DESIGN DATA				
Traffic	Average Daily			
Current 2017	Pass: 10,025	Trucks: 1,335	Total: 11,360	
Forecast 2037	Pass: 12,235	Trucks: 1,630	Total: 13,865	
Clear Zone Distance: 32 feet		Design Speed: 55 mph		
Minimum Sight Dist. for Stopping:		Bridges:		
Sight Dist. for No Passing Zone:				
Pavement Design Life (years)				
Design Accumulated One-way ESALs:				

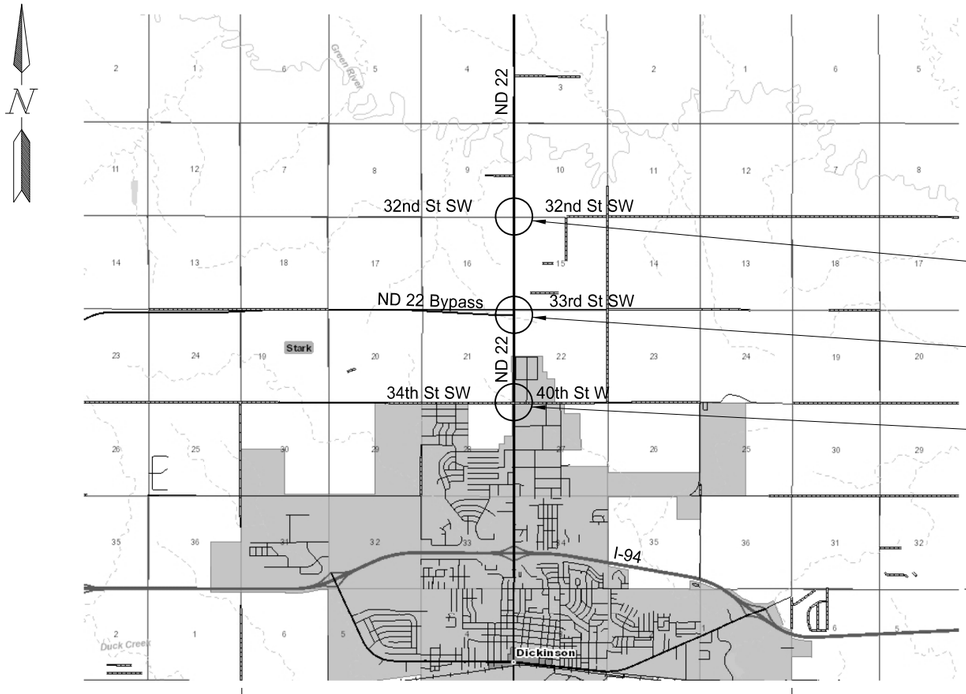
	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	22001	1	1

JOB # 36
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

HES-5-022(121)073
Stark County
ND 22 and 34th St SW, 33rd St SW,
and 32nd St SW Intersections
Traffic Signal Revisions

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

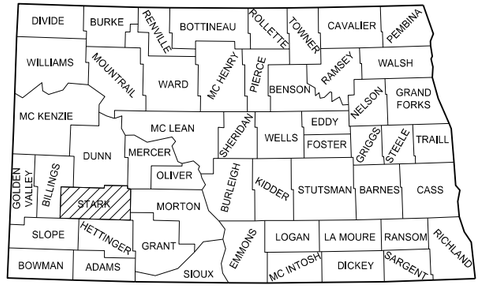
PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
HES-5-022(121)073		



ND 22 and 32nd St SW Intersection
RP 75.670
Traffic Signal Revisions

ND 22 and ND 22 Bypass/33rd St SW Intersection
RP 74.623
Traffic Signal Revisions

ND 22 and 40th St W/34th St SW Intersection
RP 73.678
Traffic Signal Revisions



STATE COUNTY MAP

DESIGNERS

Blaine Johanneson /s/

APPROVED DATE 2-8-18

for Roger Weigel /s/
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

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

APPROVED DATE 2-8-18

James Douglas Rath /s/
NDDOT DIV-DIST OR CONSULTANT FIRM

This document was originally issued and sealed by James Douglas Rath, Registration Number PE- 4288, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	2	1

TABLE OF CONTENTS

PLAN SECTIONS

LIST OF STANDARD DRAWINGS

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	6	1

NOTES

SECTION 100

704-P01 TRAFFIC CONTROL: Provide traffic control according to the following layouts on the Standard Drawings and Plan Sheets for traffic control:

D-704-24, type R: For signal revisions when shoulder closure is needed.
Section 100, Sheet 2, left lane closed: For signal revisions. Two per intersection (NB and SB).

