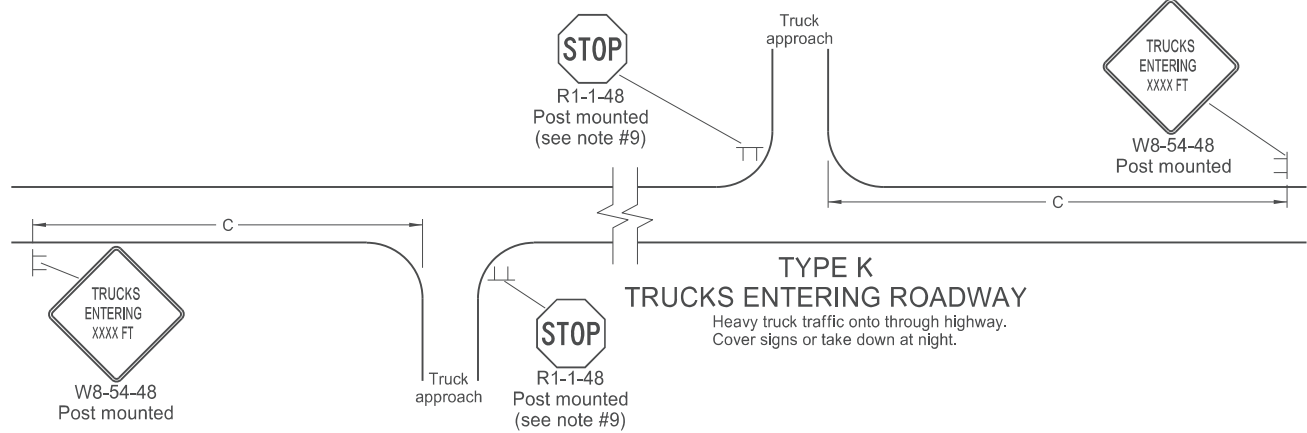
11/29/22

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

KEY

- Type III barricade
- Sign
- Work area
- Flagger



- Notes:**
- Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
 - Where necessary, safe speed to be determined by the Engineer.
 - Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within a reduced speed zone.
 - Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Install sign G20-1b-60 when work is suspended for winter.
 - If existing stop sign is in place, a 48" stop sign is not required.
 - Sign G20-55-96 is not required if layout is part of other traffic control that contains this sign, or if work is less than 15 days.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

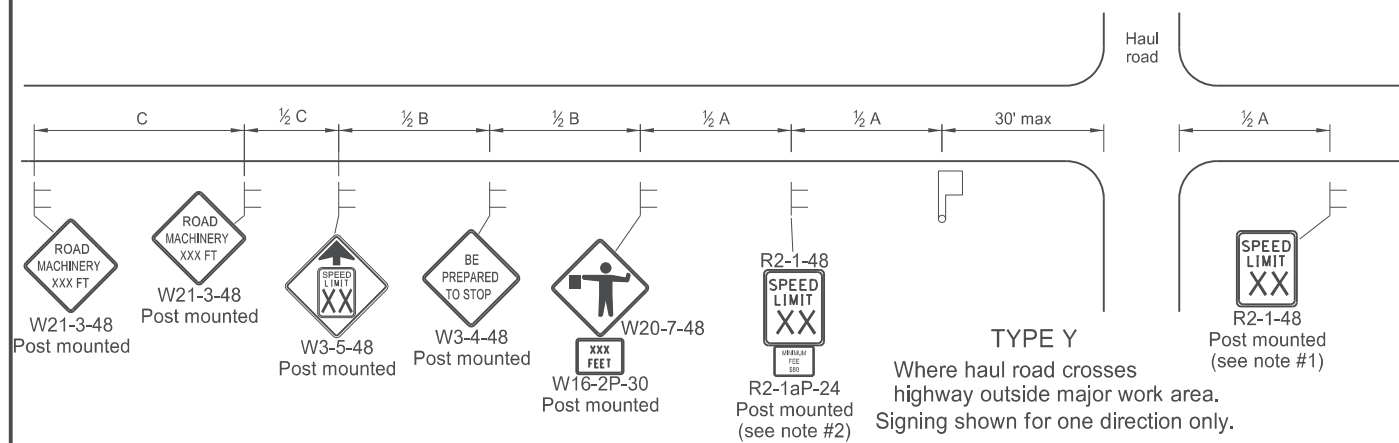
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work

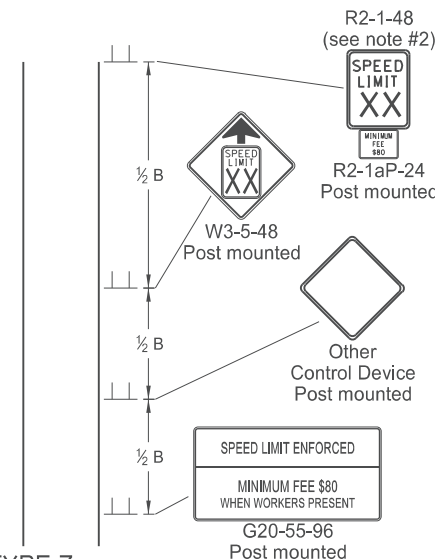


11/29/22

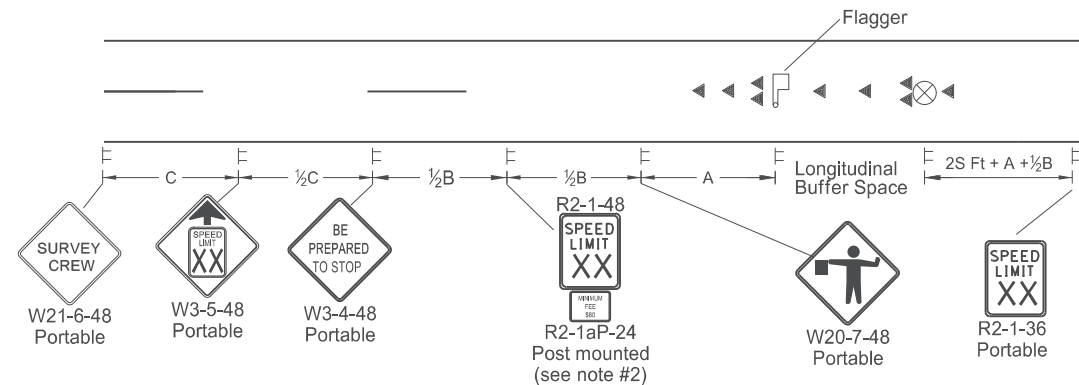
MISCELLANEOUS SIGN LAYOUTS



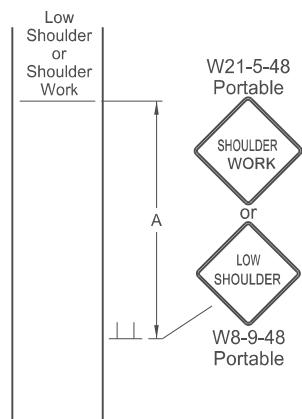
TYPE Y
Where haul road crosses highway outside major work area. Signing shown for one direction only.



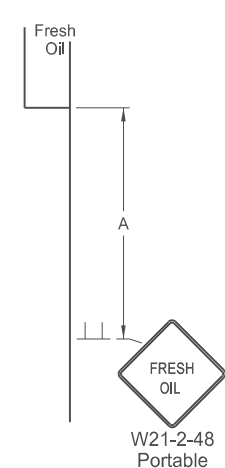
TYPE Z
Where speed zone is needed. Signing shown for one direction only.



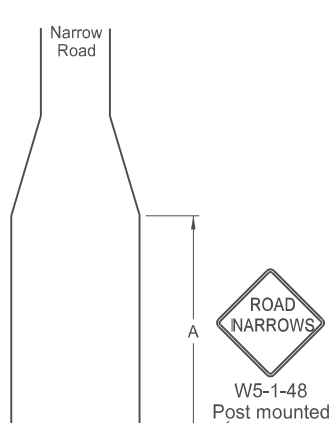
TYPE AA
Where survey crew is used. Signing shown for one direction only.



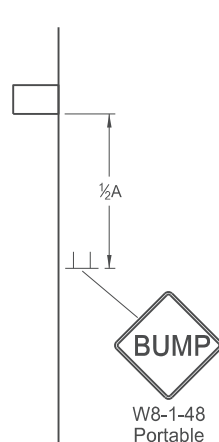
TYPE BB
Within major work area where sign conditions exist



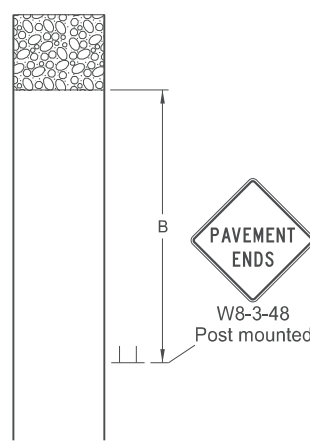
TYPE CC
Where sign conditions exist



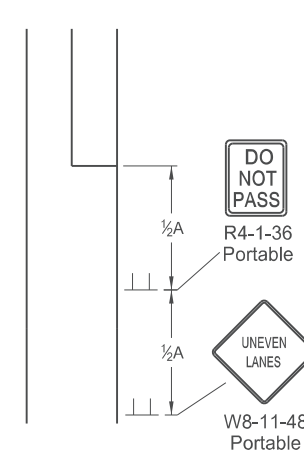
TYPE DD
Where sign conditions exist



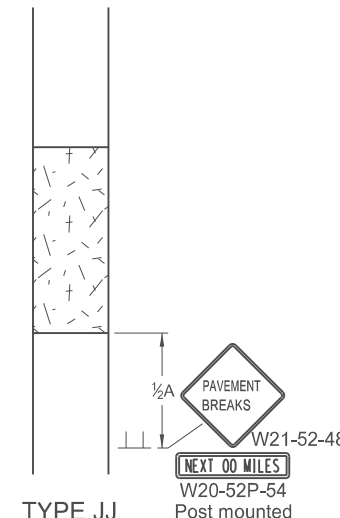
TYPE EE
Where sign conditions exist



TYPE FF
Where sign conditions exist. Signing shown for one direction only.



