

DESIGN DATA			
Traffic	Average Daily		
Current 2016	Pass: 2175	Trucks: 680	Total: 2855
Forecast 2036	Pass: 3245	Trucks: 1015	Total: 4260
Clear Zone Distance:	Design Speed:		
Minimum Sight Dist. for Stopping:	Bridges:		
Limited Access Control			
Pavement Design Life (years)			
Design Accumulated One-way	ESALS:		

JOB # 8
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

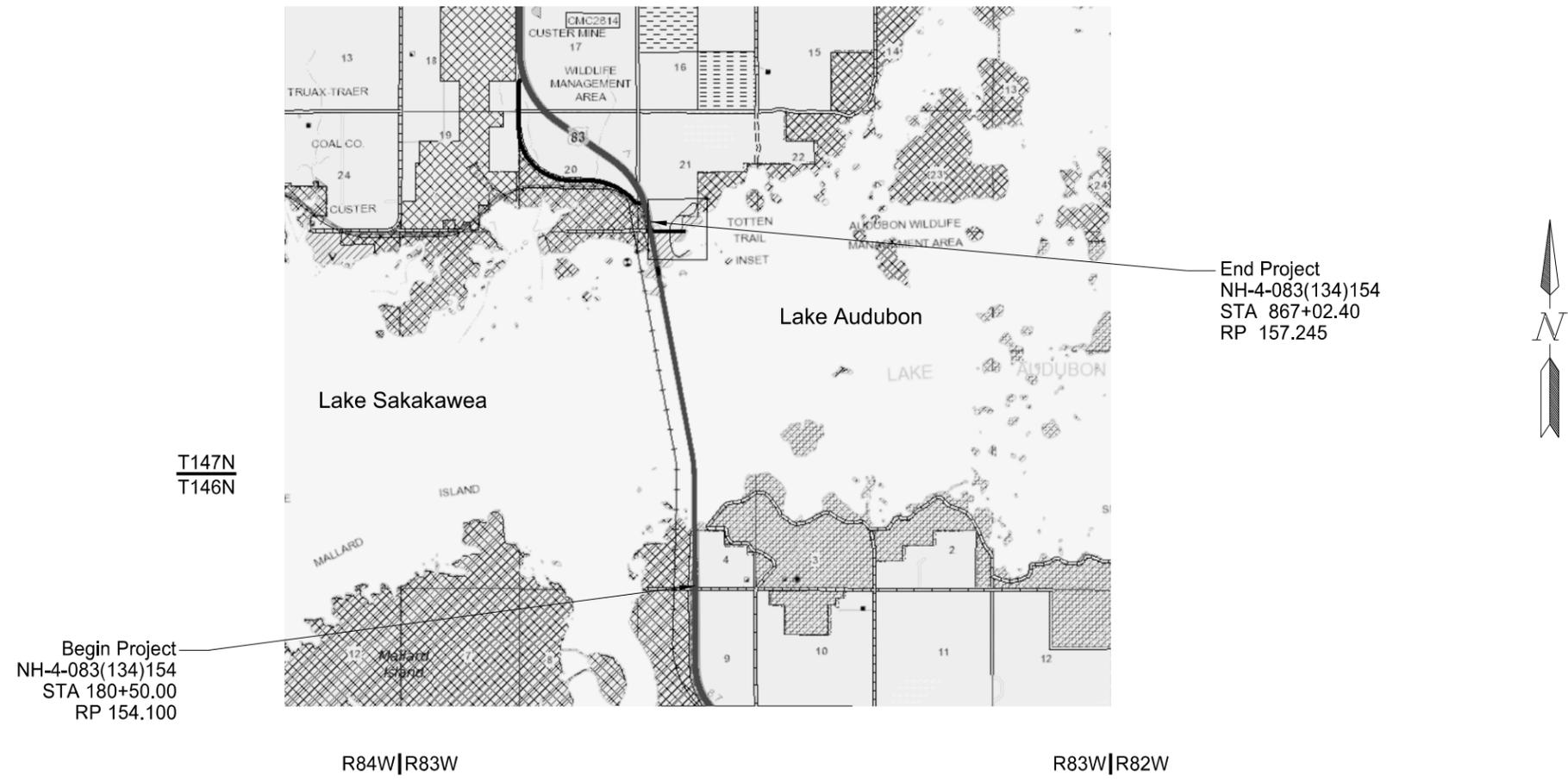
NH-4-083(134)154
 McLean County
 US 83, Snake Creek Embankment, NB & SB

HMA

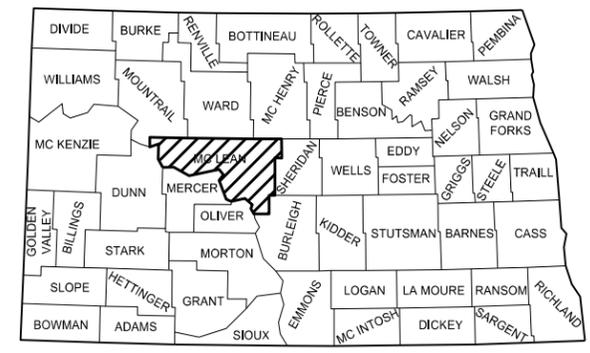
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	21497	1	1

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-4-083(134)154	3.137	3.137



DESIGNERS
Amer Hmidan
Joshua Ide



DISTRICT REVIEW
James L. Redding /s/
MINOT DISTRICT
APPROVED DATE 8/11/16
Roger Weigel /s/
OFFICE OF PROJECT DEVELOPMENT ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 08/08/2016

Amer Hmidan /s/

MINOT DISTRICT

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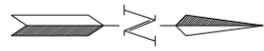
TABLE OF CONTENTS

<u>Section No.</u>	<u>Sheet No.</u>	<u>Description</u>
1	1	Title Sheet
2	1	Table of Contents
4	1	Scope of Work
6	1	Notes
8	1	Quantities
10	1	Basis of Estimate
20	1	Approach Paving Details
20	2-4	Milling Transition Details
20	5	Rumble Strips Details
30	1	Existing Typical Section
30	2	Proposed Typical Section
100	1	Traffic Control Device List
100	2-4	Work Zone Traffic Control

LIST OF STANDARD DRAWINGS

<u>Standard No.</u>	<u>Description</u>
D-101-1, 2, 3	NDDOT Abbreviations
D-101-10	NDDOT Utility Company Abbreviations
D-101-20, 21	Linestyles
D-101-30, 31, 32	Symbols
D-704-7, 8	Breakaway Signs for Construction Zone Signs
D-704-9, 10, 11, 12	Construction Sign Details
D-704-13	Barricade and Channelizing Device Details
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	Traffic Control Plan for Moving Operations
D-704-32	Sign Layout For One Lane Closure Divided Highway Moving Operation
D-704-34	Sign Layout For One Lane Closure
D-704-34A	Traffic Control System Lane Shift between a Lane Closure and an Opposite Lane Closure
D-704-50	Portable Sign Support Assembly
D-706-1	Bituminous Laboratory
D-754-24	Mounting Details Perforated Tube
D-754-24a	Breakaway Coupler System for Perforated Tubes
D-754-25	Mounting Details Perforated Tube
D-754-29	Sign Punching, Stringer, and Support Location Details Regulatory, Warning, and Guide Signs
D-754-87	Sign Punching, Stringer and Support Location Details for Street Name Signs and 911 Signing
D-760-2	Rumble Strips Divided Highways (Non- Interstate)
D-762-4	Pavement Marking
D-762-6	Short Term Pavement Marking

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	4	1



Lake Sakakawea

End Project
Station = 867+02.40
RP = 157.245

Equation:
Sta 340+00.00 BK =
Sta 873+58.60 AH

Begin Project
Station = 180+50.00
RP = 154.100

Equation:
Sta 207+19.20 BK =
Sta 207+60.00 AH

11th Street NW

14th Street NW

Railroad

Gate Control Structure
Sta. 307+92
(To remain in place)

Adjust Precast
Concrete Inlet
Sta. 188+00

175+23.79

228+03.79

280+83.79

333+63.79

154

155

156

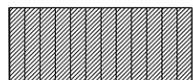
157

Lake Audubon

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3" Minor Rehabilitation Overlay



Mill and Overlay

Scope of Work

NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	6	1

100-P01 COORDINATION OF WORK: A U.S. Army Corps of Engineers (USACE) project to raise the gate control structure within this project's termini is scheduled to be completed by June 1, 2017. It is the responsibility of the contractor to contact and coordinate with the USACE and verify the completion of their project prior to begin of work on this project.

100-P02 PROTECTION OF EXISTING FACILITIES: Protect the surface of the access to the Gate Control at RP 156.514 from work performed while applying the overlay.

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

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

411-P01 MILLING PAVEMENT SURFACE: Place milled material on the five approaches for pavement transition. Deliver and stockpile all remaining milled material at the NDDOT Garrison Section, located approximately 10 miles northwest of the project. Stockpile milled material using a payloader. Keep payloader tires off of stockpile. Contact the Project Engineer 48 hours prior to milling to discuss the location of the stockpile. All labor and equipment required for the placement of the millings on approaches as well as the delivering and stockpiling unused excess millings will not be paid for separately but included in the unit price bid for "Milling Pavement Surface".

430-P01 SUPERPAVE FAA 45: The 3" hot mix asphalt (HMA) overlay shall be paver laid in two lifts: 1" leveling course bottom lift and 2" top lift.

430-P02 PAVING SEAMS: All seams must be at least 11.5' from edge of median unless a hot seam is used. Hot seams can be located at any offset distance. Paving seams should not be located within the wheel path. A hot seam will be defined as a seam created when two pavers are paving at the same time, with no more than 300' between the pavers. The seam must be rolled in a way to join and hide the seam so it is not visible to the traveling public.

704-P01 TEMPORARY TRAFFIC CONTROL: The traffic control details, as indicated on the plans, have been developed on the basis that this project will be constructed in five phases:

Phase 1: The northbound and southbound passing lanes and median will be closed to traffic for the required milling and placing the first lift of 1" HMA, as shown on the detail plan sheet in section 100. This will consist of two single lane closures following standard drawing D-704-34.

Phase 2: Traffic will be transferred to the new pavement in the median and part of the passing lanes. The driving lanes and the shoulders will be closed for the required milling and first lift of pavement.

Phase 3: Traffic control devices will move back to the position they were in the first phase for the construction of the second lift of 2" HMA in the passing lanes and the median.

Phase 4: Traffic control devices will be moved back to second phase positions for the second lift of pavement, the installation of shoulder rumble strips, and the painting of the white 4 inch edge line and centerline skips.

Phase 5: The last phase is a moving operation with all lanes open to traffic. This will be used to install the double yellow pavement marking median and rumble strips on both sides of the median.

722-P01 ADJUST INLET: The existing inlet at Station 188+00 will remain but will require adjustment using standard concrete rings and replacement of the existing inlet casting due to the 3" overlay. All costs associated with resetting the precast concrete inlet such as new materials, removal and disposal of existing materials, and all labor shall be included in the price bid for "Adjust Inlet".

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ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	8	1

SPEC CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
-----	-----	-----	-----	-----
103	0100 CONTRACT BOND	L SUM	0.65	0.65
401	0050 TACK COAT	GAL	14,409	14,409
411	0105 MILLING PAVEMENT SURFACE	SY	2,103	2,103
430	0045 SUPERPAVE FAA 45	TON	21,608	21,608
430	1000 CORED SAMPLE	EA	70	70
430	6428 PG 64-28 ASPHALT CEMENT	TON	1,254	1,254
702	0100 MOBILIZATION	L SUM	0.65	0.65
704	0100 FLAGGING	MHR	400	400
704	1000 TRAFFIC CONTROL SIGNS	UNIT	2,406	2,406
704	1052 TYPE III BARRICADE	EA	6	6
704	1060 DELINEATOR DRUMS	EA	70	70
704	1067 TUBULAR MARKERS	EA	185	185
704	1080 STACKABLE VERTICAL PANELS	EA	555	555
704	1087 SEQUENCING ARROW PANEL-TYPE C	EA	2	2
706	0550 BITUMINOUS LABORATORY	EA	0.65	0.65
706	0600 CONTRACTOR'S LABORATORY	EA	0.65	0.65
722	6160 ADJUST INLET	EA	1	1
760	0005 RUMBLE STRIPS - ASPHALT SHOULDER	MILE	12.548	12.548
762	0113 EPOXY PVMT MK 4IN LINE	LF	107,663	107,663
762	0430 SHORT TERM 4IN LINE-TYPE NR	LF	107,663	107,663

BASIS OF ESTIMATE

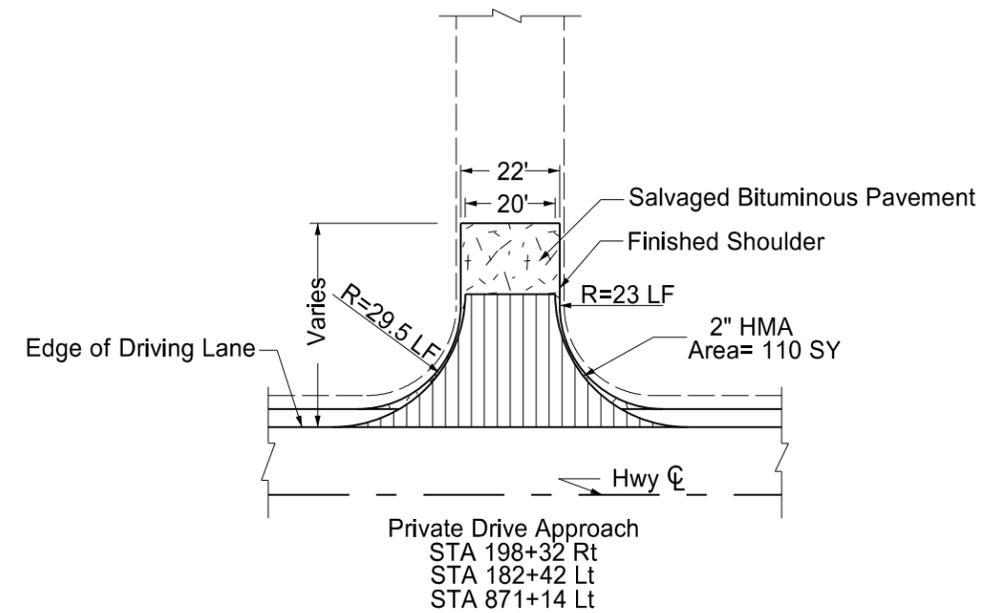
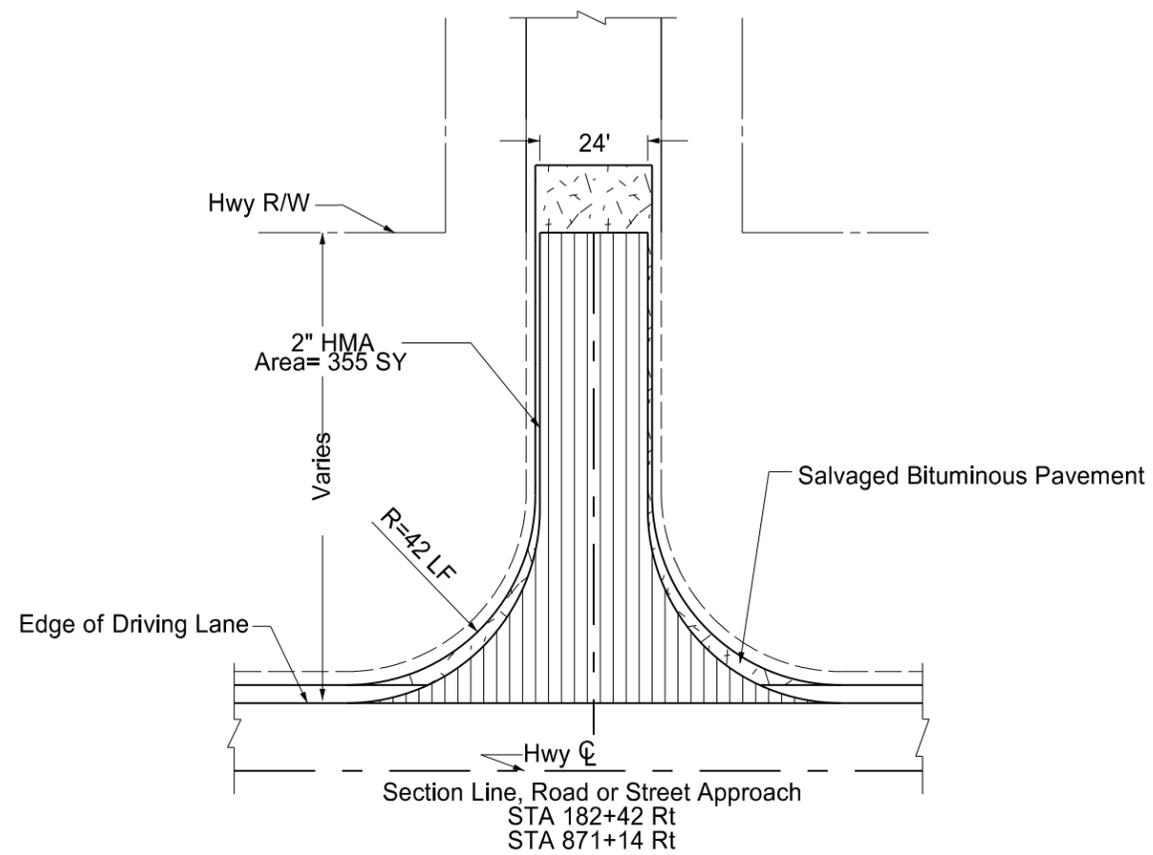
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	10	1

<u>Design Calculation</u>		Proposed Typical Section RP 154.100 – 157.245 (3.137 Miles) HMA Cross Sectional Area = 17.517 SF Roadway Width = 78 LF	
Material	Unit	Quantities	
Tack Coat @ 0.05 Gal/SY* (2 Applications)	Gal	$[(78 \text{ LF}) \times (3.137 \text{ Miles} \times 5,280 \text{ FT/Mile})] / (9 \text{ SF/SY}) \times 0.05 \text{ Gal/SY} \times 2 \text{ Applications}$	14,355
Superpave FAA 45 @ 2 Ton/CY	Ton	$[(17.517 \text{ SF}) \times (3.137 \text{ Miles} \times 5,280 \text{ FT/Mile})] / (27 \text{ CF/CY}) \times 2 \text{ TON/CY}$	21,493
PG 64-28 Asphalt Cement @ 5.8%	Ton	$[(17.517 \text{ SF} \times (3.137 \text{ Miles} \times 5,280 \text{ FT/Mile})) / (27 \text{ CF/CY})] \times 2 \text{ TON/CY} \times 5.8\%$	1,247
Milling at:			
- Begin Project (South End)	SY	$[36 \text{ LF (width)} \times 100 \text{ LF (length)} \times 2] / (9 \text{ SF/SY})$	800
- End Project (North End)	SY	$[78 \text{ LF (width)} \times 100 \text{ LF (length)}] / (9 \text{ SF/SY})$	867
- Gate Control Structure (RP 156.514)	SY	$[(33 \text{ LF (width)} \times 100 \text{ LF (length)}) + (5 \text{ LF (width)} \times 125 \text{ LF (length)})] / (9 \text{ SF/SY})$	<u>436</u>
			Total = 2,103
Rumble Strips	Mile	3.137 Miles X 4 Strips	12,548
Permanent (Epoxy) Pavement Marking:			
- White 4" Centerline Skips	LF	$[(3.137 \text{ Miles} \times (5,280/4 \text{ LF/Mile}))] \times 2 \text{ Skip Lines}$	8,282
- White 4" Edge Line (shoulder side)	LF	$[3.137 \text{ Miles} \times 5,280 \text{ LF/Mile}] \times 2 \text{ Edge Lines}$	33,127
- Double Yellow 4" Edge Line (median side)	LF	$[3.137 \text{ Miles} \times (5,280 \times 2 \text{ LF/Mile})] \times 2 \text{ Double Edge Lines}$	<u>66,254</u>
			Total = 107,663
Short Term Pavement Marking:			
- White 4" Centerline Skips	LF	$[(3.137 \text{ Miles} \times (5,280/4 \text{ LF/Mile}))] \times 2 \text{ Skip Lines}$	8,282
- White 4" Edge Line (shoulder side)	LF	$[3.137 \text{ Miles} \times 5,280 \text{ LF/Mile}] \times 2 \text{ Edge Lines}$	33,127
- Double Yellow 4" Edge Line (median side)	LF	$[3.137 \text{ Miles} \times (5,280 \times 2 \text{ LF/Mile})] \times 2 \text{ Double Edge Lines}$	<u>66,254</u>
			Total = 107,663

*: Undiluted

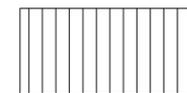
HMA Cored Samples							
	A	B	C	D			
Specification Section	Distance (Ft)÷2000	Lanes	Lifts	Sublots (A x B x C)	Quantity (D x 2)	Quantity (1 per mile)	Unit
430.04 I.2.b(1), "General"	8	4	1	32	64	N/A	EA
430.04 I.2.b(2), "Pavement Thickness Determination Cores"					N/A	6	EA
				Total	64	6	EA

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BASIS OF ESTIMATE

ITEM	UNIT	Section Line (2)	Private Drive (3)	TOTAL
Tack Coat (0.05 Gal/SY)	Gal	36	18	54
Hot Mix Asphalt (2 Ton/CY)	Ton	79	36	115
Asphalt Cement (at 5.8 %)	Ton	5	2	7

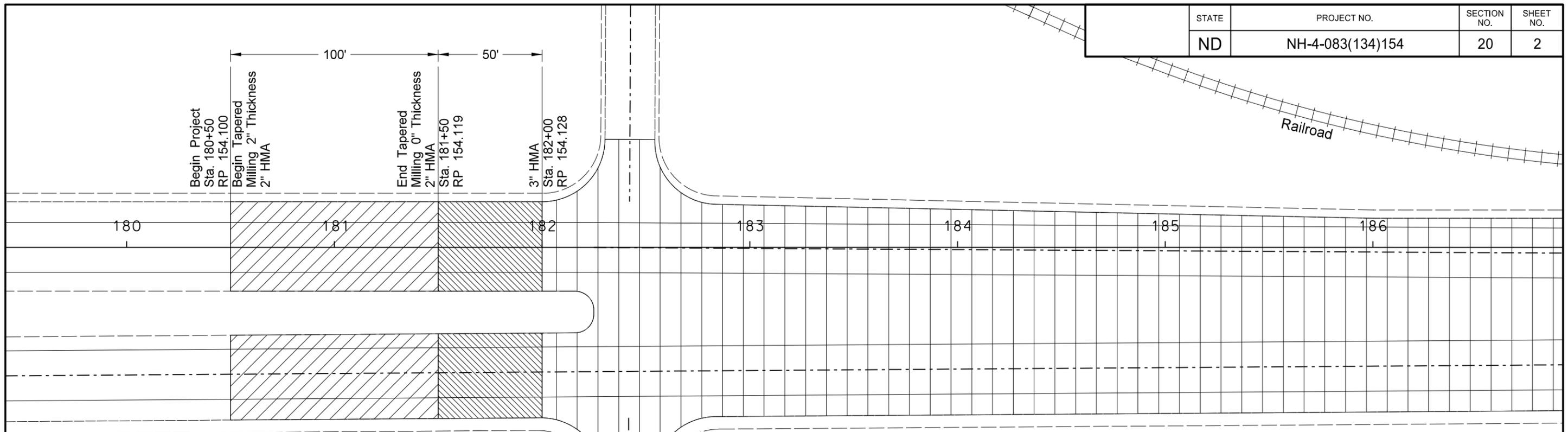
 3" Hot Mix Asphalt

 Salvaged Bituminous Pavement

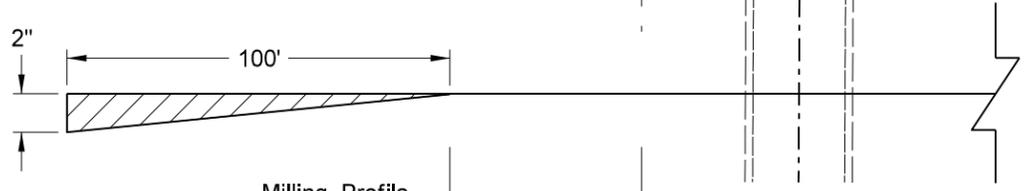
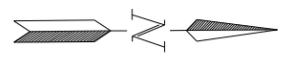
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Approach Details

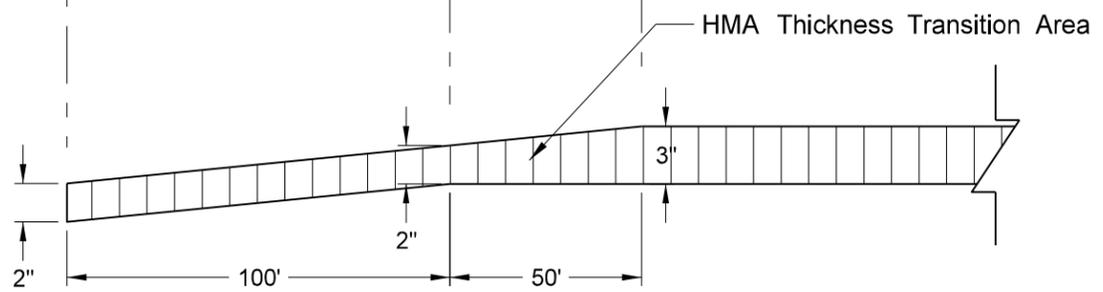
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	20	2



Plan View



Milling Profile



Overlay Profile

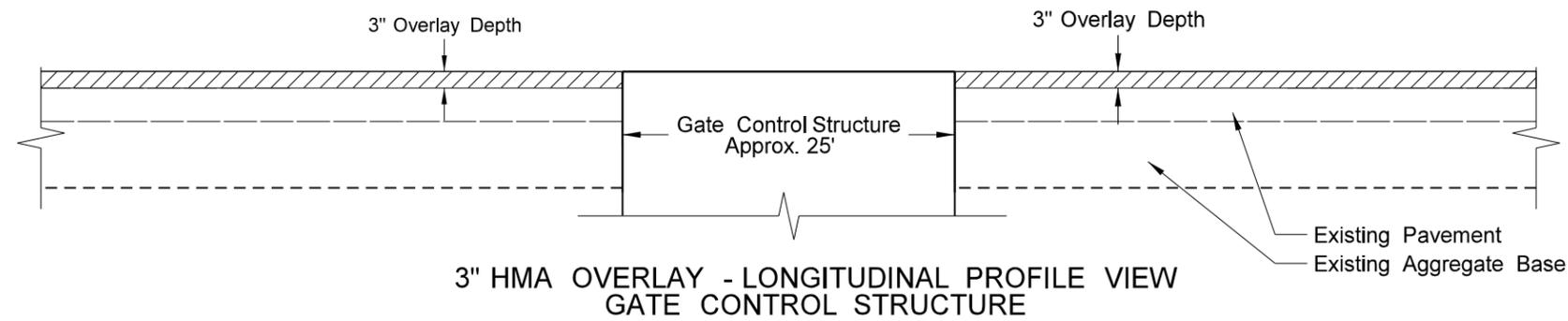
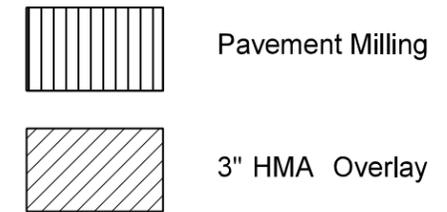
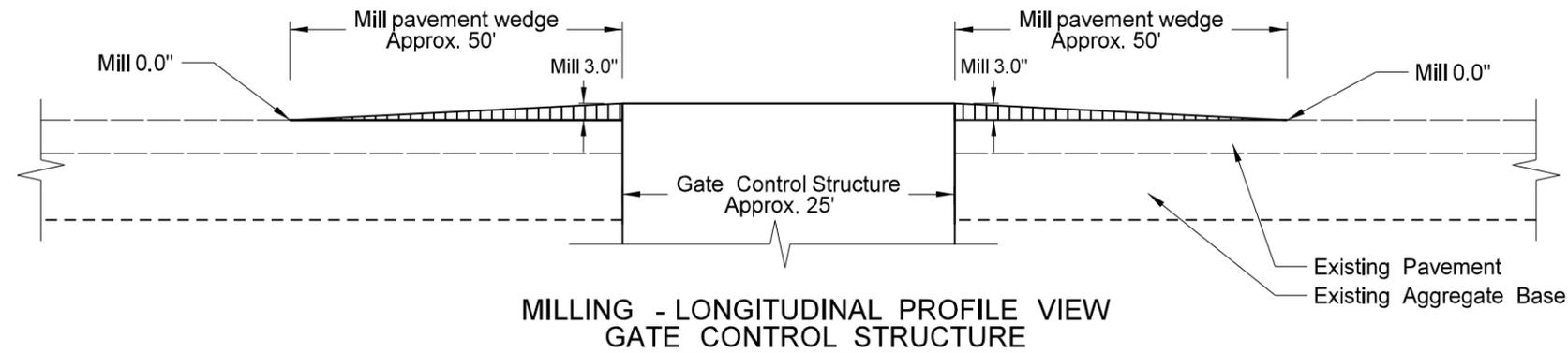
HMA Thickness Transition Area

-  Milling Transition
-  HMA Overlay Transition
-  HMA Overlay

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Milling Transition
South End of Project

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	20	4



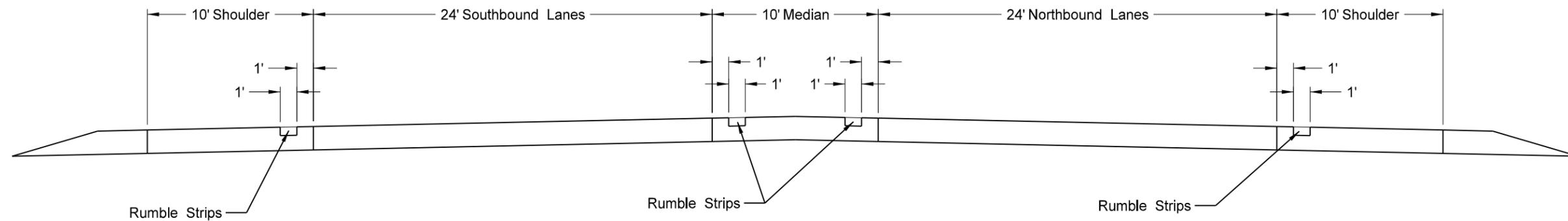
Notes:

- The pavement wedge shall be milled at 2.1% cross slope or match existing slope.
- Milling and HMA quantities are included in the Basis of Estimate section.