Remove lane or shoulder closures at the end of each day's work.

SECTION 150

772-P01 REVISE CONTROLLER: Include all controller and controller cabinet work necessary to add the flashing yellow arrow signal heads and relocate the video detection cameras. Work includes adding load switches, programming the MMU and controller, and revising the video detection zones of the relocated cameras.

Include the cost of Revise Controller in the item "Revise Traffic Signal System".

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE-5038, on 2/8/18 and the original document is stored at the North Dakota Department of Transportation.

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	60	60
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1,627	1,627
704	1048	PORTABLE RUMBLE STRIPS	EA	2	2
704	1052	TYPE III BARRICADE	EA	2	2
704	1060	DELINEATOR DRUMS	EA	40	40
704	1067	TUBULAR MARKERS	EA	35	35
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2	2
772	2904	REVISE TRAFFIC SIGNAL SYSTEM	EA	3	3

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
CONSIGN1	**48"X48"**	**RUMBLE STRIP AHEAD**	**2**	**35**	**70**
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**4**	**19**	**76**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	**48"x48"**	**STOP**	**4**	**32**	**128**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**4**	**5**	**20**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**12**	**39**	**468**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**6**	**10**	**60**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		35	
W3-4-48	48"x48"	BE PREPARED TO STOP		35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**5**	**35**	**175**
W4-2-48	**48"x48"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**4**	**35**	**140**
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT.		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT.		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**5**	**35**	**175**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	**48"x48"**	**RIGHT or LEFT LANE CLOSED AHEAD or __ FT.**	**4**	**35**	**140**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**4**	**35**	**140**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		35	
W21-5-48	**48"x48"**	**SHOULDER WORK**	**1**	**35**	**35**
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**1627**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**60**
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1048	**PORTABLE RUMBLE STRIPS**	**EACH**	**2**
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**2**
704-1060	**DELINEATOR DRUMS**	**EACH**	**40**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**35**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**2**
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE-5038, on 2/8/18 and the original document is stored at the North Dakota Department of Transportation.

Traffic Control Devices List

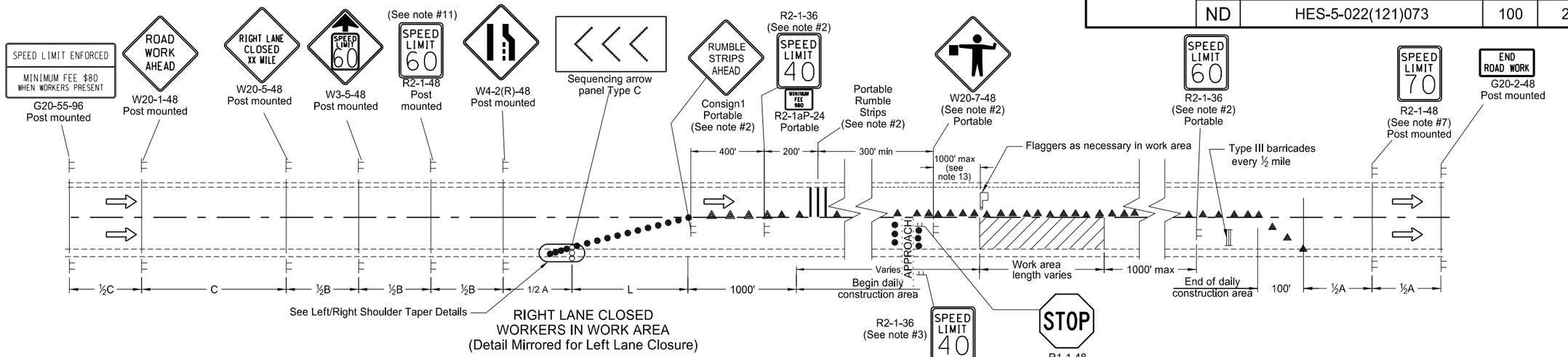
Revise Traffic Signal System

ND 22

Dickinson

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	100	2

SIGN LAYOUT FOR ONE LANE CLOSURE



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

Notes:

1. Install advance signs for flagging when flaggers are flagging.

2. Move the portable rumble strips, rumble strips ahead sign, advanced flagger sign, and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Cover or remove the rumble strips ahead sign, 40 mph speed limit and Minimum Fee $80 signs and the 65 mph speed limit sign upon completion of the work day or when workers are not present. Remove the portable rumble strips upon completion of the work day.

3. Approaches: When the work area encompasses an approach, install a 40 mph speed limit sign to control the approach. Cover the existing stop sign and install a new portable stop sign when the approach is on the side of the lane closure. Remove the approach speed limit sign once the main line 40 mph speed zone is moved past the approach.