TYPE GG
Where elevation difference exists between lanes

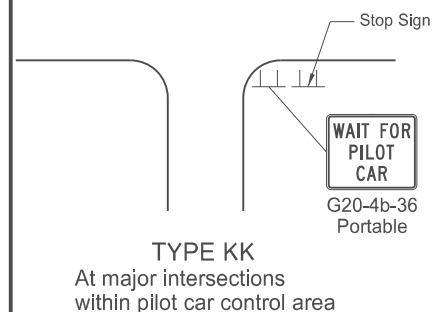


TYPE JJ
For break in pavement. Install signs when conditions exist and remove when not applicable. Signing shown for one direction only.

KEY

- Flagger
- Sign
- Cones
- Survey Equipment

S = Numerical value of speed limit or 85th percentile.



TYPE KK
At major intersections within pilot car control area

- Notes**
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at 1/2 B.
 - Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
 - Cover existing speed limit signs within reduced speed zones.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
 - When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
 - Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
 - Layouts shown for one direction only.

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

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

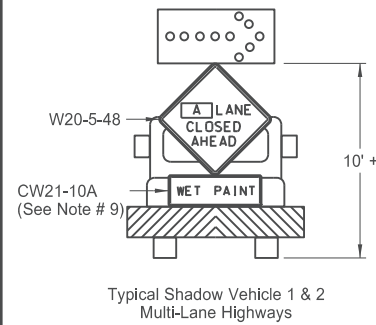
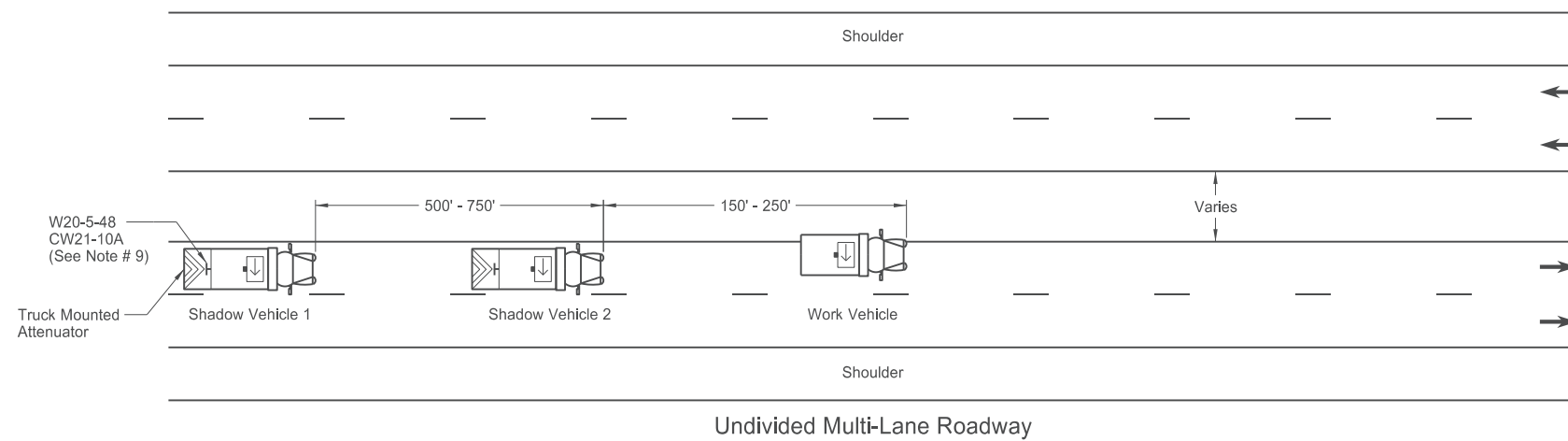
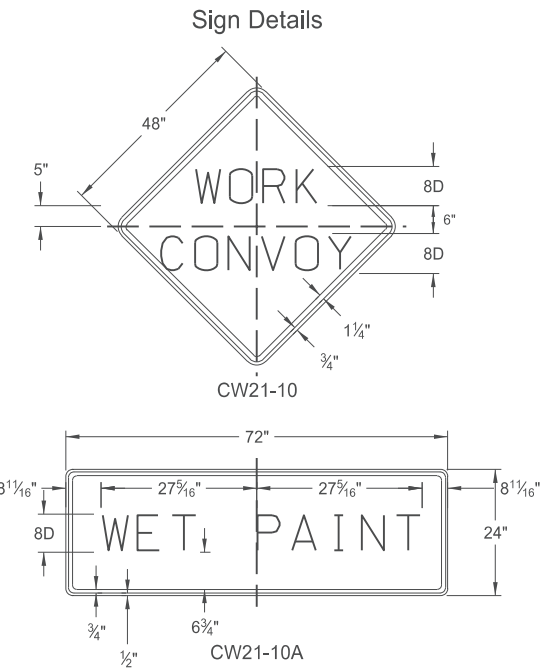
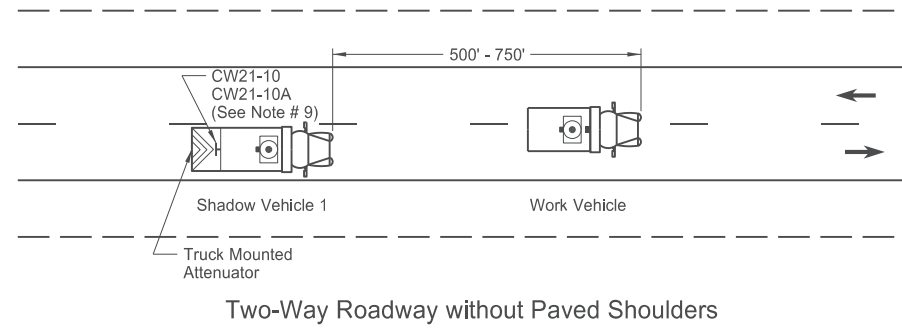
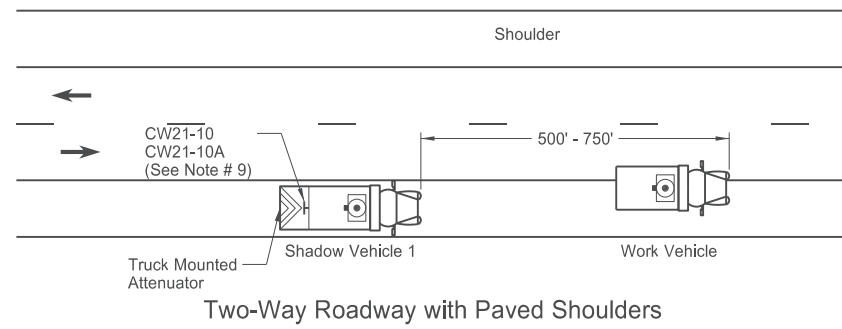
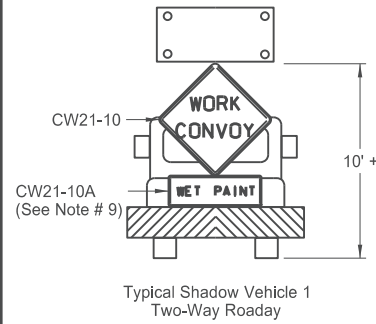
* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers.
11-01-19	Revised note 5 & sign numbers.
2-23-23	Revised distance & removed signs.

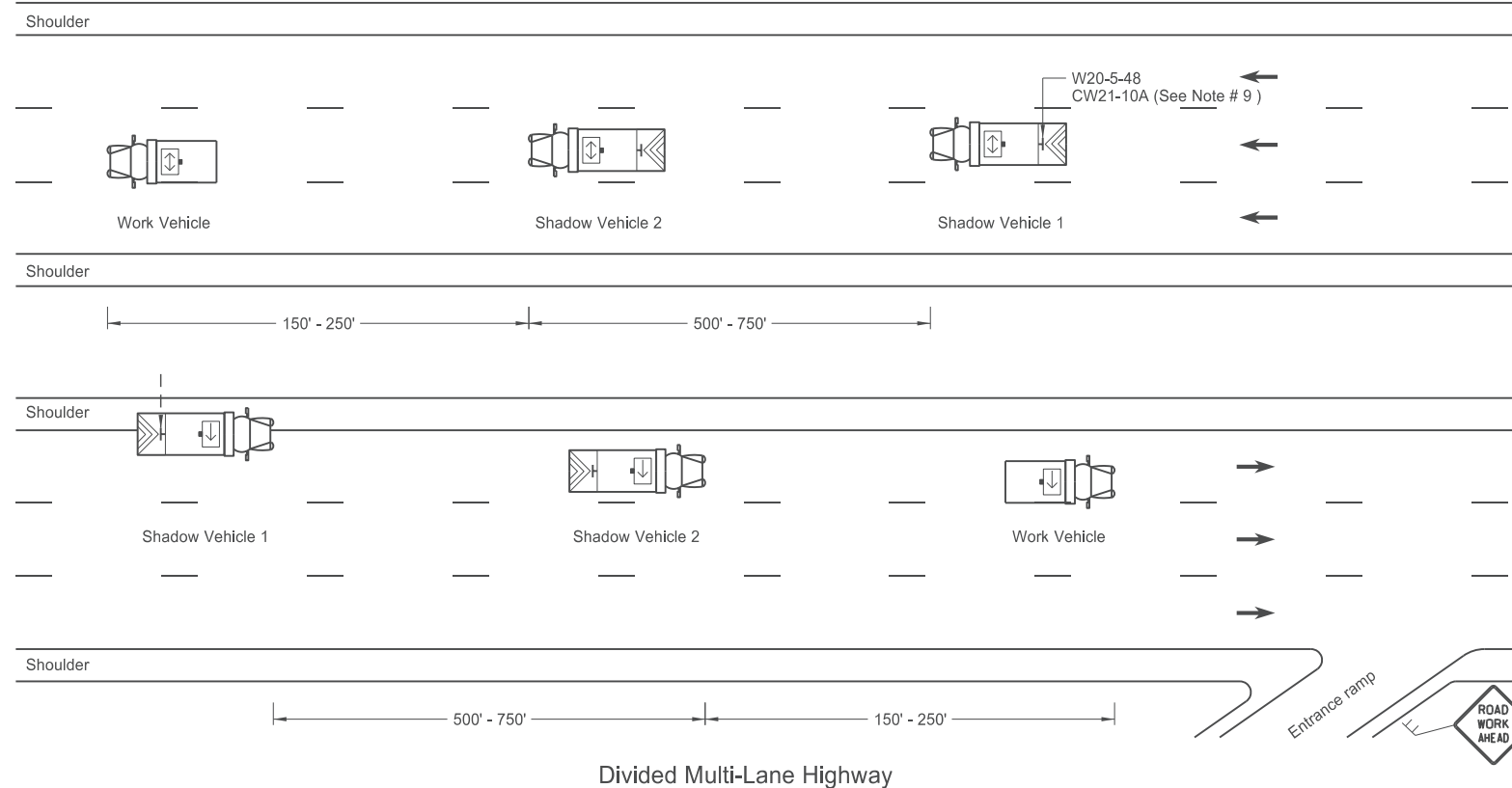


02/23/23

MOBILE OPERATION (PAVEMENT MARKING)