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Milling and Overlay Detail
Gate Control Structure
STA. 307+92

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	ND	NH-4-083(134)154	20	5

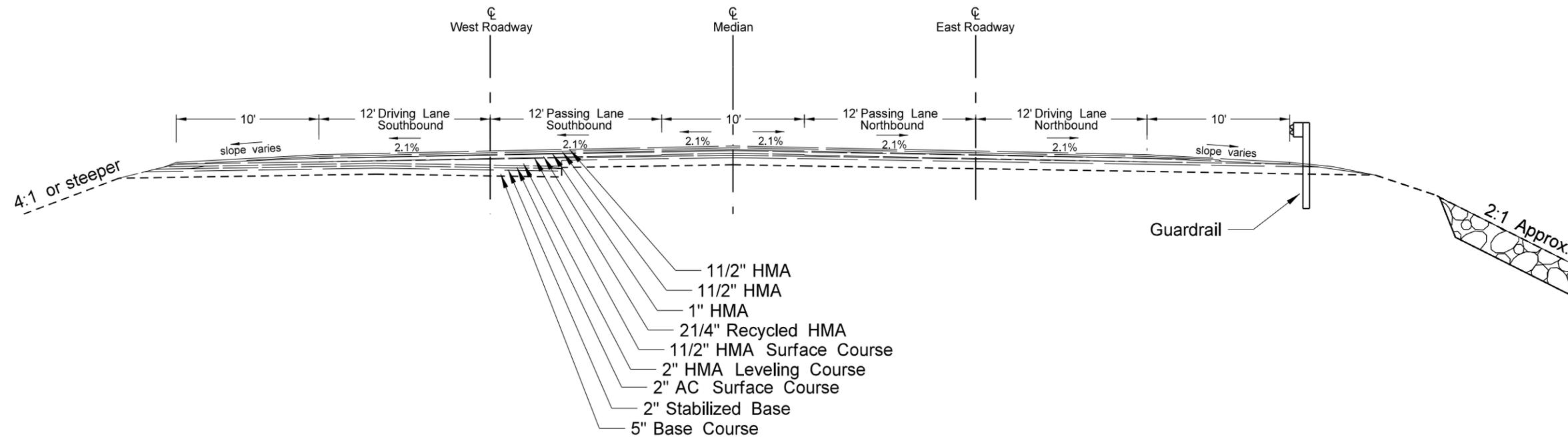


Note: Detail plan sheet provided to indicate placement of rumble strips in the 10' median and outside shoulders. The rumble strips shall be constructed in accordance with Standard Drawing D-760-2

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Rumble Strips

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	30	1

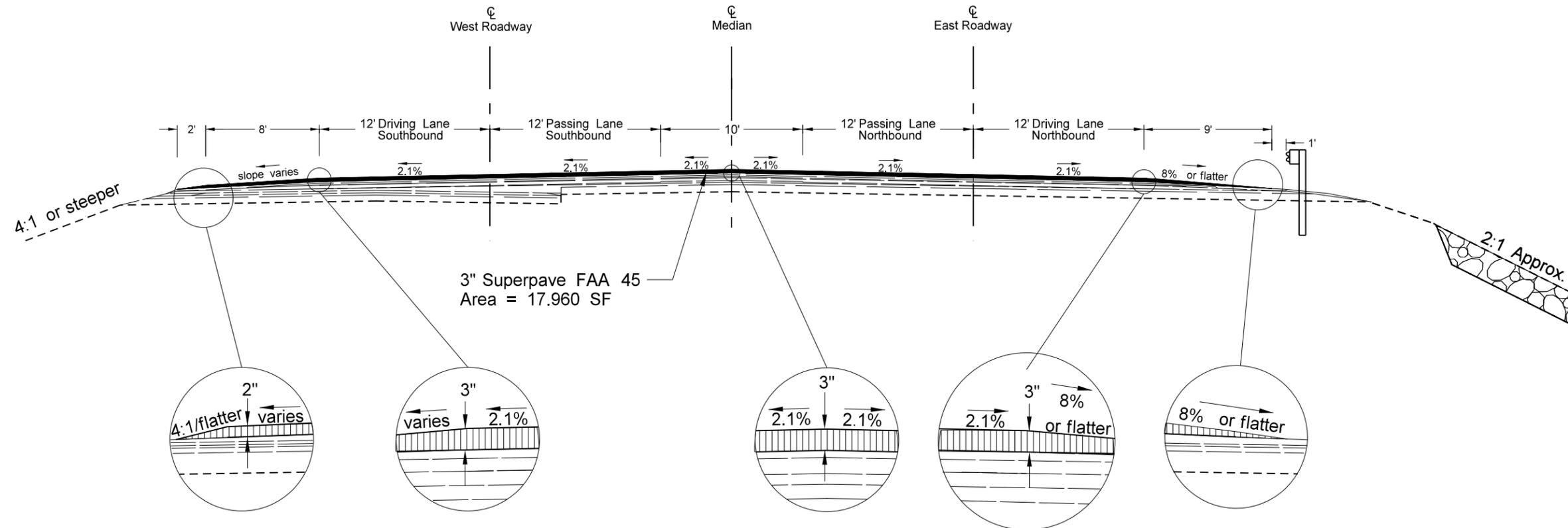


*: Slope varies: 3.4% - 6.0%

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Existing Typical Section

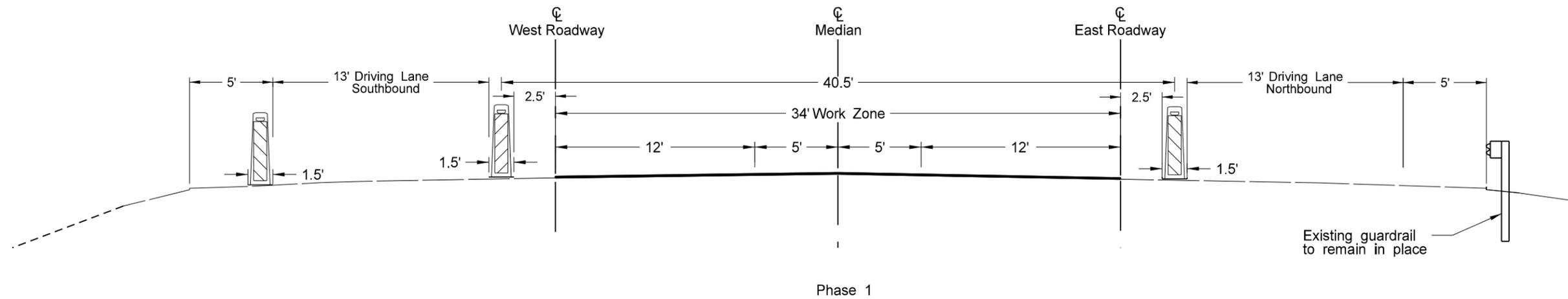
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ND	NH-4-083(134)154	30	2



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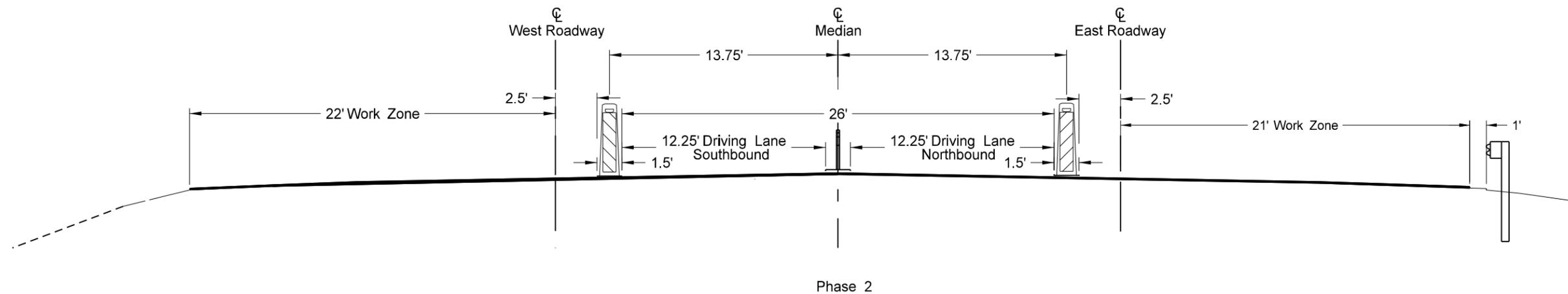
Proposed Typical Section

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	100	2



Work to be performed:

- Mill Begin Project, End Project, and at Gate Control Structure in passing lanes and median
- 1" bottom lift of leveling course of HMA in passing lanes and median



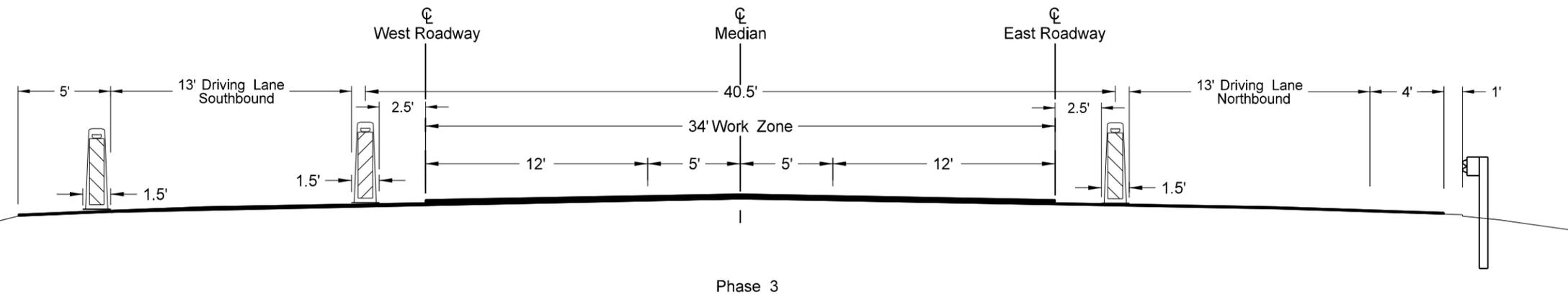
Work to be performed:

- Mill Begin Project, End Project, and at Gate Control Structure in driving lanes and shoulders
- 1" bottom lift of leveling course of HMA in driving lanes and shoulders

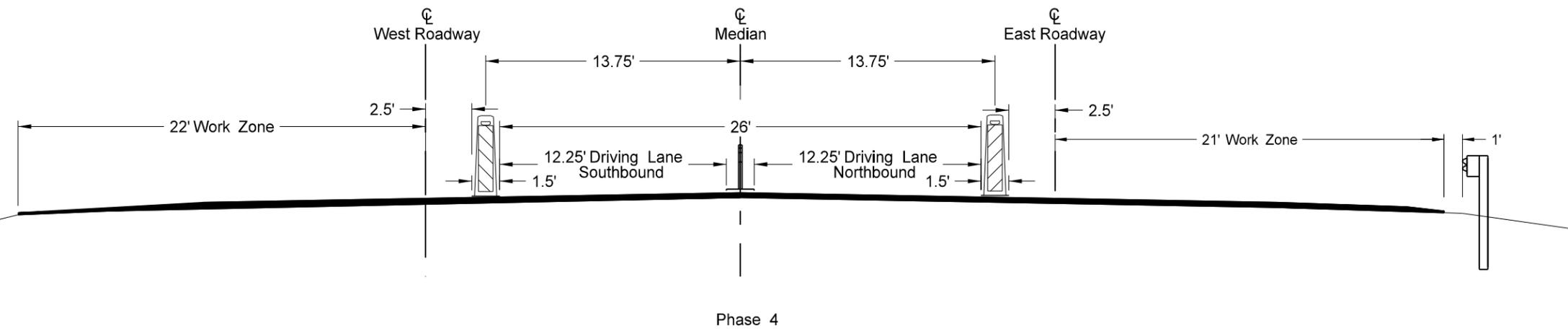
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Traffic Control
 Phase 1 & 2

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-4-083(134)154	100	3



Work to be performed:
 - 2" Top Lift of HMA in passing lanes and median

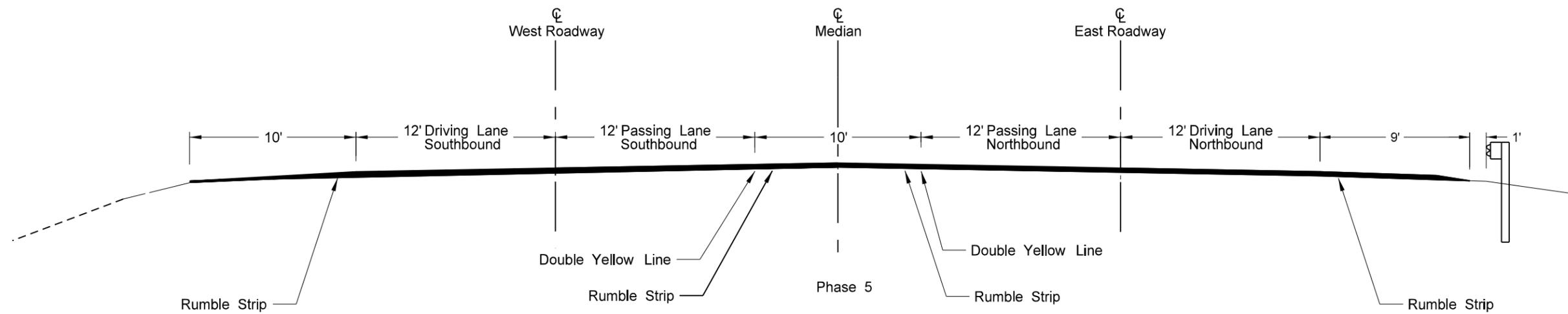


Work to be performed:
 - 2" Top lift of HMA in driving lanes and shoulders
 - Single white and skip pavement marking

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Traffic Control
 Phase 3 & 4

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-4-083(134)154	100	4



Work to be performed:

- Rumble strips - moving operation
- Double yellow pavement marking - moving operation

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Traffic Control
 Phase 5

NDDOT ABBREVIATIONS

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

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

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

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

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

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

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NDDOT ABBREVIATIONS

D-101-2

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

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

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NDDOT ABBREVIATIONS

D-101-3

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

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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

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

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

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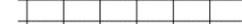
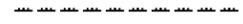
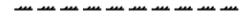
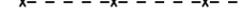
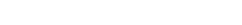
Line Styles

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

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

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Line Styles

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

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

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Symbols

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

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

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Symbols

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

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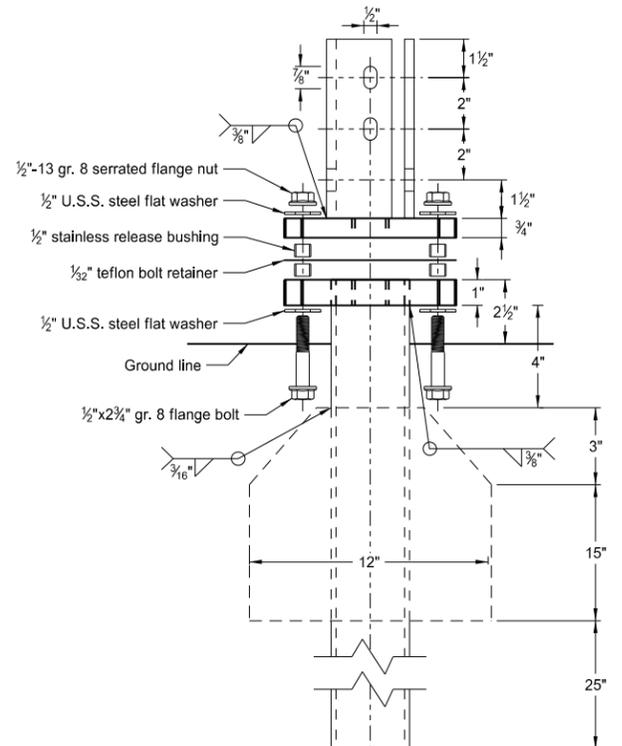
Symbols

D-101-32

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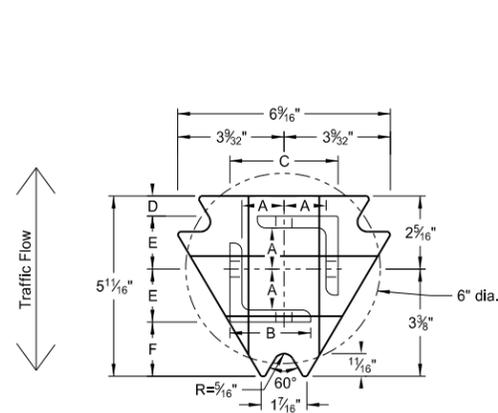
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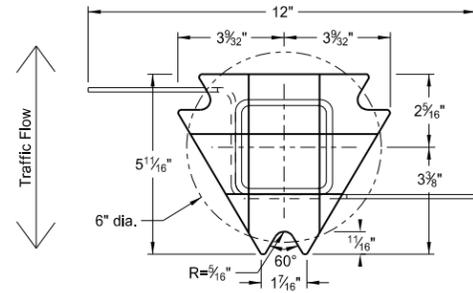


Multi-Directional Slip Base Assembly

Perforated Tube



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



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

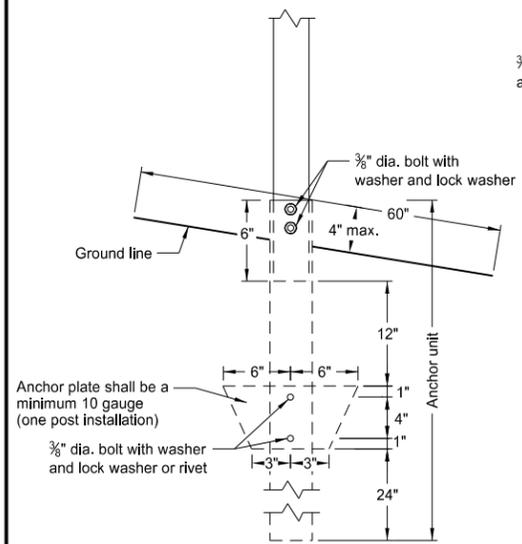
Notes:

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

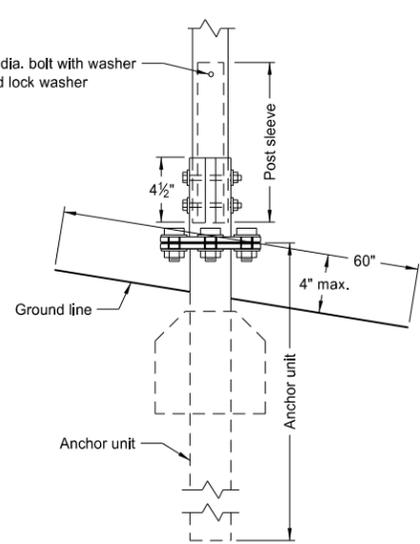
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/4	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No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

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

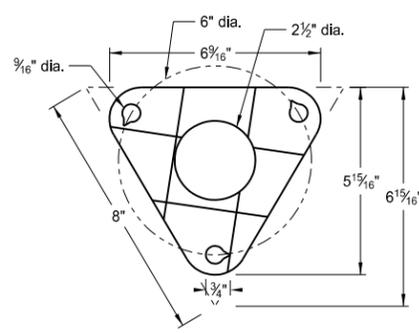
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2 1/2"	3 1/32"	2 5/32"	1 33/64"	1 1/8"
2 1/2"x10 ga.	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"



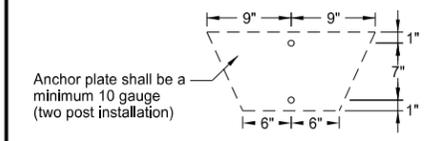
Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly



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

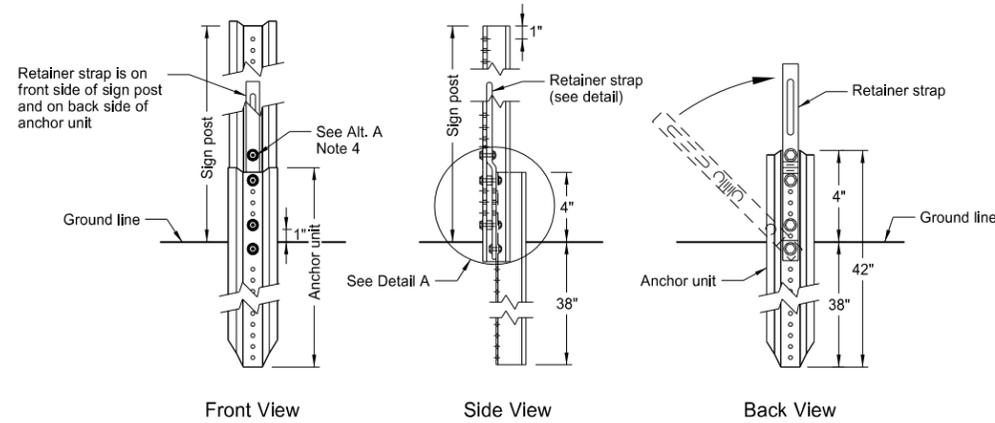
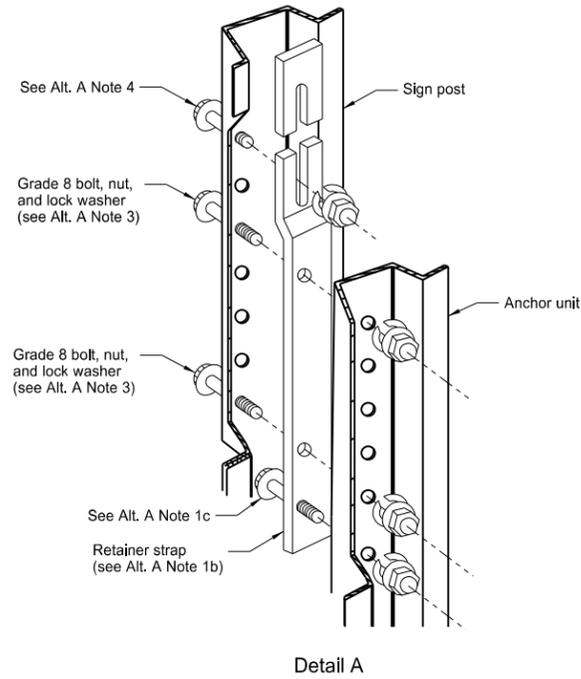


Anchor plate shall be a minimum 10 gauge (two post installation)

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

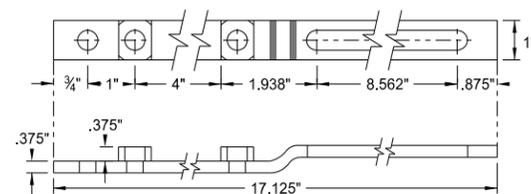
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U-Channel Post

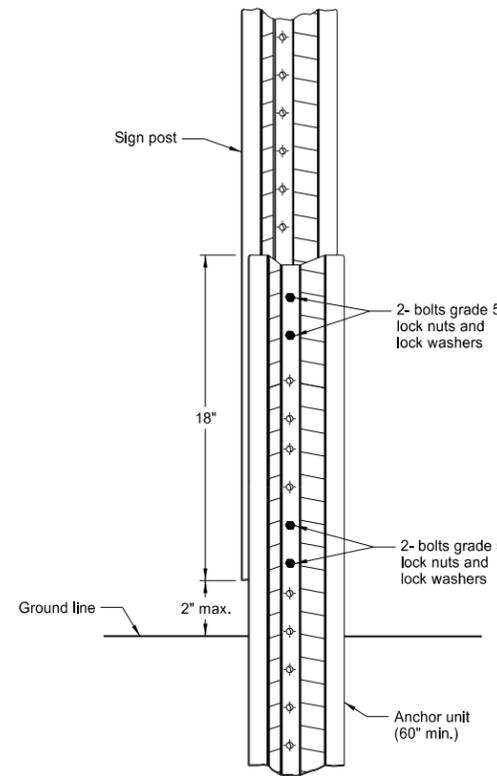


Breakaway U-Channel Detail Alternate A

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

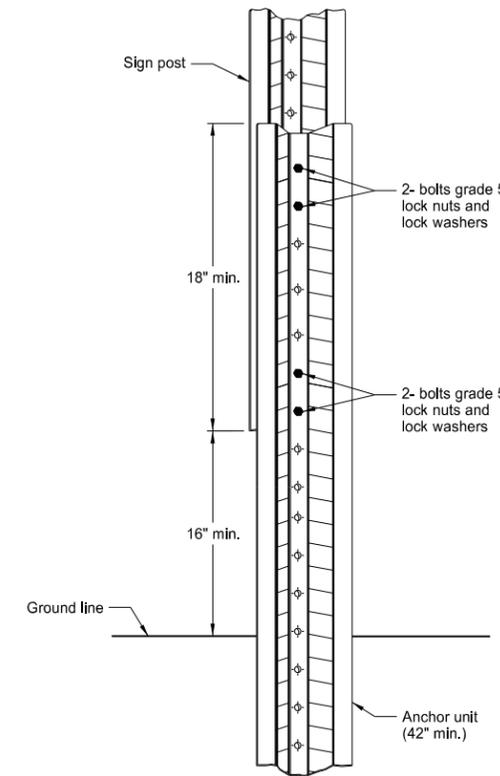


Retainer Strap Detail



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

A maximum of 3 posts shall be installed within 7'.