4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or (WxSxS)/60 for urban, residential, and other streets with speeds of 40 mph or less.

5. Space delineator drums for tapering traffic at the dimension "S". Space tubular markers used for tangents at 2 times dimension "S".

6. Place sequencing arrow panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).

7. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.

8. Cover existing speed limit signs within a reduced speed zone.

9. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the diamond sign, and at such a distance above the edge that the flag does not touch the sign when limp.

10. Determine the reduced speed limit dependent on the in place speed limit before construction. Where speed limits are to be reduced more than 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.

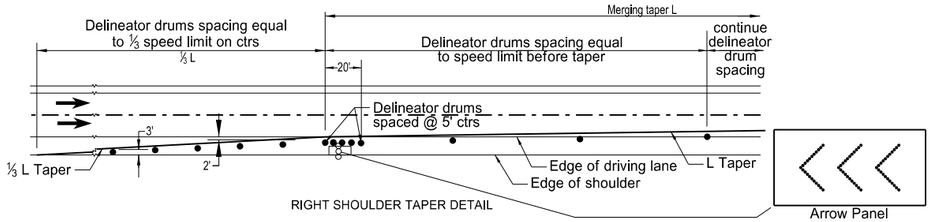
11. As an option use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.

12. Sign G20-55-96 is not required if this standard is part of other traffic control layouts or the work is less than 15 days.

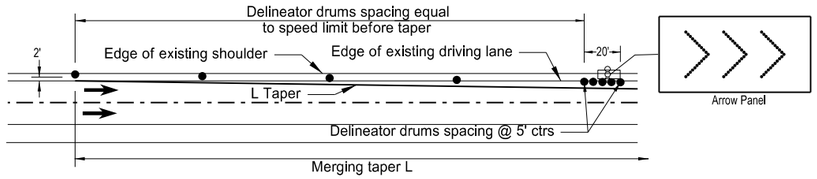
13. For a stationary operation, maximum distance is 1000'. For a moving operation, maximum distance is 3000'.

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

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

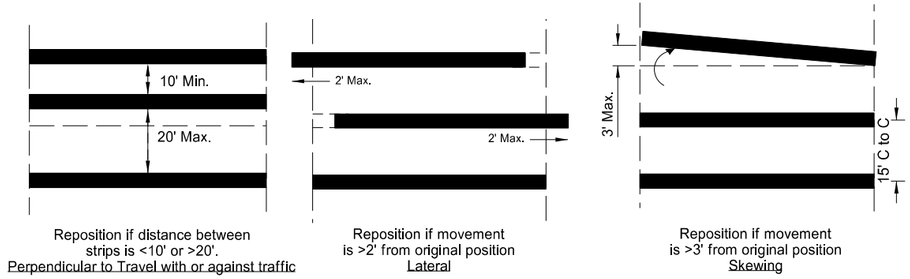


RIGHT SHOULDER TAPER DETAIL

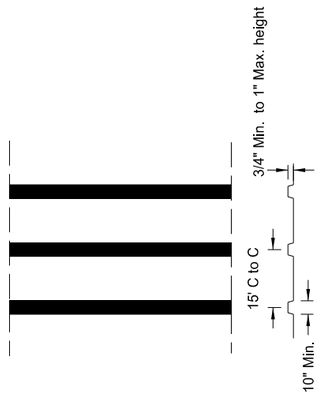


LEFT SHOULDER TAPER DETAIL

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



PORTABLE RUMBLE STRIPS ARRAY - TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES



PORTABLE RUMBLE STRIPS ARRAY DETAIL

KEY

- Type I barricade
- Type II barricade
- Type III barricade
- Sign
- Delineator drum
- Work area
- Flagger
- Sequencing arrow panel
- Tubular markers

PORTABLE RUMBLE STRIPS

ND 22

Dickinson

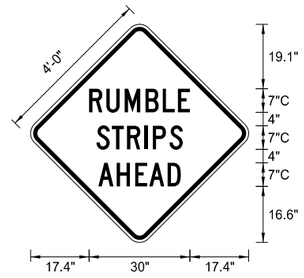
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	100	3

SIGN NUMBER	Consign 1
WIDTH x HEIGHT	4'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
Various Locations

AREA: 16 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Misc_Warning.sil

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
R	U	M	B	L	E														30	7	C 2000
17.4	22.5	28	34.1	39.2	43.8																
S	T	R	I	P	S														25.6	7	C 2000
19.6	24.1	28.7	33.8	36.3	41.3																
A	H	E	A	D															24.5	7	C 2000
20.1	25.6	31.1	35.3	40.7																	

