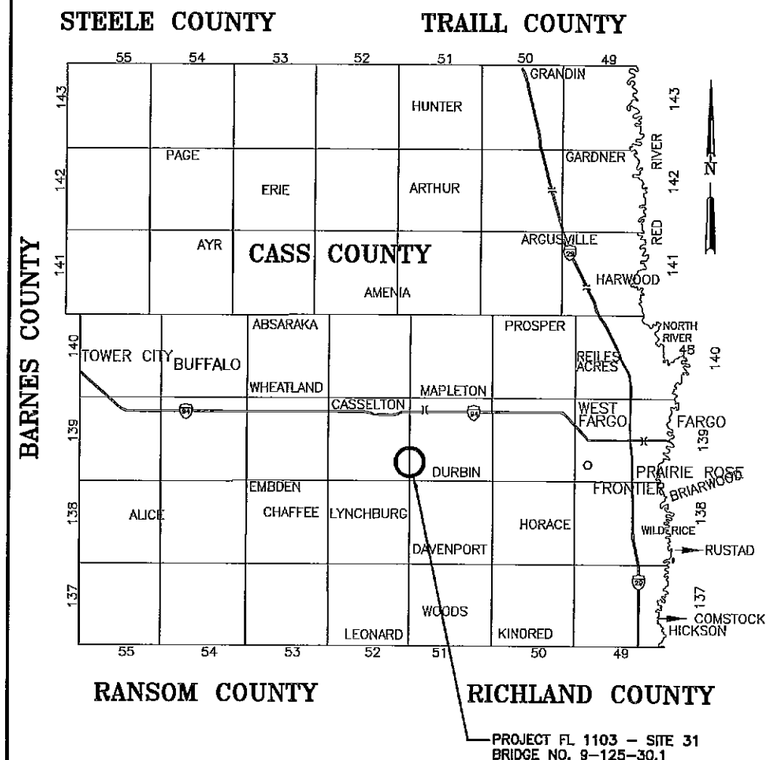
PROJECT NO.	SECTION NO.	SHEET NO.
FL 1103 – SITE 131	1	1

CASS COUNTY HIGHWAY DEPARTMENT

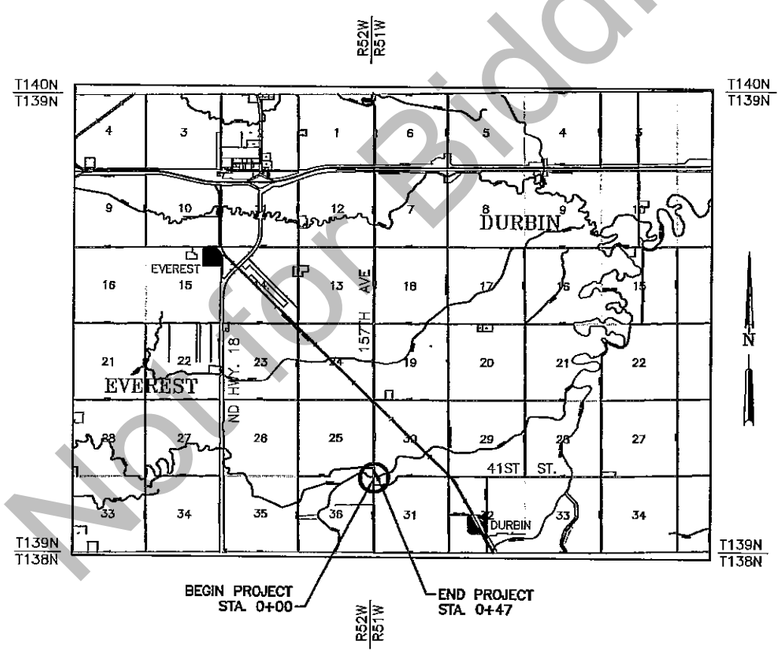
PLANS

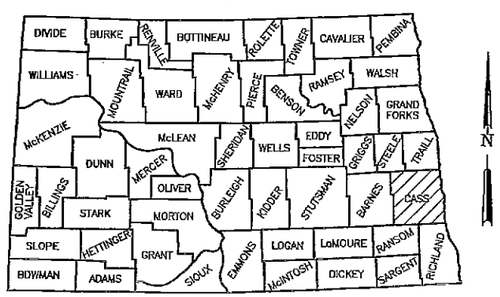
FOR

COUNTY PROJECT NO. FL1103 – SITE 131
BRIDGE NO. 9-125-30.1



PROJECT CONSISTS OF REPLACEMENT OF BRIDGE QUAD T BEAM & INCIDENTALS.





SKETCH MAP OF NORTH DAKOTA
SHOWING COUNTIES

GOVERNING SPECIFICATIONS:

STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION ADOPTED BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION, OCTOBER 2008: STANDARD DRAWINGS CURRENTLY IN EFFECT: AND OTHER CONTRACT PROVISIONS SUBMITTED HEREIN.

TABLE OF CONTENTS

STANDARD DRAWINGS

D-20-1-3	NDDOT ABBREVIATIONS
D-20-10	NDDOT UTILITY COMPANY ABBREVIATIONS
D-20-20 & 21	LINESTYLES
D-20-30-31	SYMBOLS
D-704-7	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS PERFORATE TUBE
D-704-8	BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS
D-704-9,11,12	CONSTRUCTION SIGN DETAIL
D-704-13	BARRICADE DETAILS AND CHANNELIZING DEVICES
D-704-14	CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS
D-704-19,21	CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

THE STANDARD DRAWINGS ARE INCLUDED IN THE BACK OF THE PLANS

LENGTH OF PROJECT = 0.009 MILES

SURVEY DECEMBER, 2011
DESIGN APRIL, 2012

DESIGN DATA FOR BRIDGE 9-125-30.1				
Traffic	Average Daily			Max.Hr.
Current 2012	Pass: <50	Trucks:	Total: <50	
Forecast 2032	Pass: <50	Trucks:	Total: <50	
Clear Zone Distance: 14		Design Speed: 55		
Minimum Sight Dist. for Stopping: 305				
Minimum Sight Dist. for Safe Passing:				
Sight Dist. for No Passing Zone: 1,100				
Pavement Design Life (years)				

JEREMY L. McLAUGHLIN REGISTERED PROFESSIONAL PE 4883 5/24/12 ENGINEER NORTH DAKOTA

APPROVED BY CASS COUNTY ENGINEER:

Jason Benson PE-7490

JASON BENSON N.D. REG. NO.

DATE: 3-7-13

Houston Engineering Inc.
Fargo
P: 701.237.5065
F: 701.237.5101

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	6	1

NOTES

100-P01 INCIDENTAL ITEMS: The cost of those items shown on the plans but not listed in the estimate of quantities shall be included in the unit price bid for other various pay items. This includes all structural steel, grout, cork, waterproofing, bituminous felt, polystyrene, and any other items that are not listed in the estimate of quantities.

107-P01 HAUL ROADS: All paved roads off the state system shall not be designated as haul roads. The contractor shall obtain approval from the county before using any off system road as a haul road.

202-P01 CONCRETE REMOVAL: The contractor shall remove concrete in a manner that prevents any damage to the parts of the structure to remain which includes saw cutting the concrete joints between girders. All concrete removed shall become the property of the contractor and shall be disposed of properly off of the right of way. Approximately 7.1 cu. yds. of concrete will be removed. This will not be measured separately but shall be included in the lump sum bid for removal of concrete.

Price for "Removal of Concrete" includes cost to remove the existing T girder, the existing endwall to the removal limits, removing the grout key, cutting welds, and disposal of the existing girder.

408-P01 GRAVEL REMOVAL: Remove gravel on west 10' of road approximately 5' back from each abutment for removal and construction of end walls. After construction of the end walls, Cl. 5 aggregate should be placed where the existing gravel was removed. Quantities for the Cl. 5 aggregate are included in the quantities listed. All work associated with removing and replacing this section of road should be included in the price bid for "Aggregate Surface Course Cl. 5."

602-P01 CONCRETE: All concrete for end wall diaphragms, and intermediate diaphragms shall have an approximate 7 day cure strength of 4000 psi and ultimate strength of 5000 psi. These values are approximate and should be verified by the girder manufacturer prior to pouring the diaphragms.

The concrete for end diaphragms and intermediate diaphragm shall be included in the price bid for "Prestressed Quad T Girder." The quantity of end diaphragms and intermediate diaphragm concrete is approximately 2.0 CY.

All exposed corners of concrete shall be beveled with 3/4" triangular molding unless otherwise noted on the plans.

All exposed concrete surfaces shall be finished as per spec. 602.03 i.4.

Cost to set, weld, and grout the new girder shall be included in the price bid for "Prestressed Quad T Girder."

602-P02 PRESTRESSED QUAD T GIRDER: Prestressing and reinforcement layout for the Quad Tee Girder and diaphragms as provided by North Dakota Concrete Products shop drawings for Bridge No. 9-125-30.1. Signed and stamped calculations and drawings, by an engineer registered in the state of North Dakota, of the girder and diaphragms shall be completed by the contractor and submitted to the engineer for approval prior to production of the girder.

602-P03 GROUT: Grout for keyway shall be one part 1A air-entrained portland cement, and two parts sand. Maximum slump is 4". Grout shall be vibrated in place and protected from low temperature. Grout shall be included in unit price bid for other various pay items.

764-P01 REMOVE AND RESET PRECAST CONCRETE CURB AND STEEL RAILING: Before removal of the existing girder, the precast concrete curb and steel railing should be removed in a manner that prevents any damage to the curb or railing or any other part of the structure that is to remain. After the new quad tee girder is placed, the concrete curb and steel railing shall be replaced. Any missing bolts or connections in the existing railing should be replaced. Existing approximate bolt spacing is shown in these plans but shall be verified by the contractor prior to girder production. The price to remove and reset the concrete curb and steel railing and all work and materials needed to complete this work should be included in the price bid for "Remove and Reset Precast Concrete Curb and Steel Railing."

JEREMY L. McLAUGHLIN REGISTERED PROFESSIONAL ENGINEER PE-4883 5/24/12 NORTH DAKOTA

CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK
BRIDGE NO. 9–125–30.1
CONSTRUCTION
NOTES
PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	8	1

ESTIMATE OF QUANTITIES

ITEM DESCRIPTION	UNIT	QUANTITY
REMOVAL OF CONCRETE	L SUM	1
AGGREGATE SURFACE COURSE CL 5	CY	8
PRESTRESSED QUAD T GIRDER	LF	47
MOBILIZATION	L SUM	1
TRAFFIC CONTROL	L SUM	1
REMOVE AND RESET PRECAST CONCRETE CURB AND STEEL RAILING	LF	48

CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK

BRIDGE NO. 9–125–30.1

ESTIMATED
QUANTITIES

PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	100	1

TRAFFIC CONTROL LEGEND

CONSTRUCTION SITE

POST–MOUNTED SIGN

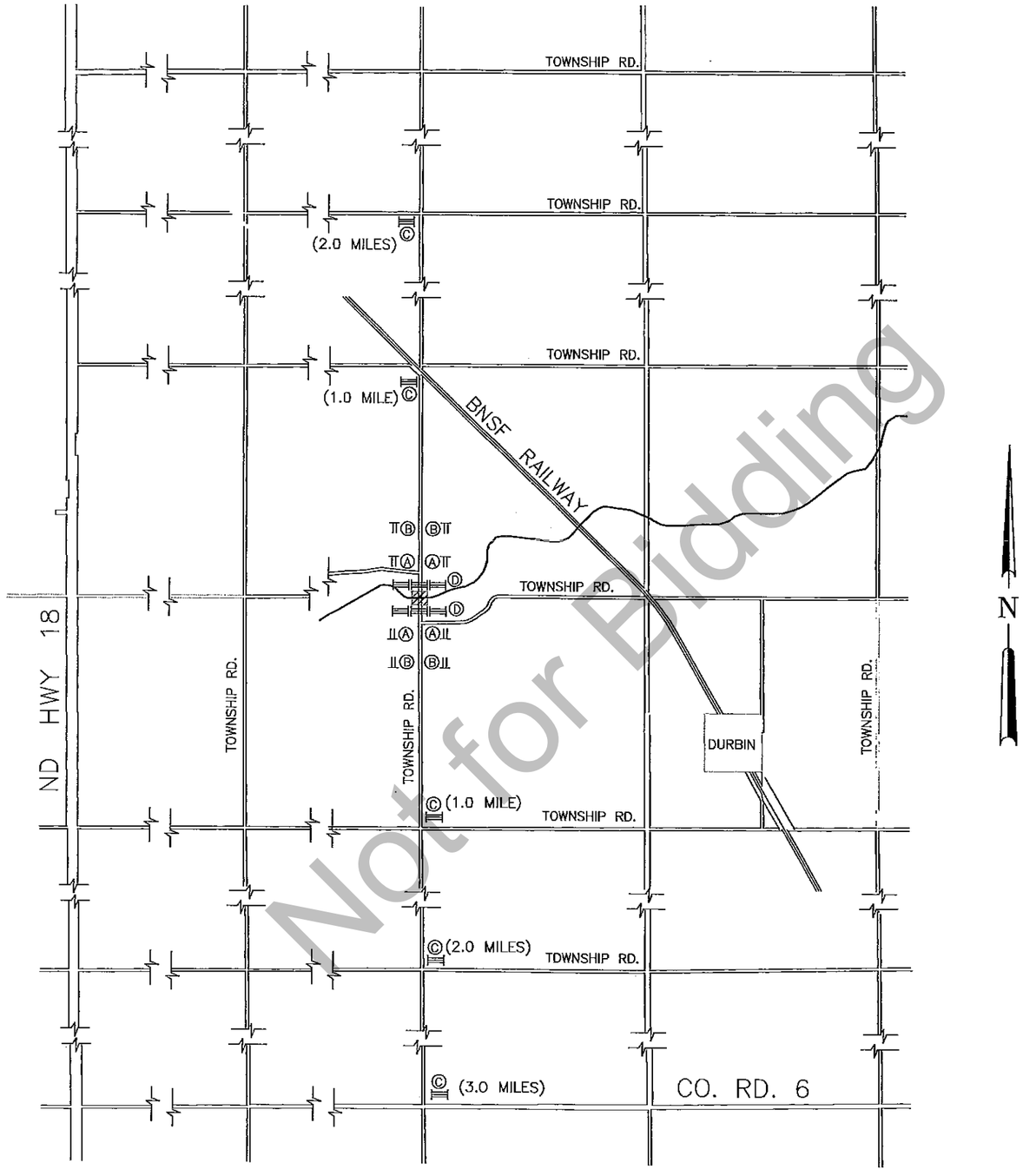
TYPE III BARR.