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

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

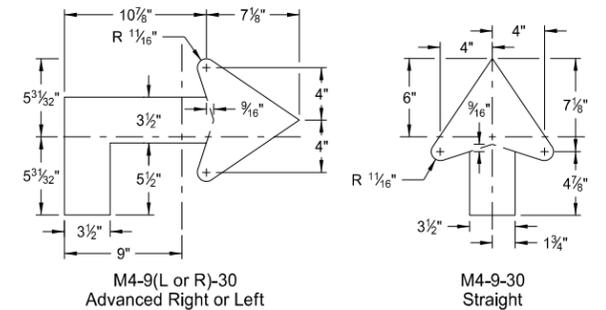
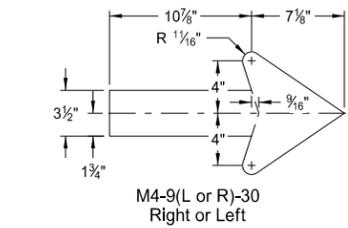
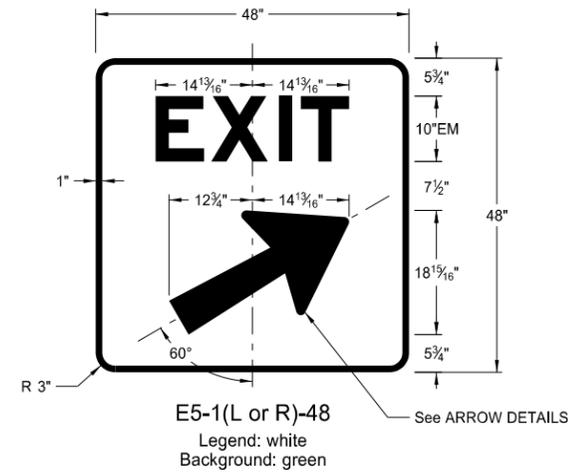
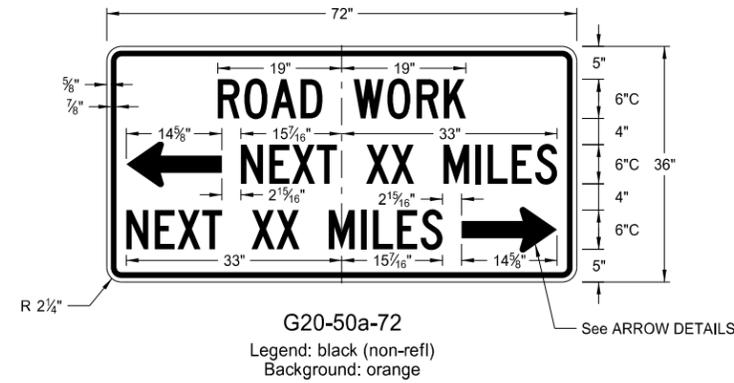
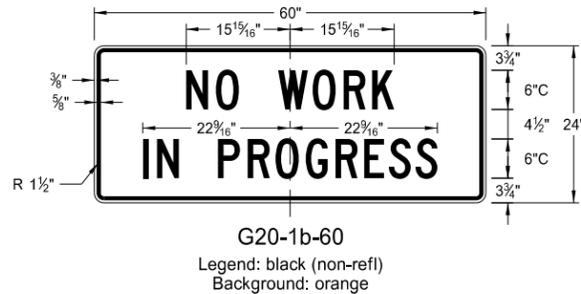
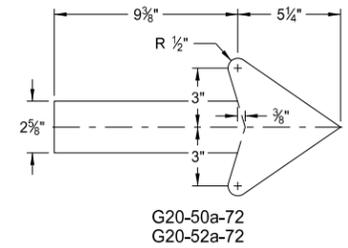
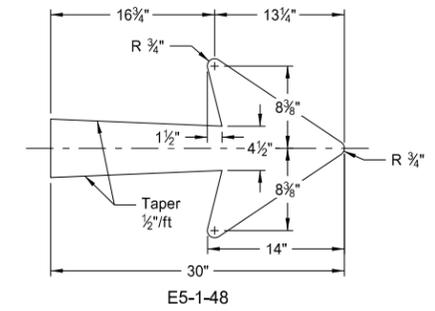
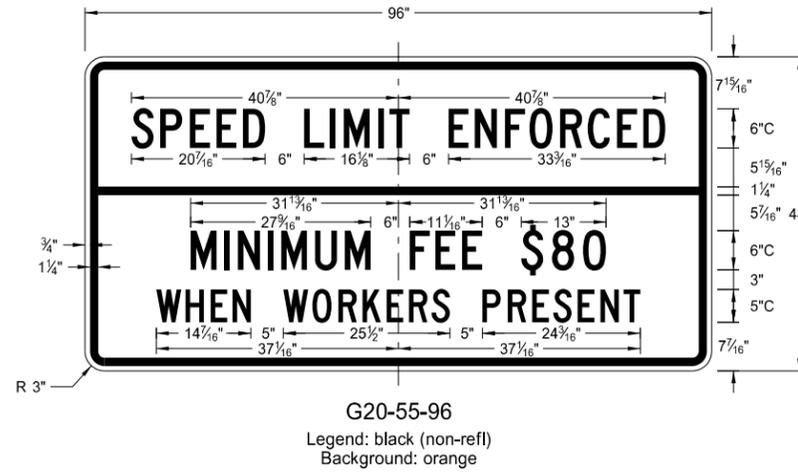
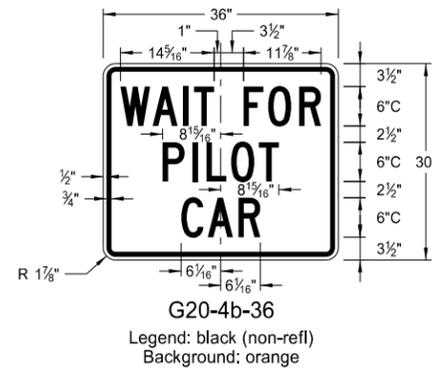
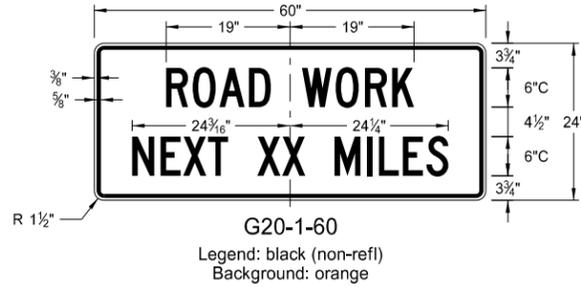
1. a) Drive anchor unit to within 12" of ground level.
b) Proper assembly established by lining up the bottom hole of retainer strap with the 6th hole from the top of the anchor unit.
c) Assemble strap to back of anchor unit using 5/16"x2" bolt, lock washer and nut.
d) Rotate strap 90° to left.
2. a) Drive anchor unit to 4" above ground.
b) Rotate strap to vertical position.
3. a) Place 5/16"x2" bolt, lock washer and nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit.
b) Alternately tighten two connector bolts.
4. Complete assembly by tightening 5/16"x2" bolt (this fastens sign post to retainer strap).
5. The base post, strap and sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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2-28-14	
REVISIONS	
DATE	CHANGE

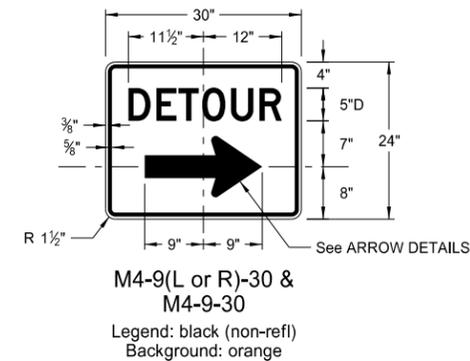
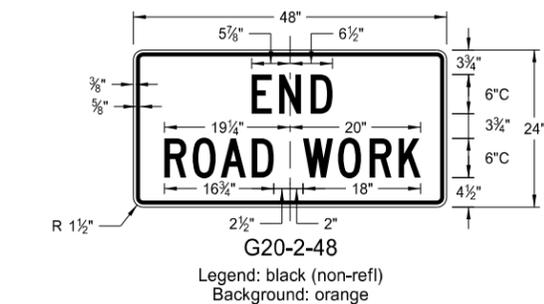
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CONSTRUCTION SIGN DETAILS
 TERMINAL AND GUIDE SIGNS

D-704-9



ARROW DETAILS



NOTES:

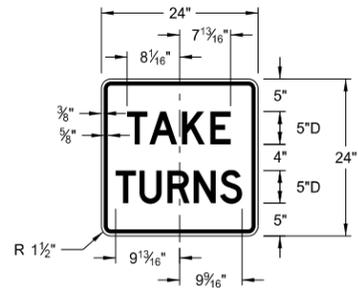
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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8-13-13	
REVISIONS	
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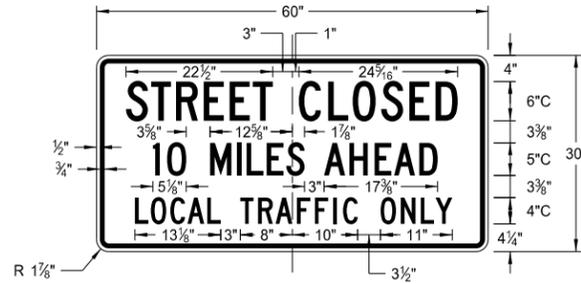
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CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS

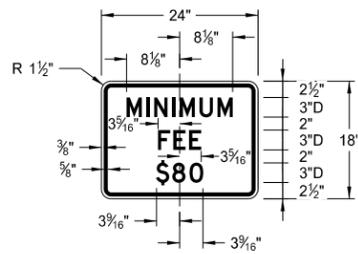
D-704-10



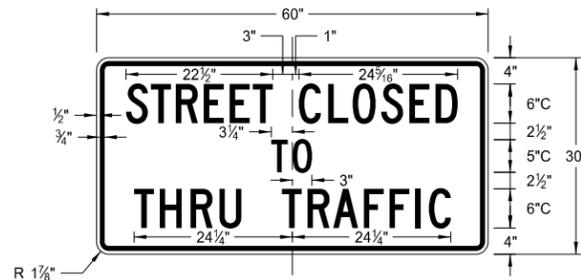
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Background: white



R11-3c-60
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R2-1a-24
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R11-4a-60
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R11-2a-48
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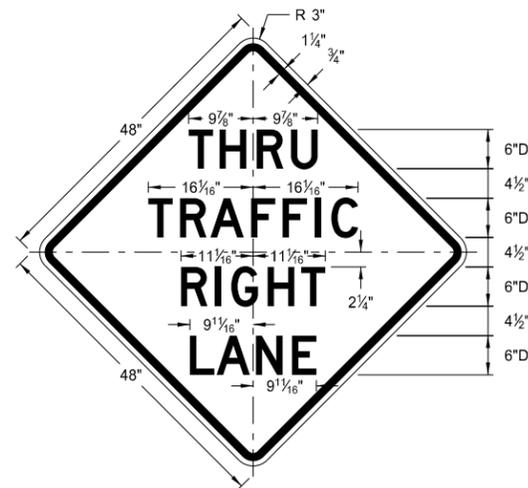
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8-13-13	
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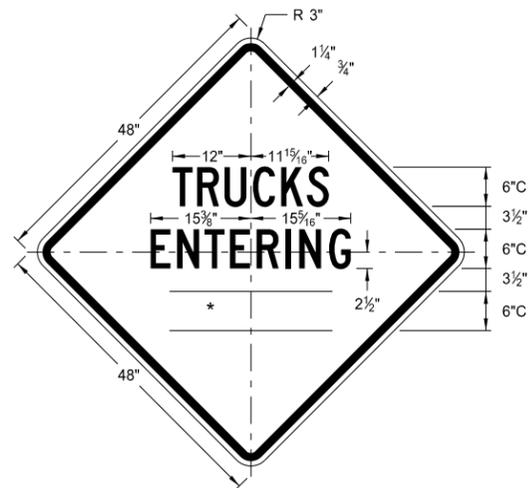
CONSTRUCTION SIGN DETAILS
WARNING SIGNS

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

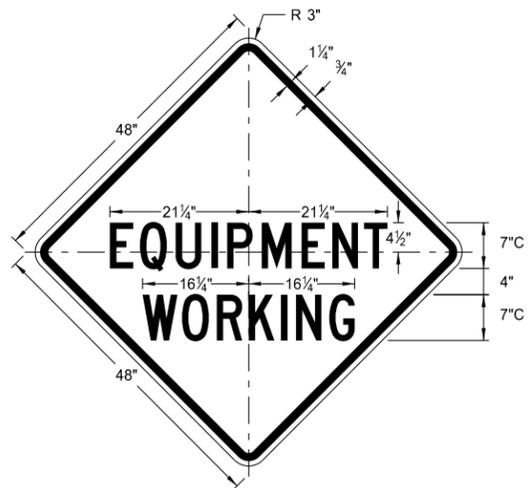
* DISTANCE MESSAGES



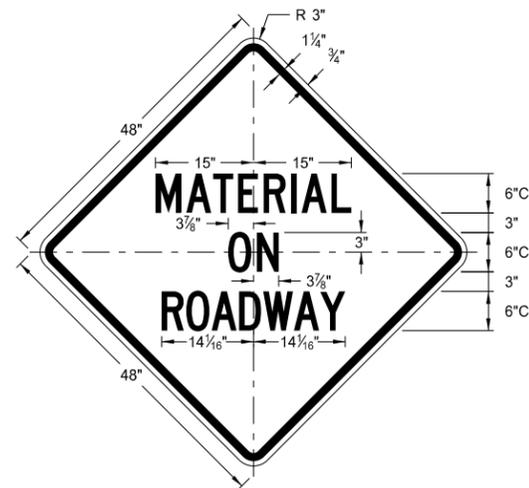
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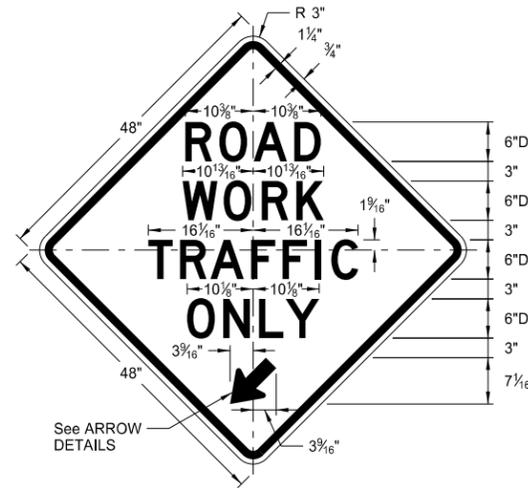
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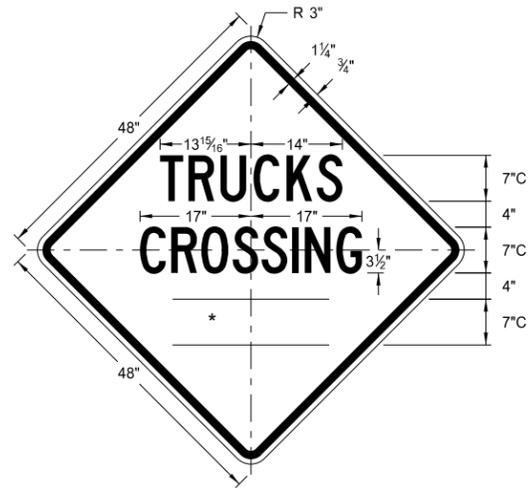
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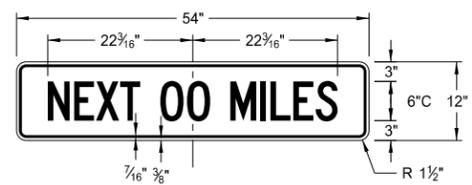
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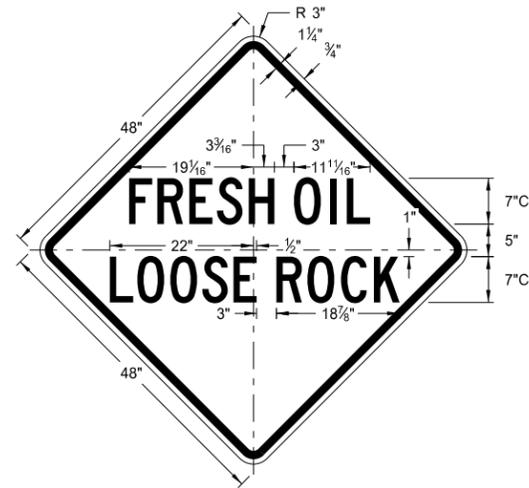
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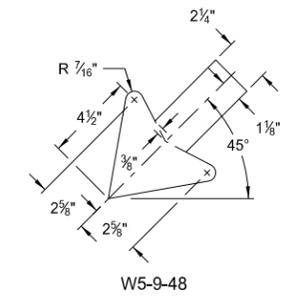
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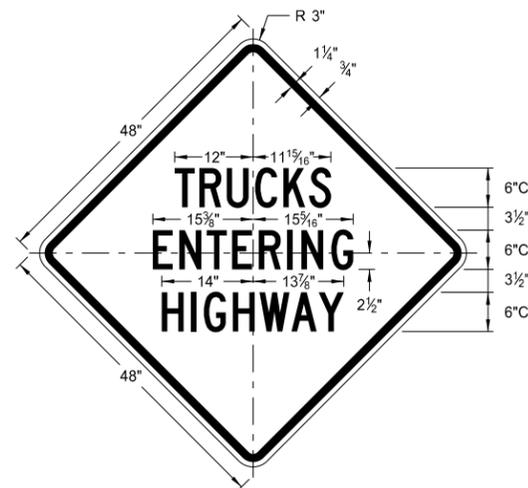
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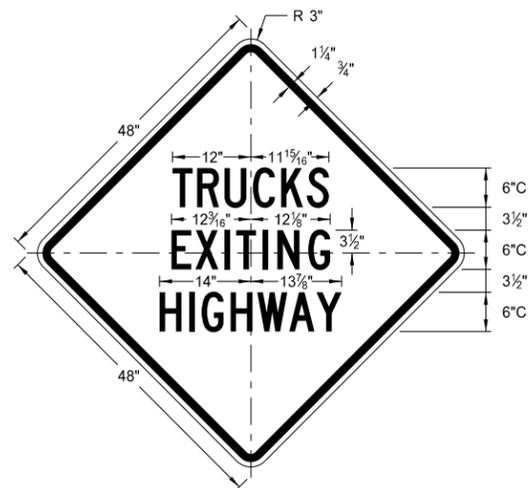
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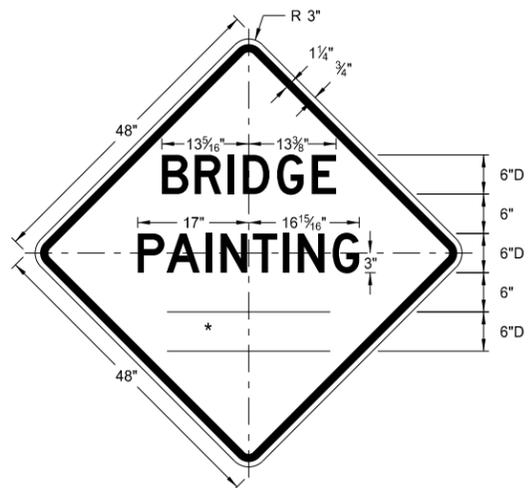
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ARROW DETAILS



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W8-56-48
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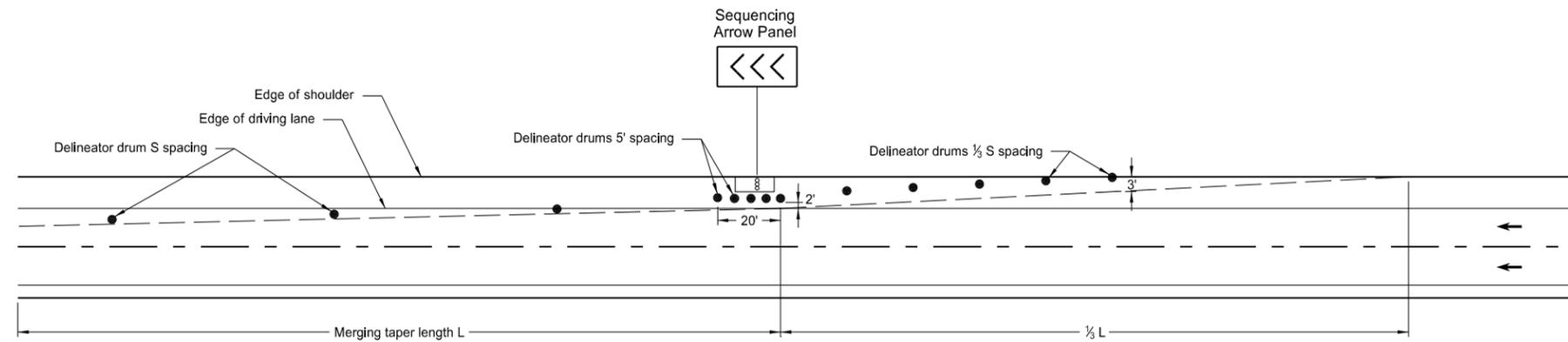
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8-13-13	
REVISIONS	
DATE	CHANGE

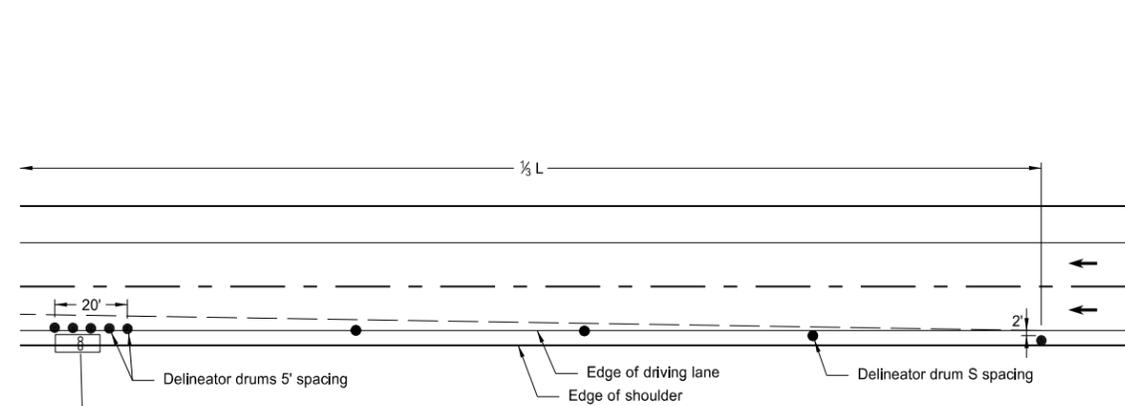
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SHOULDER CLOSURE TAPERS

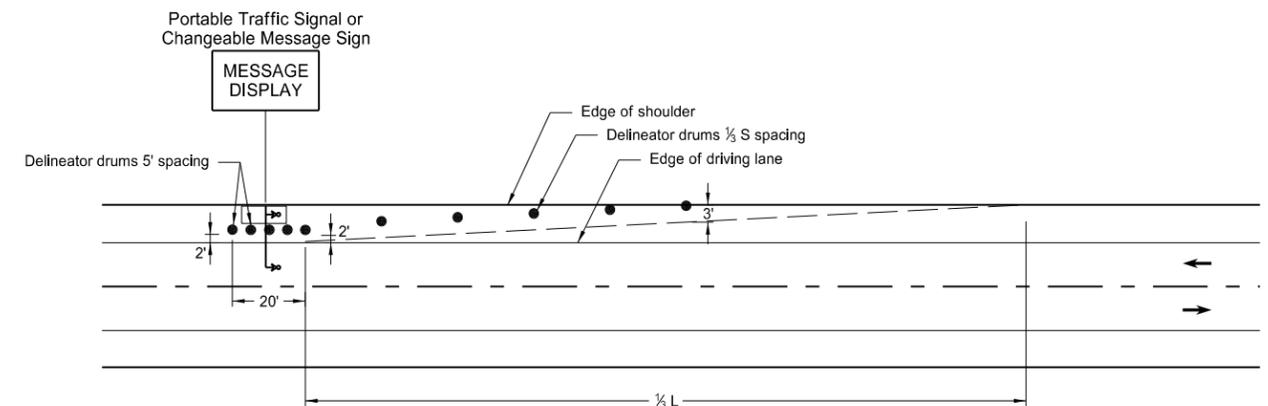
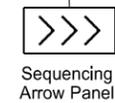
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

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

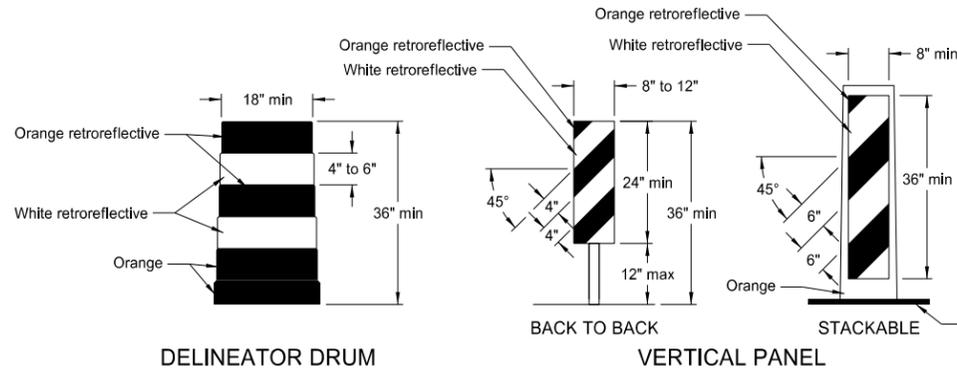
Notes:

- S = Posted Speed Limit in mph
W = Width of offset in feet
L = Taper length in feet
L = WS²/60 (40mph or less)
L = WS (45mph or more)
- If a shoulder taper is used, it should have a length of approximately 1/3L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
- When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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10-3-13	
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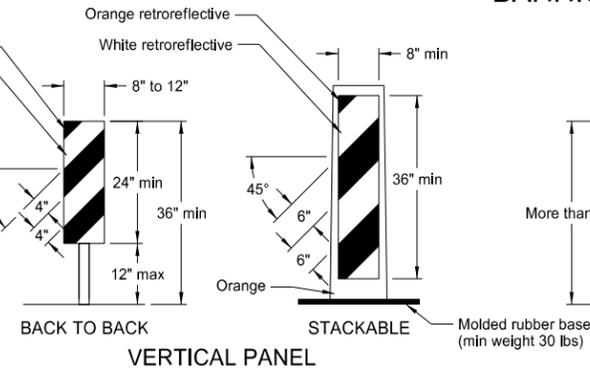
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BARRICADE AND CHANNELIZING DEVICE DETAILS



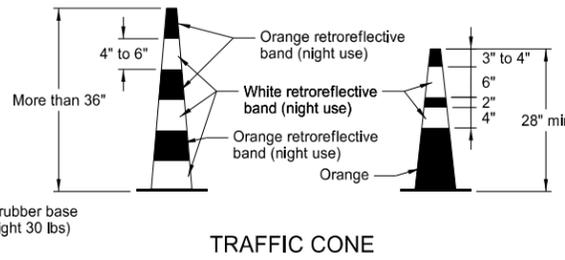
DELINEATOR DRUM

The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.