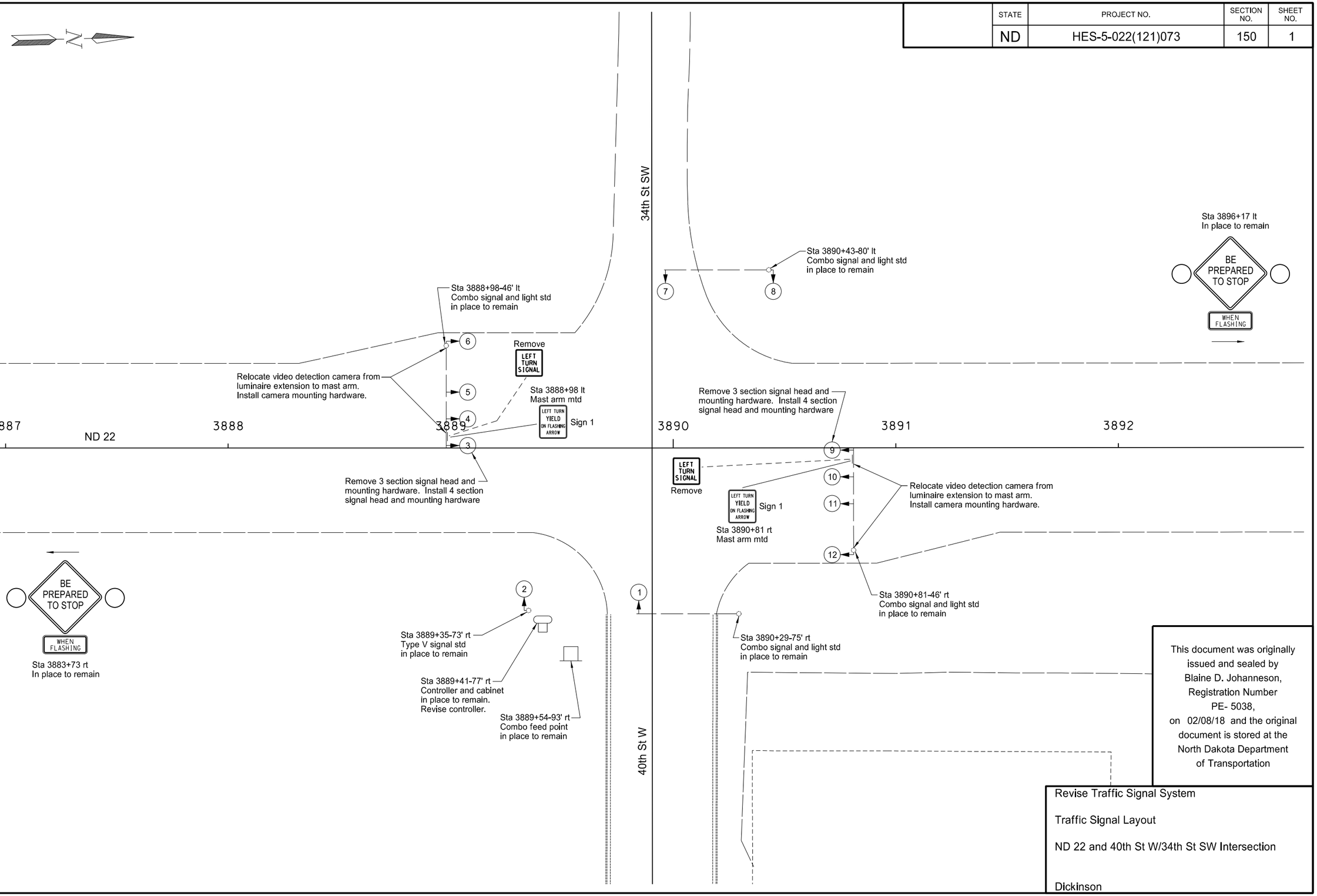
This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038 , on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

CONSTRUCTION SIGN DETAIL

ND 22

Dickinson

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	1



This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Traffic Signal Layout

ND 22 and 40th St W/34th St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	2

(A) Existing conduit in place to remain. Remove relocated video camera conductor. Install new video camera conductor. All other existing conductors in place to remain.