(A) ROAD CLOSED 500 FT
W20–3–48

(B) ROAD CLOSED 1000 FT
W20–3–48

(C) ROAD CLOSED X MILES AHEAD LOCAL TRAFFIC ONLY
R11–3a–60

(D) ROAD CLOSED
R11–2–48



JEREMY L. McLAUGHLIN REGISTERED PROFESSIONAL ENGINEER PE 4283 3/12/12 NORTH DAKOTA

CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK

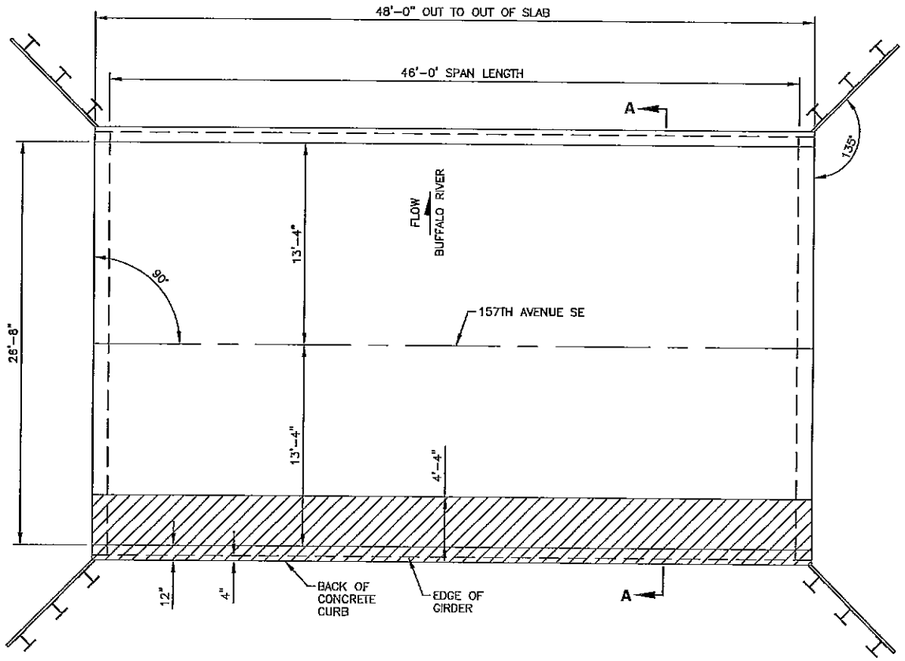
BRIDGE NO. 9–125–30.1

TRAFFIC CONTROL

PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

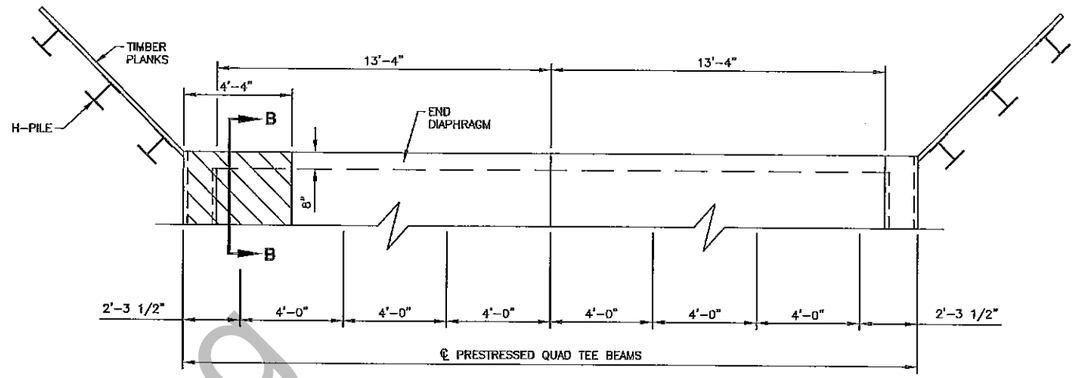
Z:\6000\6008\11_6008_041\CAD\TRAFFIC CONTROL.dwg-Layout1-5/24/2012 8:32 AM-(Baskerman)

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	170	1

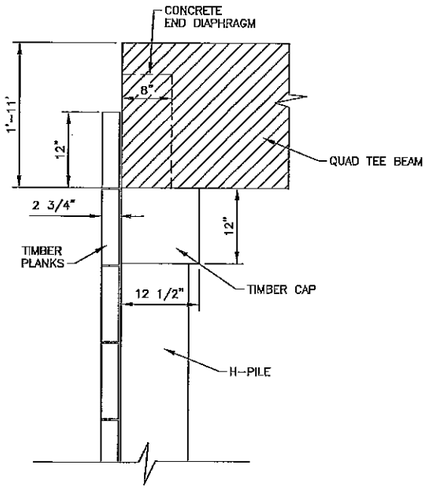


PLAN

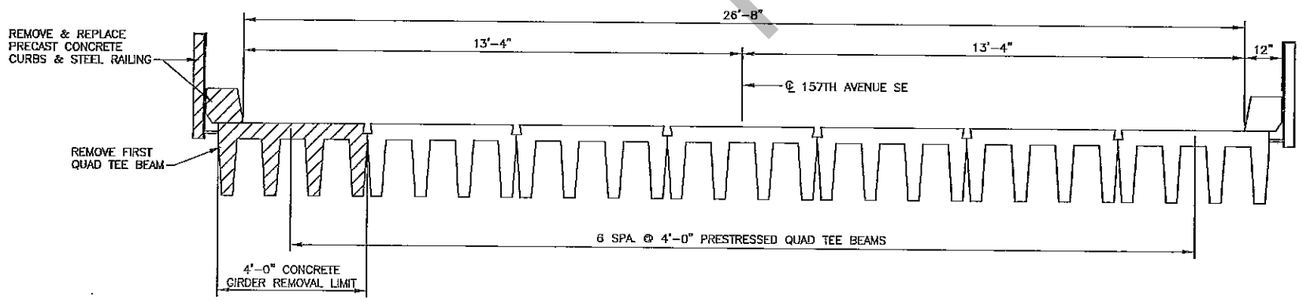
5 0 5 10
Scale Feet



END DIAPHRAGM REMOVAL
(NORTH ABUTMENT SHOWN)



SECTION B-B
NOT TO SCALE



SECTION A-A
NOT TO SCALE

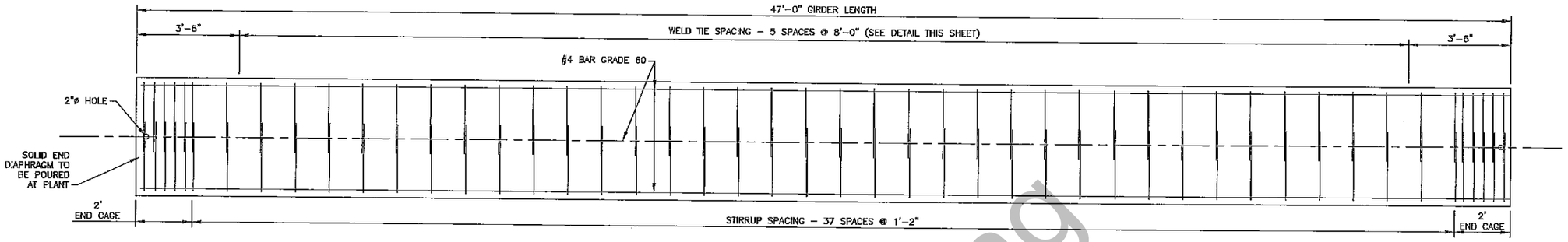
JEREMY Z. McLAUGHLIN REGISTERED PROFESSIONAL ENGINEER NORTH DAKOTA PE-9883 5/24/12

CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK

BRIDGE NO. 9–125–30.1
REMOVALS

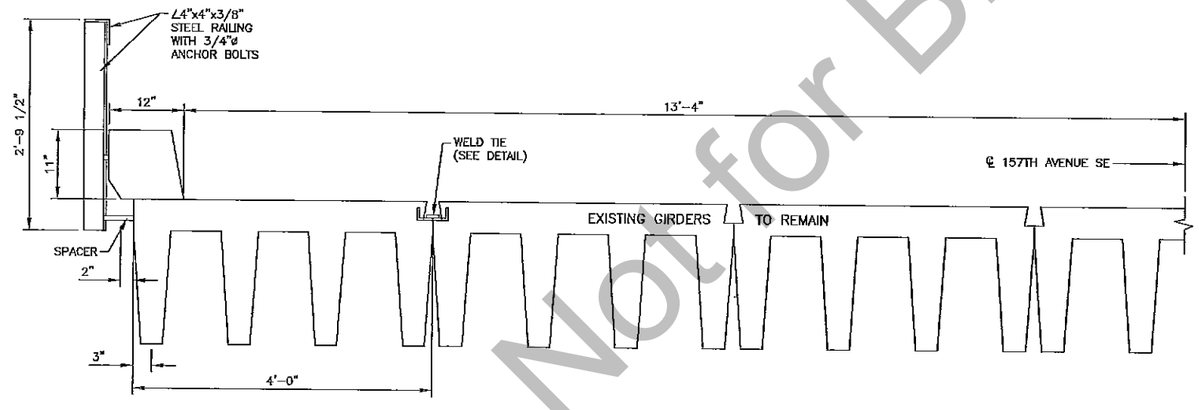
PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	170	2



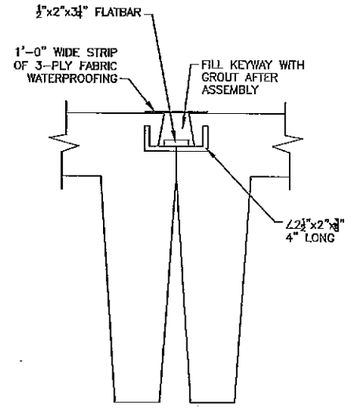
PLAN VIEW

2 0 2 4
Scale Feet



HALF SECTION

1 0 1 2
Scale Feet



WELD TIE DETAIL

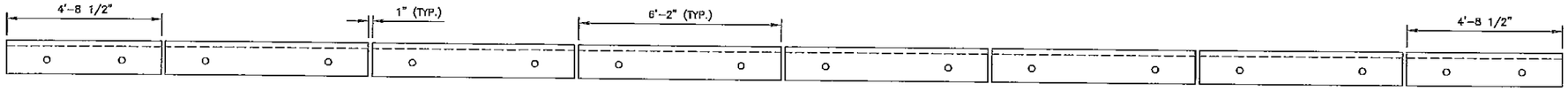
NOT TO SCALE

JEREMY L. McLAUGHLIN REGISTERED PROFESSIONAL ENGINEER PE-4883 5/24/12 NORTH DAKOTA

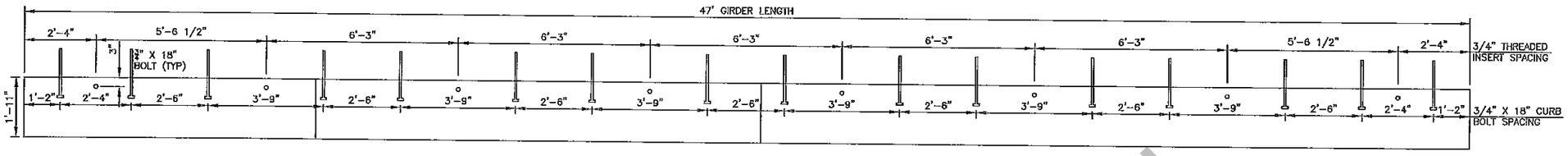
CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK

BRIDGE NO. 9–125–30.1
QUAD T GIRDER
DETAILS
PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	170	3



EXISTING PRECAST CURB BOLT LAYOUT - PLAN VIEW
NOT TO SCALE



MINIMUM CONCRETE STRENGTH PSI		
	f'ci*	f'c**
REQUIRED MIN. CONCRETE STREGTH	4000 psi	5000 psi

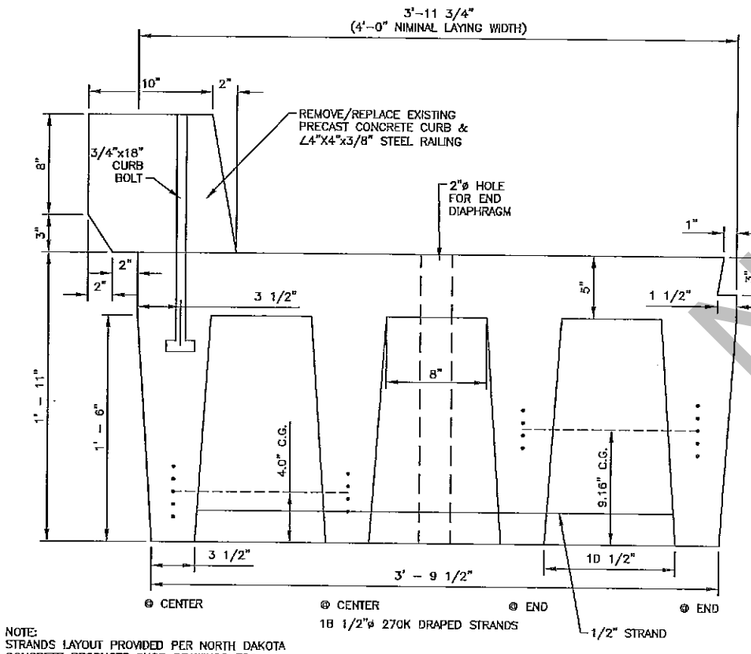
* MINIMUM CONCRETE STRENGTH AT TIME OF PRESTRESSED TRANSFER

** MINIMUM CONCRETE STRENGTH WHEN CURING CAN BE DISCONTINUED AND GIRDER TRANSPORTED AND INSTALLED

NOTE:
VALUES ESTIMATED FROM TEST REPORTS FOR BRIDGE 9–125–30.1. STRENGTHS TO BE VERIFIED BY GIRDER MANUFACTURER.