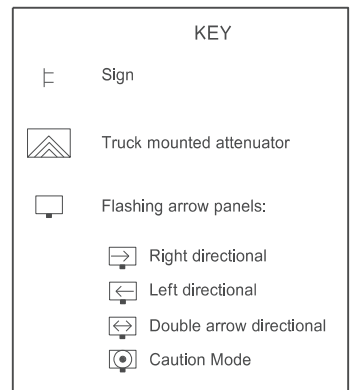


A = Left Right Center



Notes

1. Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
2. Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
3. Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
4. Provide each vehicle with two-way electronic communication capability.
5. Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
6. Vary vehicle spacing between shadow vehicle 1 and shadow vehicle 2 based on sight distance restrictions. Motorists approaching the work convoy need to see trail vehicle in time to slow down and/or change lanes as they approach shadow vehicle.
7. Sign Colors
 Letters = Black
 Border = Black
 Background = Orange
8. As an option, use shadow vehicle 2 the paint tender vehicle.
9. Use sign CW21-10A only during painting operation.
10. Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading

This document was originally issued and sealed by
 Kirk J Hoff,
 Registration Number
 PE- 4683,
 on 11/08/19 and the original document is stored at the
 North Dakota Department
 of Transportation

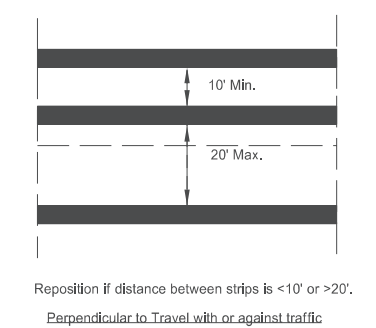
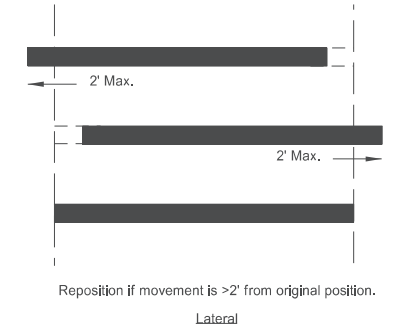
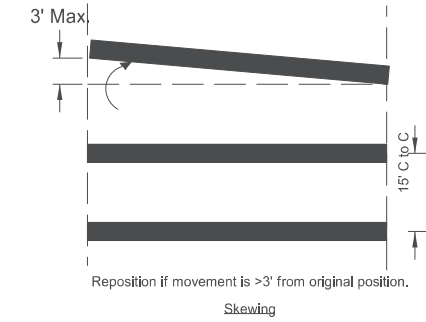
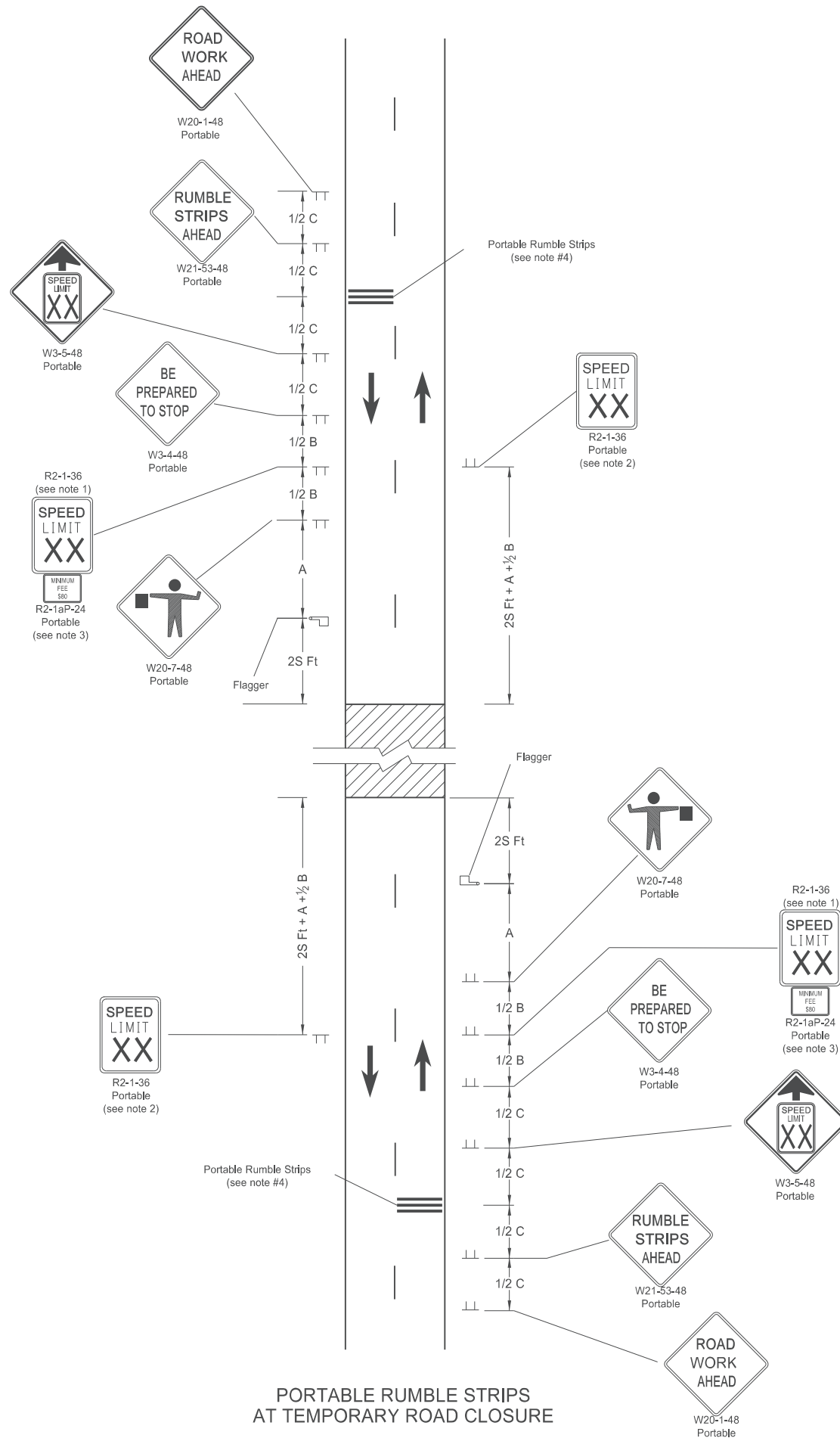
Two-Lane Roadway Portable Rumble Strips

KEY

- Work area
- Flagger
- Sign

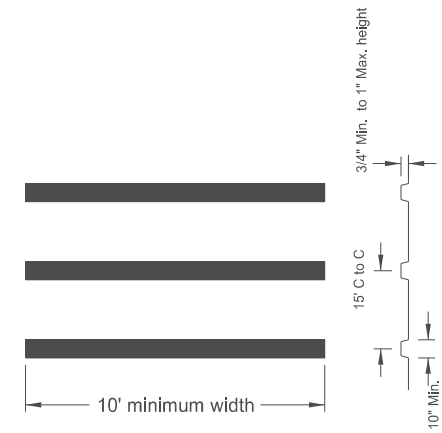
S = Numerical value of speed limit or 85th percentile.

Road Type	ADVANCE WARNING SIGN SPACING		
	A	B	C
Urban - High Speed (over 45 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720



PORTABLE RUMBLE STRIPS ARRAY TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

- Notes:
- Determine speed in the field based on location and conditions.
 - Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
 - Sign R2-1aP-24 is not required when pilot car operation is used.
 - Do not use rumble strips on a non paved surface or in a pre-construction speed zone of 45 mph or less.