34th St SW

Sta 3888+98-46' lt
Signal std

(A)

Sta 3889+41-42' lt
Existing pull box
in place to remain

3887 3888 3889 3890 3891 3892

ND 22

(A)

(A)

Sta 3890+81-46' rt
Signal std

(A)

Sta 3889+41-77' rt
Controller and cabinet

Sta 3890+22-76' rt
Existing pull box
in place to remain

40th St W

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Conduit and Conductor Layout

ND 22 and 40th St W/34th St SW Intersection

Dickinson

2/8/2018 8:00:01 AM bjohanne R:\project\50022073.121\traffic\150SL_002_LSCOP.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	3

	STATION	CONDUIT RUNS		CABLE RUNS	
		LF	DIA	LF	Type
Signal std Pull box	3888+98-46' lt to 3889+41-42 lt	42 (C)	2" (C)	111	No. 16 AWG 3 (B)
Pull box Controller cabinet	3889+41-42' lt to 3889+41-77' rt	118 (C)	3" (C)	128	No. 16 AWG 3 (B)
Controller cabinet Pull box	3889+41-77' rt to 3890+22-76' rt	80 (C)	3" (C)	90	No. 16 AWG 3 (B)
Pull box Signal std	3890+22-76' rt to 3890+81-56' rt	77 (C)	2" (C)	146	No. 16 AWG 3 (B)

(B) Video Detection Camera Power Cable
(C) Existing Conduit

QUANTITIES (A)										
	No. 16 AWG 3 Conductor Cable	1-Way 4 Section Head W/12" Lens - Mast Arm Mounted	Signal Head Mounting Hardware	Remove Signal Head	Relocate Video Detection Camera	Video Detection Camera Mounting Hardware	Revise Controller	Flat Sheet for Signs - Type XI Reflective Sheeting		Revise Traffic Signal System
STATION	LF	EA	EA	EA	EA	EA	EA	SF		EA
3888+98-46' lt		1	1	1	1	1		7.5		
3890+81-46' rt		1	1	1	1	1		7.5		
Various Locations	475						1			
TOTAL	475	2	2	2	2	2	1	15		1

(A) Do not bid these items separately but include in the item "Revise Traffic Signal System".

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Cable and Conduit Runs and Quantities

ND 22 and 40th St W/34th St SW Intersection

Dickinson

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	4

CONDUCTORS			EXISTING CABLE 2 (NO.12 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	Black			Spare
2	White			Neutral
3	Red		4, 5, 6	Red
4	Green			Ground
5	Orange		4, 5, 6	Yellow
6	Blue		4, 5, 6	Green
7	White	Black		Spare
8	Red	Black	3	Red Arrow
9	Green	Black	3	Yellow Flashing Arrow (new)
10	Orange	Black	3	Yellow Arrow
11	Blue	Black	3	Green Arrow
12	Black	Black		Spare

CONDUCTORS			EXISTING CABLE 4 (NO.12 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	Black			Spare
2	White			Neutral
3	Red		10, 11, 12	Red
4	Green			Ground
5	Orange		10, 11, 12	Yellow
6	Blue		10, 11, 12	Green
7	White	Black		Spare
8	Red	Black	9	Red Arrow
9	Green	Black	9	Yellow Flashing Arrow (new)
10	Orange	Black	9	Yellow Arrow
11	Blue	Black	9	Green Arrow
12	Black	Black		Spare

Heads 3, 9

Flashing

12" Lenses
5" Louvered Backplate

All traffic signal heads shall be LED

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Conductors and Signal Heads

ND 22 and 40th St W/34th St SW Intersection

Dickinson

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	5

Head #	Phase 1 (Existing)								Phase 2 (Revise)								Phase 3 (Future)							
	R/W	Clear To ∅							R/W	Clear To ∅							R/W	Clear To ∅						
		2		4	5	6		8			4	5	6		8	1		4	5	6	7	8	1	2
1																								
2																								
3																								
4									G		Y	(A)	(A)		Y	Y								
5									G		Y	(A)	(A)		Y	Y								
6									G		Y	(A)	(A)		Y	Y								
7																								
8																								
9	G	Y		Y	(A)	(A)		Y	FY		Y	(A)	(A)		Y	FY								
10																								
11																								
12																								

Head #	Phase 4 (Existing)						Phase 5 (Existing)							Phase 6 (Revise)							Phase 7 (Future)							Phase 8 (Existing)						
	R/W	Clear To ∅					R/W	Clear To ∅						R/W	Clear To ∅						R/W	Clear To ∅						R/W	Clear To ∅					
		5	6		8	1	2		6		8	1	2		4		8	1	2		4	5		8	1	2	3	4	5	6		1	2		4	5	6	
1	G	Y	Y		(A)	Y	Y																													
2	G	Y	Y		(A)	Y	Y																													
3								G	Y		Y	(A)	(A)		Y	FY		Y	(A)	(A)		Y	FY													
4																																				
5																																				
6																																				
7																															G	Y	Y		(A)	Y	Y
8																															G	Y	Y		(A)	Y	Y
9																																				
10														G		Y	(A)	(A)		Y	Y																
11														G		Y	(A)	(A)		Y	Y																
12														G		Y	(A)	(A)		Y	Y																

Blank Squares Denote a Red Indication.