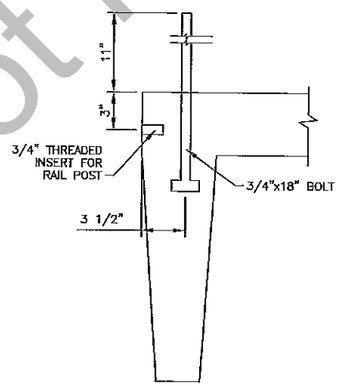
ANCHOR BOLT LAYOUT - SIDE VIEW

NOTES:
1. TOPS OF GIRDERS SHALL BE ROUGH FLOATED AND BROOMED TRANSVERSLY.
2. PROVIDE HANDLING HOOKS OR DEVICES AS REQUIRED BY THE CONTRACTOR. HOOKS OR DEVICES PROVIDED WILL BE SUBJECT TO APPROVAL OF ENGINEER AND SHALL BE INSTALLED WITHIN 4'–0" OF THE END OF THE GIRDER.
3. GIRDER SHALL BE MARKED, SHOWING BRIDGE NUMBER, CASTING DATE, AND INDIVIDUAL IDENTIFICATION LETTERS AND NUMBERS. MARKINGS SHALL BE MADE ON THE FACE OF THE GIRDER, NEAR THE END, SO LOCATED THAT THEY WILL BE EXPOSED AFTER THE END DIAPHRAGMS HAVE BEEN CAST. FASCIA GIRDERS SHALL BE MARKED ON AN INSIDE FACE. ALL MARKINGS SHALL BE STENCILED AND BE CLEARLY LEGIBLE.
4. ALL MATERIAL AND WORK FOR POURING THE GIRDER SHALL BE INCLUDED IN THE UNIT PRICE BID FOR THE PRESTRESSED CONCRETE GIRDER.
5. SEE NOTES FOR KEYWAY GROUT INFORMATION.
6. THE PRICE FOR ALL REINFORCING STEEL, PRESTRESSED STRANDS, THREADED RODS, AND DIAPHRAGM AND INTERMEDIATE DIAPHRAGM CONCRETE SHALL BE INCLUDED IN THE PRICE BID FOR "PRESTRESSED QUAD T GIRDER"
7. CONTRACTOR TO VERIFY ANCHOR BOLT SPACING FOR RAILING AND CURB PRIOR TO GIRDER FABRICATION.

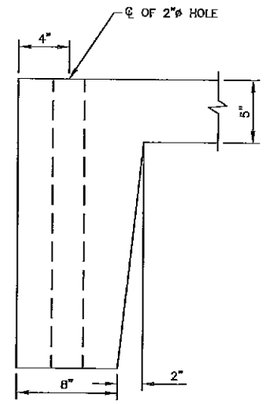


NOTE:
STRANDS LAYOUT PROVIDED PER NORTH DAKOTA CONCRETE PRODUCTS SHOP DRAWINGS FOR BRIDGE NO. 9–125–30.1. SIGNED AND STAMPED CALCULATIONS AND DRAWINGS, BY AN ENGINEER REGISTERED IN THE STATE OF NORTH DAKOTA, OF THE GIRDER AND DIAPHRAGMS SHALL BE COMPLETED BY THE CONTRACTOR AND SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PRODUCTION OF THE GIRDER

QUAD TEE GIRDER DETAIL
NOT TO SCALE



CURB BOLT DETAIL
EXTERIOR GIRDER



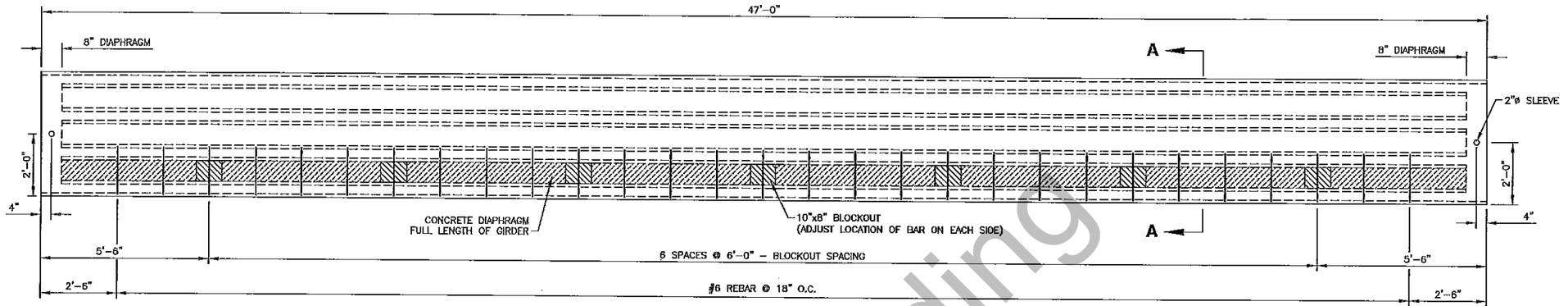
END DIAPHRAGM DETAIL
NOT TO SCALE

JEREMY L. McLAUGHLIN
REGISTERED
PROFESSIONAL
PE 4883
ENGINEER
NORTH DAKOTA
5/24/12

CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK

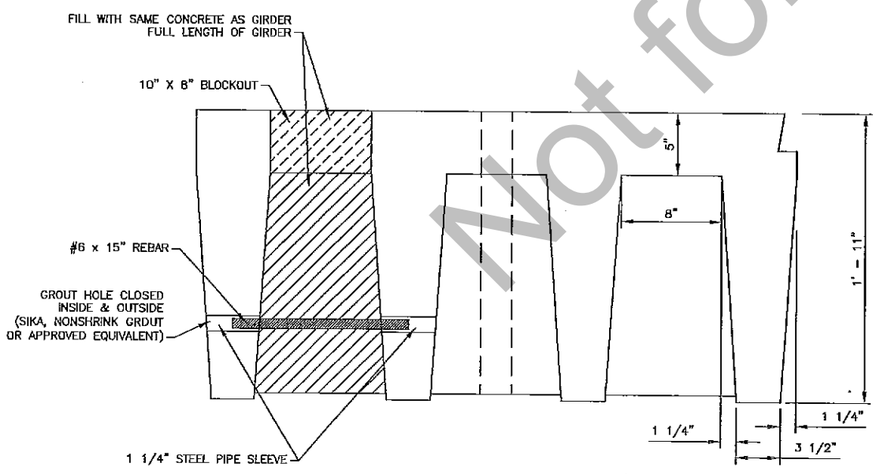
BRIDGE NO. 9–125–30.1
QUAD T GIRDER
DETAILS
PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

PROJ. NO.	SECTION NO.	SHEET NO.
FL 1103–SITE 131	170	4



DIAPHRAGM DETAIL

2 0 2 4
Scale Feet



SECTION A-A

EXTERIOR GIRDER

JEREMY L. McLAUGHLIN
REGISTERED
PROFESSIONAL
PE 4883
5/24/12
ENGINEER
NORTH DAKOTA

CASS COUNTY
HIGHWAY DEPARTMENT
BUFFALO CREEK
BRIDGE NO. 9–125–30.1
DIAPHRAGM
DETAILS
PROJECT NO. FL 1103–SITE 131
157th AVENUE SE
NORTHWEST OF DURBIN
CASS COUNTY

NDDOT ABBREVIATIONS

D-20-1

Abn	abandoned
Abut	abutment
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
A	ampere
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
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
BLM	Bureau of Land Management
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
Elec	electric/al
EDM	electronic distance meter
Elev or El	elevation
Ellipt	elliptical
Emb	embankment
Emuls	emulsion/emulsified
ES	end section
Engr	engineer
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
FHWA	Federal Highway Administration
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-20-3

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
06-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

NDDOT UTILITY COMPANY ABBREVIATIONS

D-20-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
All PI	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
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 PWR ELEC	Central Power Electric Cooperative
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
FALK MNG	Falkirk Mining Company
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
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ WRD	McKenzie County Water Resource District
MCKNZ ELEC	McKenzie Electric Cooperative
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
MUNICIPAL	City Of '.....'
MUNICIPAL	City Water And Sewer
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
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
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
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
STUT RWU	Stutsman Rural Water Users
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
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
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	
6-15-10	
REVISIONS	
DATE	CHANGE
04-20-11	Added Items

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Line Styles

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Line Styles

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-20-30

North Arrow (Half Scale)
Truck Mounted Attenuator
Type I Barricade
Type II Barricade
Type III Barricade
Catch Basin
Cairn or Stone Circle
Video Detection Camera
Storm Drain Cap or Stub
Corrugated Metal End Section 18 Inch
Corrugated Metal End Section 24 Inch
Corrugated Metal End Section 30 Inch
Corrugated Metal End Section 36 Inch
Corrugated Metal End Section 42 Inch
Corrugated Metal End Section 48 Inch
Concrete Foundation
Ground Connection Conductor
Neutral Connection Conductor
Phase 1 Connection Conductor
Phase 2 Connection Conductor
Traffic Cone
Signal Controller
Pad Mounted Signal Controller
Alignment Data Point
Emergency Vehicle Detector

Attenuation Device
Diamond Grade Delineator Type A
Diamond Grade Delineator Type B
Diamond Grade Delineator Type C
Diamond Grade Delineator Type D
Diamond Grade Delineator Type E
Flexible Delineator
Flexible Delineator Type A
Flexible Delineator Type B
Flexible Delineator Type C
Flexible Delineator Type D
Flexible Delineator Type E
Delineator Type A
Delineator Type A Reset
Delineator Type B
Delineator Type B Reset
Delineator Type C
Delineator Type D
Delineator Type E
Delineator Drums
Spot Elevation
Existing Access Control Arrow
Existing Artifact
Existing Flashing Beacon
Existing Benchmark

Existing Railroad Battery Box
Existing Bush or Shrub
Existing Gas Cap or Stub
Existing Sanitary Cap or Stub
Existing Storm Drain Cap or Stub
Existing Water Cap or Stub
Existing Sanitary Cleanout
Existing Concrete Foundation
Existing Traffic Signal Controller
Existing Pad Mounted Signal Controller
Existing Sixteenth Section Corner
Existing Quarter Section Corner
Existing Section Corner
Existing Railroad Crossbuck
Existing Satellite Dish
Existing Fuel Dispensers
Existing Flexible Delineator Type A
Existing Flexible Delineator Type B
Existing Flexible Delineator Type C
Existing Flexible Delineator Type D
Existing Flexible Delineator Type E
Existing Delineator Type A
Existing Delineator Type B
Existing Delineator Type C
Existing Delineator Type D

Existing Delineator Type E
Existing EFB Misc
Existing Flashing Beacon
Existing Pipe Mounted Flasher
Existing Pad Mounted Feed Point
Existing Pipe Mounted Feed Point with Pad
Existing Pole Mounted Feed Point
Existing Railroad Frog
Existing Snow Gate 18
Existing Snow Gate 28
Existing Snow Gate 40
Existing Headwall
Existing Pedestrian Head with Number
Existing Signal Head
Existing Sprinkler Head
Existing Fire Hydrant
Existing Catch Basin Drop Inlet
Existing Curb Inlet
Existing Manhole Inlet
Existing Junction Box

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-20-31

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

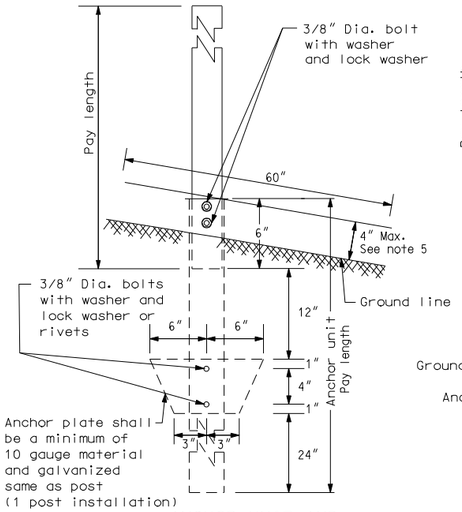
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
4-20-11	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 4/20/11 and the original document is stored at the North Dakota Department of Transportation

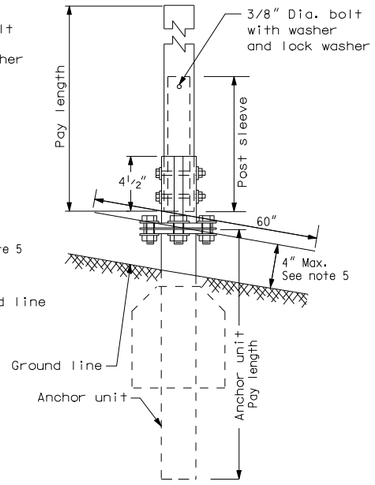
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

PERFORATED TUBE

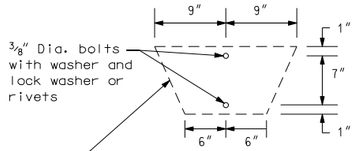
D-704-7

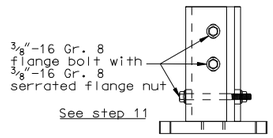


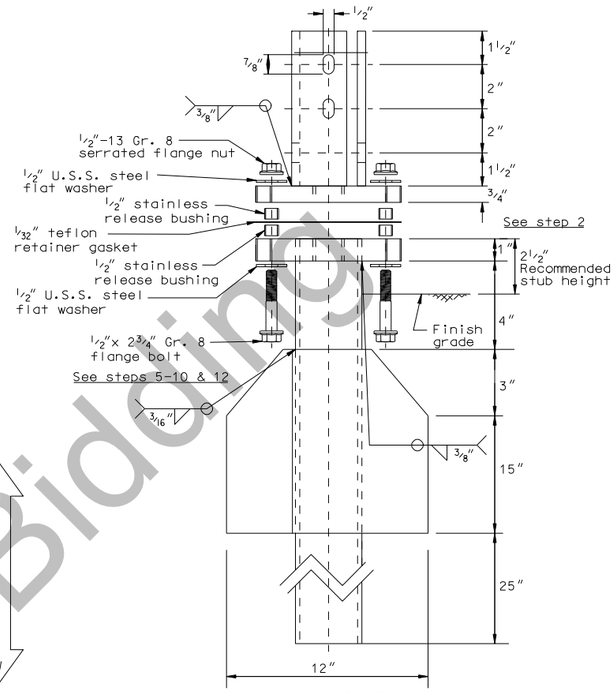
ANCHOR UNIT AND POST ASSEMBLY



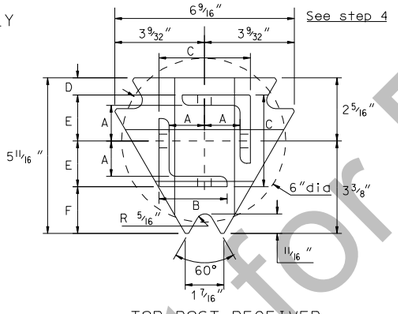
SLIP BASE ANCHOR UNIT AND POST SLEEVE ASSEMBLY







MULTI-DIRECTIONAL SLIP BASE ASSEMBLY

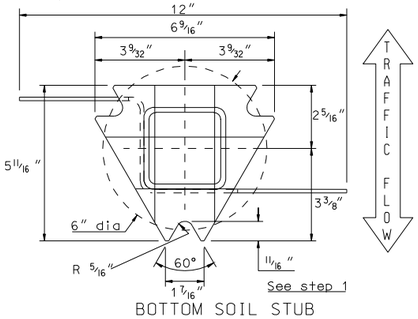


TOP POST RECEIVER

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

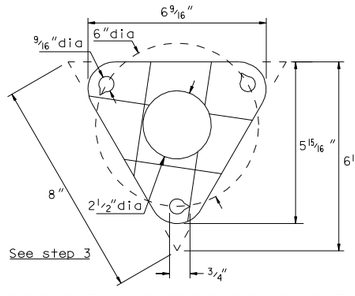
TOP POST RECEIVER DATA TABLE						
Square Post Sizes	A	B	C	D	E	F
2 3/16" x 10 Ga. Square Post	1 9/64"	2 1/2"	3 1/32"	25/32"	1 33/64"	1 7/8"
2 1/2" x 10 Ga. Square Post	1 9/32"	2 1/2"	3 5/16"	5/8"	1 21/32"	1 3/4"

2 3/16" x 10 gauge may be inserted into 2 1/2" x 10 gauge for additional wind load.