PORTABLE RUMBLE STRIPS ARRAY DETAIL

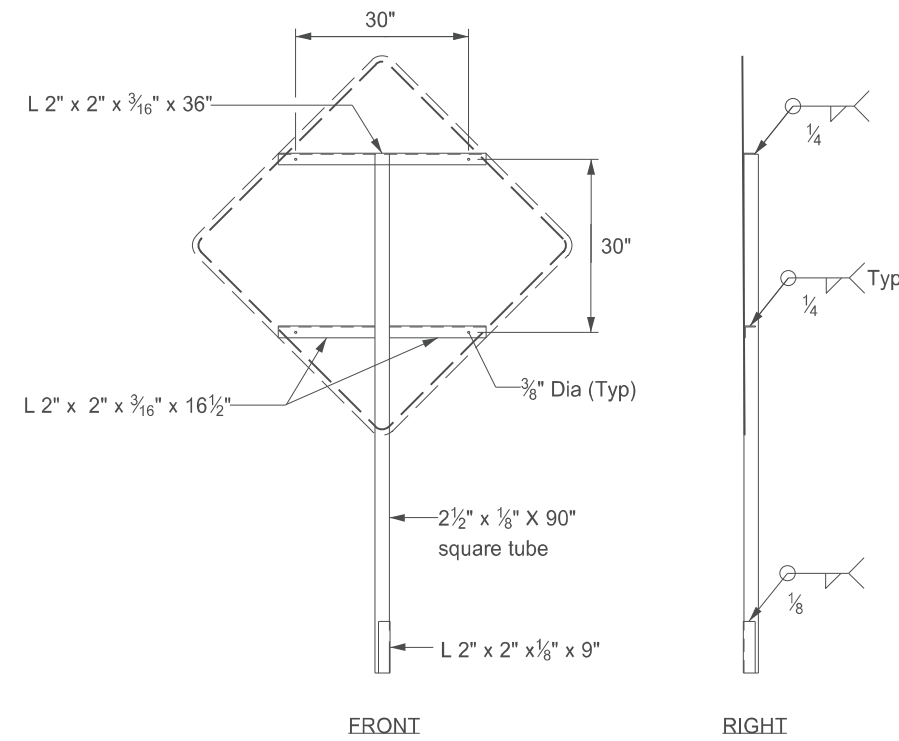
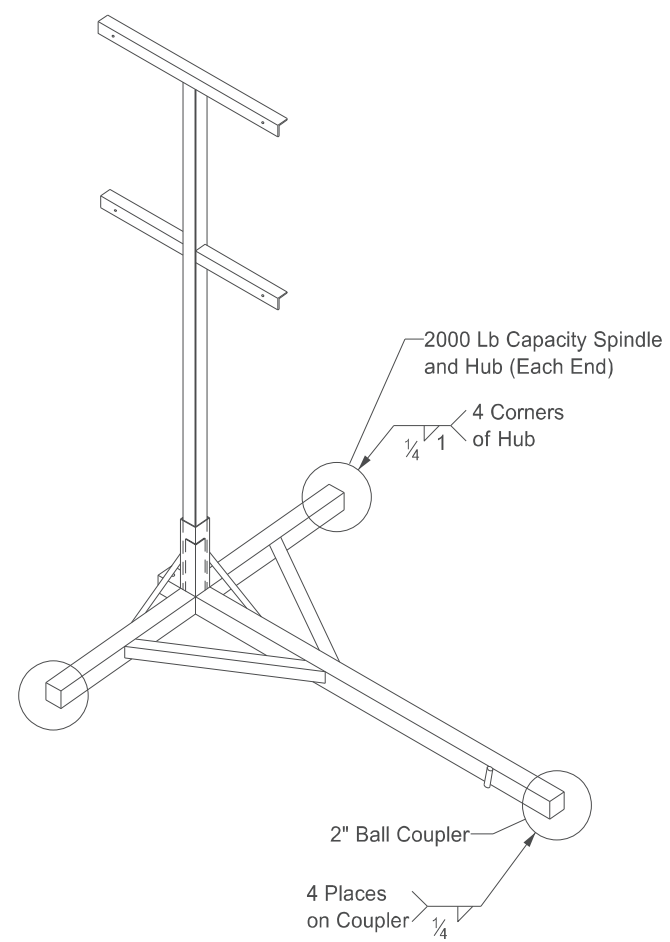
PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		
02-22-22 REVISIONS		
DATE	CHANGE	03/07/23 Use changed to min 45 mph.
03/07/23		

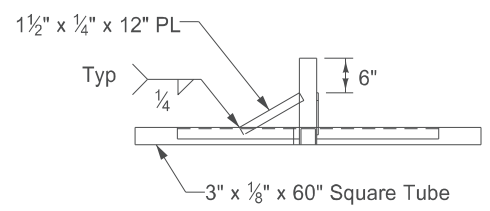
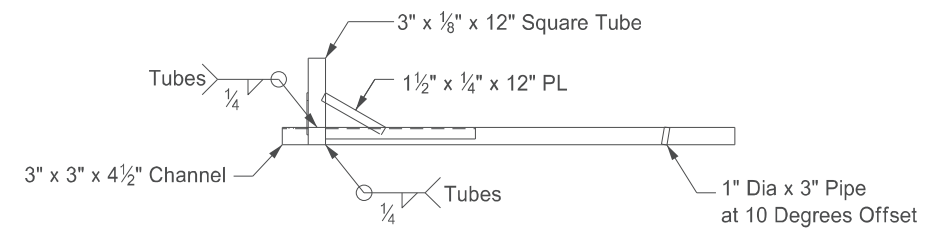
03/07/23

PORTABLE SIGN SUPPORT ASSEMBLY

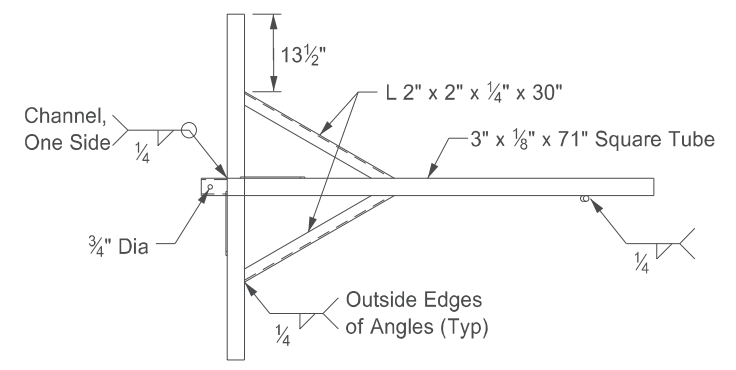
D-704-50



SIGN SUPPORT



RIGHT



TOP TRAILER

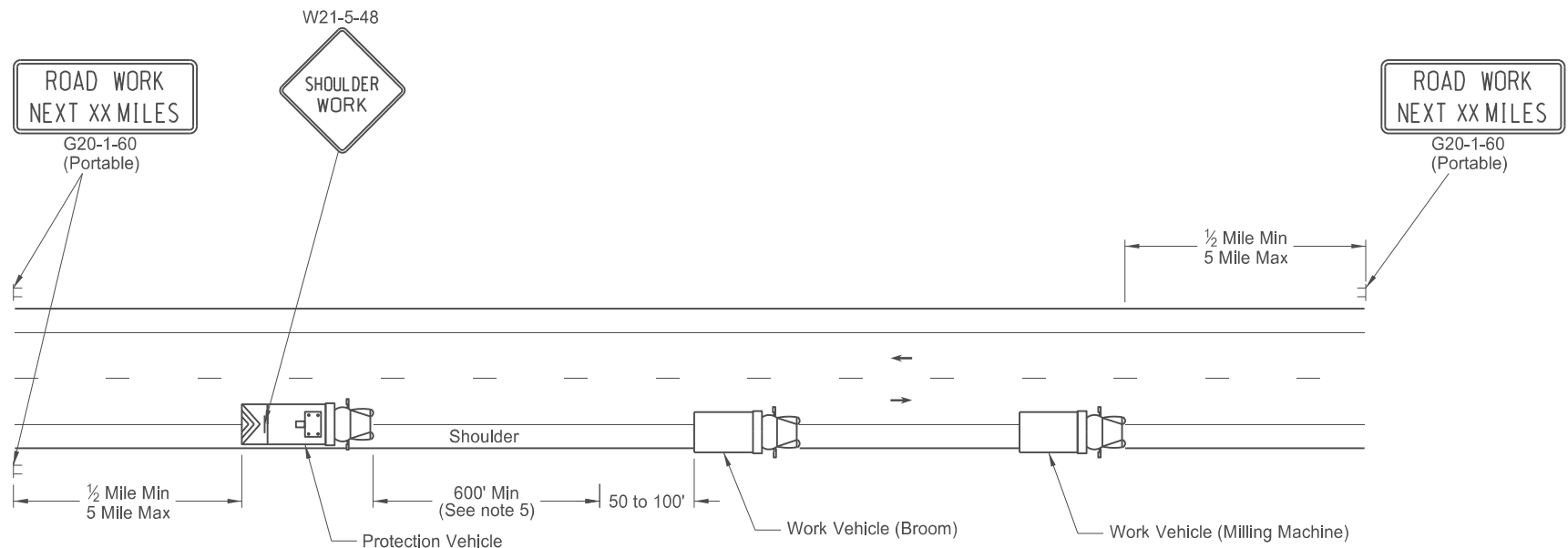
Notes:

- ① Maximum 250 pound weight of assembly.
- ② Use a 14" wheel and tire.
- ③ Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
- ④ Other NCHRP 350 or MASH crash tested assemblies are acceptable.