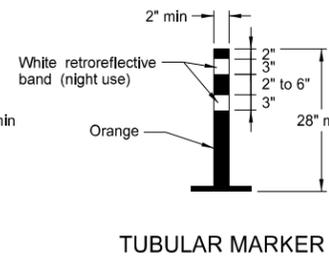
VERTICAL PANEL

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective material on the vertical panel is 36 inches or more, a stripe width of 6 inches shall be used.



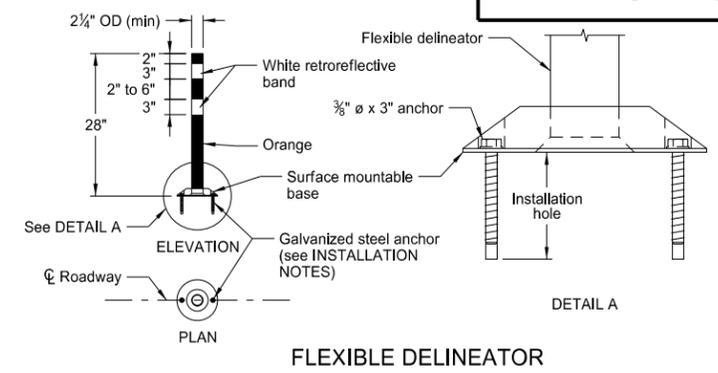
TRAFFIC CONE

RetroreflectORIZATION of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectORIZED space between the orange and white stripes shall not exceed 3" wide.



TUBULAR MARKER

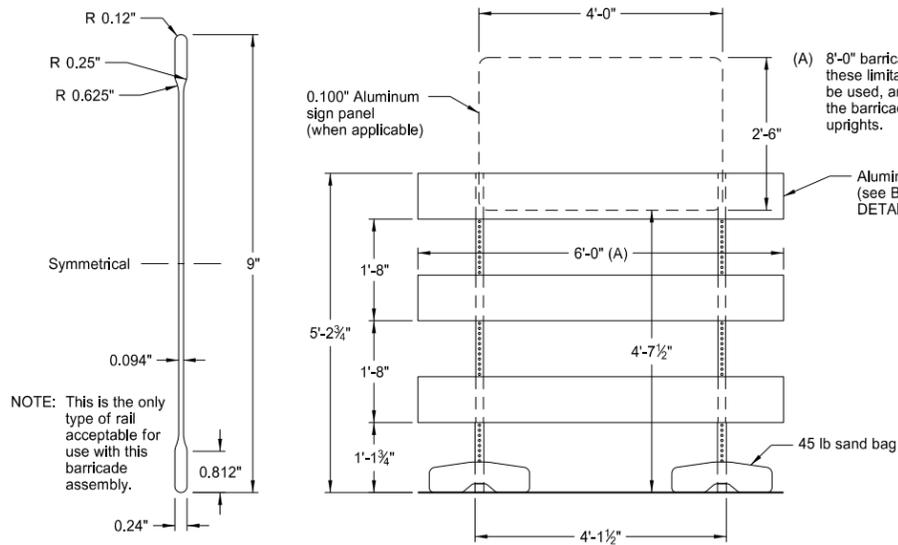
RetroreflectORIZATION of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

INSTALLATION NOTES:

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

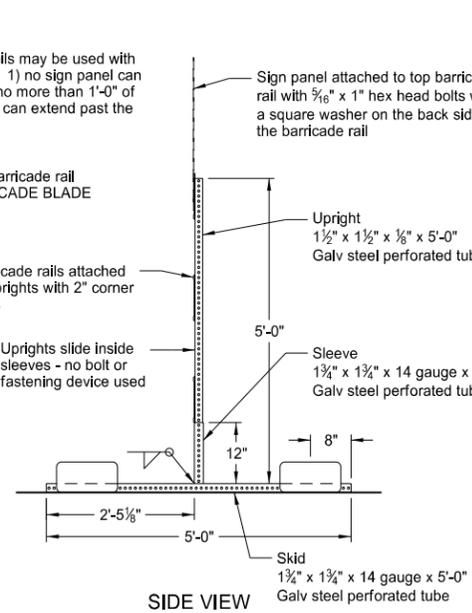


BARRICADE BLADE DETAIL

NOTE: This is the only type of rail acceptable for use with this barricade assembly.

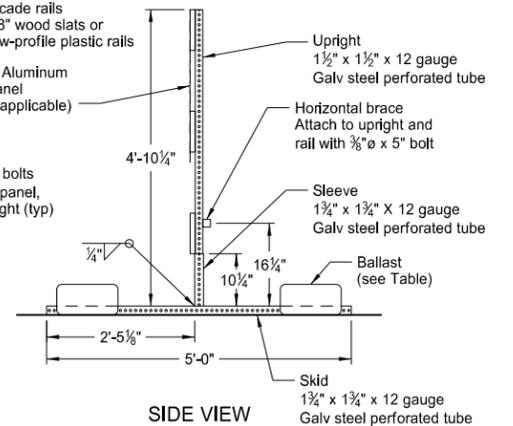
BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

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

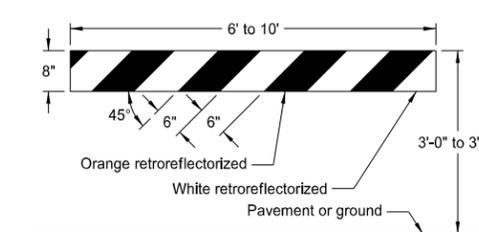


ELEVATION VIEW

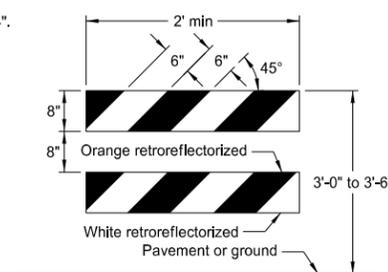
BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)



SIDE VIEW

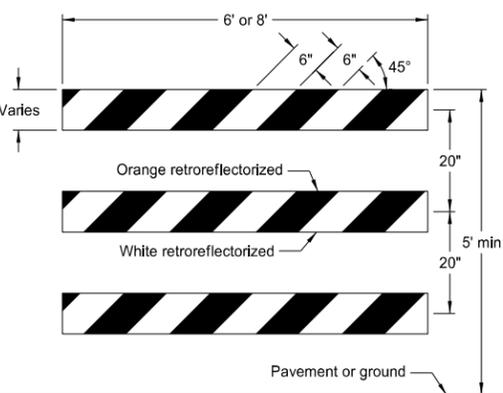


TYPE I BARRICADE

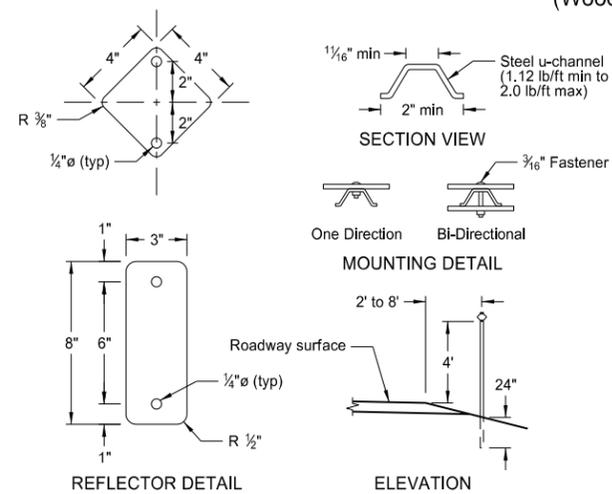


TYPE II BARRICADE

BARRICADE RAIL DETAILS

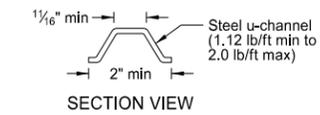


TYPE III BARRICADE

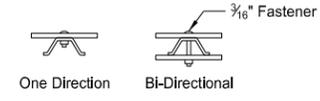


REFLECTOR DETAIL

DELINEATORS



SECTION VIEW



MOUNTING DETAIL

One Direction Bi-Directional

ROADWAY SURFACE

ELEVATION

MINIMUM BALLAST (For each side of barricade support)

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

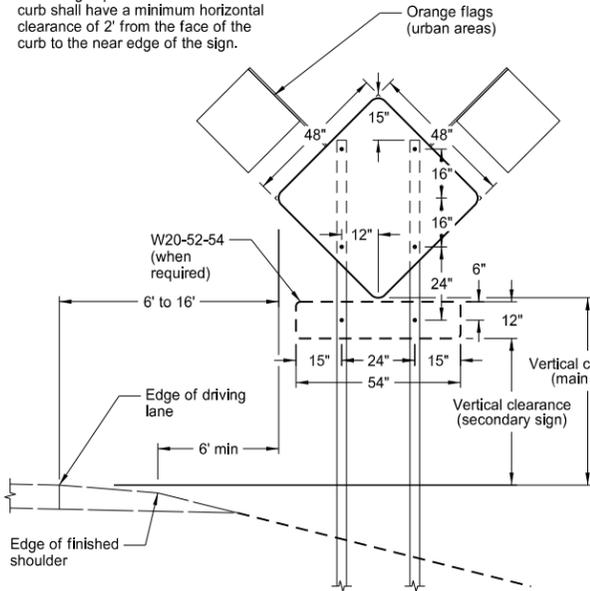
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

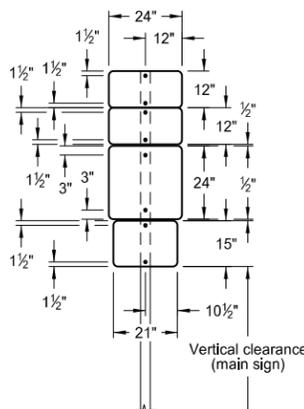
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

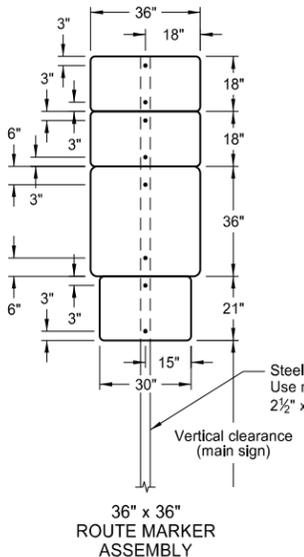
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



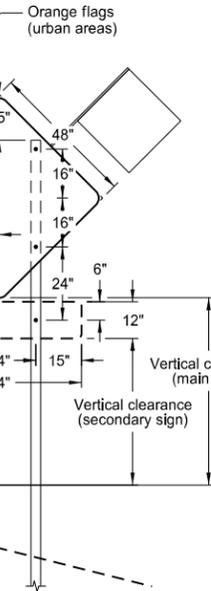
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



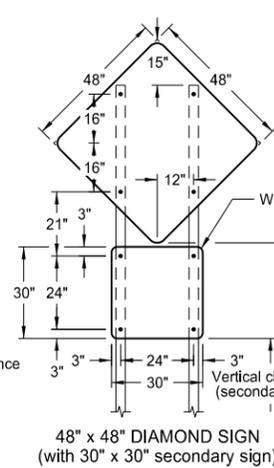
24" x 24" ROUTE MARKER ASSEMBLY



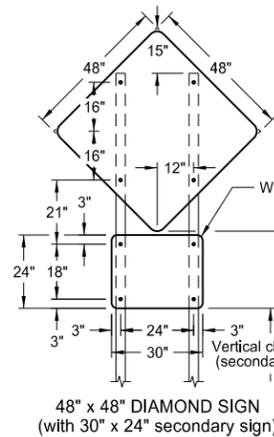
36" x 36" ROUTE MARKER ASSEMBLY



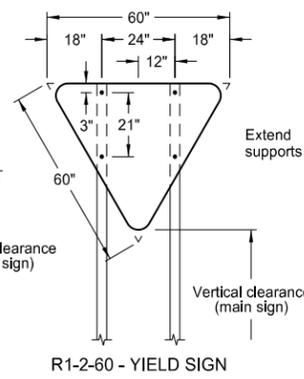
18" x 18" DIAMOND SIGN



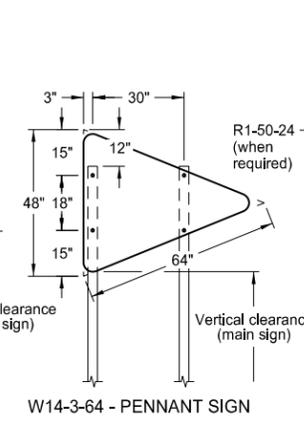
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



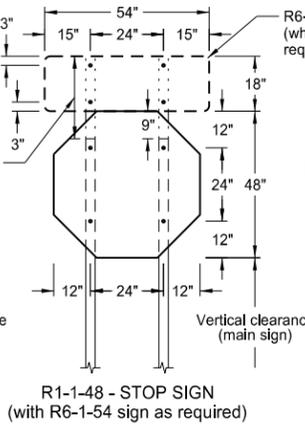
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



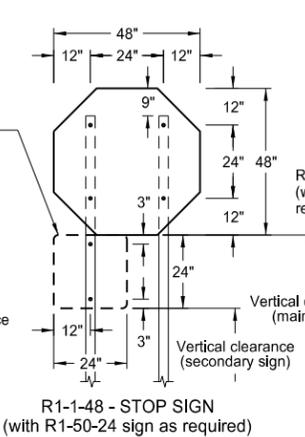
R1-2-60 - YIELD SIGN



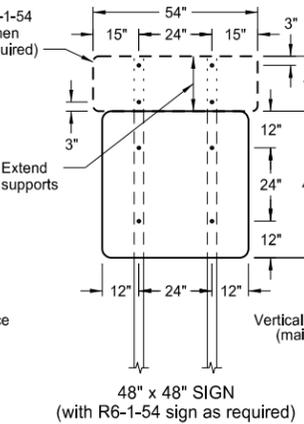
W14-3-64 - PENNANT SIGN



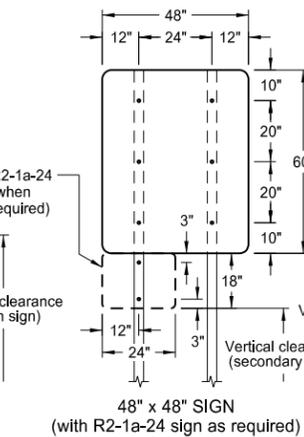
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



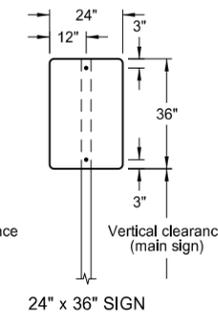
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



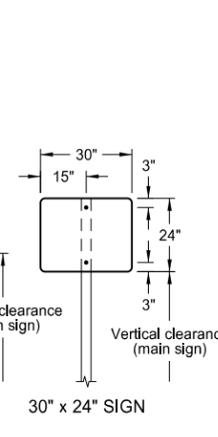
48" x 48" SIGN
(with R6-1-54 sign as required)



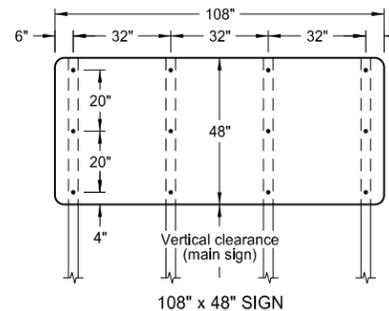
48" x 48" SIGN
(with R2-1a-24 sign as required)



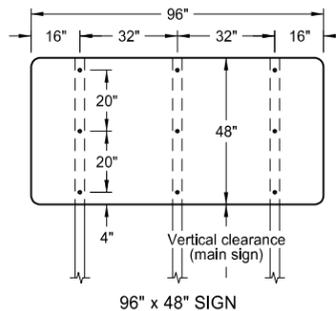
24" x 36" SIGN



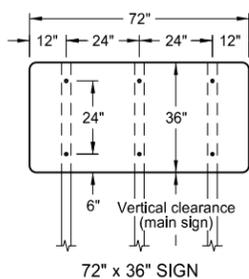
30" x 24" SIGN



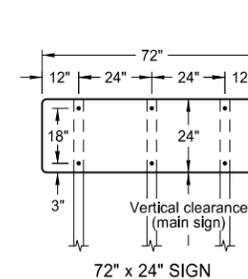
108" x 48" SIGN



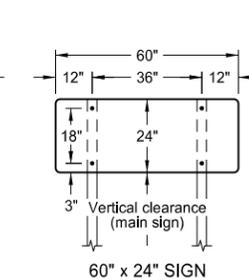
96" x 48" SIGN



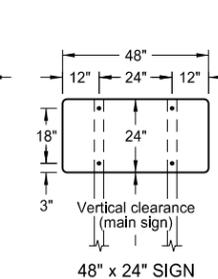
72" x 36" SIGN



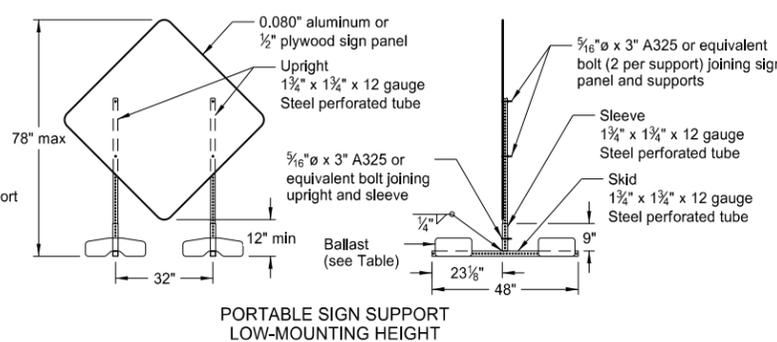
72" x 24" SIGN



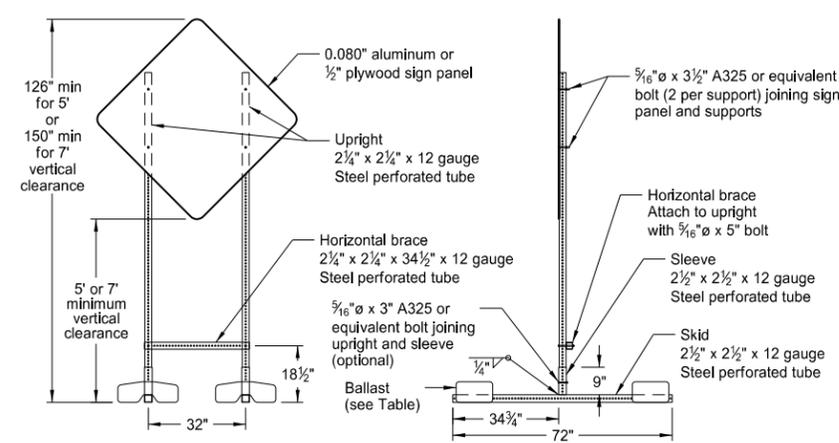
60" x 24" SIGN



48" x 24" SIGN



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

Signs over 50 square feet should be installed on 2 1/2" x 2 1/2" perforated tube supports as a minimum.

Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.
2. Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. All holes to be punched round for 3/8" bolts.
3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a lane closure sign)
4. Route Marker Auxiliary Signs: Provide route marker auxiliary signs, such as the cardinal direction and directional arrows, with a background and legend that match the route marker they are used with:

Interstate - white legend on blue background
Interstate Business Loop - white legend on green background
US and State - black legend on white background
County - yellow legend on blue background
5. Vertical Clearance: Install signs with a vertical clearance of 5'-0" (see TYPICAL SECTION.) In areas where parking or pedestrian movements are likely or the view of the sign may be obstructed, install signs with a vertical clearance of 7'-0" from the top of the curb or from the near edge of the driving lane in absence of a curb.

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

Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.
6. Portable Signs: Provide portable signs that meet the vertical clearance as stated above. Use portable signs when it is necessary to place signs within the pavement surface.

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

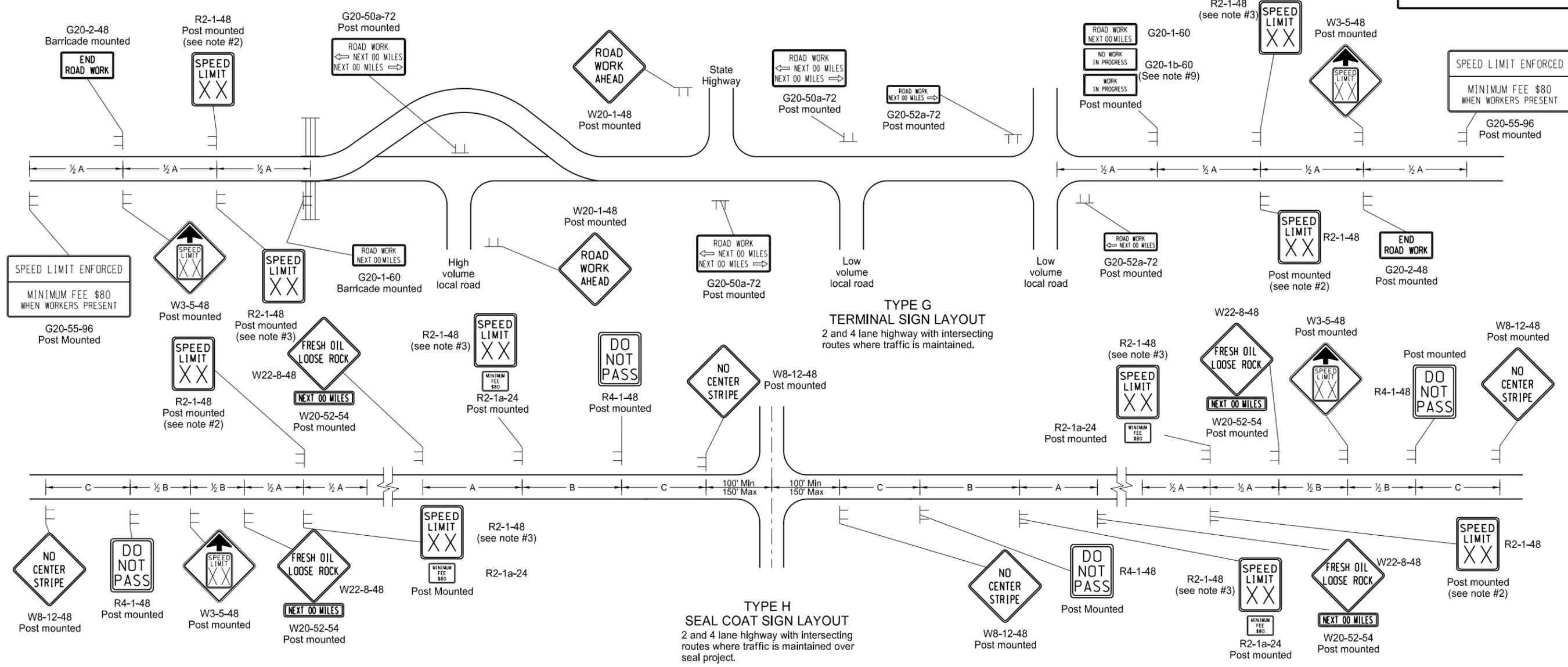
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

This document was originally issued and sealed by
Roger Weigel,
Registration Number
PE-2930,
on 11/14/13 and the original document is stored at the North Dakota Department of Transportation

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



- Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
- The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
- When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
- Existing speed limit signs within a reduced speed zone shall be covered.
- On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
- The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
- Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
- The contractor shall install the G20-1b-60 sign when work is suspended for winter.
- Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
- G20-55-96 sign is not required if work is less than 15 days.