BOTTOM SOIL STUB

Materials: Tube - 3"x 3"x 7 gauge ASTM A500 Gr B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A 569
Plate - ASTM A572 grade 50



BOLT RETAINER FOR BASE CONNECTION

Materials: 1/32" reprocessed Teflon

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY	
STEP	INSTALLATION PROCEDURE
1.	Install bottom soil anchor stub plumb and squared up with road, with point of plate facing oncoming traffic.
2.	Depth of imbedment to leave 2 1/2" from grade to top of anchor plate.
3.	Place teflon bolt retainer gasket on top of bottom plate (make sure that notches in holes are pointing counter clockwise).
4.	Place top post receiver on to retainer gasket, properly indexed so that angle receivers are squared up with road.
5.	Slide 1 each 1/2" flat washer on to 1 each inverted 1/2"-13 gr. 8 flange bolt, followed by 1 each stainless steel release bushing.
6.	Insert above bolt with washer and bushing up through notched points of top and bottom plates, passing through hole in gasket.
7.	Slide second bushing down on to above bolt until it rests on top of gasket followed by second washer.
8.	Complete by threading 1/2"-13 gr. 8 serrated flange nut snugly down against top of washer.
9.	Repeat steps 5,6,7 & 8 at the two remaining notched triangle points.
10.	Insert sign post into angle receivers on top half until post(s) bottom out. *NOTE: Where higher wind load is desired, insert the next size smaller square post inside bottom of main upright post (Minimum of 48", not to exceed beyond bottom edge of sign).
11.	Secure posts into receivers using 3 each 3/8"-16 gr. 8 flange bolts and 3 each 3/8"-16 serrated flange nuts in receiver slots (top 2 bolts should be parallel to highway) do not tighten nuts until all bolts are in place.
12.	After all sub-assembly hardware is tightened, then torque the three 1/2"-13 nuts to 42 ft-lbs, in a circular pattern until all bolt assemblies reach the required torque. *NOTE: On multi-leg installations, be sure that all anchors are squared and lined up with each other.

Notes
1. Slip base bolts shall be torqued as specified by the manufacturer.
2. The 2 3/16" size 10 gauge is shown as 2.19" size on the plans. The 2 1/2" size 10 gauge is shown as 2.51" size on the plans.
3. Anchor for 2", 2 1/4", and 2 1/2" posts.
4. 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 of 43.9 KSI and tensile strength of 59.3 KSI. Anchor shall be hot dipped galvanized per ASTM A123/A153. All tolerances on anchor unit and slip base bottom assembly are ± 0.005 unless otherwise noted.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement shall be made above and below post location and also back and ahead of post.
6. When used in concrete sidewalk, anchor shall be the same except without the wings.
7. Four post signs shall have over 8' between the first and fourth posts.

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.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			B	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	10			Yes	
2	2 1/4	12	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	

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.

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 3/16 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
4 x 4	0.250	1/4	6.600	3.040	1.940	1.050

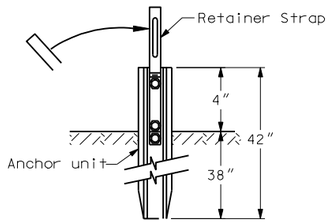
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-02	
REVISIONS	
DATE	CHANGE
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

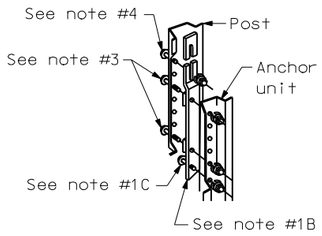
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

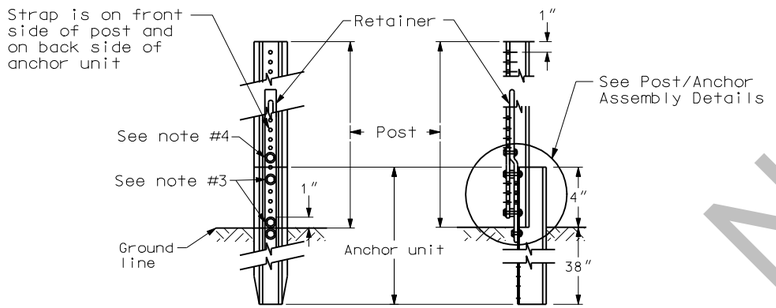
FLANGED CHANNEL



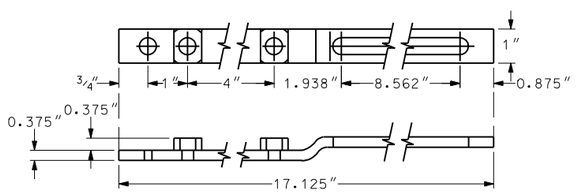
Anchor Unit & Strap Assembly Detail



Post/Anchor Assembly Details



Sign Post Assembly Detail



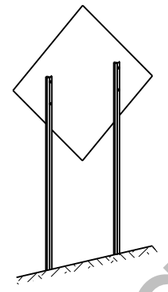
Retainer/Spacer Strap Detail

STEPS OF INSTALLATION

1. A) Drive anchor unit to within 12″ of ground level.
   B) Proper assembly established by lining up the top 3/4″ slot of retainer spacer strap with top hole of anchor unit.
   C) Assemble strap to back of anchor unit using 3/8″-16 UNC x 2.0″ long bolt, lock washer and nut.
   D) Rotate strap 90° to left.
2. A) Drive anchor unit to 4″ dimension.
   B) Rotate strap to vertical position.
3. A) Place 3/8″-16 UNC x 2″ bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4″ slot in the strap).
   B) Alternately tighten two connector bolts.
4. A) Complete assembly by tightening 3/8″-16 UNC x 2″ long retainer bolt (this fastens sign post to retainer spacer strap).
5. The base post, strap & 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.

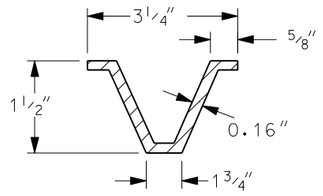
CHANNEL SIZE IN.	WALL THICKNESS IN.	WEIGHT PER FOOT LBS.	MOMENT OF INERTIA IN.4	CROSS SECT. AREA IN. SQ.	SECTION MODULUS IN.3
1.516 x 3.125"	.116	2.00	.179	.590	.225
1.532 x 3.125"	.124	2.25	.201	.648	.254
1.562 x 3.125"	.132	2.50	.233	.748	.289
1.578 x 3.125"	.140	2.75	.271	.819	.329
1.750 x 3.500"	.150	3.00	.372	.918	.403
1.750 x 3.500"	.175	4.00	.500	1.190	.560

3 LB/FT U POSTS

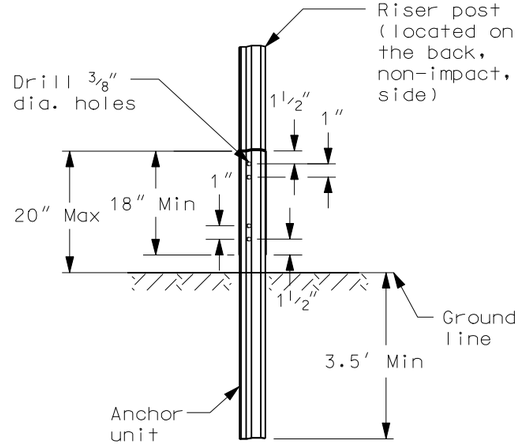


Typical Installation

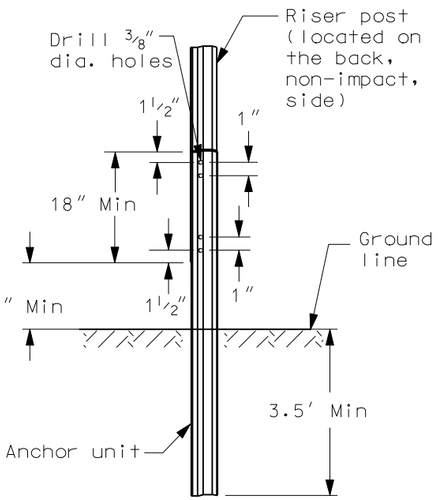
Notes
1. Use 3 lb/ft riser anchor units and risers
2. Driven riser posts shall be at least 7′ long and embedded at least 3.5′.
3. A splice shall overlap a minimum of 18″.
4. Use 4 bolts 5/16″ diameter with washers and nuts. Two at top and two at bottom of splice.
5. Anchor unit for guy wires shall be no more than 4″ above ground and embedded at least 3.5′.



U-Post Detail (3 lb/ft)



U-Channel Splice Option 1



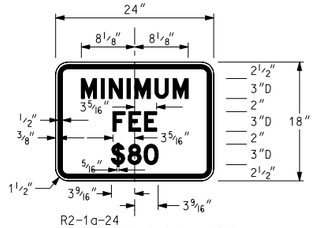
U-Channel Splice Option 2

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-28-93	
REVISIONS	
DATE	CHANGE
03-07-01	Revised U-post details
11-21-02	Deleted perforated tube
05-08-03	Revised U-Channel splice
12-01-04	PE stamp added
06-29-05	Revised flanged channel note

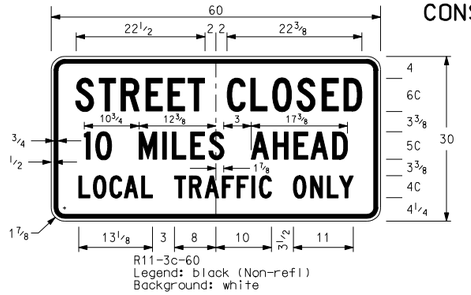
This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAILS

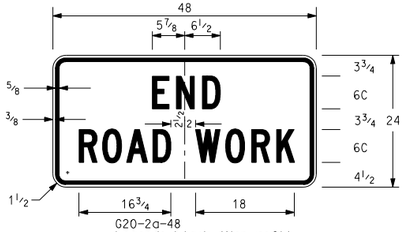
D-704-9



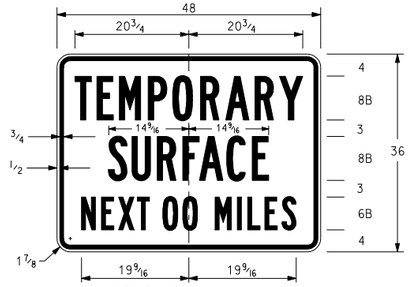
R2-1a-24
Legend: black (Non-refl)
Background: white



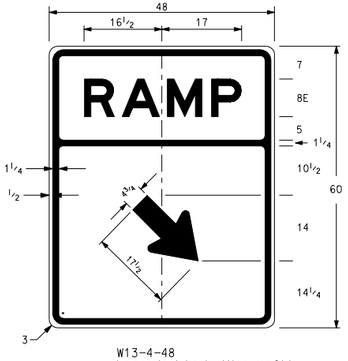
R11-3c-60
Legend: black (Non-refl)
Background: white



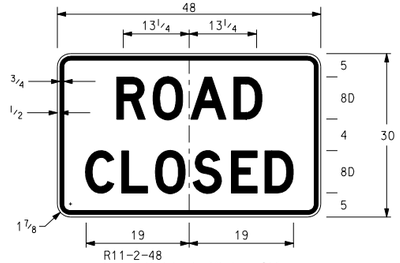
G20-2a-48
Legend: black (Non-refl)
Background: orange



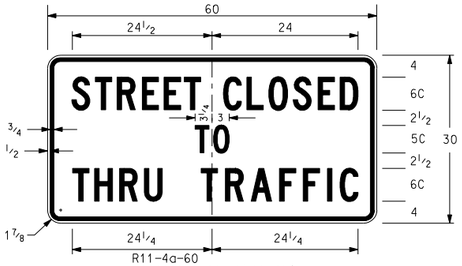
G20-8-48
Legend: black (Non-refl)
Background: orange



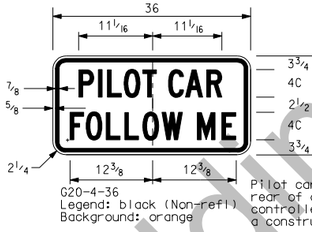
W13-4-48
Legend: black (Non-refl)
Background: orange



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

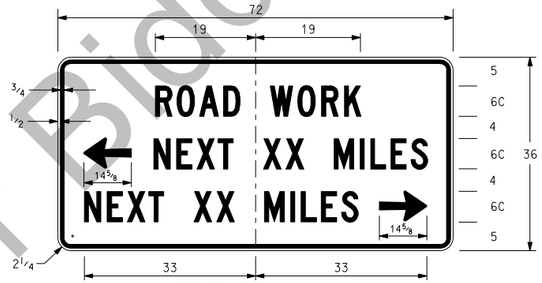


R11-4a-60
Legend: black (Non-refl)
Background: white

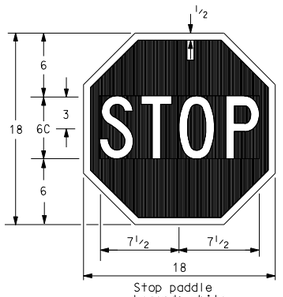


G20-4-36
Legend: black (Non-refl)
Background: orange

Pilot car sign shall be mounted on rear of a vehicle used for guiding controlled one-way traffic through a construction area.