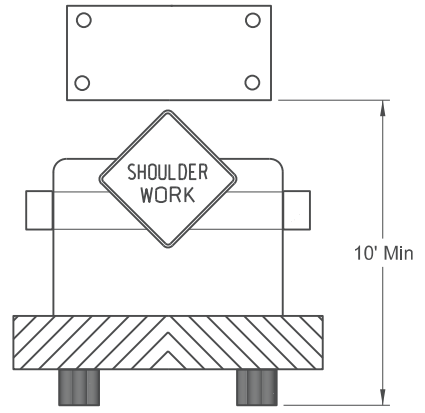
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

KIRK J. HOFF
 REGISTERED
 PROFESSIONAL
 PE-4683
 ENGINEER
 NORTH DAKOTA
 12 02 2020

MOBILE OPERATION Grinding Shoulder Rumble Strips

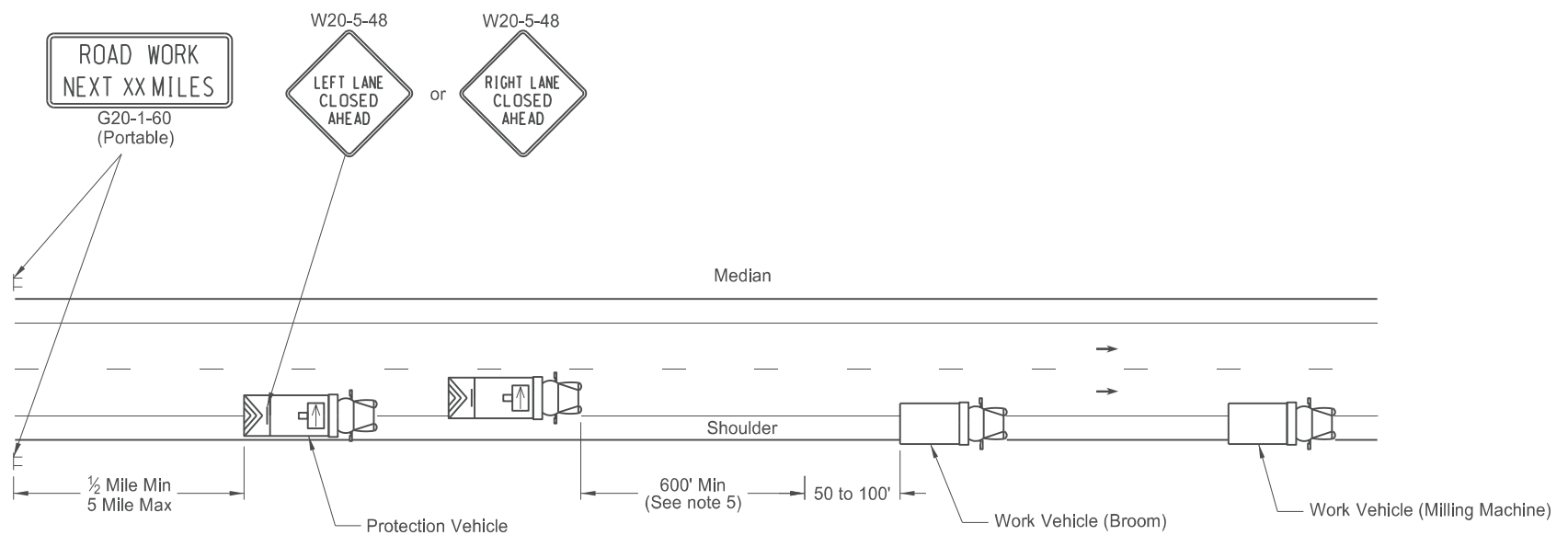


TWO LANE - TWO WAY ROADWAY

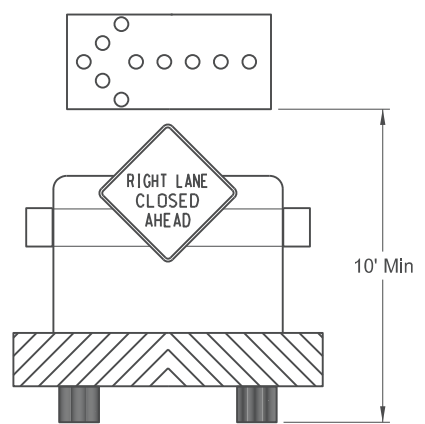


TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with
Flashing Arrow Panel In Caution Mode

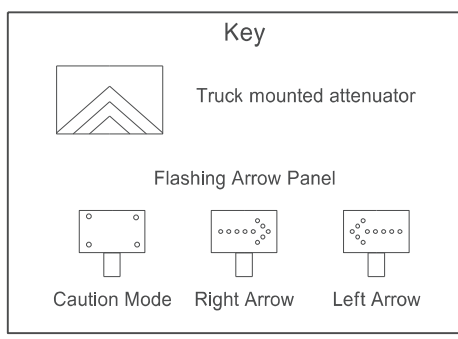
- Notes:
1. Provide truck mounted attenuators on additional vehicles in the convoy, at no additional cost.
 2. Provide rotating, flashing, oscillating, or strobe lights on vehicles.
 3. Provide Type B or Type C flashing arrow panels that are controlled from inside the vehicle.
 4. Provide two - way electronic communication capability in each vehicle.
 5. Vary vehicle spacing between the protection vehicle and work vehicle depending on sight distance restrictions. Keep the spacing of the convoy vehicles such that motorists approaching the work convoy can see the protection vehicle in time to slow down and safely pass the work vehicles.
 6. Move advance Road Work Ahead signs as the work area moves through the construction zone.



INTERSTATE & 4 LANE DIVIDED HIGHWAY

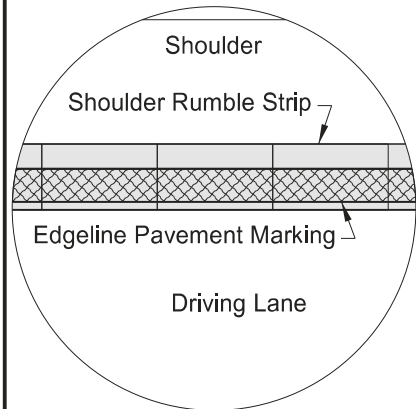


INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow
Panel In Flashing Arrow Mode

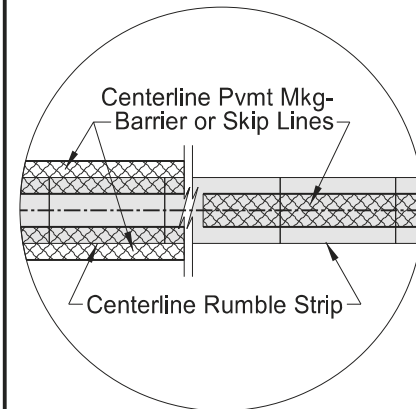


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & signs
10-03-19	New Design Engineer PE Stamp

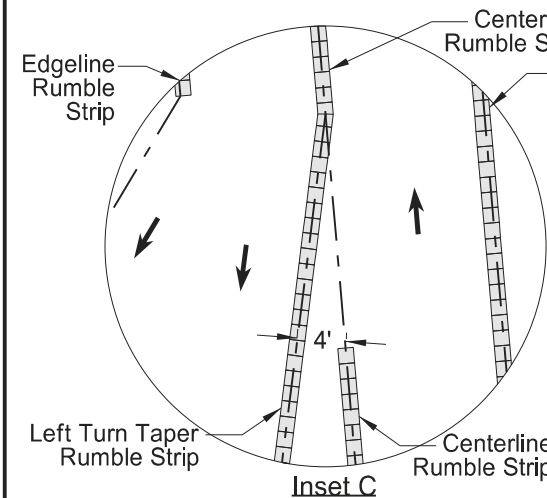
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Registration Number
PE- 4683,
on 10/3/19 and the original document is stored at the
North Dakota Department
of Transportation



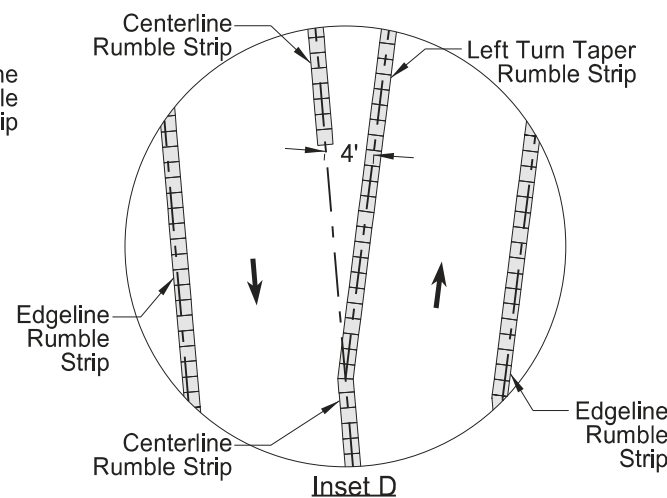
Inset A - Edgeline Rumble Strip
(Layout for opposite shoulder reversed)