KEY

≡ Type III barricade

⊥ Sign

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

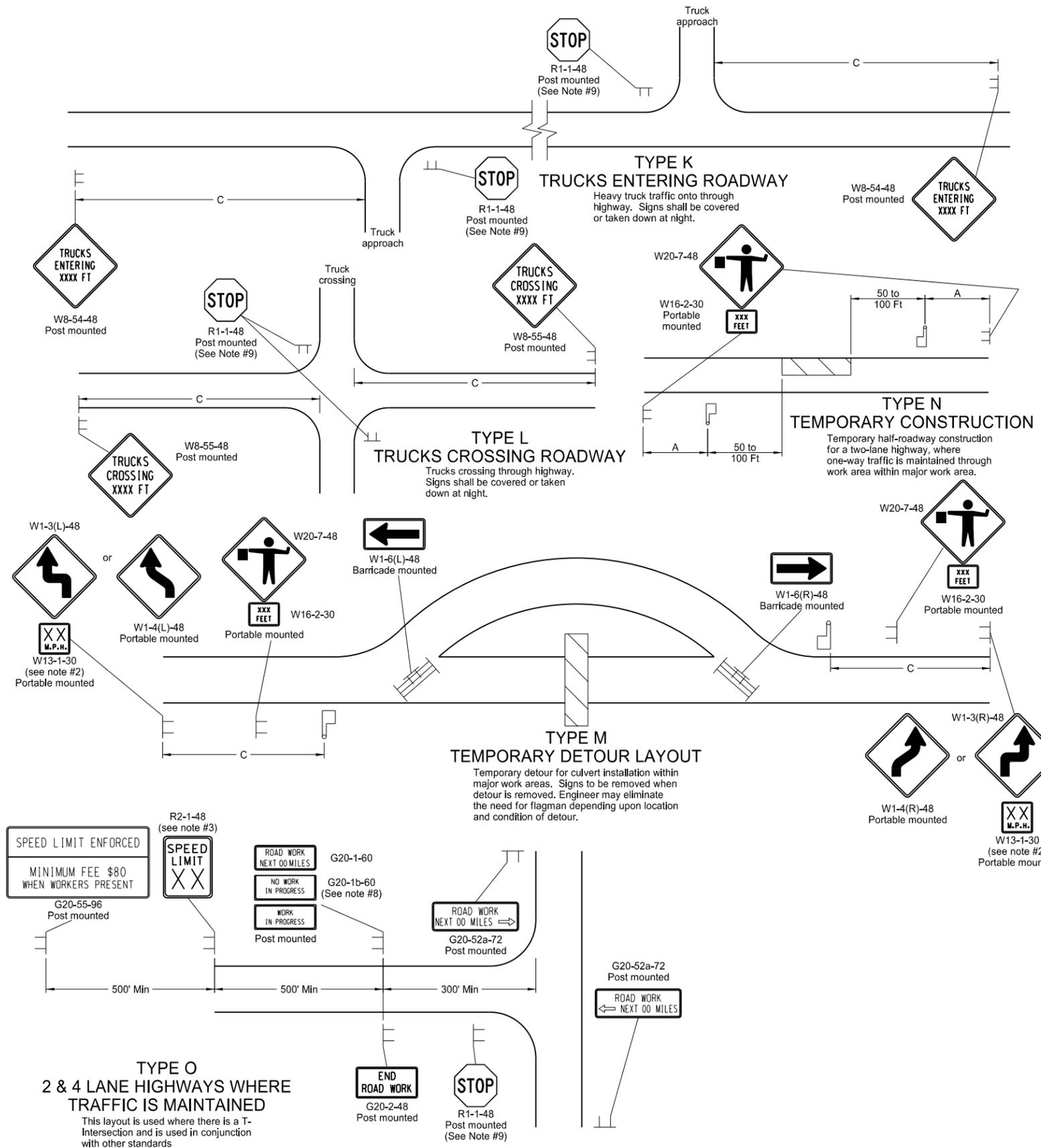
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
9-27-13

REVISIONS	
DATE	CHANGE

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on 09/27/13 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



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

KEY

- Type III barricade
- Work area
- Sign
- Flagger

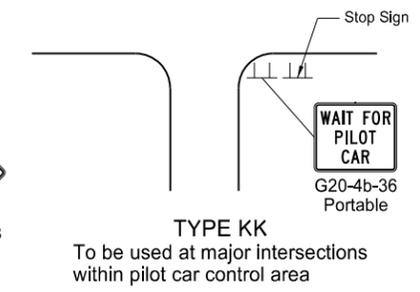
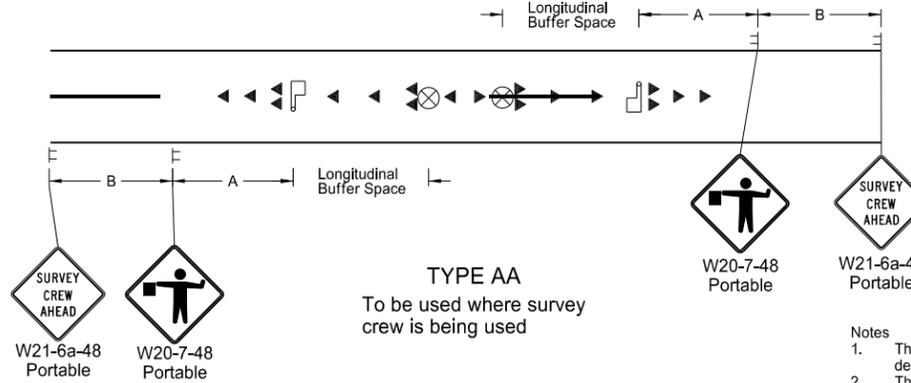
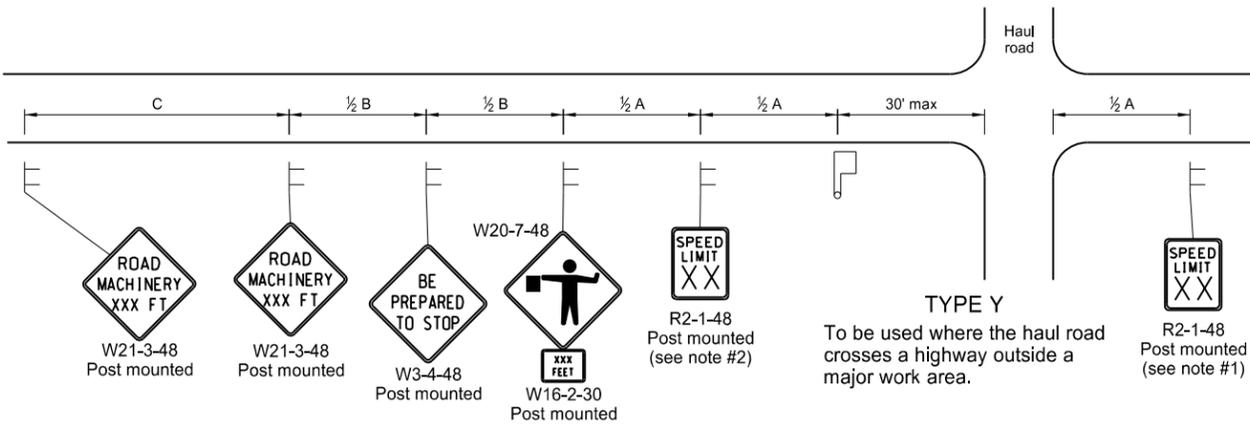
Road Type	ADVANCE WARNING SIGN SPACING		
	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

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

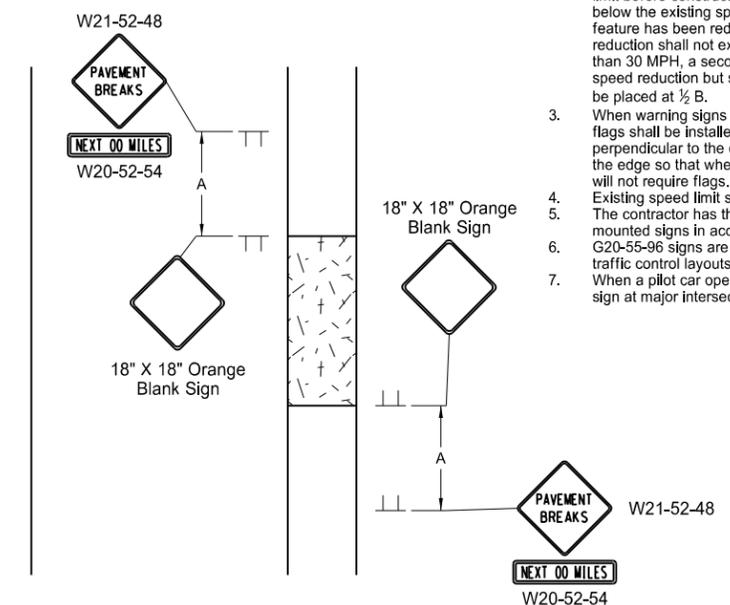
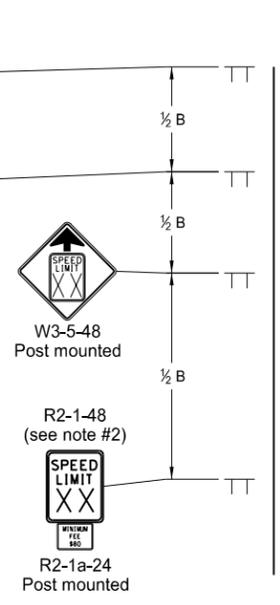
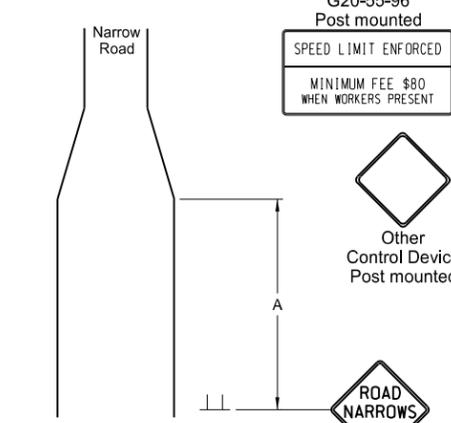
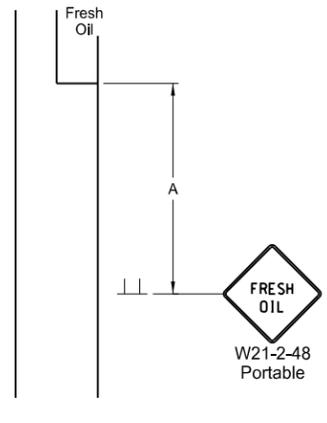
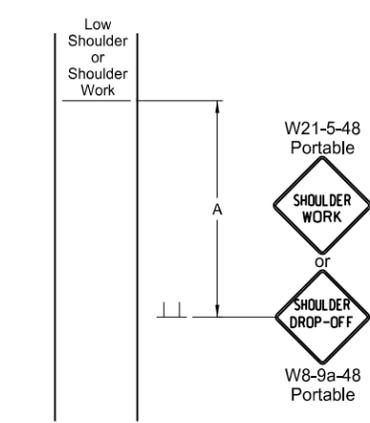
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MISCELLANEOUS SIGN LAYOUTS

D-704-26

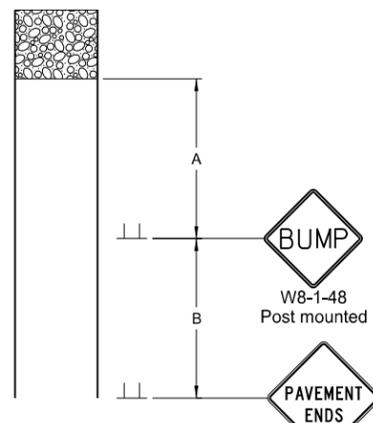
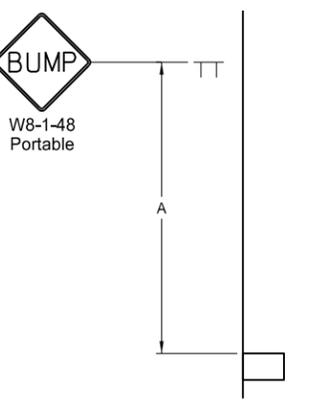
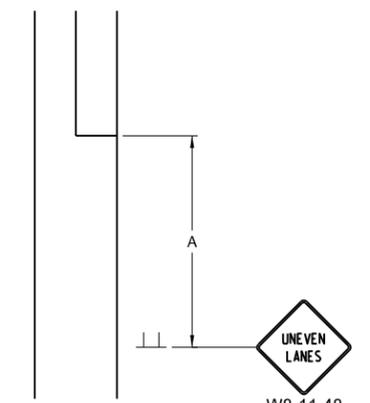


- Notes
- The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph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



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.



KEY

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

Flagger (represented by a square with a diagonal line)

Cones (represented by a triangle)

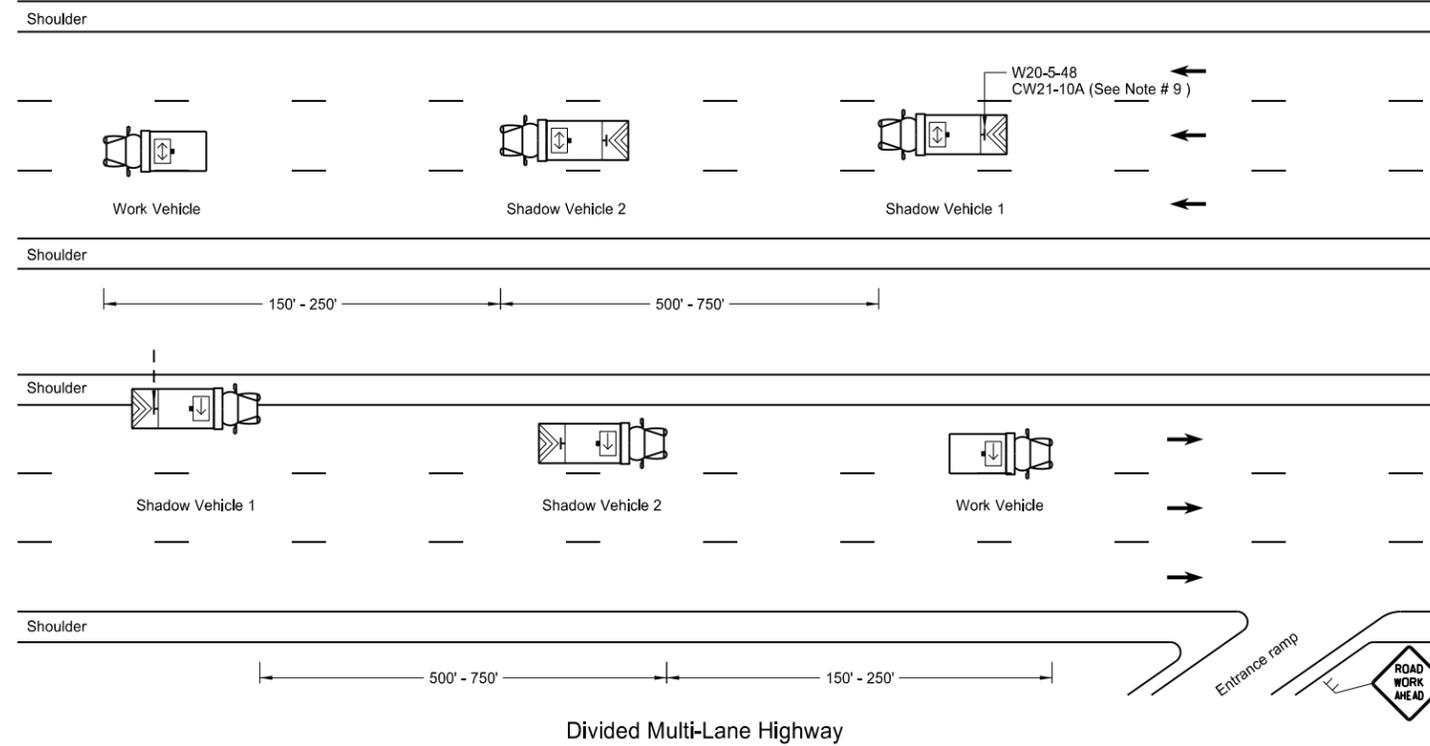
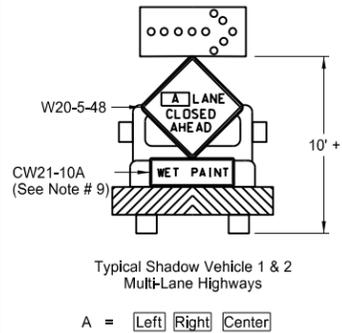
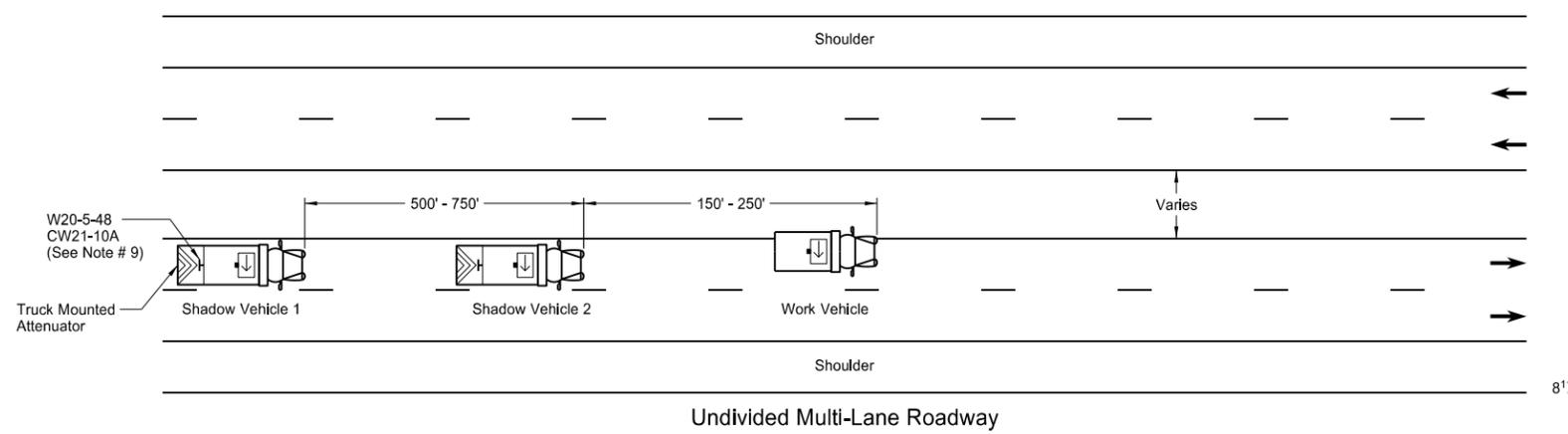
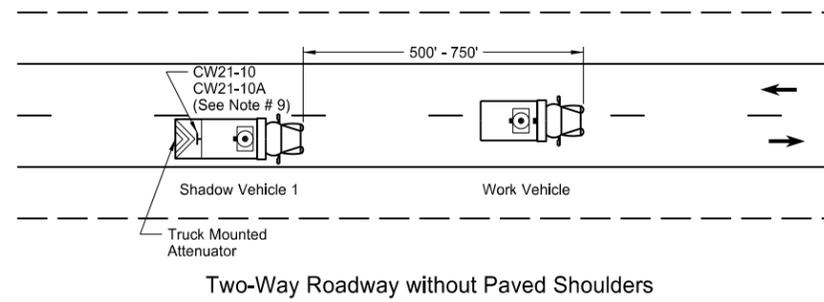
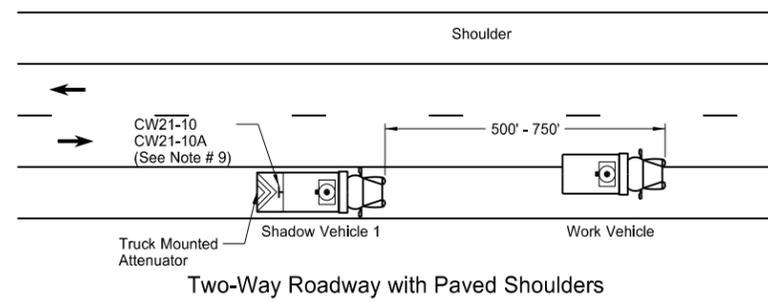
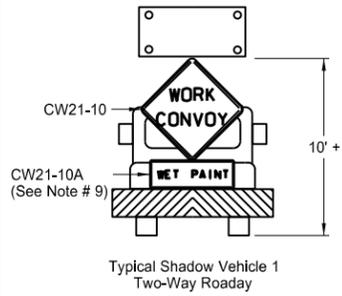
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60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

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

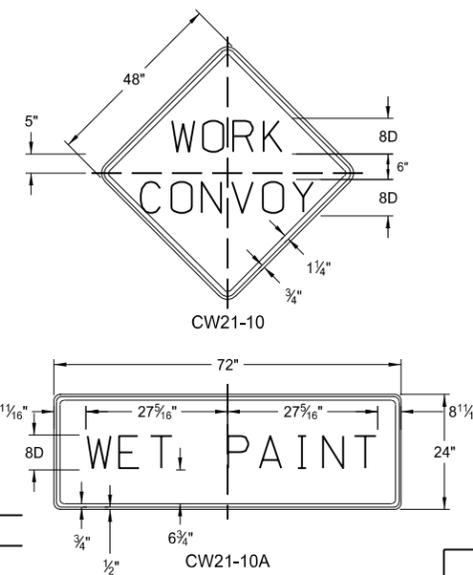
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TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

D-704-27



Sign Details



Notes

- If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
- Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
- Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
- Each vehicle shall have two-way electronic communication capability.
- When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
- Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
- Sign Colors
Letters = Black
Border = Black
Background = Orange
- Shadow vehicle 2 may be used as the paint tender vehicle.
- Sign CW21-10A shall only be used during a painting operation.
- On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.

KEY

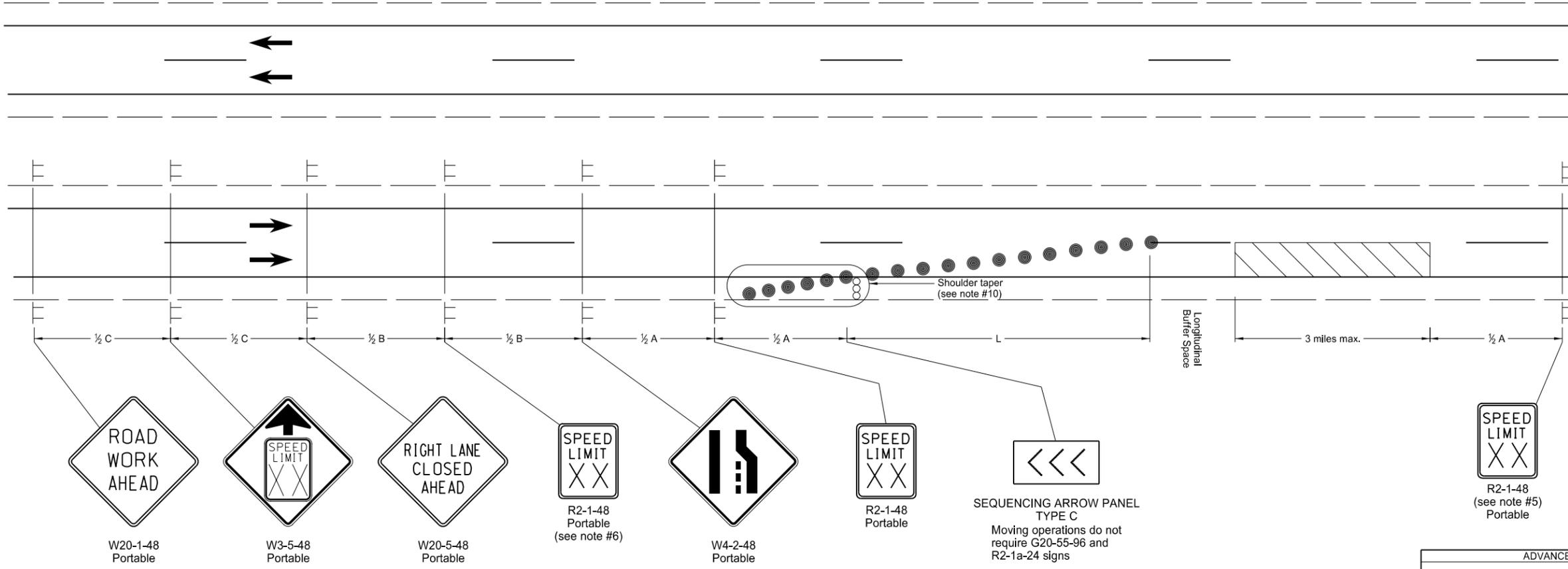
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
 - Right directional
 - Left directional
 - Double arrow directional
 - Caution Mode

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

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SIGN LAYOUT FOR ONE LANE CLOSURE DIVIDED HIGHWAY MOVING OPERATION

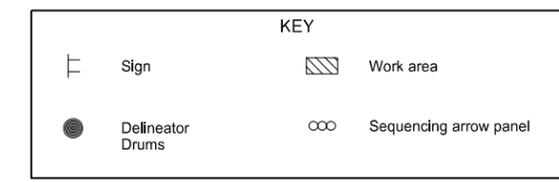
D-704-32



*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.