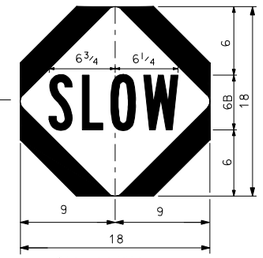


G20-50a-72
Legend: black (Non-refl)
Background: orange



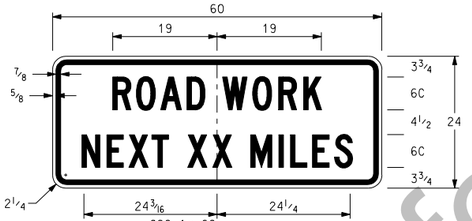
Back to Back

Stop paddle
Legend: white
Background: red
Flag person paddle

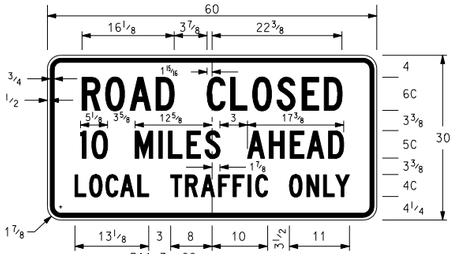


Slow paddle
Legend: black (Non-refl)
Background: orange
Flag person paddle

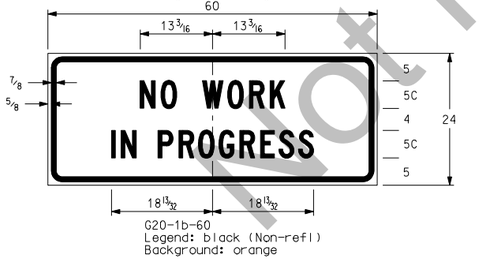
R11-2a-48
Legend: black (Non-refl)
Background: white



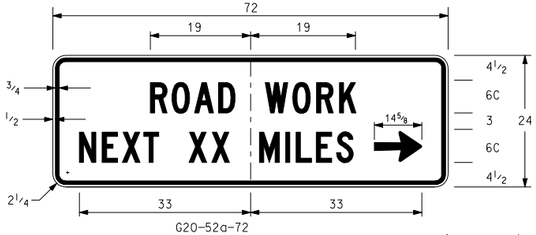
G20-1a-60
Legend: black (Non-refl)
Background: orange



R11-3a-60
Legend: black (Non-refl)
Background: white

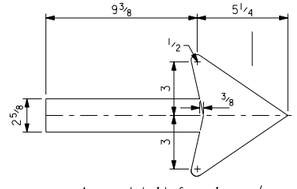


G20-1b-60
Legend: black (Non-refl)
Background: orange



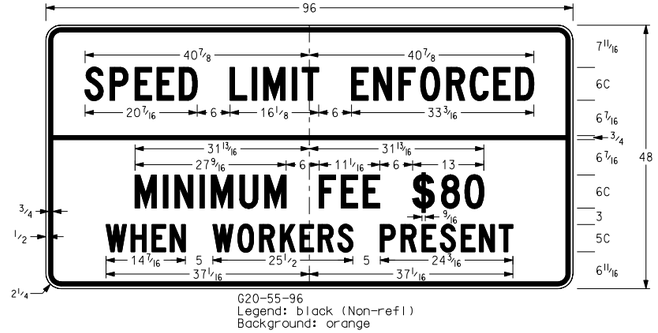
G20-52a-72
Legend: black (Non-refl)
Background: orange

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

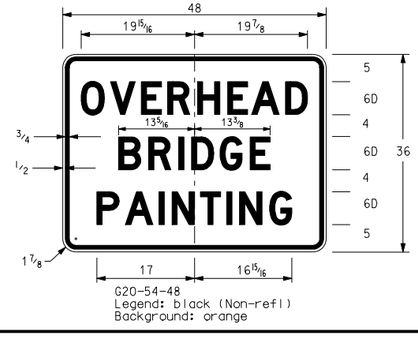


Arrow detail for sign no's.
G20-50a-72 & G20-52a-72

R11-3b-60
Legend: black (Non-refl)
Background: white



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



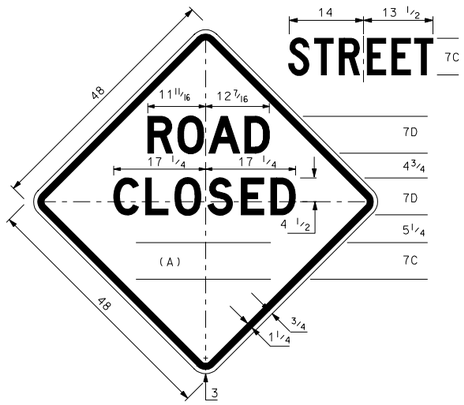
G20-54-48
Legend: black (Non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revision
07-26-95	Added signs G20-1a, G20-50a, R2-1a
03-04-96	Remove G20-2-60
10-18-01	G20-1b-60
01-30-03	Pavement end sign
07-25-04	Revised Fee Sign
04-01-04	Revised G20-55-96 sign
08-04-04	Deleted W8-3-48. Added Slow paddle
12-01-04	PE stamp added
07-11-05	Revised G20-4

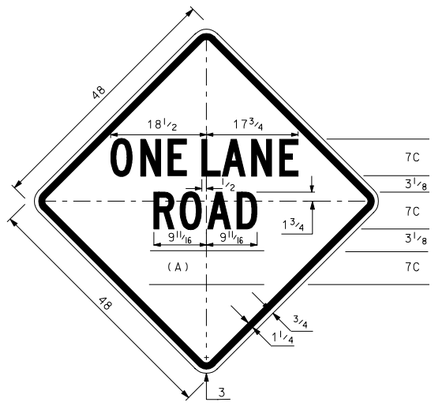
This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 07/11/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAIL

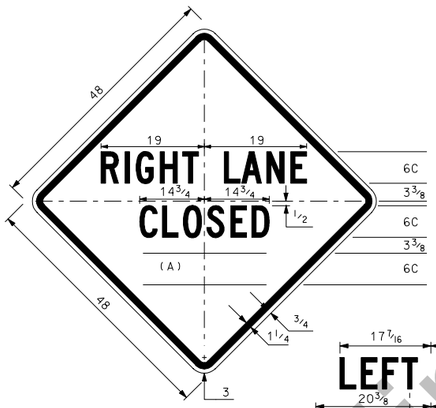
D-704-11



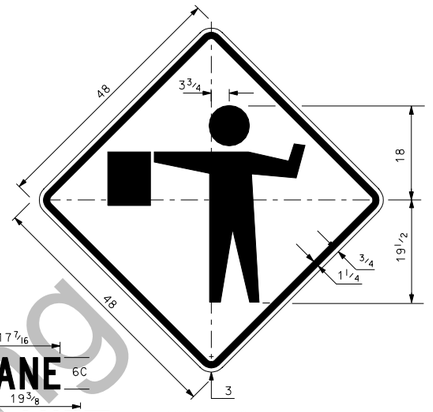
W20-3-48
Legend: black
(Non-refl)
Background: orange



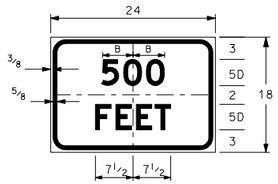
W20-4-48
Legend: black
(Non-refl)
Background: orange



W20-5-48
Legend: black
(Non-refl)
Background: orange



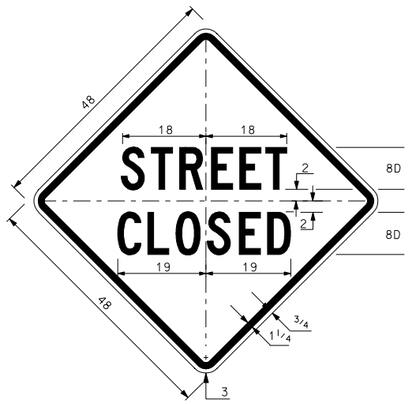
W20-7a-48
Legend: black
(Non-refl)
Background: orange



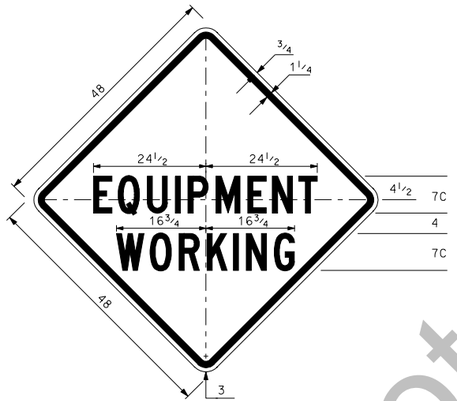
W20-7k-24
Legend: black
(Non-refl)
Background: orange

SIGN	DIMENSION B (INCHES)
500'	6
1000'	7 3/8
1500'	7 3/8

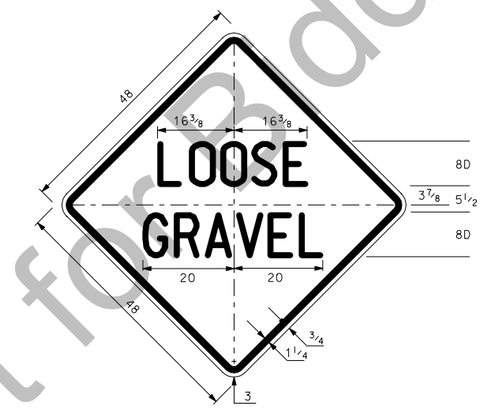
For use with
W20-7a-48 &
W21-1a-48



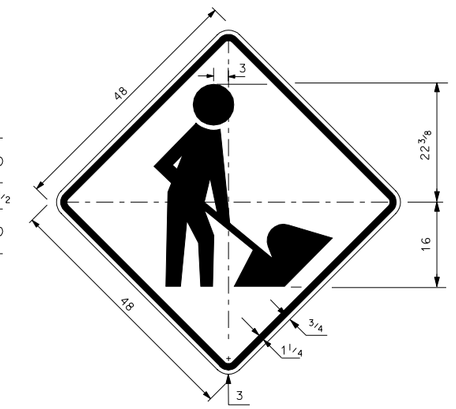
W20-8-48
Legend: black
(Non-refl)
Background: orange



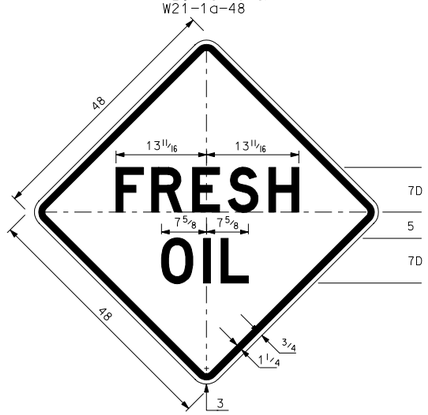
W20-51-48
Legend: black
(Non-refl)
Background: orange



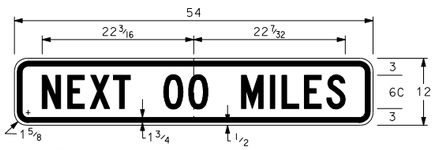
W8-7-48
Legend: black
(Non-refl)
Background: orange



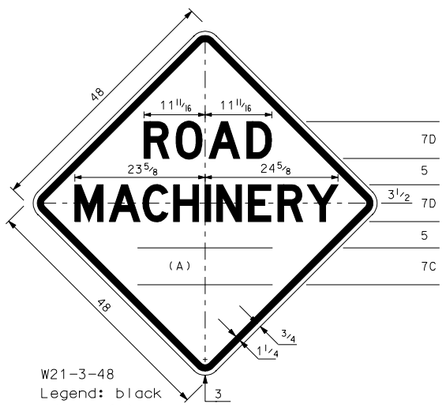
W21-1a-48
Legend: black
(Non-refl)
Background: orange



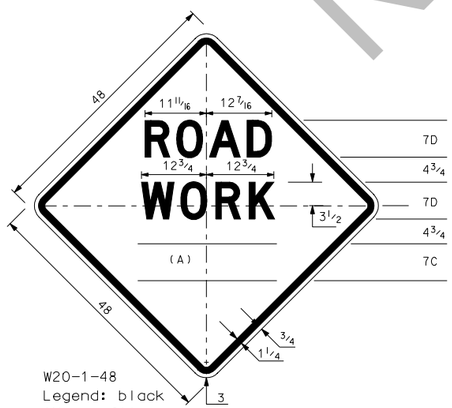
W21-2-48
Legend: black
(Non-refl)
Background: orange



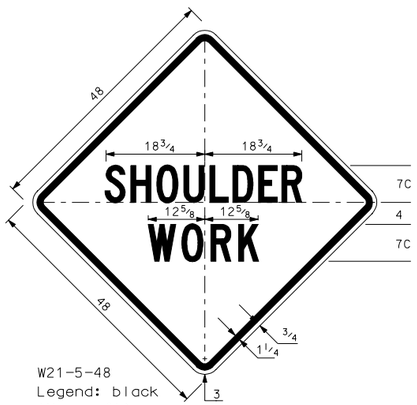
W20-52-54
Legend: black
(Non-refl)
Background: orange



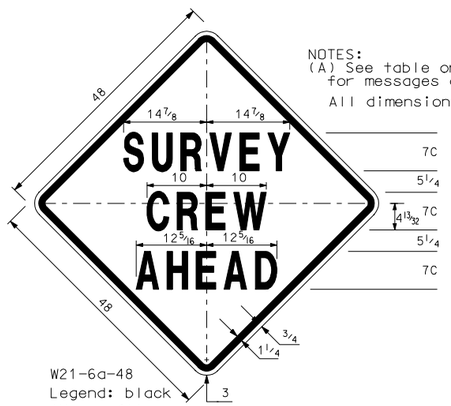
W21-3-48
Legend: black
(Non-refl)
Background: orange