(A) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart A)

Change phase 2 and 6 red time to 2.4 seconds.

CHART A

On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	5 or 6
2	5 or 6
3	Future
4	8
5	1 or 2
6	1 or 2
7	Future
8	4

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

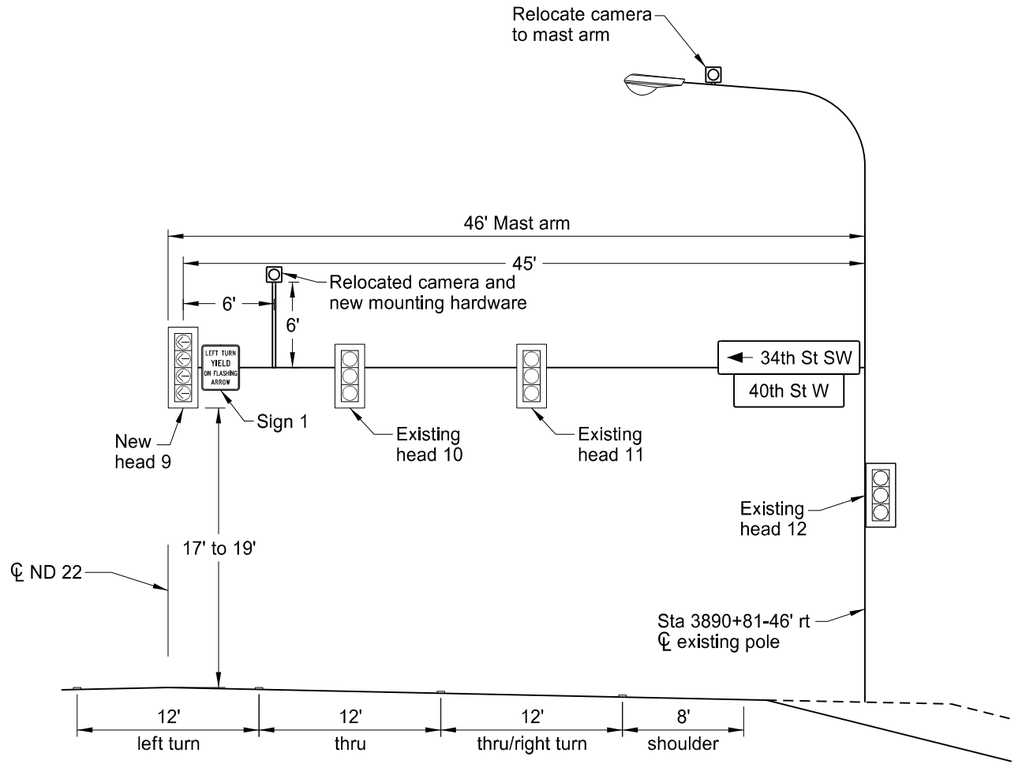
Revise Traffic Signal System

Controller Phasing and Timing Revisions

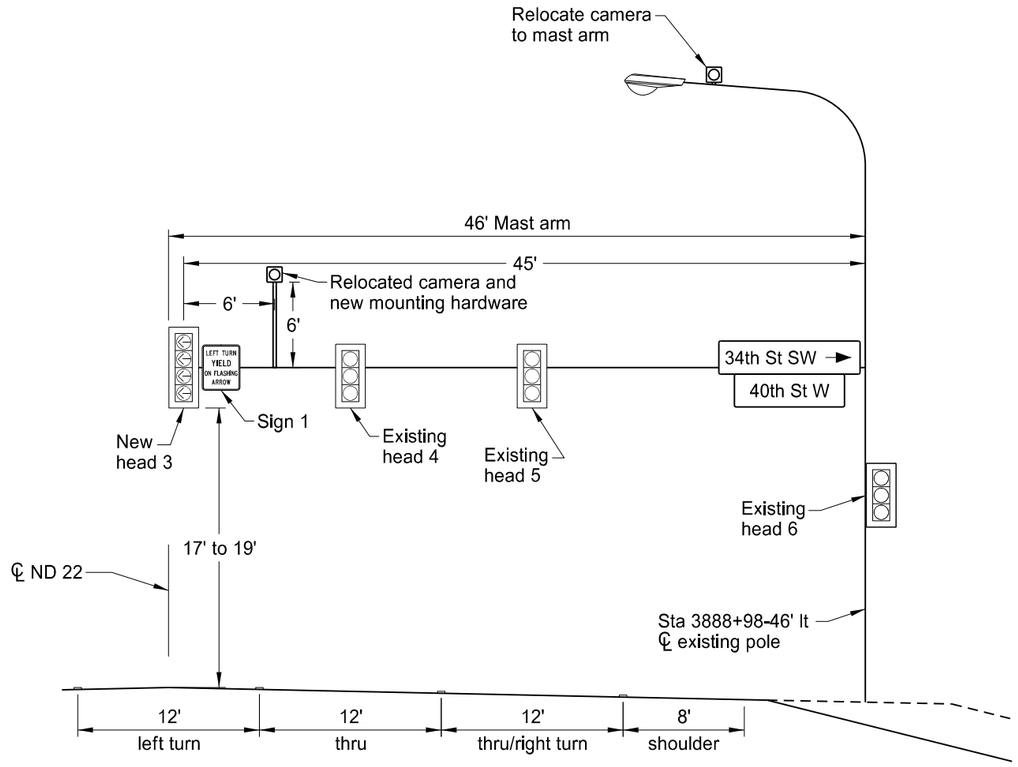
ND 22 and 40th St W/34th St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	6