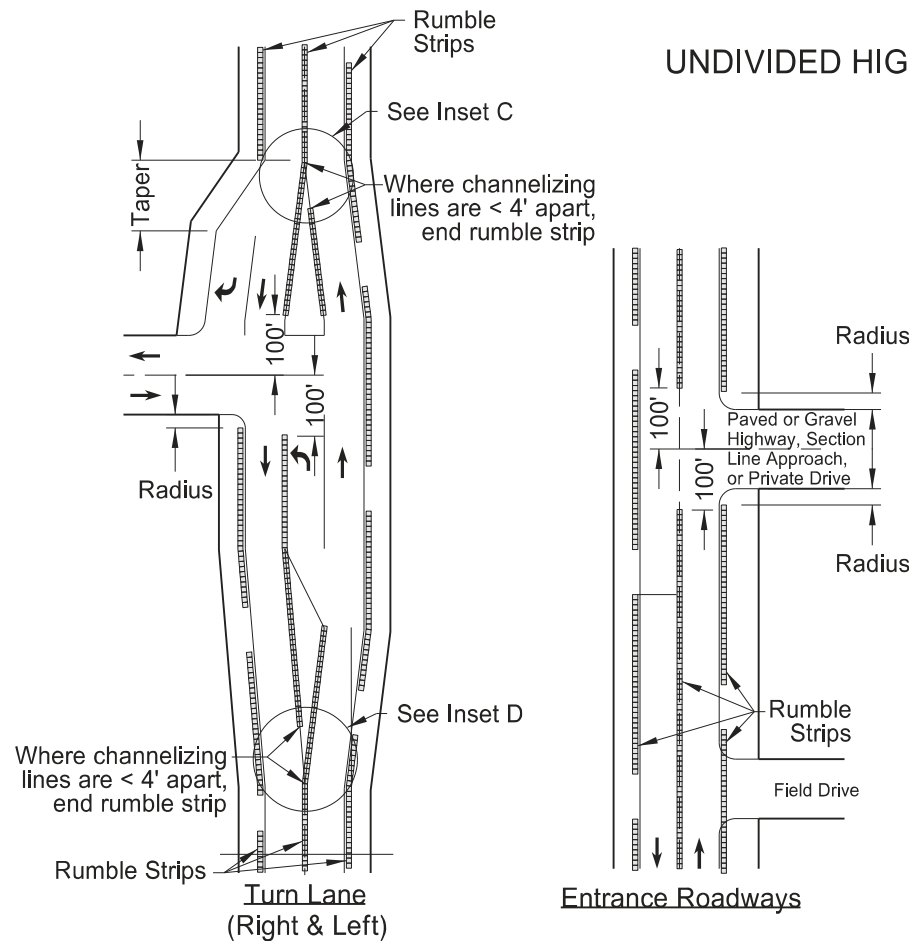
Inset B - Centerline Rumble Strip



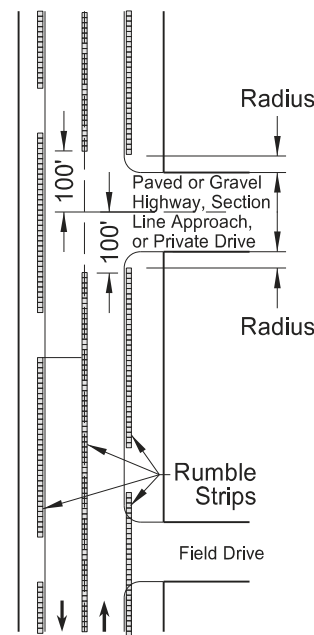
Inset C



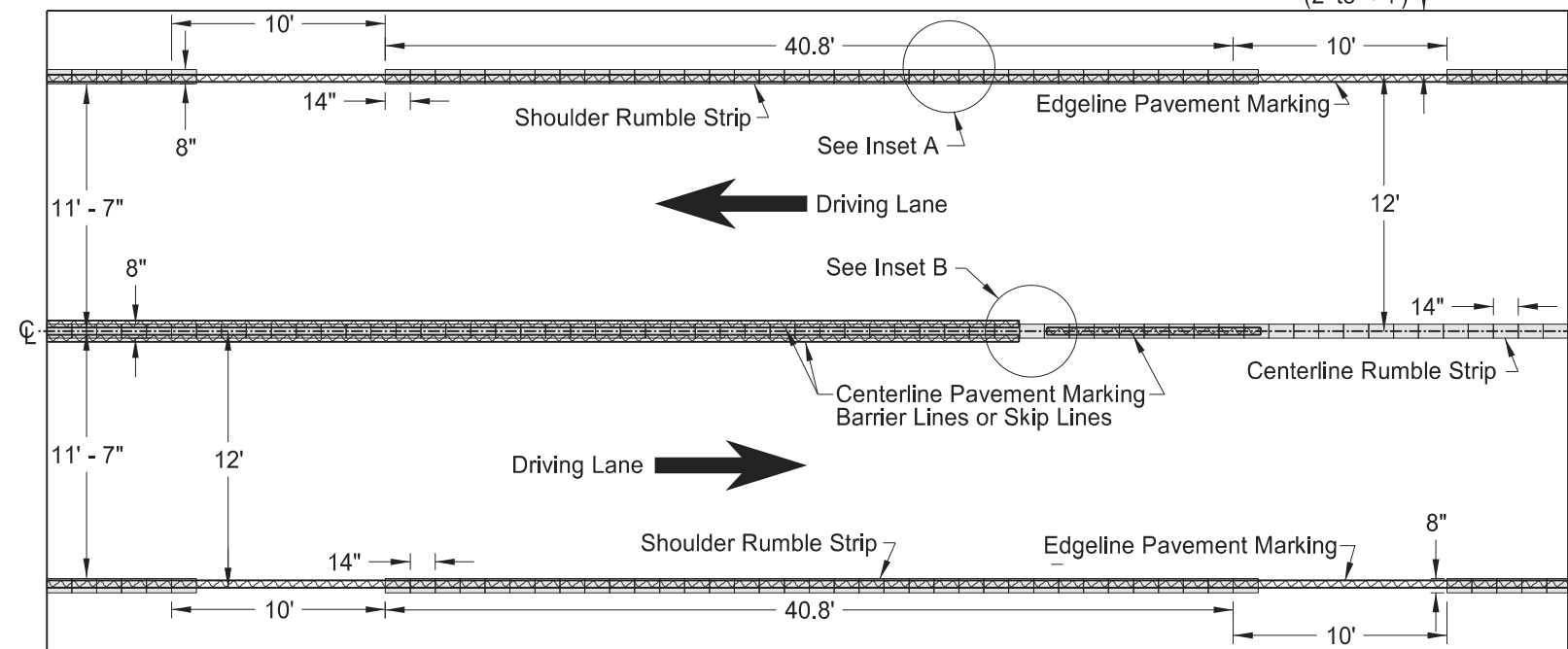
Inset D



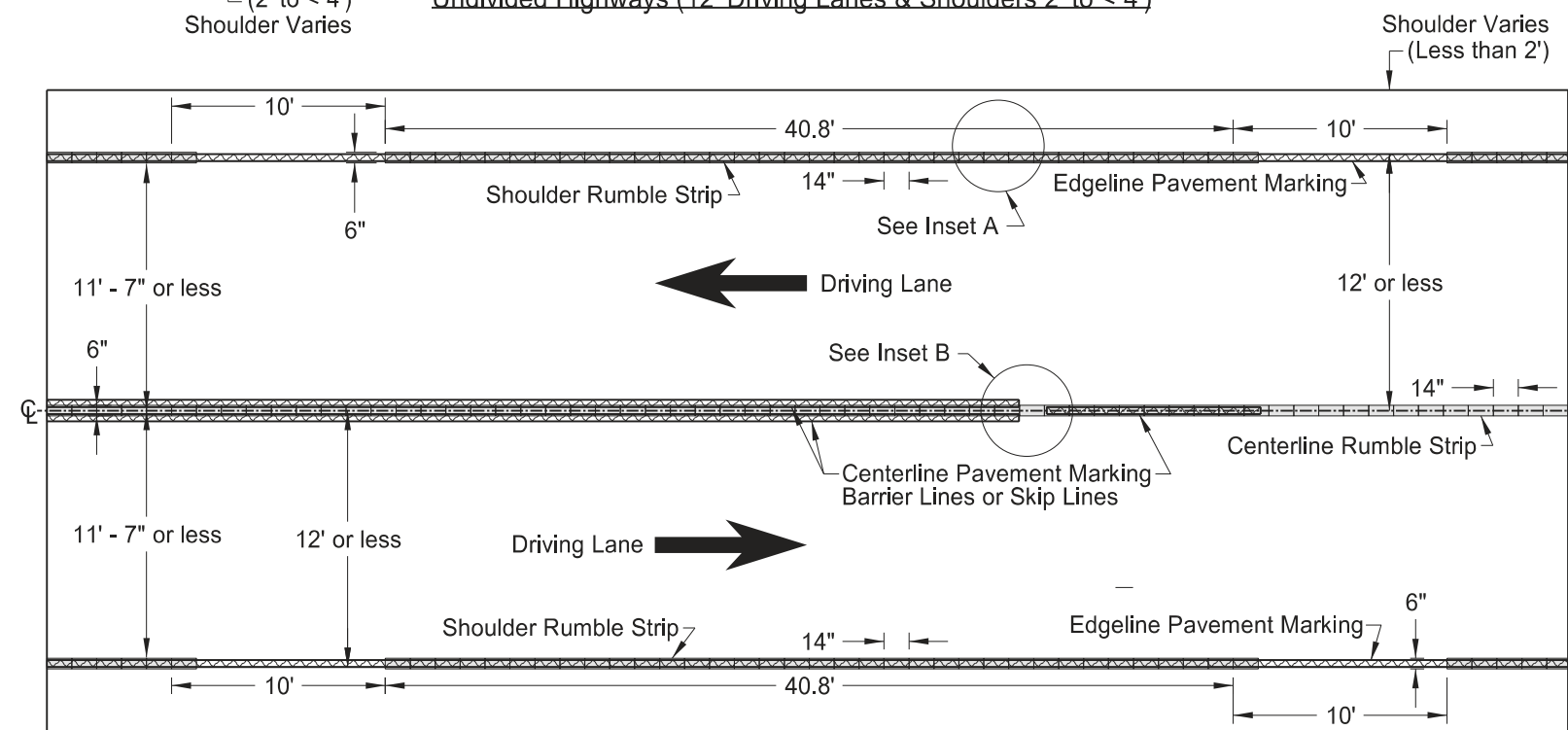
Entrance Roadways



RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')

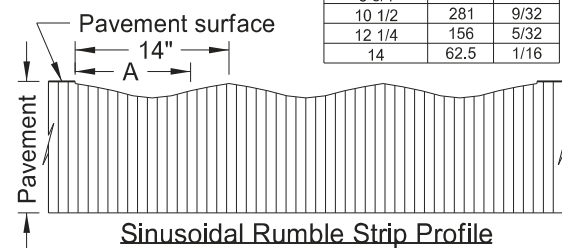


Undivided Highways (12' Driving Lanes & Shoulders 2' to < 4')

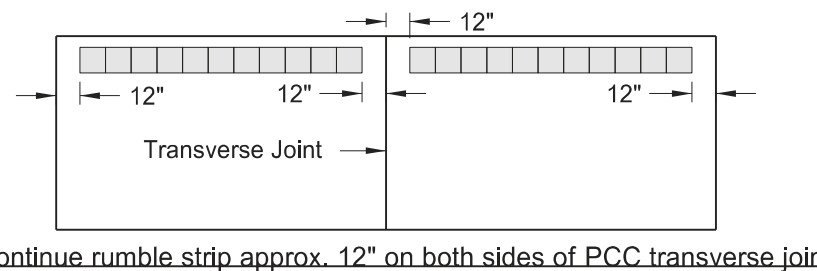


Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')

Milling Depths		
Location A (in)	MIL	Depth in
0	62.5	1/16
1 3/4	156	5/32
3 1/2	281	9/32
5 1/4	438	7/16
7	500	1/2
8 3/4	438	7/16
10 1/2	281	9/32
12 1/4	156	5/32
14	62.5	1/16



- NOTES:**
- Discontinue shoulder rumble strips through the entire length of right turn lanes and tapers, and at the radius of paved or gravel highways, section line approaches, or private drives.
 - Discontinue centerline rumble strips 100' before and after paved or gravel highways, section line approaches, or private drives. Place rumble strips at left turn lanes as shown below.
 - No additional quantity provided for centerline rumble strips on left turn tapers. Include all costs for centerline rumble strips on left turn tapers in the price bid for "Sinusoidal Rumble Strip - Asphalt Centerline" or "Sinusoidal Rumble Strip - Concrete Centerline".