W20-1-48
Legend: black
(Non-refl)
Background: orange



W21-5-48
Legend: black
(Non-refl)
Background: orange



W21-6a-48
Legend: black
(Non-refl)
Background: orange

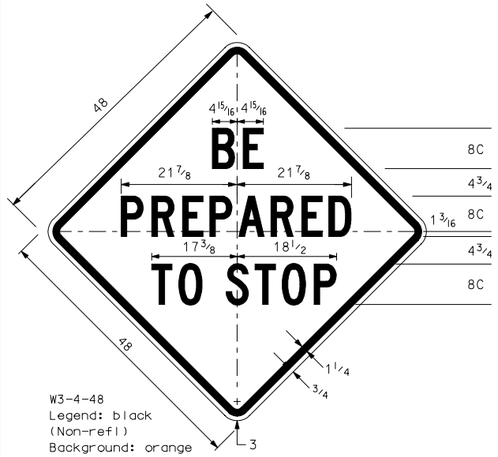
NOTES:
(A) See table on standard D-704-12 for messages and dimensions.
All dimensions are in inches

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
05-01-92	General revisions
06-09-95	Chg 7D to 7C(Dwg W20-3, W21-3 & W21-4
05-26-98	Add W7-7-48
11-06-00	Rev W20-52-54
01-25-01	W21-6a-48
07-25-03	Rev W21-4 to W20-1
08-05-04	General revisions
12-01-04	PE stamp added
07-11-05	Revised W21-3, W20-1, W20-7a, W21-1a and W20-7k

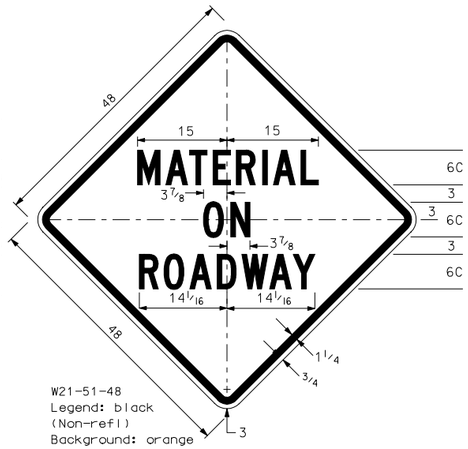
This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 07/11/05 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAIL

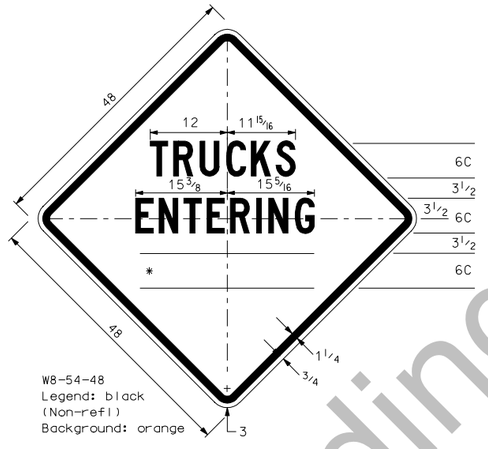
D-704-12



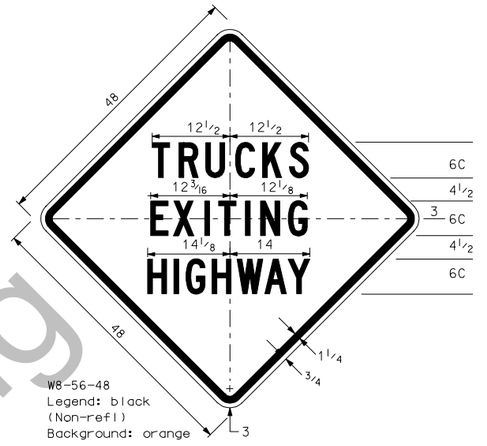
W3-4-48
Legend: black
(Non-refl)
Background: orange



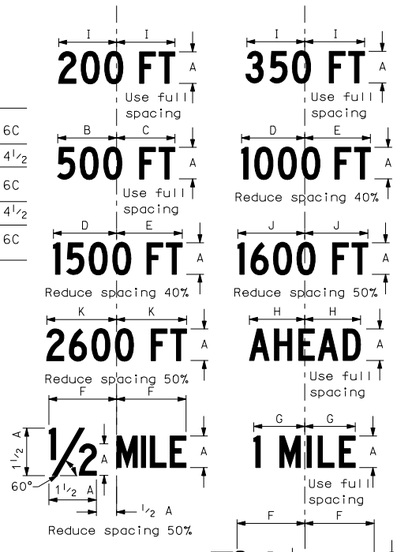
W21-51-48
Legend: black
(Non-refl)
Background: orange

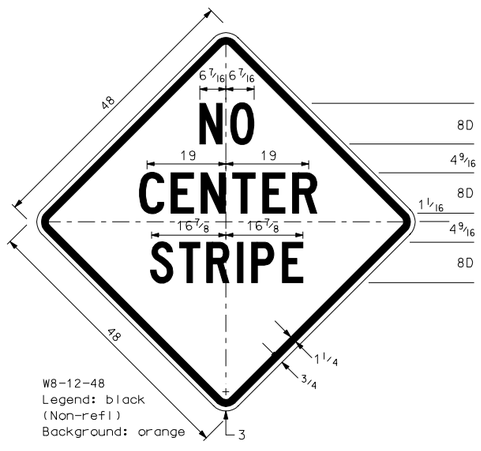


W8-54-48
Legend: black
(Non-refl)
Background: orange

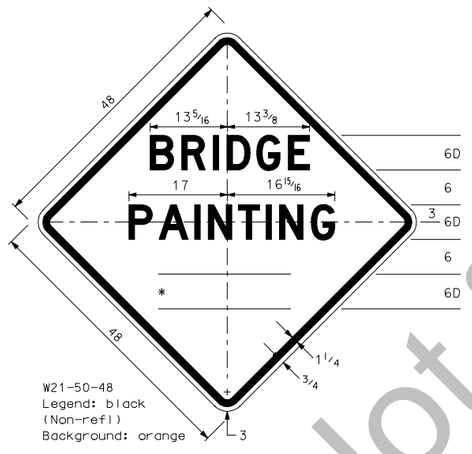


W8-56-48
Legend: black
(Non-refl)
Background: orange

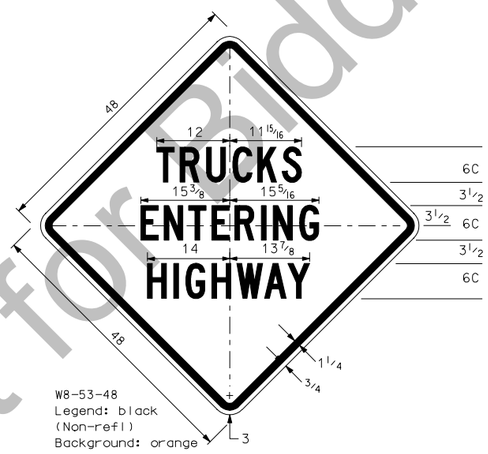




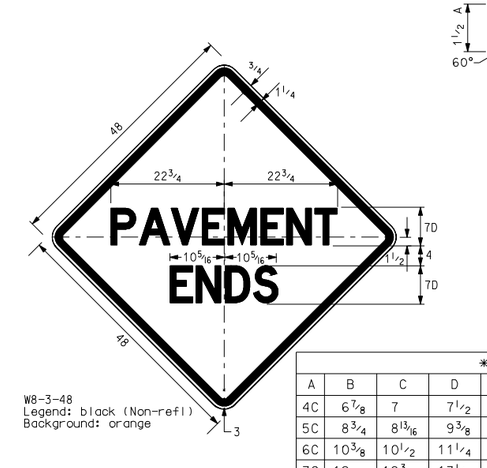
W8-12-48
Legend: black
(Non-refl)
Background: orange



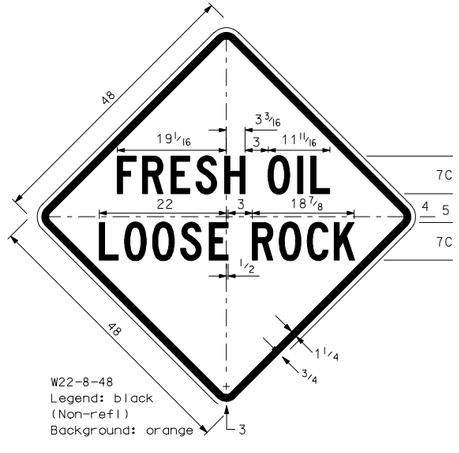
W21-50-48
Legend: black
(Non-refl)
Background: orange



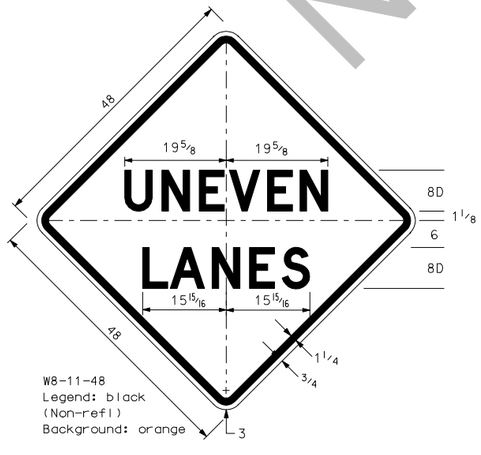
W8-53-48
Legend: black
(Non-refl)
Background: orange



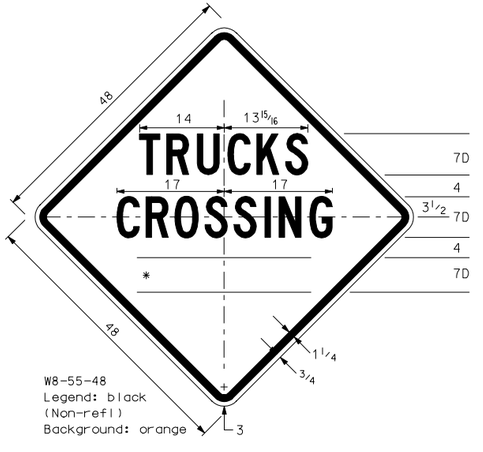
W8-3-48
Legend: black (Non-refl)
Background: orange



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



W8-11-48
Legend: black
(Non-refl)
Background: orange



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

* DIMENSIONS (INCHES)

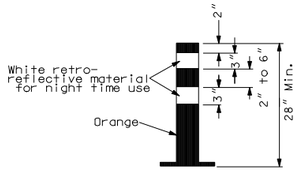
A	B	C	D	E	F	G	H	I	J	K
4C	6 7/8	7	7 1/2	8	8 5/16	6 1/16	7	8 5/16	9 1/8	9 3/4
5C	8 3/4	8 13/16	9 3/8	10	10 7/16	7 5/8	8 3/4	10 7/16	11 7/16	12 3/16
6C	10 3/8	10 1/2	11 1/4	12	12 1/2	9 1/8	10 1/2	12 1/2	13 3/4	14 5/8
7C	12	12 3/16	13 1/8	14	14 9/16	10 5/8	12 1/4	14 9/16	15	15 5/8
8C	13 3/4	14	15	16	16 5/8	12 1/8	14	16 3/4	18 1/4	19 1/2
4D	8 1/8	8 5/8	8 1/2	9	9	7 3/16	8 11/16	9 3/4	10 3/4	11 3/8
5D	10 3/16	10 13/16	11 5/8	11 1/4	11 1/4	9 1/2	10 7/8	12 1/8	13 1/4	14 1/4
6D	12 3/16	12 15/16	12 3/4	13 1/2	13 1/2	11 13/16	13 1/8	14 9/16	14 7/8	15 1/2
7D	14 1/4	15 1/8	14 7/8	15 3/4	15 3/4	13 1/16	15 1/2	15 1/8	15 1/2	16 7/8
8D	16 1/4	17 1/4	17	18	18	14 3/8	17 7/16	19 1/4	17 3/4	19 5/16

Standard signs that are shown in the construction sign and barricade location details shall be fabricated in the shape, color, and dimensions as shown in the standard signs layout booklet.

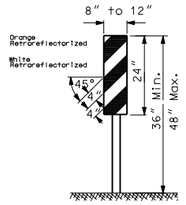
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
12-01-88	Uneven pavement
05-01-92	General revisions
01-24-95	W8-12-48
02-03-95	W8-11-48
06-15-95	General revisions
05-19-98	Added ¾ mile
05-26-99	Added W8-56-48
08-05-04	Deleted slow paddle added W8-3-48
12-01-04	PE stamp added
07-11-05	Changed W20-7b to W3-4, Revised W8-11 and W8-12

This document was originally issued and sealed by Mark S Gaydos, Registration Number PE-4518, on 07/11/05 and the original document is stored at the North Dakota Department of Transportation

BARRICADE DETAILS AND CHANNELIZING DEVICES



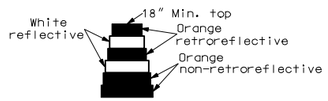
TUBULAR MARKER



VERTICAL PANEL

(Retroreflective sheeting shall be placed on both sides)

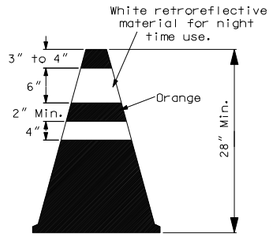
NOTE: Vertical panels used on the expressways or other high speed roadways shall be 12" by 24"



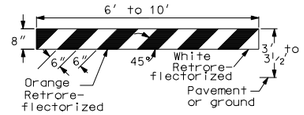
DELINEATOR DRUM

36" Min. height

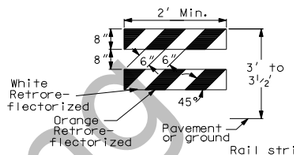
The markings on drums shall be orange and white stripes 4 to 6 inches wide. There shall be at least two orange and two white stripes. Where drums have ribs or indentations, there shall be no retroreflectorized sheeting in this area. This space shall be no more than 2 inches wide. The drum surface shall be prepared as recommended by the sheeting manufacturer before retro reflective sheeting is applied



CONE

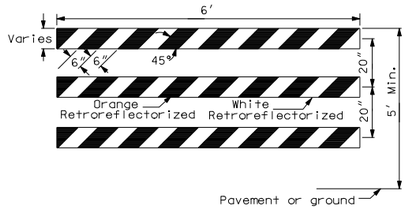


TYPE I BARRICADE



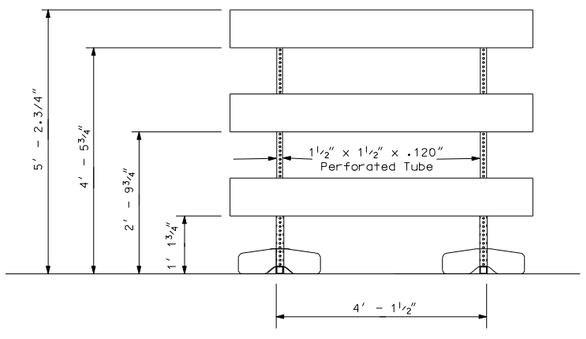
Rail stripe width shall be 4" if barricade length is less than 36".