Northbound



Southbound

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Signal Standards and Head Locations

ND 22 and 40th St W/34th St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	7

ND 22 Bypass (33rd St SW)

Sta 3938+82.5-46' lt
Combo signal and light std
in place to remain

Relocate video detection camera from luminaire extension to mast arm.
Install camera mounting hardware.

Remove
LEFT TURN SIGNAL

Sta 3938+82.5 lt
Mast arm mtd

LEFT TURN YIELD ON FLASHING ARROW
Sign 1

3937 ND 22 3938 3939 3940 3941 3942

Remove 3 section signal head and mounting hardware. Install 4 section signal head and mounting hardware

Remove 3 section signal head and mounting hardware. Install 4 section signal head and mounting hardware

Sta 3940+43.5-86' lt
Combo signal and light std
in place to remain

Sta 3940+99-97' lt
Combo feed point
in place to remain

Sta 3940+89.5-95' lt
Controller and cabinet
in place to remain.
Revise controller.

Sta 3947+45 lt
In place to remain

BE PREPARED TO STOP
WHEN FLASHING

LEFT TURN SIGNAL
Remove

LEFT TURN YIELD ON FLASHING ARROW
Sign 1

Sta 3940+69.5 rt
Mast arm mtd

Relocate video detection camera from luminaire extension to mast arm.
Install camera mounting hardware.

Sta 3940+69.5-48' rt
Combo signal and light std
in place to remain

BE PREPARED TO STOP
WHEN FLASHING

Sta 3934+90 rt
In place to remain

Sta 3939+30.5-88' rt
Combo signal and light std
in place to remain

33rd St SW

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Traffic Signal Layout

ND 22 and ND 22 Bypass/33rd St SW Intersection

Dickinson

2/8/2018 8:00:05 AM bjohanne R:\project\50022073.121\traffic\150SL_007_LSGNL.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	8

(A) Existing conduit in place to remain. Remove relocated video camera conductor. Install new video camera conductor. All other existing conductors in place to remain.

ND 22 Bypass (33rd St SW)

Sta 3940+89.5-95' lt
Controller and cabinet

Sta 3938+76-56' lt
Existing pull box
in place to remain

Sta 3940+78-44' lt
Existing pull box
in place to remain

Sta 3938+82.5-46' lt
Signal std

Sta 3940+69.5-48' rt
Signal std

Sta 3940+76-57' rt
Existing pull box
in place to remain

3937 3938 3939 3940 3941 3942

ND 22

33rd St SW

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Conduit and Conductor Layout

ND 22 and ND 22 Bypass/33rd St SW Intersection

Dickinson

2/8/2018 8:00:05 AM bjohanne R:\project\50022073.121\traffic\150SL_008_LSCOP.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	9

	STATION	CONDUIT RUNS		CABLE RUNS	
		LF	DIA	LF	Type
Signal std Pull box	3938+82.5-46' lt to 3938+76-56' lt	11 (C)	2" (C)	41	No. 16 AWG 3 (B)
Pull box Pull box	3938+76-56' lt to 3940+78-44' lt	202 (C)	2" (C)	203	No. 16 AWG 3 (B)
Signal std Pull box	3940+69.5-48' rt to 3940+76-57' rt	10 (C)	2" (C)	39	No. 16 AWG 3 (B)
Pull box Pull box	3940+76-57' rt to 3940+78-44' lt	100 (C)	2" (C)	101	No. 16 AWG 3 (B)
Pull box Controller cabinet	3940+78-44' lt to 3940+89.5-95' lt	52 (C)	3" (C)	124	(2) No. 16 AWG 3 (B)