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

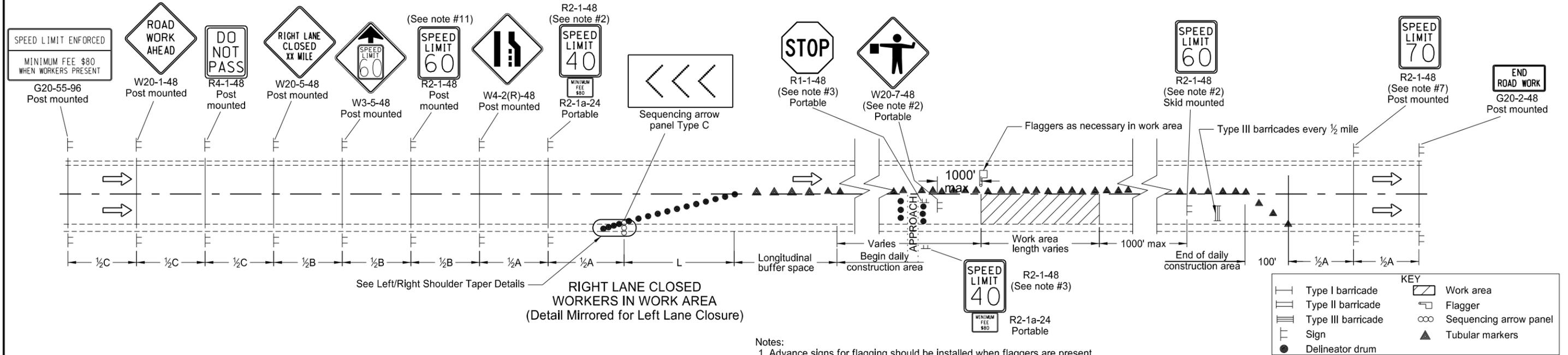


- Notes**
- If the moving operation is not visible to the motorist from the end of the taper, an additional sequencing arrow panel should be provided near the work area placed in the closed lane.
 - Variables
 S = Numerical value of speed limit or 85th percentile.
 W = The width of the taper.
 L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S² / 60 for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums used for tapering traffic shall be spaced at the dimension "S".
 - Sequencing Arrow Panels
 Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
 Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph & 750 ADT or less).
 Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
 Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - The contractor has the option of using portable sign supports in lieu of post mounted sign in accordance with the NDDOT Standard Specifications.
 - If the shoulder is 8' or wider, a shoulder taper shall be provided.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-24-14	Revised Note 9

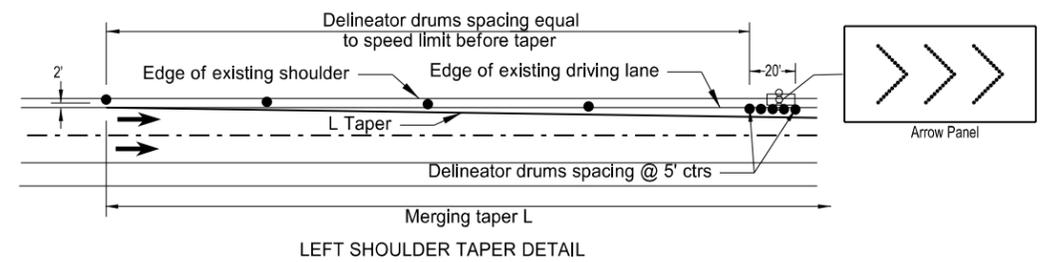
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SIGN LAYOUT FOR ONE LANE CLOSURE

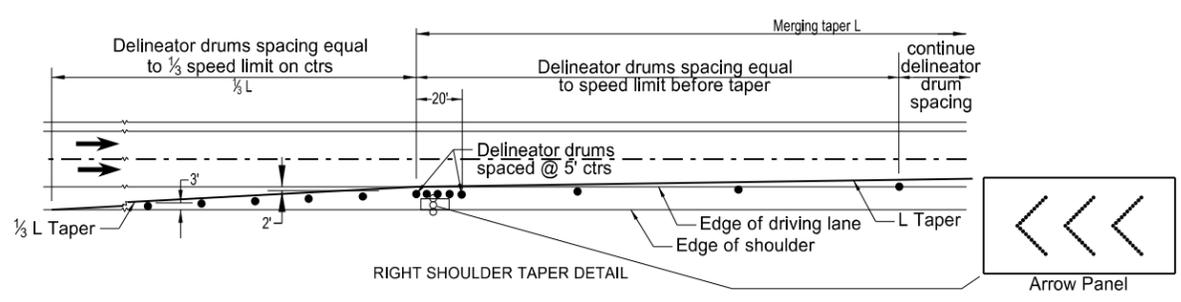


RIGHT LANE CLOSED WORKERS IN WORK AREA (Detail Mirrored for Left Lane Closure)

- Notes:
- Advance signs for flagging should be installed when flaggers are present.
 - The advanced flagger sign and the speed limit signs shall be moved as the work area moves through the construction zone. When the work area is not visible from the flagger, the flagger station shall be placed so the work area is visible. The 40 mph speed limit sign shall be spaced at 1/2 A in advance of the flagger sign. The 60 mph speed limit sign shall also be moved. Upon completion of the work day or when workers are not present, the 40 mph speed limit and the Minimum Fee \$80 signs shall be covered or removed. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - Approaches: When the work area encompasses an approach, the approach shall be controlled by installing a 40 mph speed limit sign. If this approach is on the side of the lane closure, the existing stop sign shall be covered and a new portable stop sign shall be installed. When the main line 40 mph speed zone is moved past the approach, the approach speed limit sign shall be removed.
 - Variables:
 - S=Numerical value of speed limit or 85th percentile
 - W=The width of taper.
 - L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.
 - Delineator drums, used for tapering traffic shall be spaced at the dimension "S". Tubular markers used for tangents shall be spaced at 2 times dimension "S".
 - Sequencing arrow panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
 - Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
 - Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
 - Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
 - The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
 - Existing speed limit signs within a reduced speed zone shall be covered.
 - When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
 - The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 mph. Where speed limits are to be reduced more than 30 mph, a second speed limit sign shall be installed with the desired speed reduction, but shall not exceed 30 mph. The second speed limit sign shall be placed at 1/2 B.
 - The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
 - Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.



LEFT SHOULDER TAPER DETAIL



RIGHT SHOULDER TAPER DETAIL

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

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

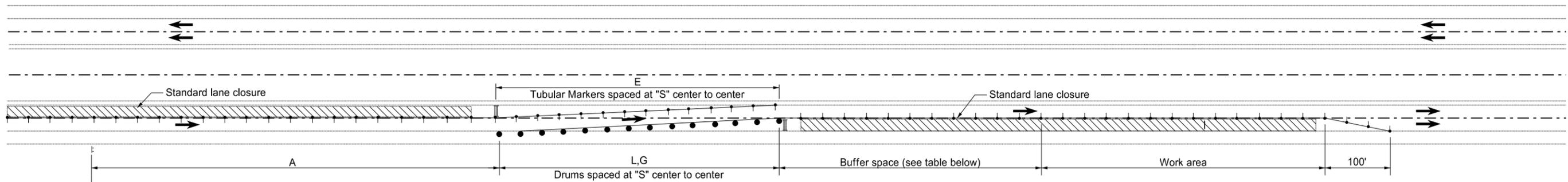
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA	
DEPARTMENT OF TRANSPORTATION	
9-26-2012	
REVISIONS	
DATE	CHANGE

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TRAFFIC CONTROL SYSTEM LANE SHIFT BETWEEN A LANE CLOSURE AND AN OPPOSITE LANE CLOSURE

D-704-34A



QUANTITIES	
TYPE III BARRICADES	2 Each
DELINEATOR DRUMS	14 Each
TUBULAR MARKERS	14 Each
RAISED PAVEMENT MARKERS (White)	Varies
OBLITERATION OF PAVEMENT MARKING	Varies

KEY			
	Work area		Delineator drum
	Type III barricade		Tubular markers
	Traffic Direction		Sign

LEGEND	
E	Obliteration of pavement marking (10' line, 30' skip centerline)
G	Raised pavement markers (white) 5' ctrs.

Notes

- Variables
 - S = Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.
 - W = Width of offset in feet.
 - L = Taper length in feet. Speeds 40 mph or less $L = WS^2 / 60$. Speeds 45 mph or greater $L = WS$.
- Signs and barricade shown to be placed on roadway shall be placed on moveable assemblies.
- Existing speed limit signs within a reduced speed zone shall be covered.
- Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the Engineer.
- The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings in accordance with NDDOT Standard Specifications.
- When placing traffic control devices, speed reductions will be necessary. The "Minimum Fee \$80" sign shall be placed below these speed limit signs.
- Obliteration of pavement marking (10' line, 30' skip, centerline) and raised pavement markers are not necessary when the work is 14 days or less.

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

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

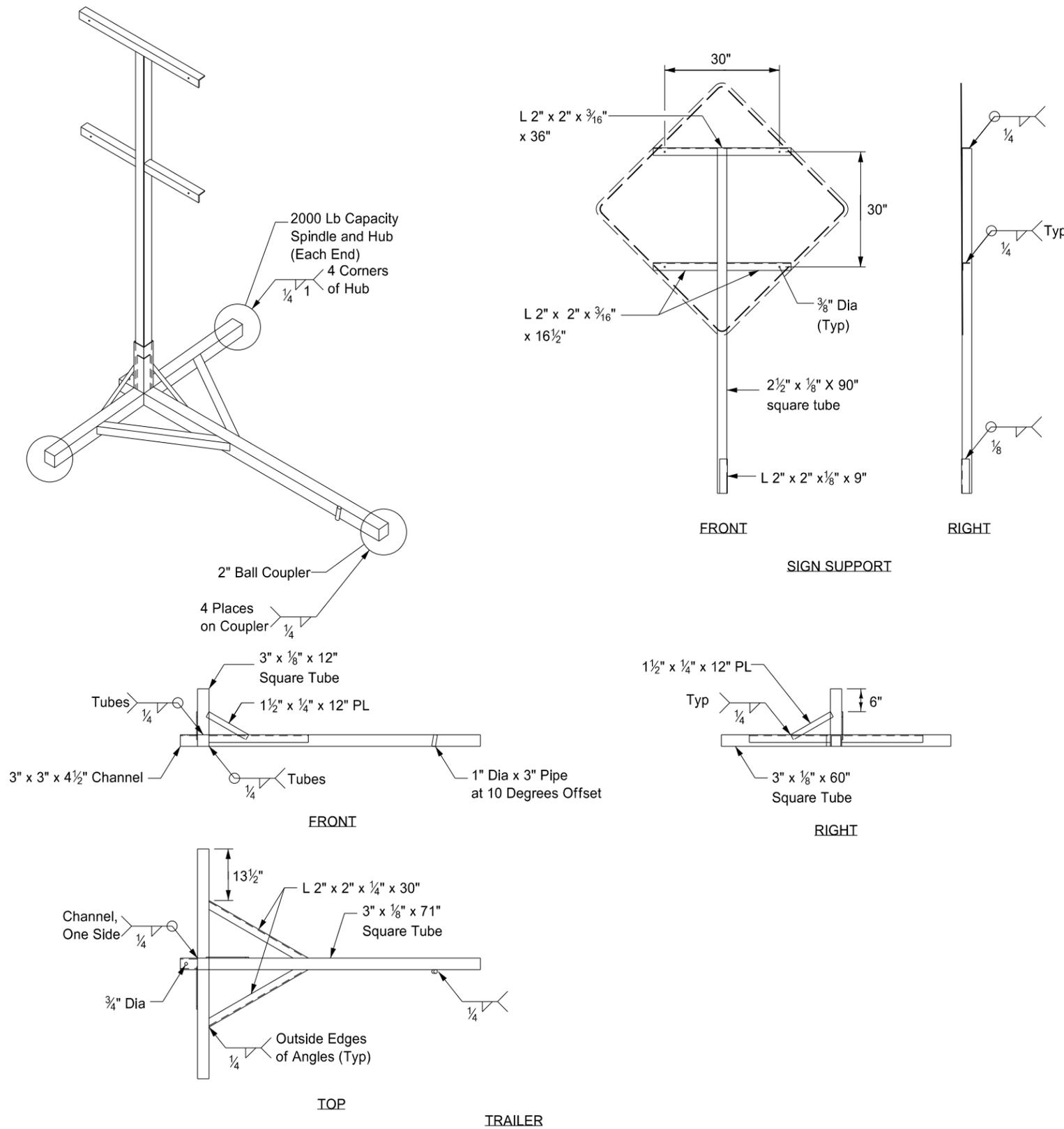
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-26-2012	
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DATE	CHANGE

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PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



Notes:

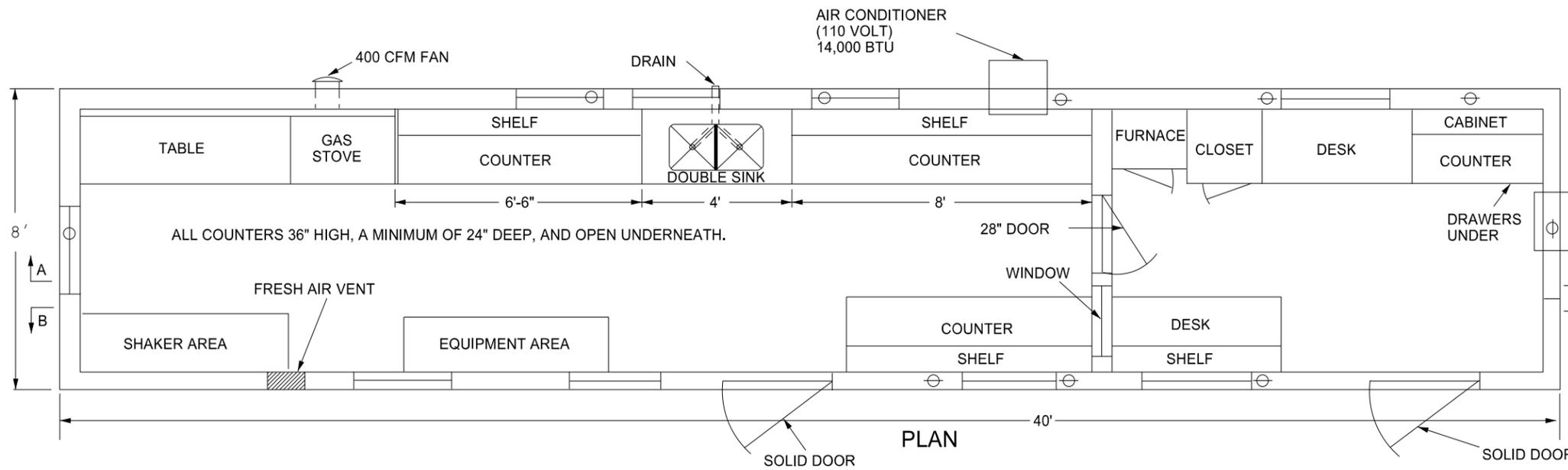
- ① The maximum weight of the assembly is 250 pounds.
- ② Use a 14" wheel and tire.
- ③ Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
- ④ Other NCHRP 350 crash tested assemblies are acceptable.

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

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BITUMINOUS LABORATORY

D-706-1



AIR CONDITIONER (110 VOLT) 8,000 BTU

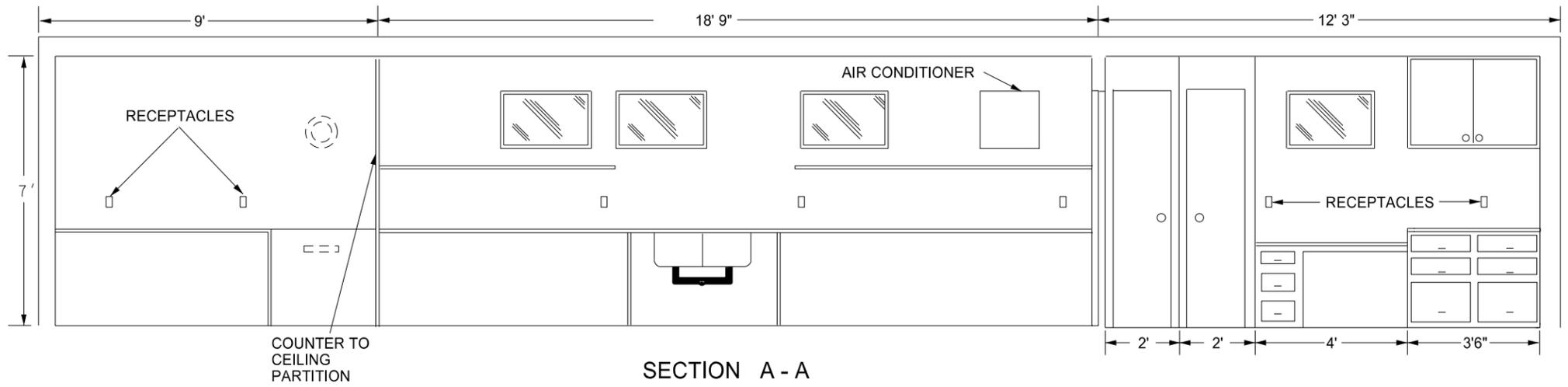
NOTES:

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

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

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

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



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

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

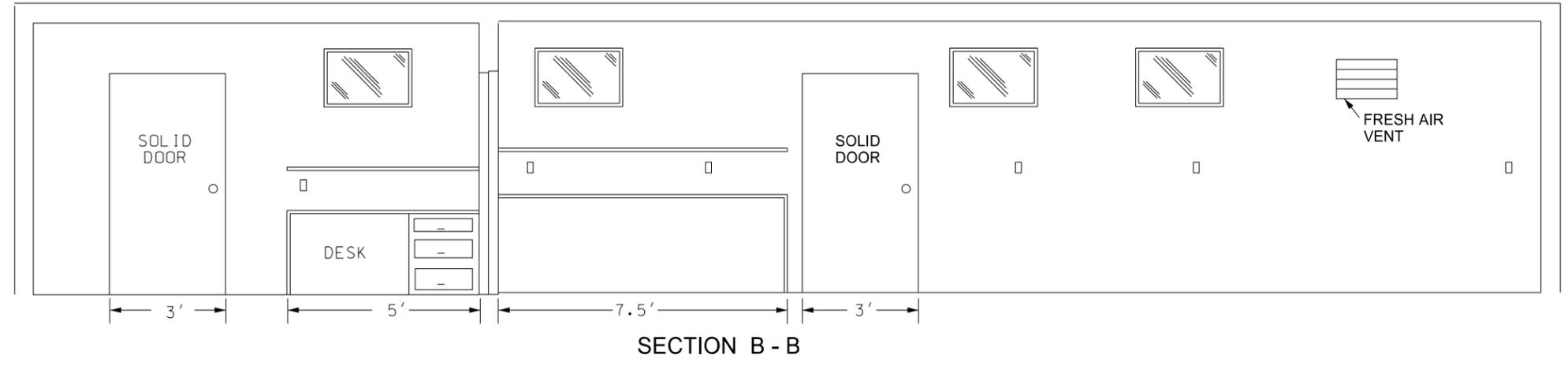
The water supply tank shall have a capacity of 500 gallons.

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

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

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

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



The floor beneath the marshall area shall be heavily reinforced.

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

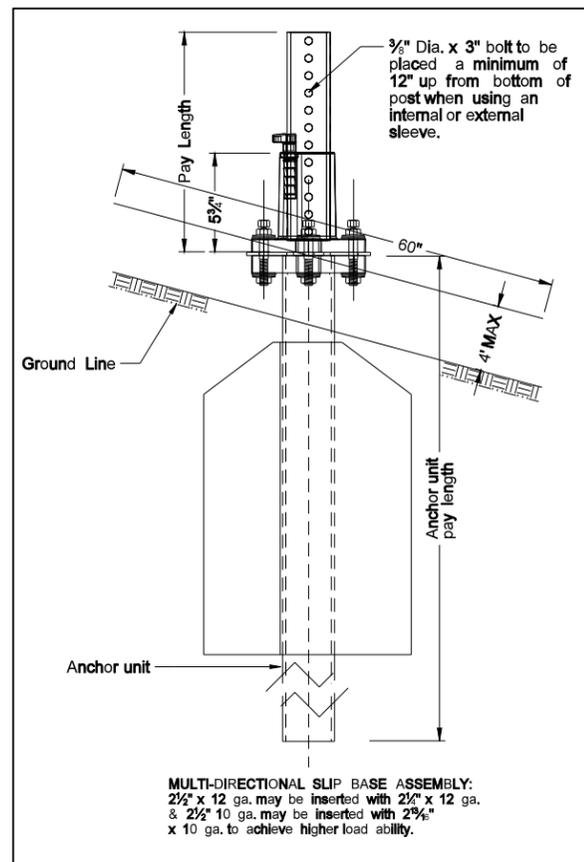
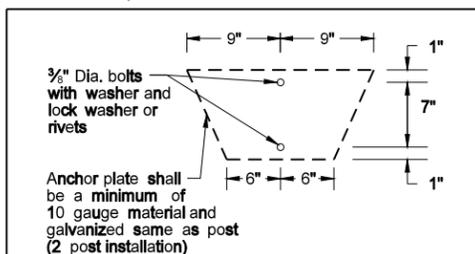
Electrical service entrance shall be wired for 100 amps, and have separate circuits for air conditioners. Convenience outlets shall have a minimum spacing of four feet in counter areas.

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

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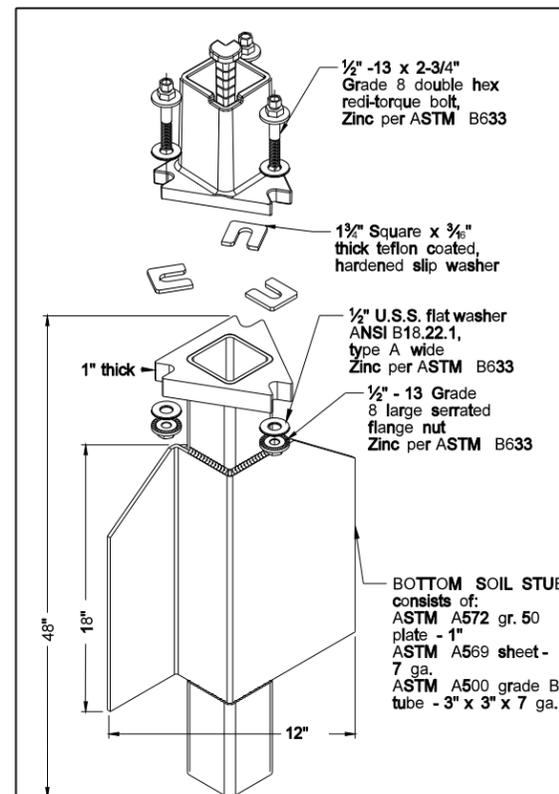
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/2	12
1	2 1/2	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/2	12	2 1/2(D)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

(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
 (C) - 3" anchor unit
 (D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.

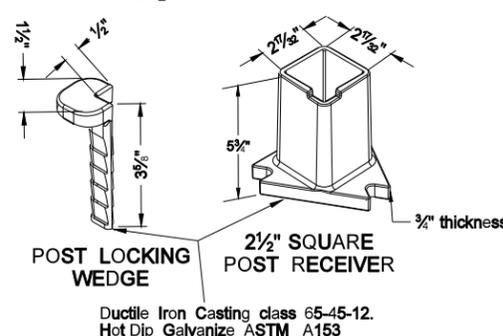


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
 2 1/2" x 12 ga. may be inserted with 2 1/2" x 12 ga. & 2 1/2" 10 ga. may be inserted with 2 3/8" x 10 ga. to achieve higher load ability.

Mounting Details Perforated Tube

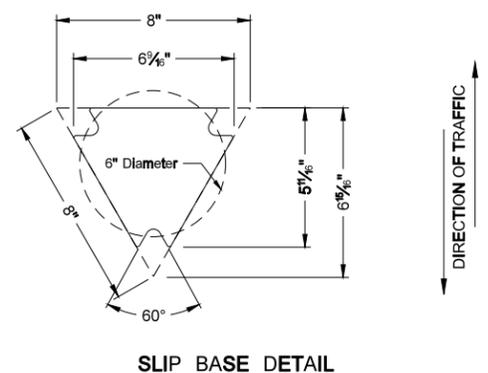


SLIP BASE FOR 2 1/2" POST



2 1/2" SQUARE POST RECEIVER

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



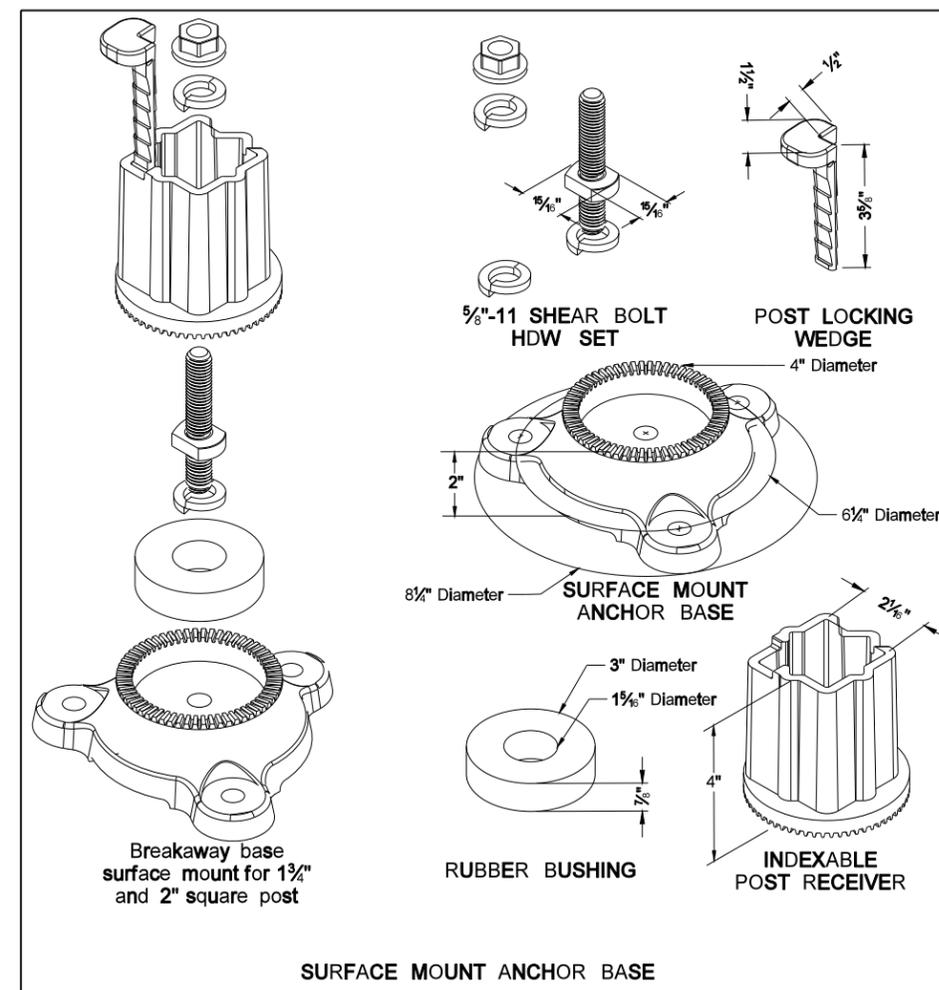
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. Area In. ²	Section Modulus In. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/2 x 2 1/2	0.105	12	2.773	0.561	0.695	0.499
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783

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

NOTE:

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



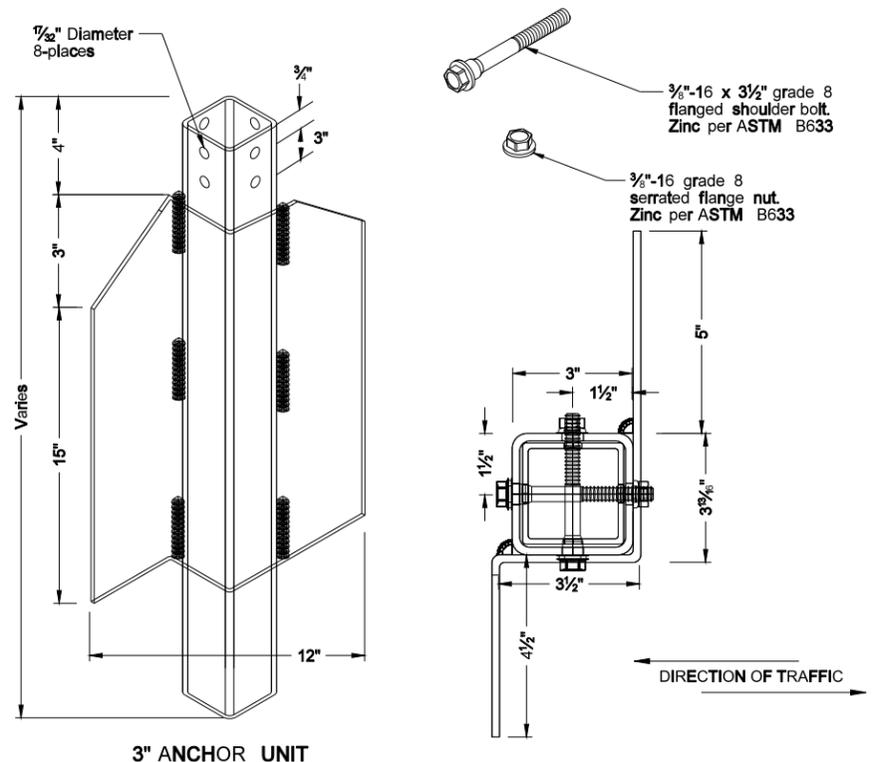
SURFACE MOUNT ANCHOR BASE

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

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

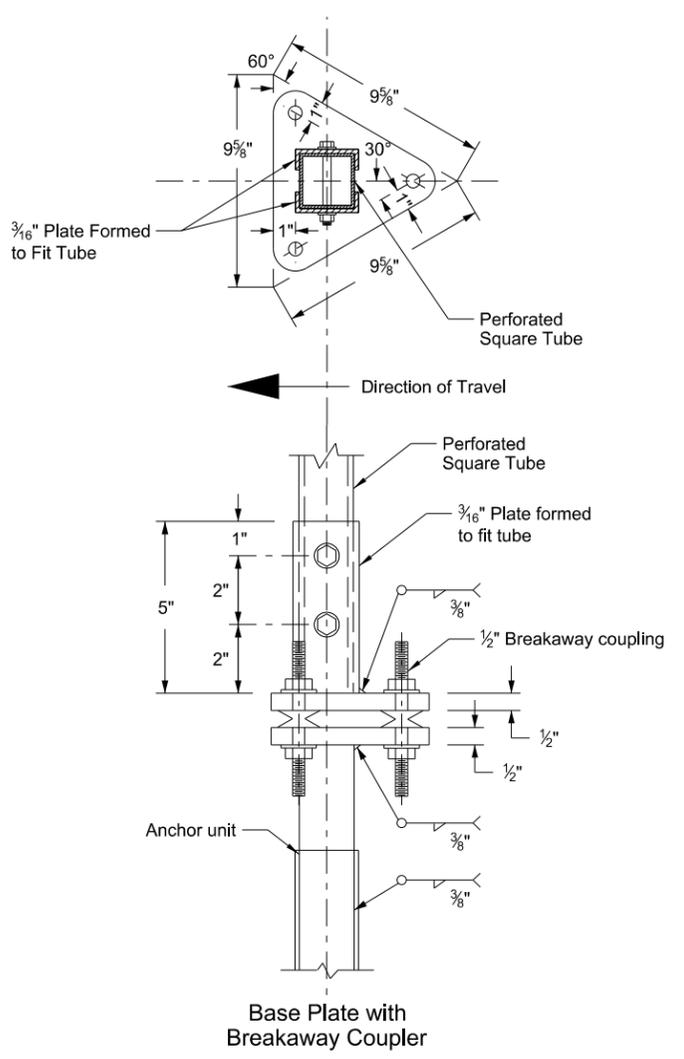
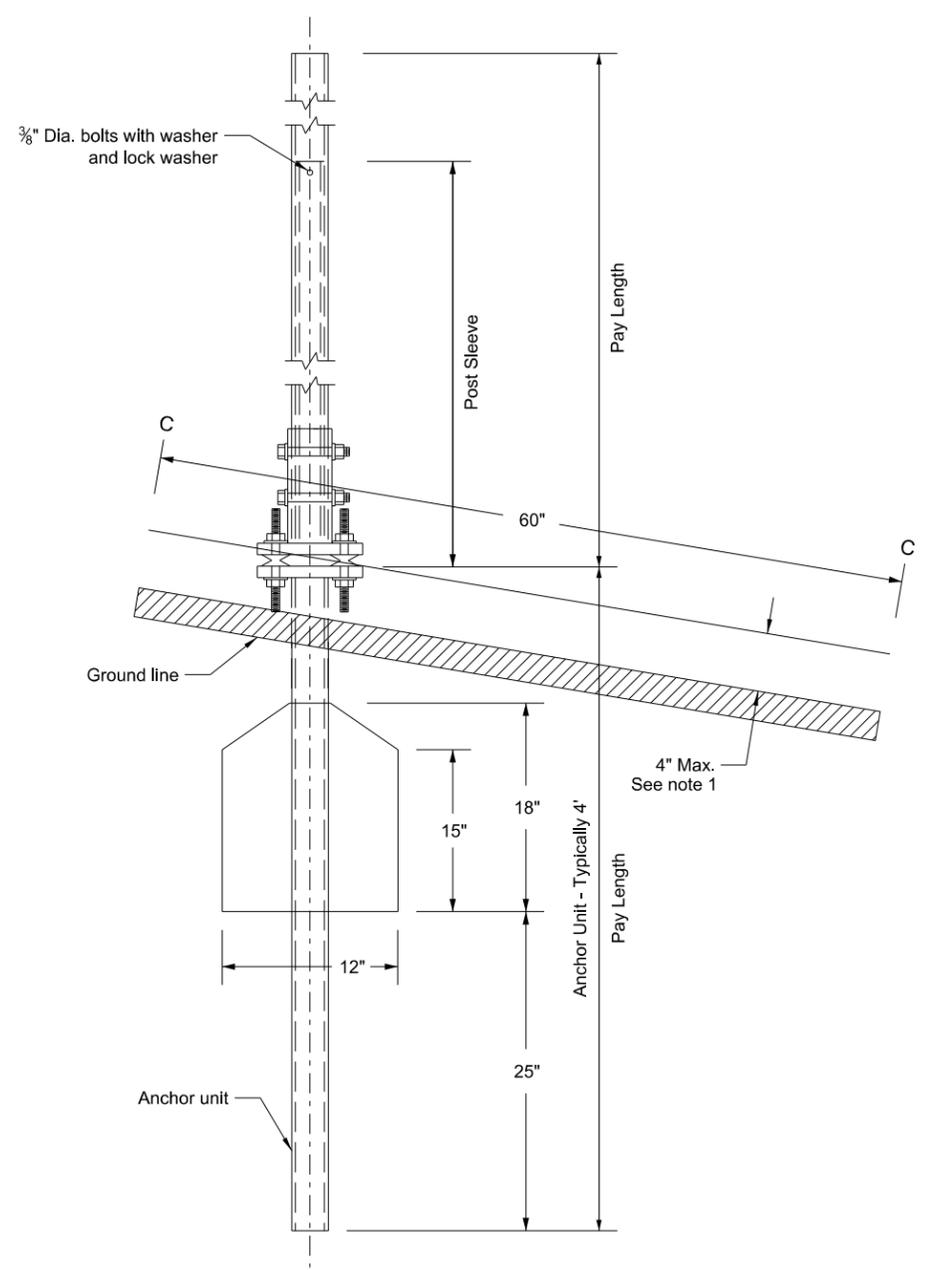


3" ANCHOR UNIT

Breakaway Coupler System for Perforated Tubes

Notes:

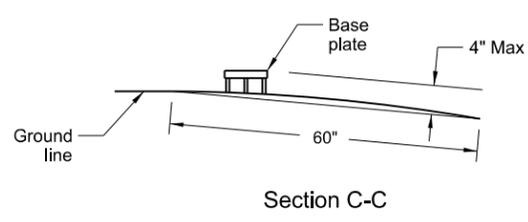
- 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
- Anchor unit shall be the same size as the post and shall have the same specification as the post.
- Four post signs shall have over 8' between the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



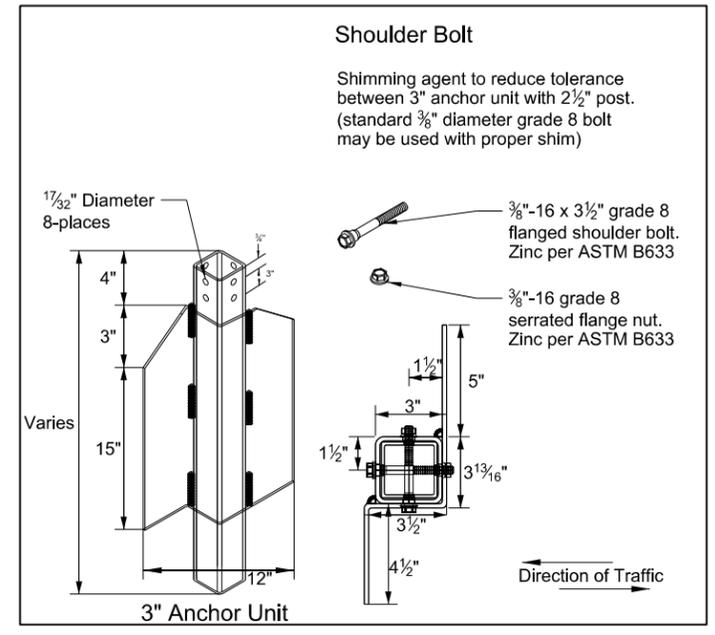
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thickness Gauge	Sleeve Size In.	Wall Thickness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Gauge
1	2	12			No	2 1/4	12
1	2 1/4	12			No	2 1/2	12
1	2 1/2	12			(B)	3(C)	7
1	2 1/2	10			Yes		7
1	2 1/4	12	2	12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

(B) - The 2 1/2" 12 gauge posts do not need breakaway bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.

(C) - 3" anchor unit



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



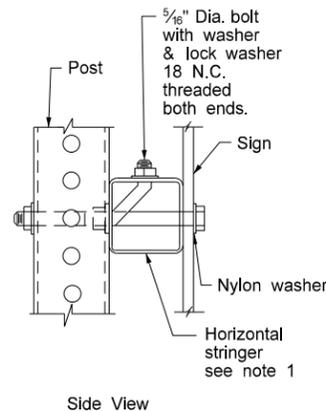
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

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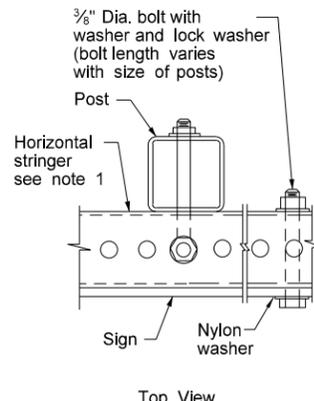
Mounting Details Perforated Tube

Note:

- Horizontal stringers - In lieu of perforated tubes, the contractor may substitute z bar stringers. The z bar stringers shall be 1 1/2" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel.
- Metal washers used on sign face shall have a minimum outside diameter of 5/16" ± 1/64" and 10 gauge thickness.
- No Parking Signs: All no parking signs with directional arrows shall be placed at a 30 to 45 degree angle with the line of traffic flow. No parking signs required at the above angles may have the support turned to the correct angle. If the no parking sign is placed with another sign that has to be placed at a 90 degree angle with the line of traffic flow, the detailed angle strap should be used to mount the no parking sign. Flat washers and lock washers shall be used with all nylon washers.
- In lieu of using the bent bolt to attach the post to the stringer, the contractor may choose to punch the sign backing and place the bolt through the sign, the stringer and the post.
- 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.

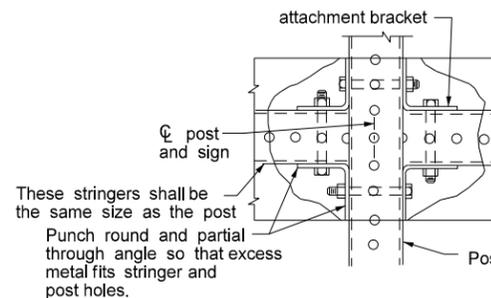


Side View



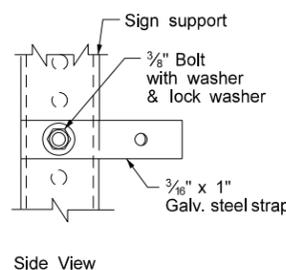
Top View

STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)

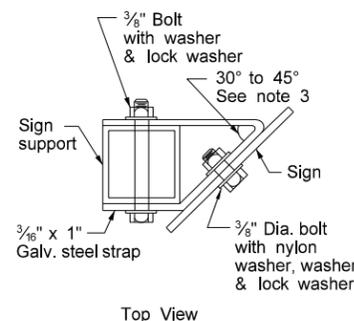


These stringers shall be the same size as the post. Punch round and partial through angle so that excess metal fits stringer and post holes.

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

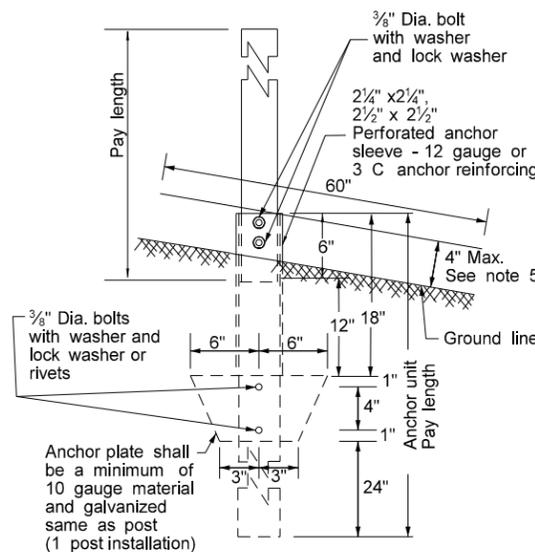


Side View

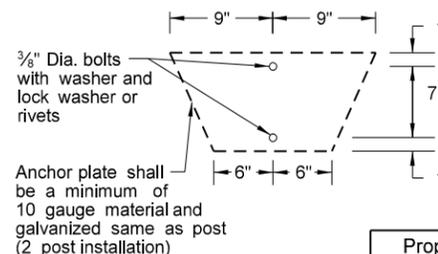


Top View

STRAP DETAIL



ANCHOR UNIT AND
POST ASSEMBLY

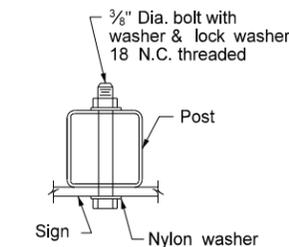


Properties of Telescoping Perforated Tubes							
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In. ⁴	Cross Sect. area In. ²	Section Modulus In. ³	
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172	
2 x 2	0.105	12	2.416	0.372	0.590	0.372	
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499	
2 3/8 x 2 3/8	0.135	10	3.432	0.605	0.841	0.590	
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643	
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.783	

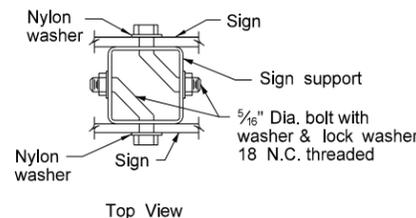
The 2 3/8" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size is shown as 2.51" size on the plans.

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

(B) - The 2 1/2", 12 gauge posts do not need breakaway bases when placed in standard soils, but require a shim as specified by the manufacturer. The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2 1/2" x 12 ga. x 18" minimum length external sleeve required.



BOLT MOUNTING



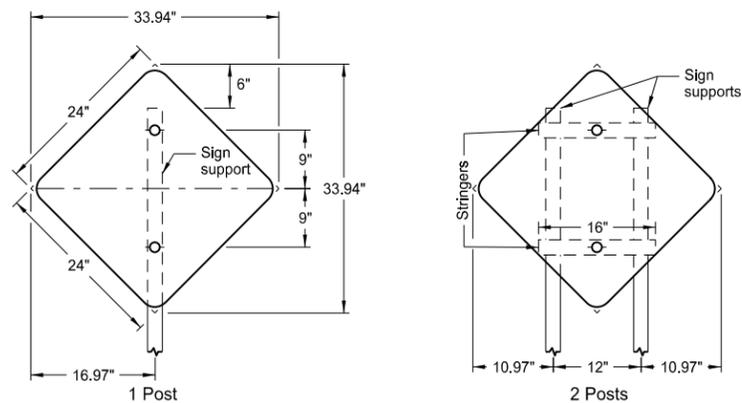
Top View

BACK TO BACK
MOUNTING

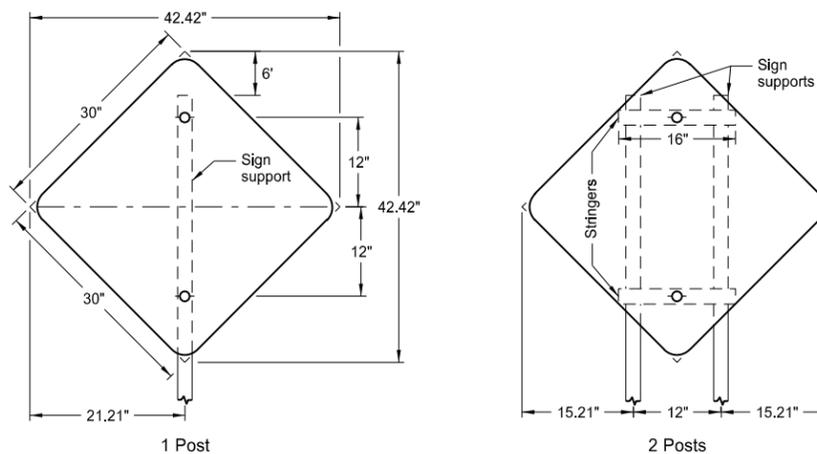
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3

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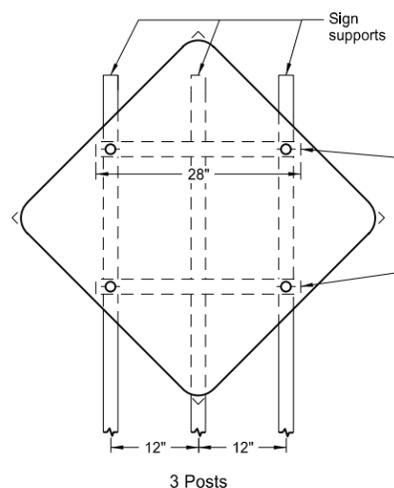
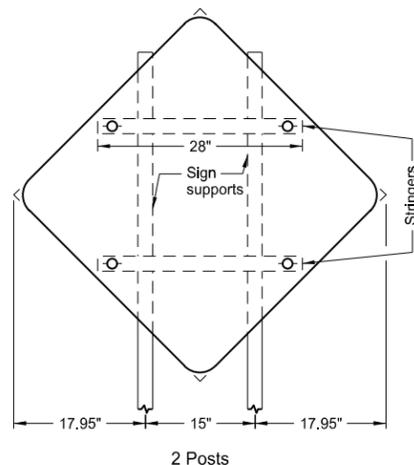
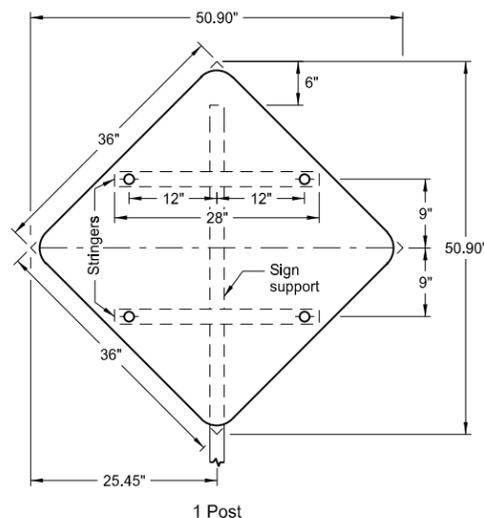
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



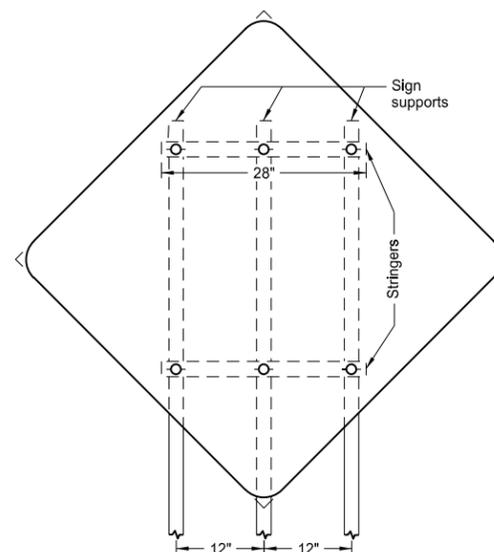
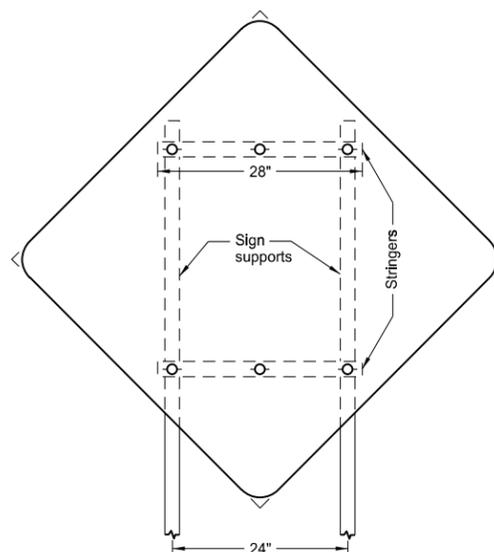
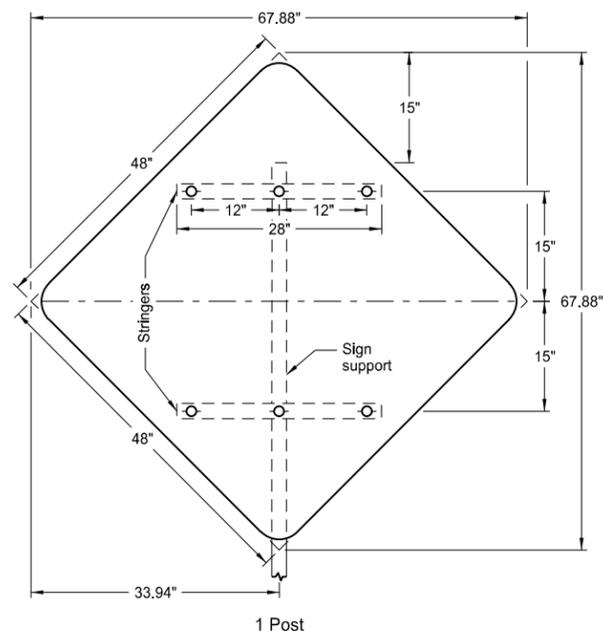
Assembly No. 18



Assembly No. 19



Assembly No. 20



Assembly No. 21

Notes:

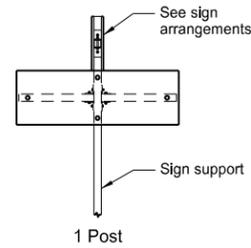
1. See Standard D-754-25 for mounting details.
2. The minimum sign backing material thickness shall be 0.100 inch.
3. Perforated square tube stringer shall be 1½" x 1½".
4. All holes shall be punched round for ⅜" bolt.

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

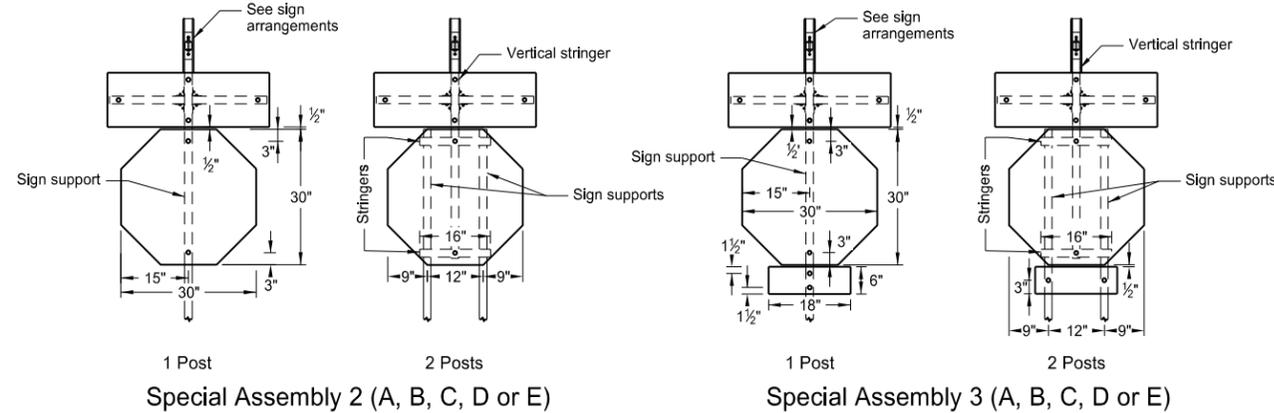
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

- A - Single sign
- B - Single sign back to back
- C - Single sign each direction
- D - Single sign one direction, back to back other direction
- E - Back to back both directions

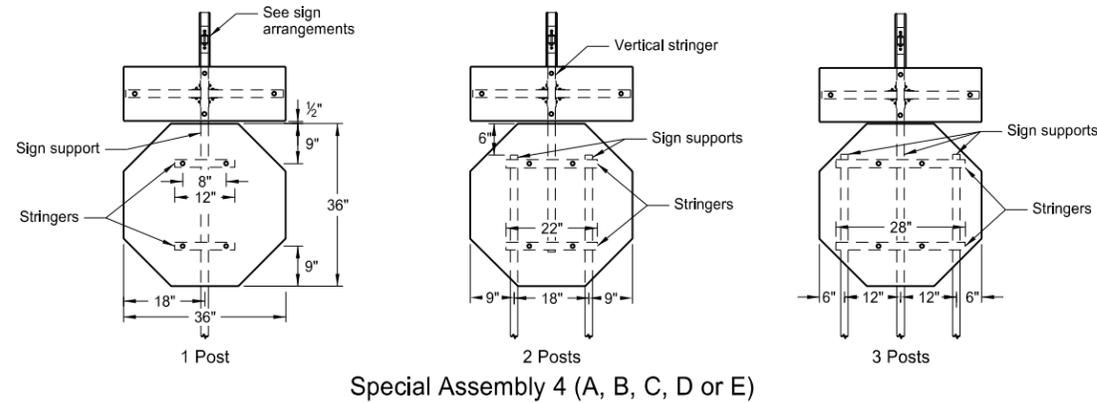


Special Assembly 1 (A, B, C, D or E)

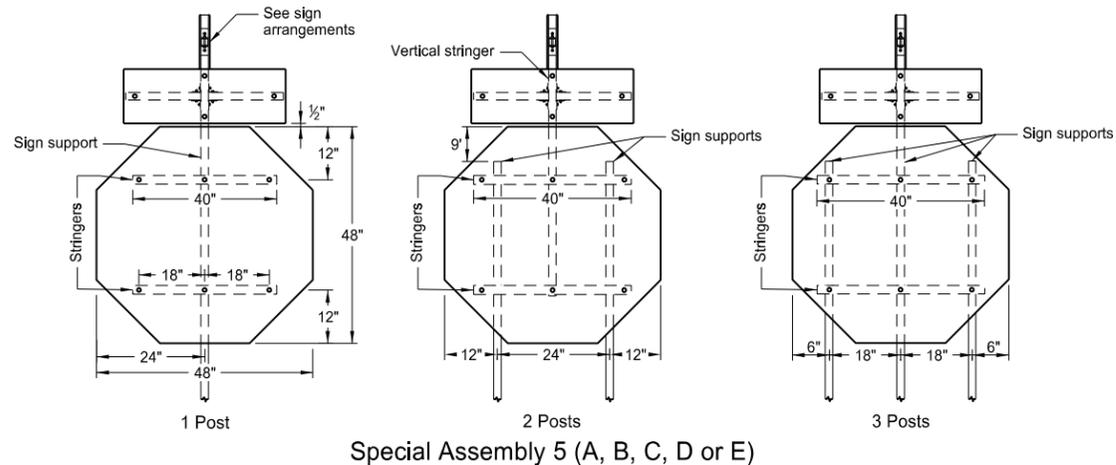


Special Assembly 2 (A, B, C, D or E)

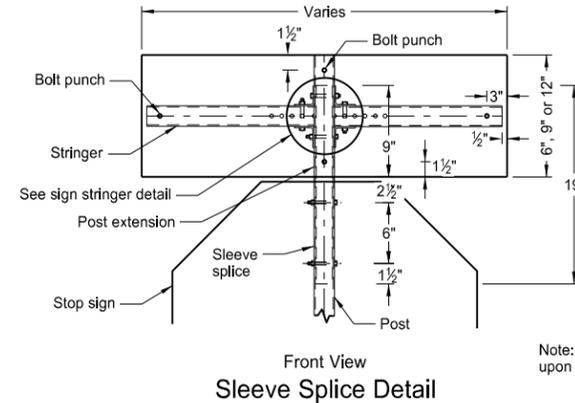
Special Assembly 3 (A, B, C, D or E)



Special Assembly 4 (A, B, C, D or E)

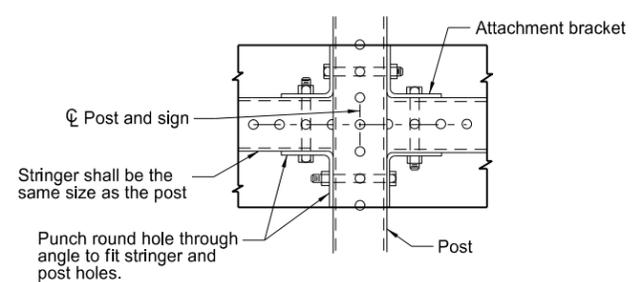


Special Assembly 5 (A, B, C, D or E)



Sleeve Splice Detail

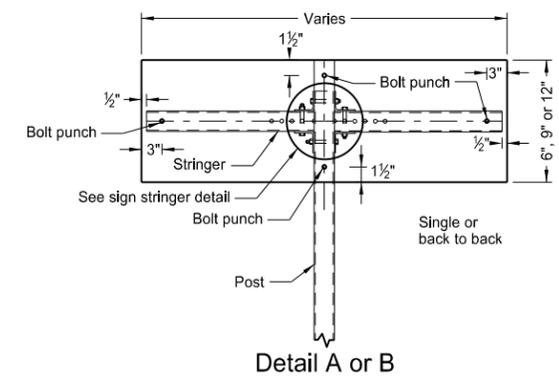
Note: The splice method may be used upon approval of the engineer.