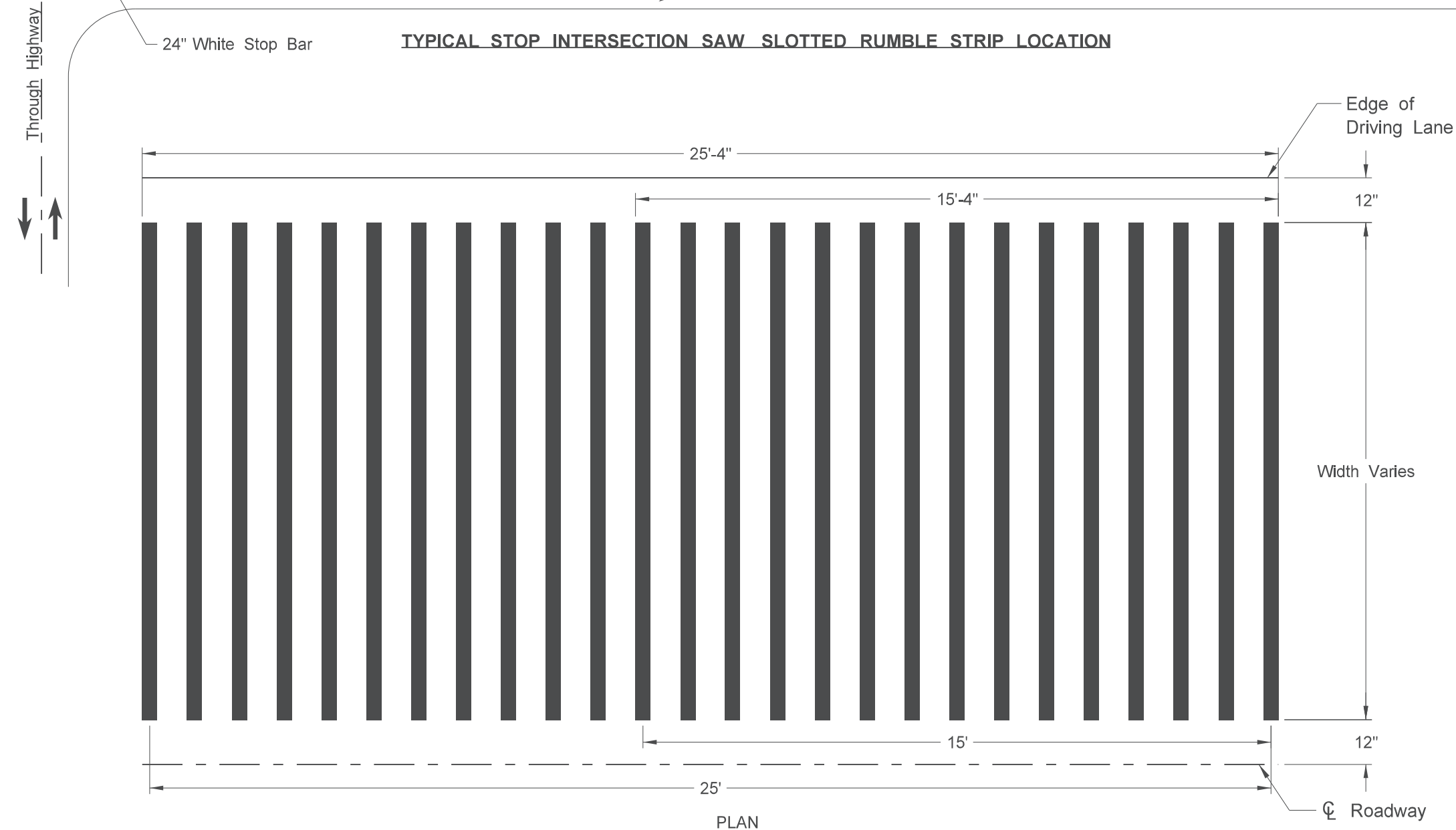
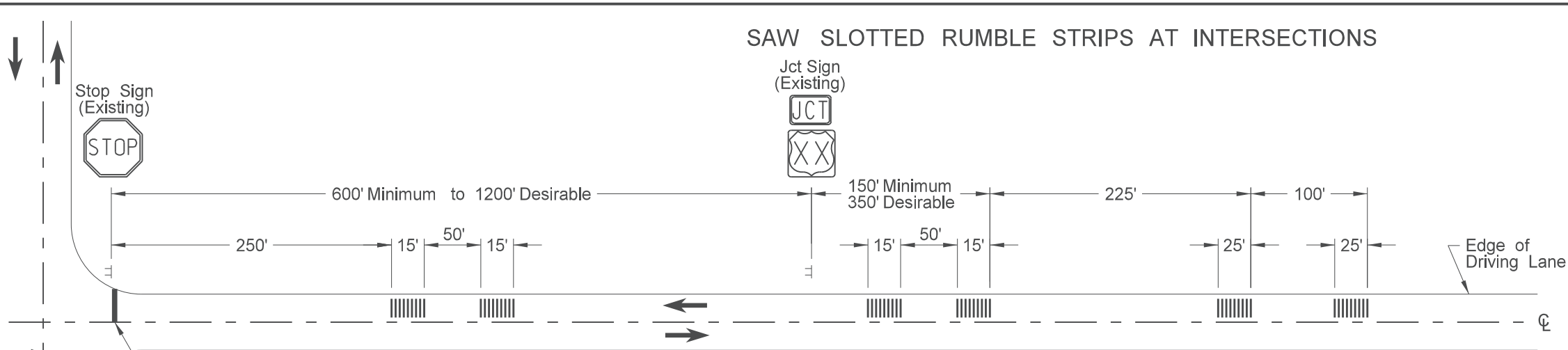


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-08-11	Revised Notes and D-760-4. Revised details for rumble strip widths and dimensions.
10-25-19	Added missing dimensions.
11-16-21	Revised turn lane rumble layout.
3-07-23	Added Note 3.
5-26-23	Rumble Strips made Sinusoidal.



05/26/23

SAW SLOTTED RUMBLE STRIPS AT INTERSECTIONS



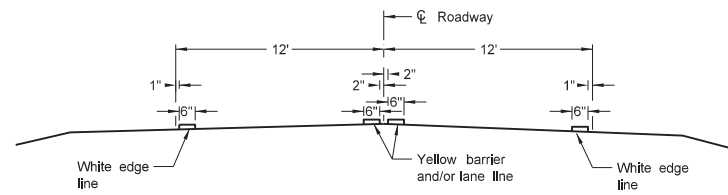
SAW SLOTTED RUMBLE STRIP DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-22-10	Saw Slotted width revised.
2-25-10	Note 7 was added.
9-8-11	Revised Notes and D-760-5.
7-7-14	Deleted Notes.
8-27-19	New Design Engr PE Stamp.

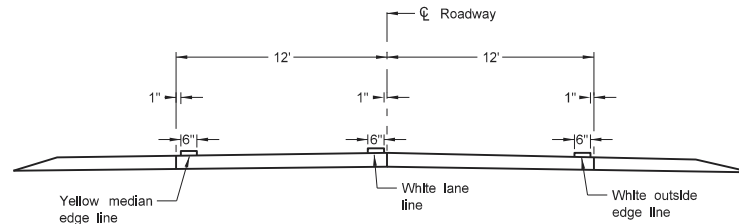
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

PAVEMENT MARKING

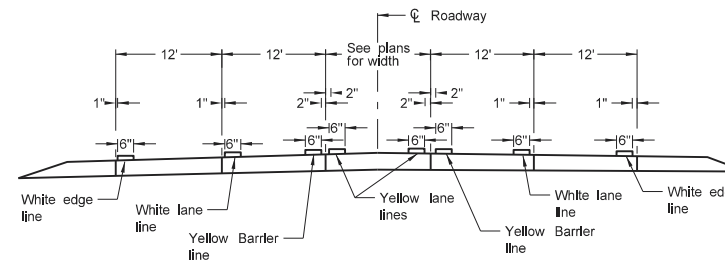
D-762-4



Two Lane Two Way
RURAL ROADWAY



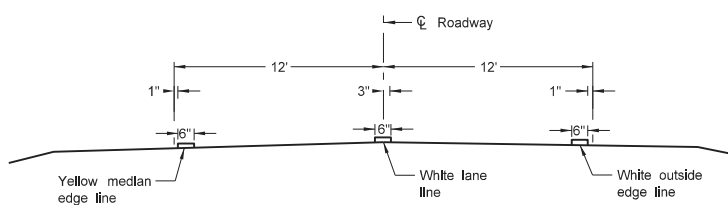
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



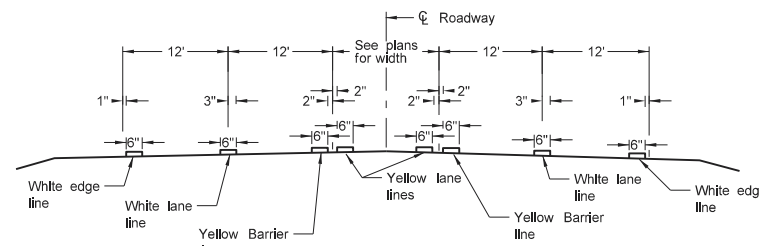
RURAL FIVE LANE ROADWAY
Concrete Section

NOTES:

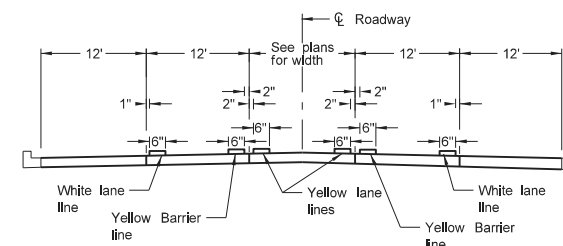
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.
2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.