TYPE II BARRICADE

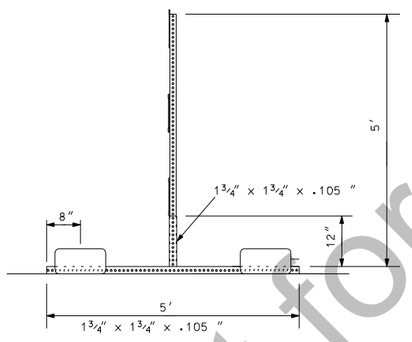


TYPE III BARRICADE

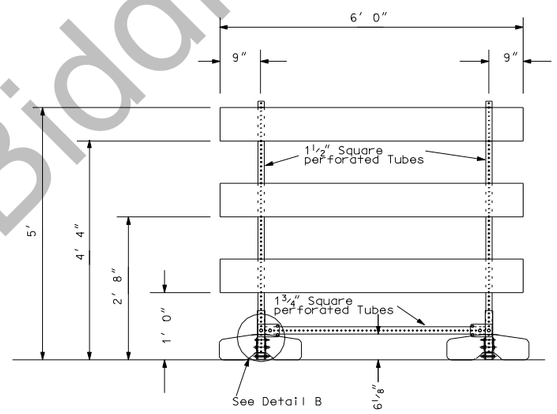
BARRICADES:
Number of retroreflectorized rail faces:
Type I - 2 (One each direction)
Type II - 4 (Two each direction)
Type III- 6 (Three in each direction)

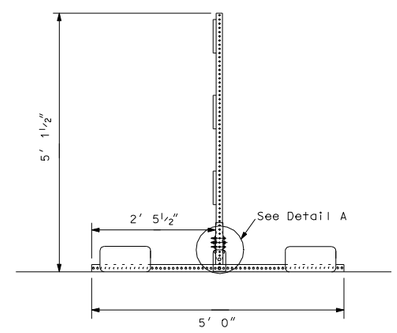


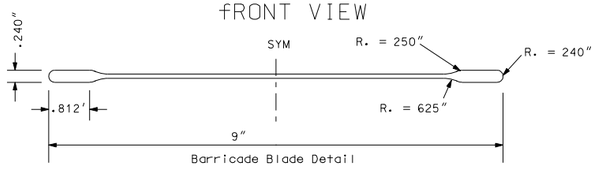
FRONT VIEW



END VIEW







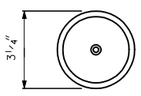
Ballast = 45lb sandbag at the end of each leg.

Barricade blade fastened to vertical supports with 2" corner bolts.

Vertical potion of leg is welded to horizontal portion on all four sides.

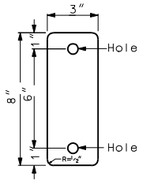
Masts slide inside vertical portion of legs. No bolts or fastenings devices used.

BARRICADE ASSEMBLY DETAIL
(Use when aluminum blade as detailed above)



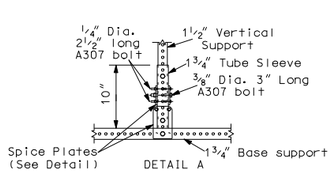
ACRYLIC PLASTIC REFLECTOR

Delineator reflector shall meet the requirements of section 894

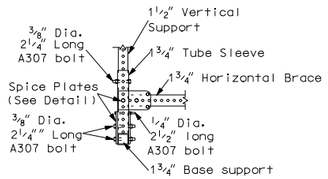


DELINEATOR REFLECTOR

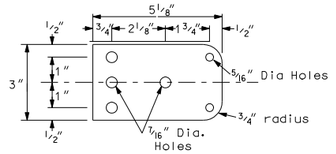
3"x8"- 18 Gauge galvanized steel sheet or 0.080" aluminum plate with white retroreflective sheeting (Type 3A or 3B) as specified in section 894 of the Standard Specifications.



DETAIL A



DETAIL B



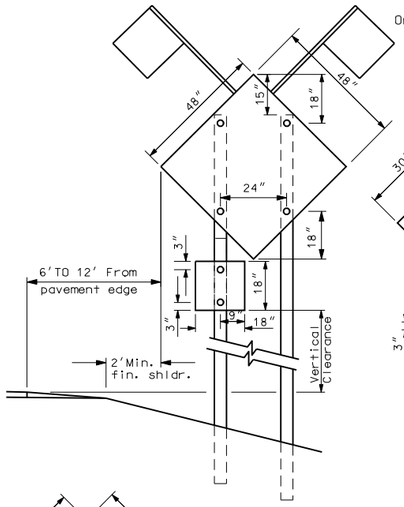
SPLICE PLATE

BARRICADE ASSEMBLY DETAIL
(Use when Plastic I-Beam w/ 1 1/2" Hollow Core Flanges or 1" x 8" x72" wood boards.

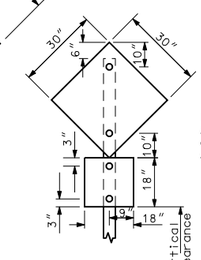
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-03-87	Type sheeting
10-01-87	Delineator drum note
06-08-88	Barricade type III
06-01-92	General revision
06-10-93	General revision
09-23-93	Vertical panel
06-09-95	Reflective sheeting
03-01-02	Barricade type III assembly details
04-01-02	Type III barricade
12-01-04	PE stamp added
06-29-05	Revised Type II barricade stripe

This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on 06/29/05 and the original document is stored at the North Dakota Department of Transportation

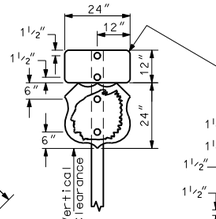
CONSTRUCTION SIGN AND BARRICADE ASSEMBLY DETAILS



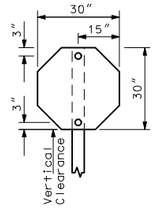
POST MOUNTING
48"x48" Signs



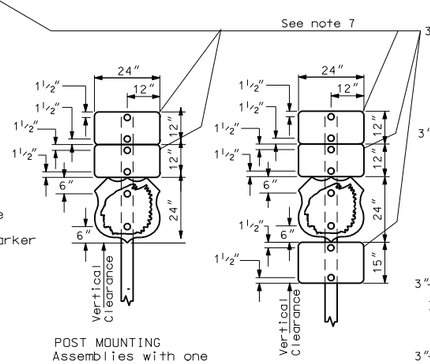
POST MOUNTING
30"x30" Signs



POST MOUNTING
Assemblies with one cardinal direction sign & one route marker

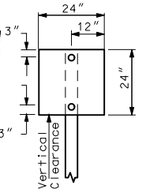


POST MOUNTING
Sign R1-1-30

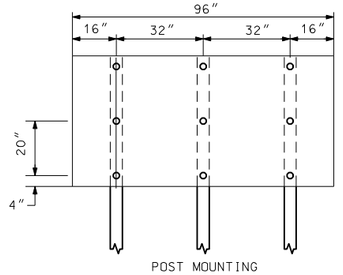


POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign & one route marker

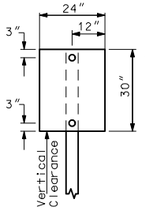
POST MOUNTING
Assemblies with one cardinal direction sign, one detour sign, one route marker & one directional arrow.



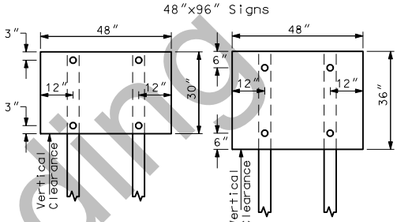
POST MOUNTING
24"x24" Signs



POST MOUNTING
48"x96" Signs

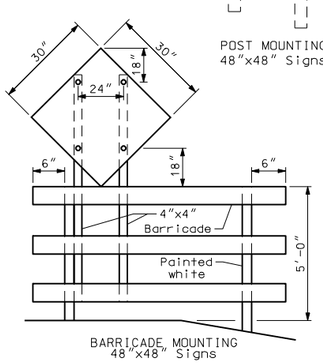


POST MOUNTING
24"x30" Signs

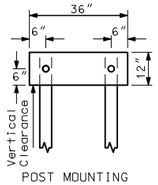


POST MOUNTING
48"x30" Signs

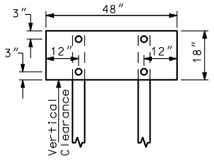
POST MOUNTING
48"x36" Signs



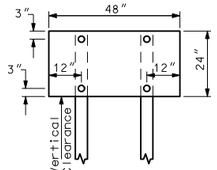
BARRICADE MOUNTING
48"x48" Signs



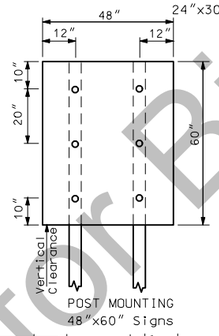
POST MOUNTING
36"x12" Signs



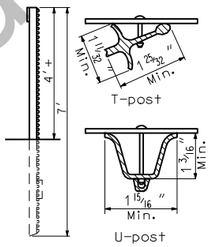
POST MOUNTING
48"x18" Signs



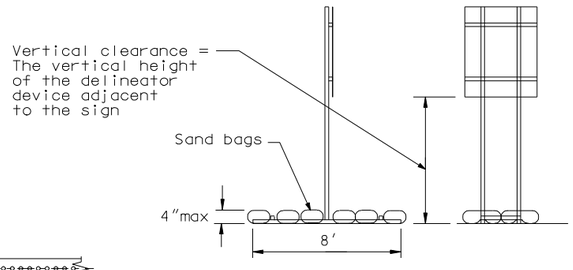
POST MOUNTING
48"x24" Signs



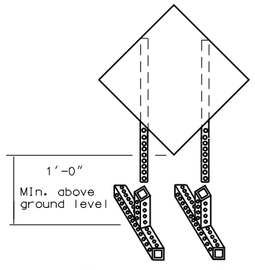
POST MOUNTING
48"x60" Signs



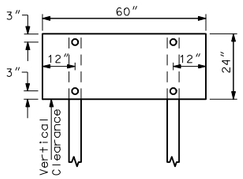
DELINEATOR ATTACHMENT AND POST MOUNTING DETAILS



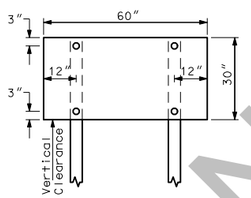
Post sizes shall be 2 1/4" perforated tube



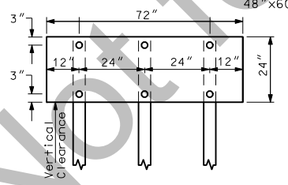
PORTABLE SIGN MOUNTING



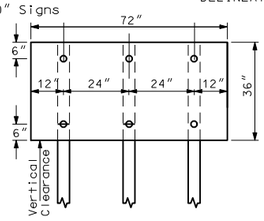
POST MOUNTING
60"x24" Signs



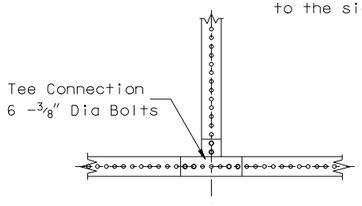
POST MOUNTING
60"x30" Signs



POST MOUNTING
72"x24" Signs

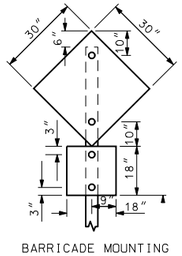


POST MOUNTING
72"x36" Signs

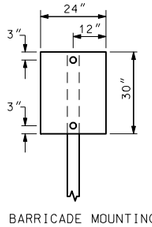


Post to Ground Support Connection

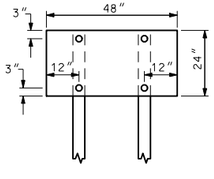
SKID MOUNTED SIGNS



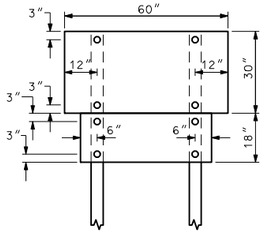
BARRICADE MOUNTING
30"x30" Signs



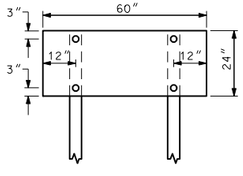
BARRICADE MOUNTING
24"x30" Signs



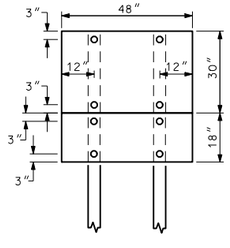
BARRICADE MOUNTING
48"x24" Signs



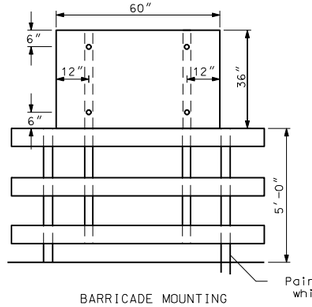
BARRICADE MOUNTING
60"x30" & 48"x18" Signs



BARRICADE MOUNTING
60"x24" Signs



BARRICADE MOUNTING
48"x30" & 48"x18" Signs



BARRICADE MOUNTING
G20-1-60 Signs

NOTES:

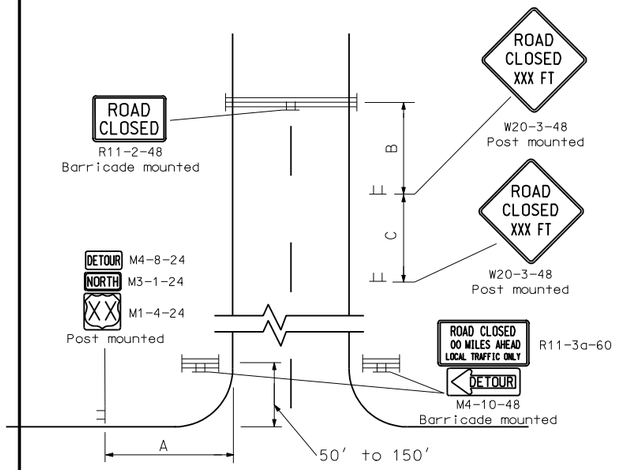
1. Barricade and Sign Supports: Wooden supports shall be painted white. Steel supports shall be galvanized or painted.
2. Barricade Mounting Signs: The bottom of the sign shall be flush with the top of the top rail. Wood sign posts shall be 4"x4" min. SFS or equivalent steel posts. All barricades and barricade mounted signs shall be assembled with 3/8" bolts.
3. Sign Supports: Sign supports shall be 4"x4" min. SFS or equivalent steel post. The anchor for steel supports shall have a stub height of 4" or less. Wood posts more than 4"x4" shall be breakaway. Sign supports shall be imbedded to a sufficient depth so that signs will remain plumb throughout duration of project. It is suggested that wood posts have a min. depth of embedment of 5' and steel posts be embedded a min. 3'-6".
   Material: All signs shall be 0.100" aluminum, 12 gauge steel, 1/2" plywood or other approved material.
   Holes: All holes to be punched round for 3/8" bolts.
4. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate without a border and this plate installed and removed as required.
5. Advance Warning Flashing or Sequencing Arrow Panels: The minimum mounting height shall be 7 feet above the roadway to the bottom of the panel, except on vehicle mounted panels which shall be as high as practicable.
6. Delineator Posts: Typical fence post sections are shown in Attachment Details. Other types of metal fence posts may be substituted upon approval of the engineer. These substituted posts shall have reflectors attached similar to the ones shown.
7. Route Marker Auxiliary Signs: The route marker auxiliary signs such as the cardinal direction and directional arrows shall have background colors the same as the route marker they are used with (Interstate route markers, blue background, US and State route markers, white background, Interstate Business loop and spur, green background, and County route markers, blue background).
8. Vertical Clearance: Post mounted signs placed in rural areas shall have a vertical clearance of at least 5 feet measured from the bottom of the sign to the near edge of the driving lane. In business, commercial and residential districts where parking and/or pedestrian movement is likely to occur or where other obstructions to view, the distance between the bottom of the sign to the near edge of the driving lane shall be at least 7 feet. The height to the bottom of secondary signs mounted below another sign may be 1 foot less than the appropriate height specified. Large signs having an area exceeding 50 square feet that are installed on multiple breakaway posts shall be mounted a minimum of 7 feet above the ground.

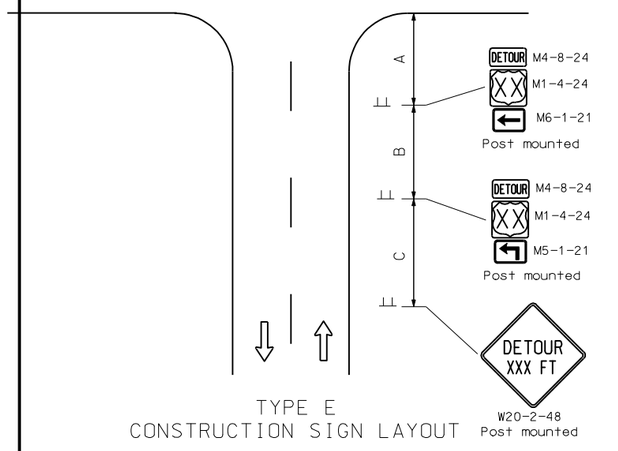
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
08-01-88	Sign assembly
05-01-92	Sign assembly
03-30-93	Sign supports note
03-04-96	Sign height
08-15-96	Note 8
07-10-97	Note revision
07-31-98	Note & portable sign
10-01-99	Skid mounted sign
02-07-03	Vertical clearance note
11-30-04	Third post added to some signs
12-01-04	PE stamp added

This document was originally issued and sealed by MARK S GAYDOS, Registration Number PE-4518, on 12/01/04 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS

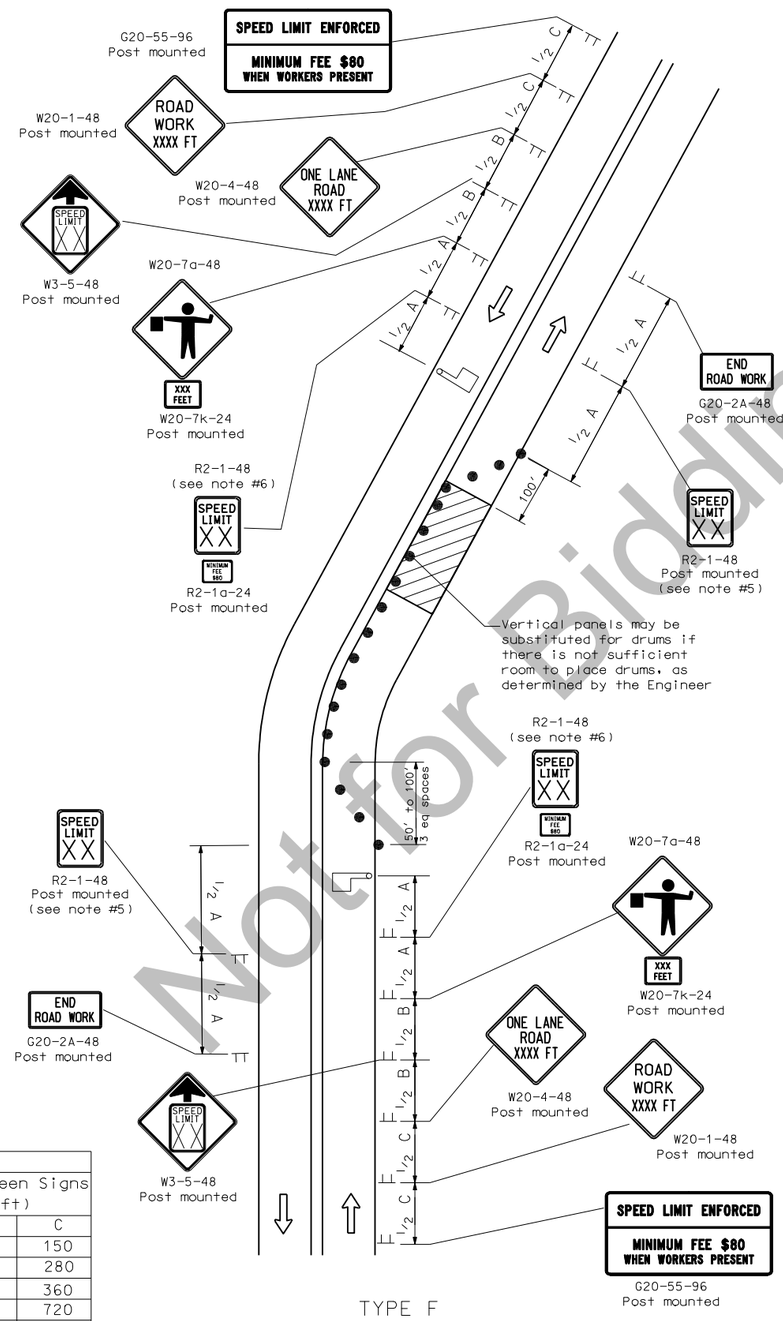
D-704-19





TYPE E
CONSTRUCTION SIGN LAYOUT

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



TYPE F
CONSTRUCTION SIGN LAYOUT

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

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 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
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   $W \times S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricade shown to be placed on roadway shall be on a moveable assembly. Sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the roadway shall be placed on skid mounted assemblies.
3. Delineator drums used for tapering traffic shall be placed at 3 equal spaces. Delineator drums for tangents shall be spaced at 2 times dimension "S".
4. 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 and 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).
5. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
6. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at 1/2 B.
7. 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.
8. Existing speed limit signs within a reduced speed zone shall be covered.
9. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
10. Where necessary, safe speed to be determined by the Engineer.
11. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.
12. G20-55-96 or R2-1a-24 sign are not required when a pilot car operation is used.

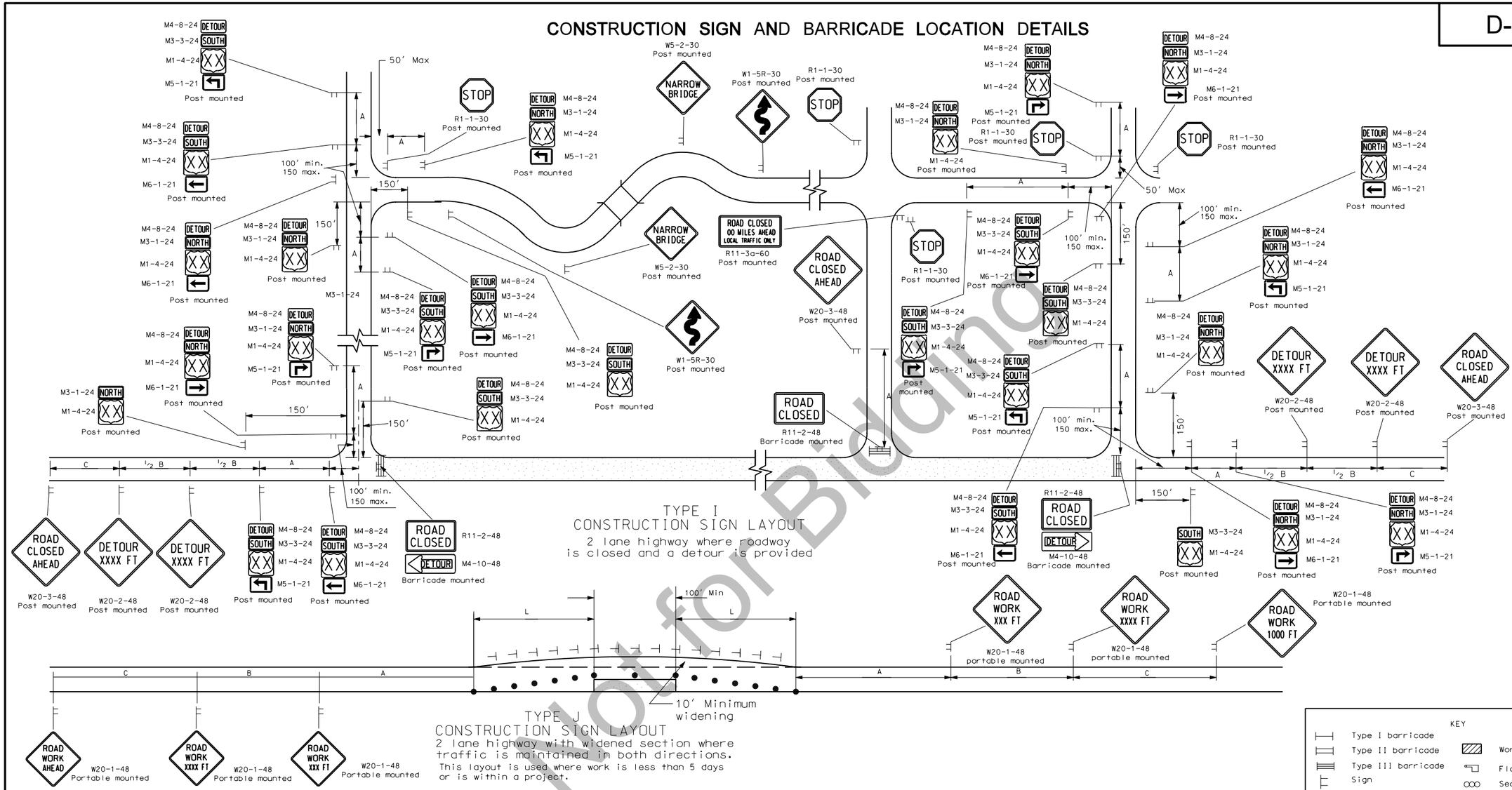
KEY

Delineator Drum	Type I Barricade	Flagger
Type A Delineator	Type II Barricade	Sequencing Arrow Panel
Sign	Type III Barricade	Work/Hazard Area
Cone		

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-1-86	
REVISIONS	
DATE	CHANGE
07-19-02	Reversed End Road Work & Speed Limit Signs
07-25-03	Revised R2-1a and W20-1
01-16-04	Revised type F
04-01-04	Revised fee sign & Warning sign spacing. Rev. note 6. add note 12
12-01-04	PE stamp added
06-29-05	Added W3-5 to type F. Rev. Adv. Warning Table. Rev. Note 6
04-05-06	Showed signing for opposite direction
02-16-07	Added W3-5-48 to opposite direction of Type F layout

This document was originally issued and sealed by MARK S GAYDOS Registration Number PE-4518, on02/16/2007and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN AND BARRICADE LOCATION DETAILS



KEY

- Type I barricade
- Type II barricade
- Type III barricade
- Sign
- Delineator drum
- Cones
- Work area
- Flagger
- Sequencing arrow panel
- Type A delineator or vertical panels back to back

Notes

1. Variables
   S=Numerical value of speed limit or 85th percentile. W=The width of taper.
   L=Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 / 60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Barricade shown to be placed on roadway shall be on a moveable assembly. sign to be mounted on barricades shall be mounted with the sign bottom on the top of the top barricade bar. Sign shown to be placed on the shall be placed on skid mounted assemblies.
3. Delineator drums, or cones used for tapering traffic shall be spaced at dimension "S". Delineator drums, or cones used for tangents shall be spaced at 2 times "S".
4. 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 shall be placed at ½ B.
5. 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.
6. Existing speed limit signs within a reduced speed zone shall be covered.
7. Obliterated or covered payment marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
8. All Route Markers shall be furnished by the state and shall be obtained and installed by the contractor unless noted otherwise in the plans.
9. The contractor has the option of using portable sign supports in lieu of post mounted sign as shown on the standard drawings as specified in section 704.03 C.

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

10-1-86

REVISIONS

DATE	CHANGE
05-01-92	General Revisions
05-28-96	W21-4-48
08-15-96	Revise flag note
10-01-99	General Revisions
11-15-99	Add Width Taper in note
01-05-01	Revised note 3
04-02-02	Type I subtitle
07-25-03	Revised W21-4 to W20-1
04-01-04	Rev.Warning sign spacing
12-01-04	PE stamp added
06-29-05	Rev. Adv. Warning Table. Rev. Note 4

This document was originally issued and sealed by MARK S. GAYDOS Registration Number PE- 4518 , on 06/29/05 and the original document is stored at the North Dakota Department of Transportation