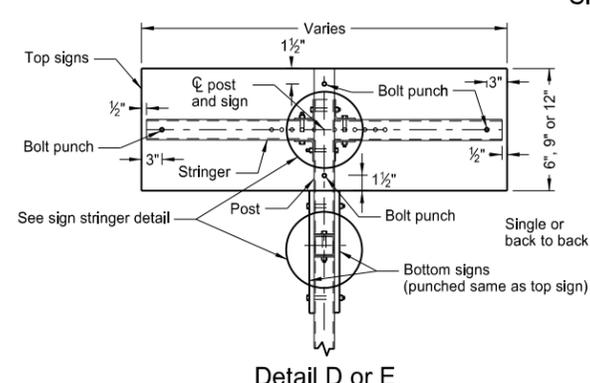
Sign Stringer Detail

Stringer shall be the same size as the post

Punch round hole through angle to fit stringer and post holes.

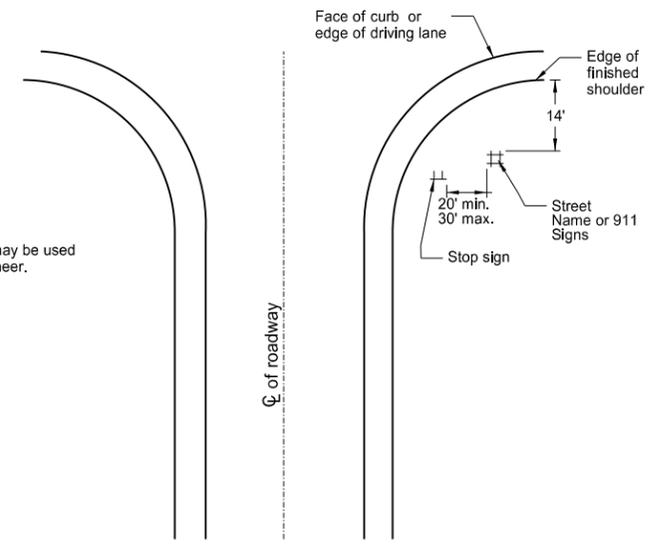


Detail A or B



Detail D or E

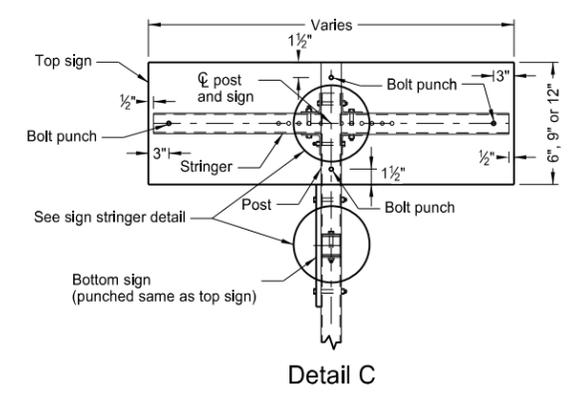
Note: See Standard Drawing D-754-86 for 911 support information and sign layout details.



Intersection Layout

Note: This layout is to be used for street name signs or 911 signs that are used with Special Assembly 1.

Sign Arrangements

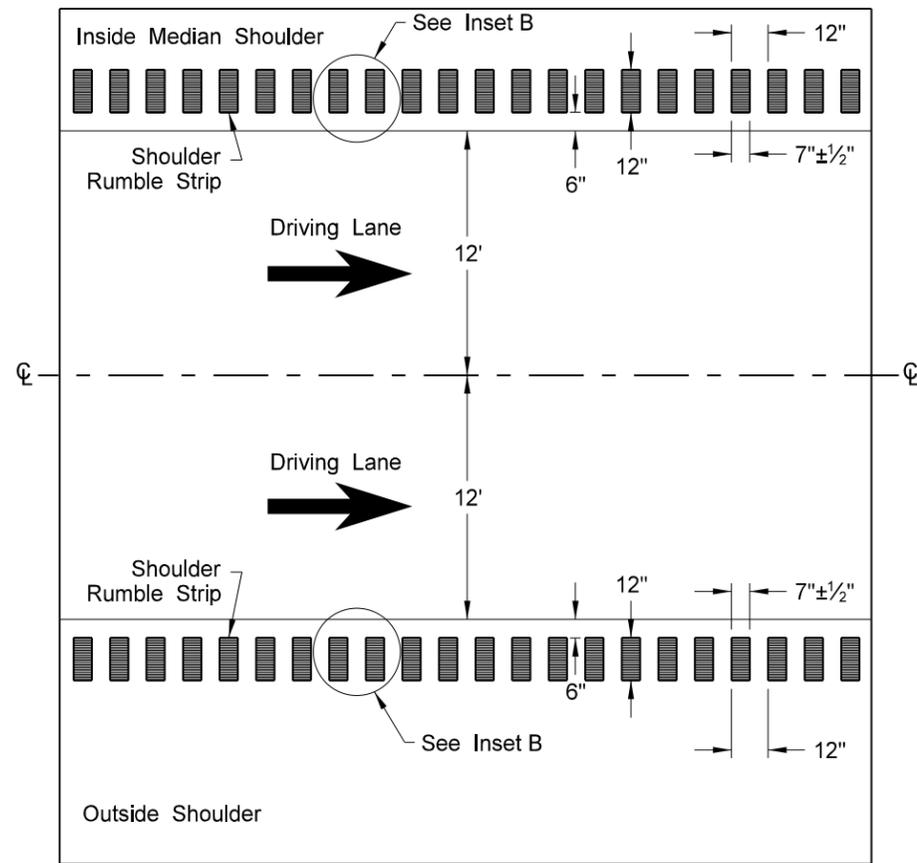


Detail C

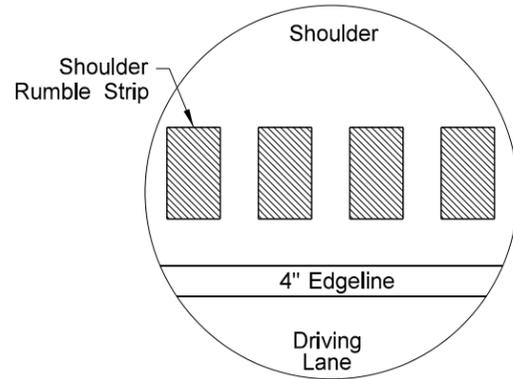
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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 Registration Number
 PE-2930,
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 of Transportation

RUMBLE STRIPS
DIVIDED HIGHWAYS (NON-INTERSTATE)



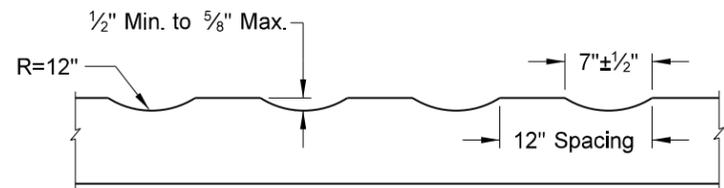
Divided Highways (Non-Interstate)



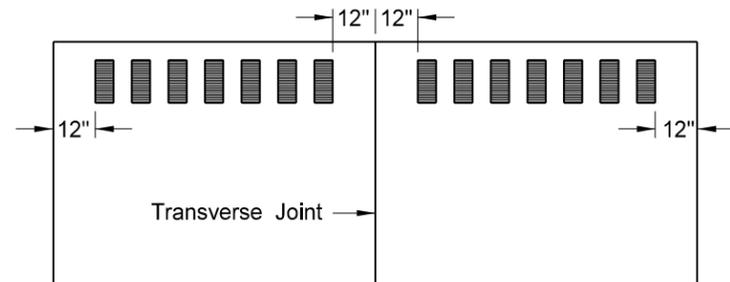
Inset B - Shoulder Rumble Strip

NOTES:

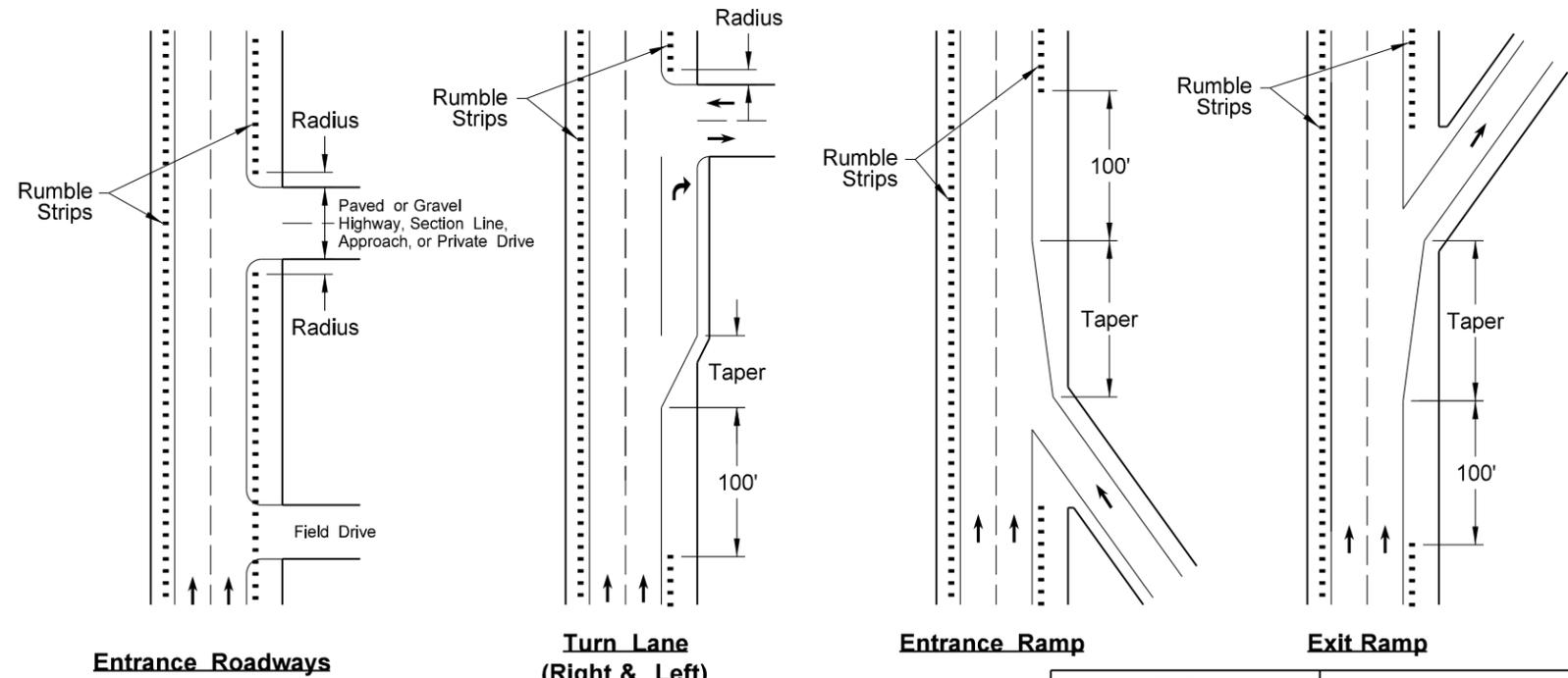
1) Discontinue rumble strips through the entire length of turn lanes & ramps, 100' before turn lane tapers, 100' before or after ramp tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive as shown below.



Profile of Rumble Strips - Bituminous and PCC Pavements



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

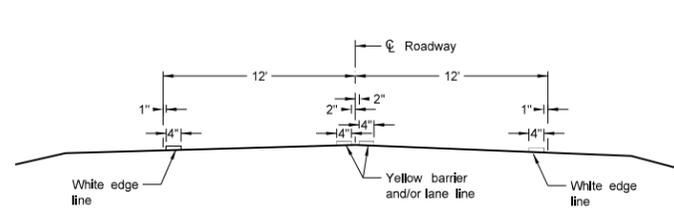


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
9-8-11	Revised Notes and D-760-2.

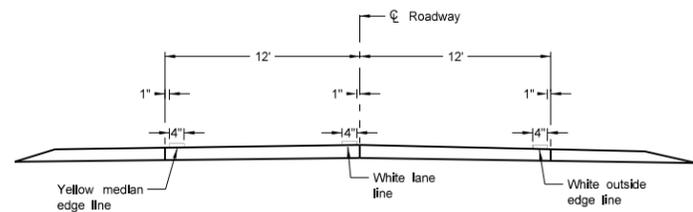
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PAVEMENT MARKING

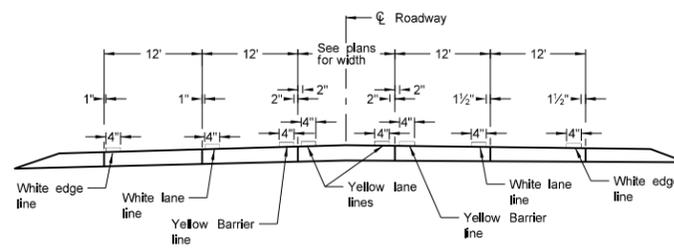
D-762-4



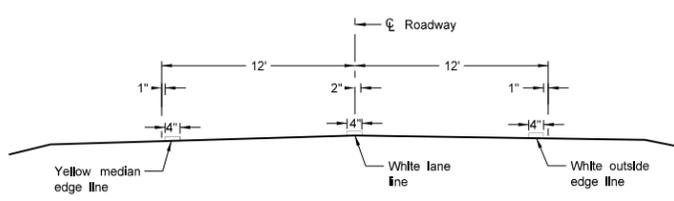
Two Lane Two Way
RURAL ROADWAY



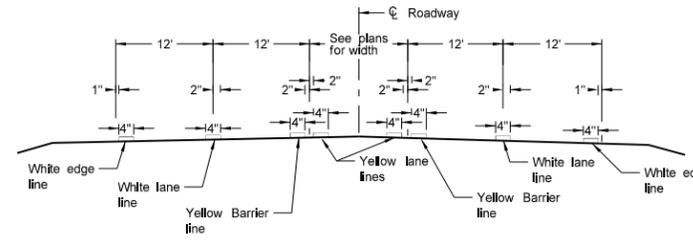
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



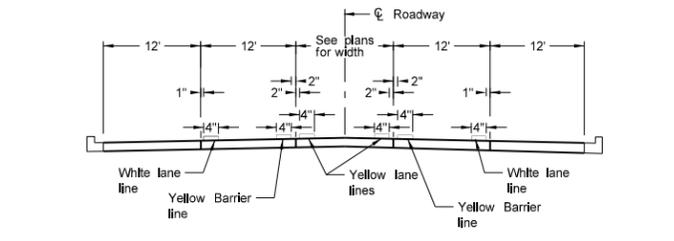
RURAL FIVE LANE ROADWAY
Concrete Section



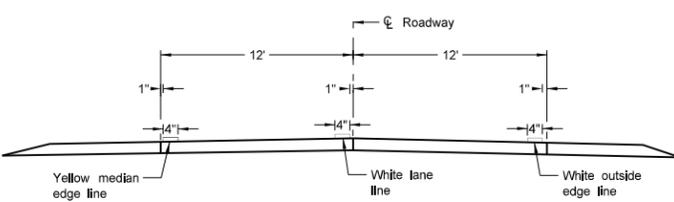
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



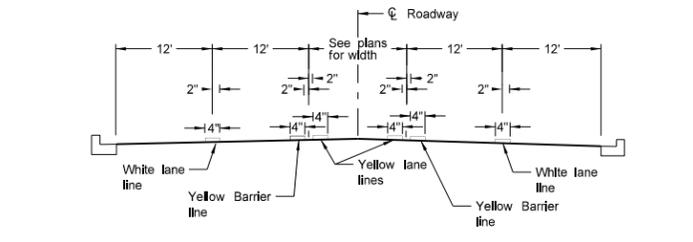
RURAL FIVE LANE ROADWAY
Asphalt Section



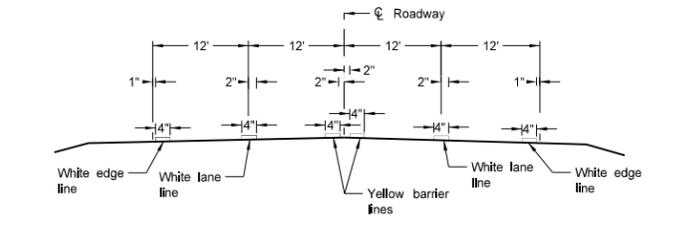
URBAN FIVE LANE SECTION
Concrete Section



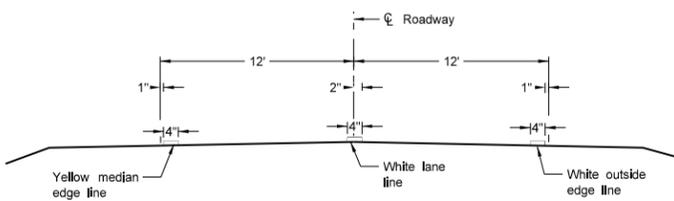
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



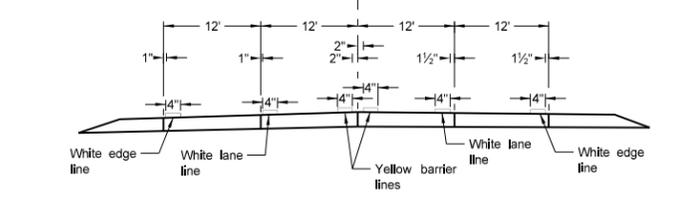
URBAN FIVE LANE SECTION
Asphalt Section



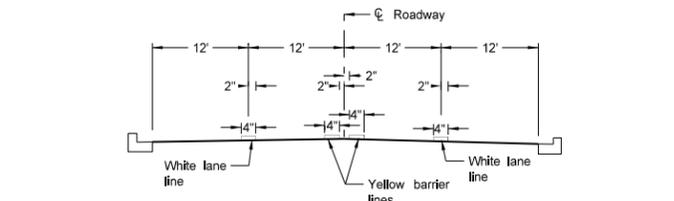
RURAL FOUR LANE ROADWAY
Asphalt Section



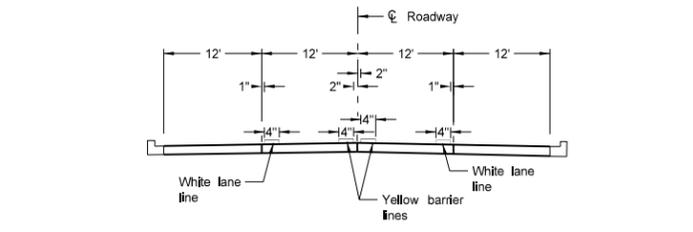
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



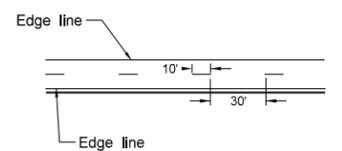
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



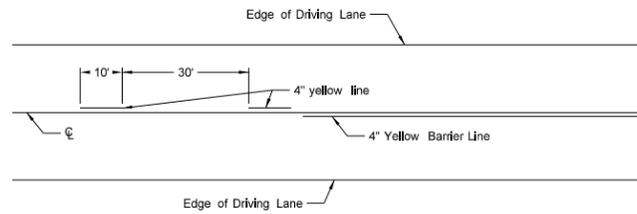
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

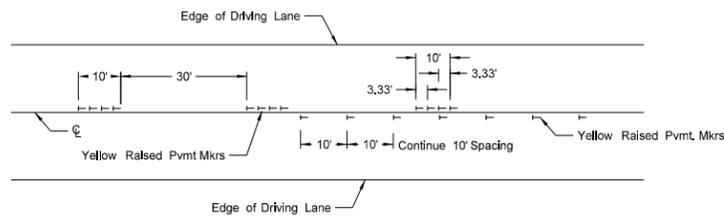
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE

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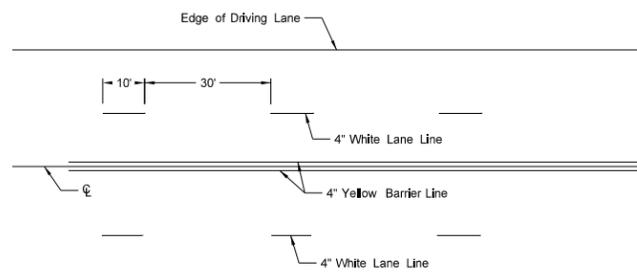
SHORT-TERM PAVEMENT MARKING



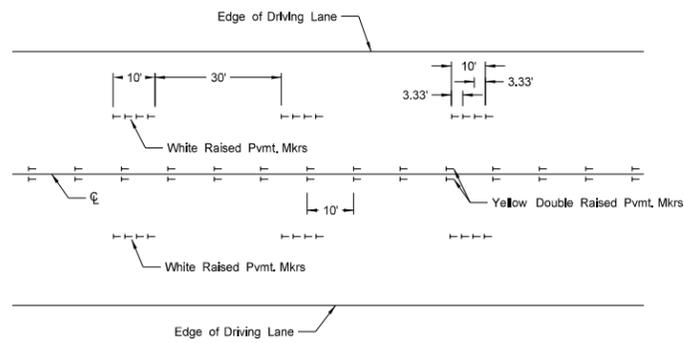
Painted or Tape Lines



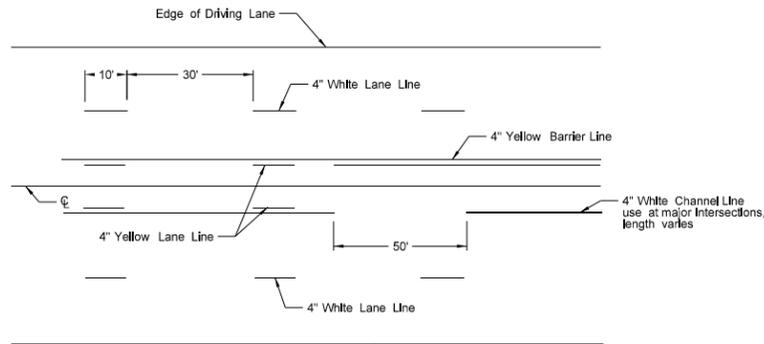
Raised Pavement Markers
TWO-LANE TWO-WAY ROADWAY



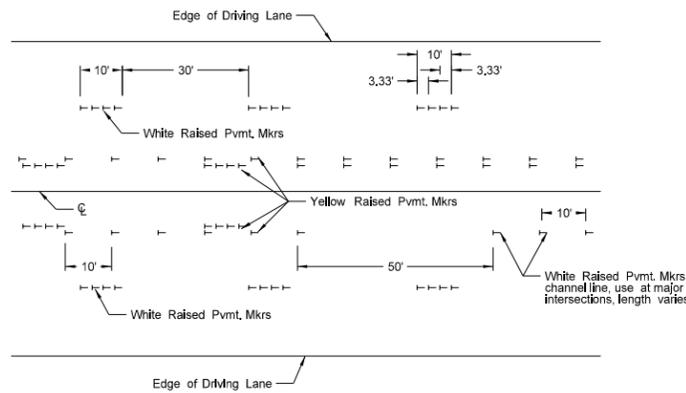
Painted or Tape Lines



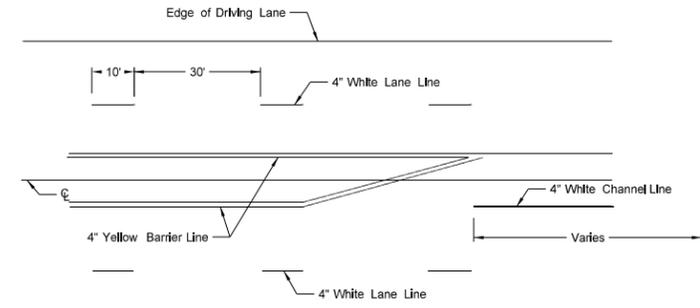
Raised Pavement Markers
FOUR LANE ROADWAY



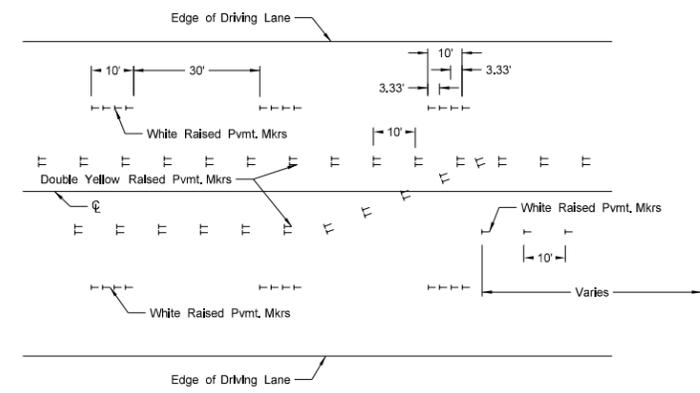
Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers
FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

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

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

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