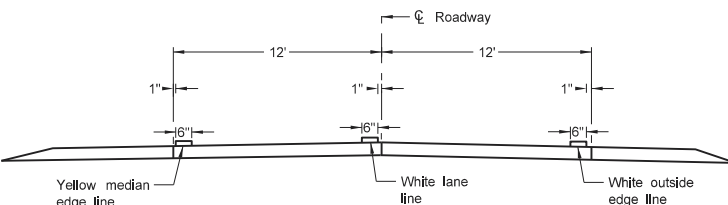
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



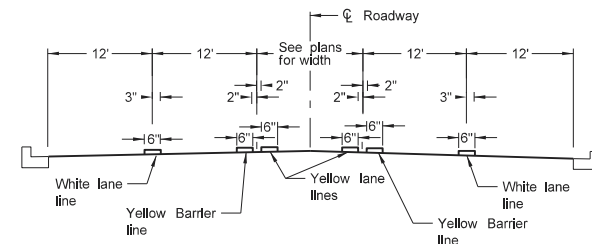
RURAL FIVE LANE ROADWAY
Asphalt Section



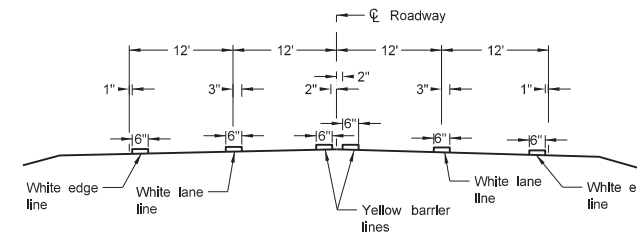
URBAN FIVE LANE SECTION
Concrete Section



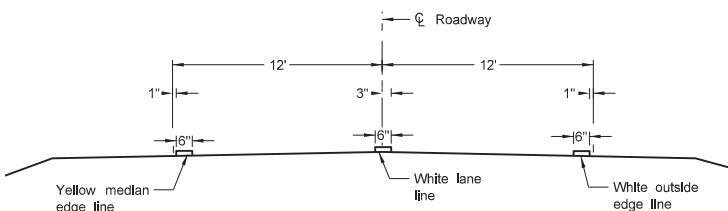
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



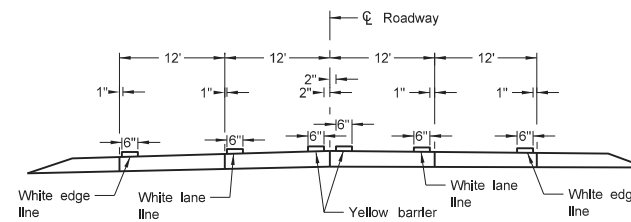
URBAN FIVE LANE SECTION
Asphalt Section



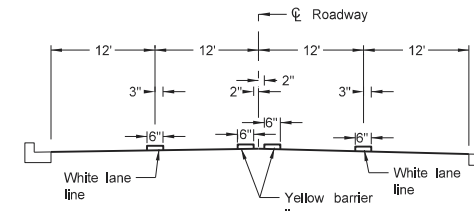
RURAL FOUR LANE ROADWAY
Asphalt Section



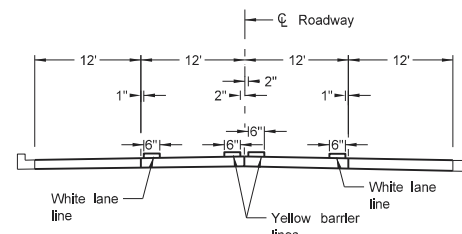
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



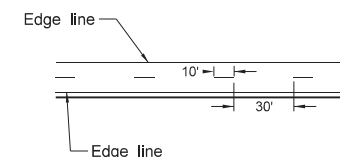
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



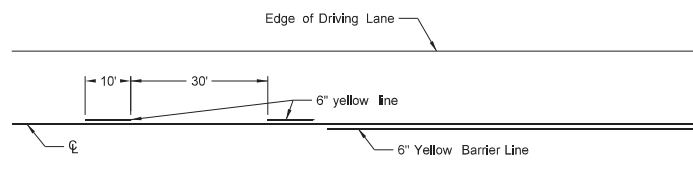
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.

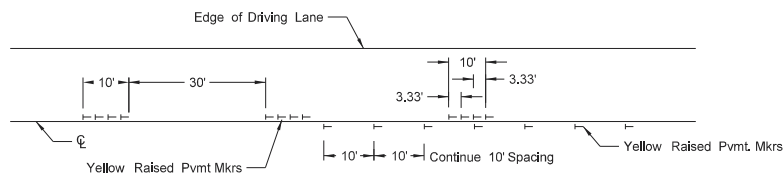


SHORT-TERM PAVEMENT MARKING

D-762-11

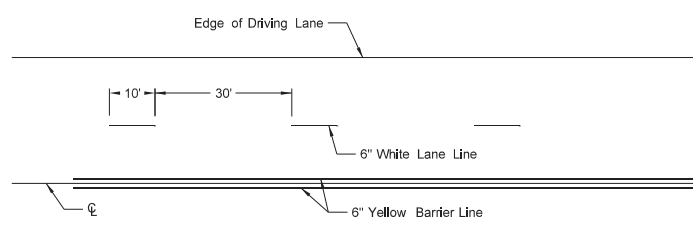


Painted or Tape Lines

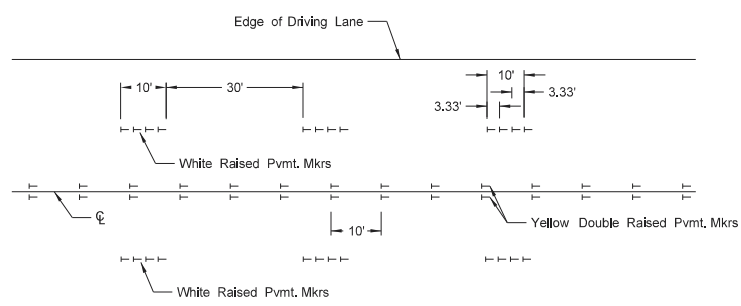


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

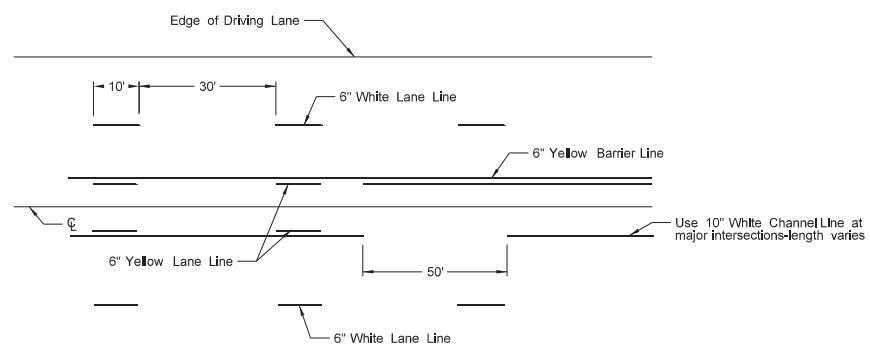


Painted or Tape Lines

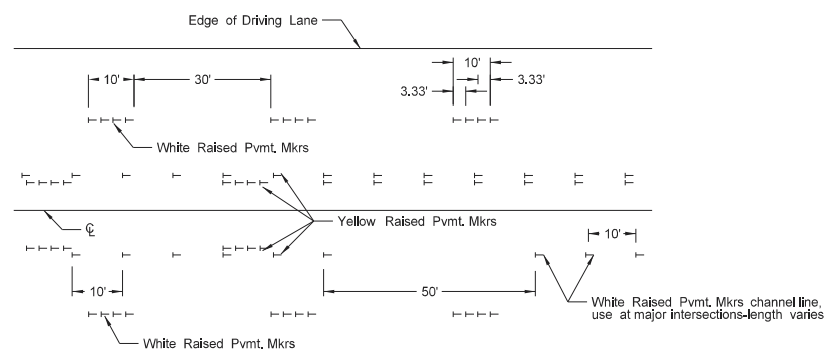


Raised Pavement Markers

FOUR LANE ROADWAY

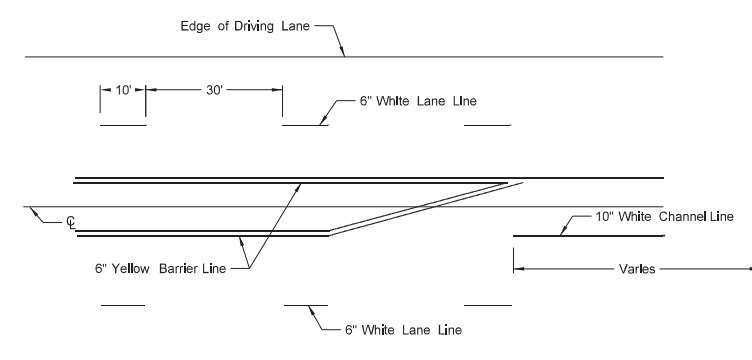


Painted or Tape Lines

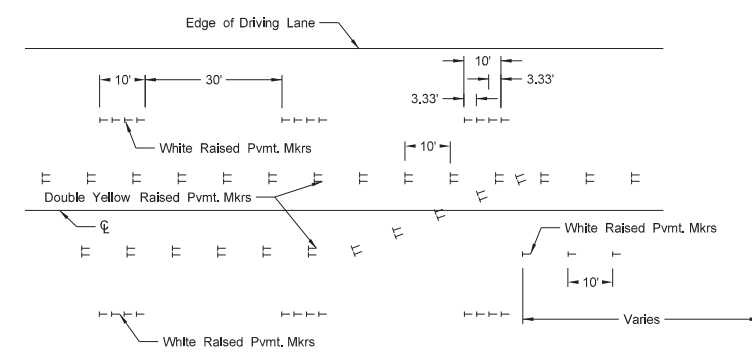


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and 10 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.