(B) Video Detection Camera Power Cable
(C) Existing Conduit

QUANTITIES (A)										
	No. 16 AWG 3 Conductor Cable	1-Way 4 Section Head W/12" Lens - Mast Arm Mounted	Signal Head Mounting Hardware	Remove Signal Head	Relocate Video Detection Camera	Video Detection Camera Mounting Hardware	Revise Controller	Flat Sheet for Signs - Type XI Reflective Sheeting		Revise Traffic Signal System
STATION	LF	EA	EA	EA	EA	EA	EA	SF		EA
3938+82.5-46' lt		1	1	1	1	1		7.5		
3940+69.5-48' rt		1	1	1	1	1		7.5		
Various Locations	508						1			
TOTAL	508	2	2	2	2	2	1	15		1

(A) Do not bid these items separately but include in the item "Revise Traffic Signal System".

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Cable and Conduit Runs and Quantities

ND 22 and ND 22 Bypass/33rd St SW Intersection

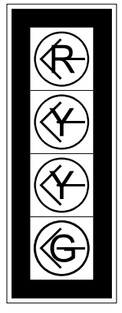
Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	10

CONDUCTORS			EXISTING CABLE 2 (NO.12 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	Black			Spare
2	White			Neutral
3	Red		2, 3, 4	Red
4	Green			Ground
5	Orange		2, 3, 4	Yellow
6	Blue		2, 3, 4	Green
7	White	Black		Spare
8	Red	Black	1	Red Arrow
9	Green	Black	1	Yellow Flashing Arrow (new)
10	Orange	Black	1	Yellow Arrow
11	Blue	Black	1	Green Arrow
12	Black	Black		Spare

CONDUCTORS			EXISTING CABLE 4 (NO.12 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	Black			Spare
2	White			Neutral
3	Red		8, 9, 10	Red
4	Green			Ground
5	Orange		8, 9, 10	Yellow
6	Blue		8, 9, 10	Green
7	White	Black		Spare
8	Red	Black	7	Red Arrow
9	Green	Black	7	Yellow Flashing Arrow (new)
10	Orange	Black	7	Yellow Arrow
11	Blue	Black	7	Green Arrow
12	Black	Black		Spare

Heads 1, 7



Flashing

12" Lenses
5" Louvered Backplate

All traffic signal heads shall be LED

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

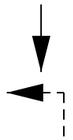
Revise Traffic Signal System

Conductors and Signal Heads

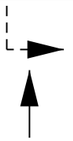
ND 22 and ND 22 Bypass/33rd St SW Intersection

Dickinson

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	11



Future



Future

Head #	Phase 1 R/W	Phase 1 Clear To ∅							Phase 2 R/W	Phase 2 Clear To ∅							Phase 3 R/W	Phase 3 Clear To ∅							Phase 4 R/W	Phase 4 Clear To ∅							Phase 5 R/W	Phase 5 Clear To ∅							Phase 6 R/W	Phase 6 Clear To ∅							Phase 7 R/W	Phase 7 Clear To ∅							Phase 8 R/W	Phase 8 Clear To ∅						
		2		4	5	6		8			4	5	6		8	1		4	5	6	7	8	1	2		5	6		8	1	2			6		8	1	2		4		8	1	2		4	5		8	1	2	3	4	5	6		1	2		4	5	6	
1																																		G	Y		Y	(A)	(A)		Y		Y	(A)	(A)		Y	FY																					
2									G		Y	(A)	(A)		Y	Y																																																					
3									G		Y	(A)	(A)		Y	Y																																																				
4									G		Y	(A)	(A)		Y	Y																																																			
5																																																																		
6																																																																	
7	G	Y		Y	(A)	(A)		Y	FY		Y	(A)	(A)		Y	FY																																																	
8																																											G		Y	(A)	(A)		Y	Y																	
9																																											G		Y	(A)	(A)		Y	Y																	
10																																											G		Y	(A)	(A)		Y	Y																	
11																									G	Y	Y		(A)	Y	Y																																			
12																									G	Y	Y		(A)	Y	Y																																			
13																									G	Y	Y		(A)	Y	Y																																			

Blank Squares Denote a Red Indication.

(A) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart A)

Change phase 2 and 6 red time to 2.4 seconds.

CHART A

On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	5 or 6
2	5 or 6
3	Future
4	8
5	1 or 2
6	1 or 2
7	Future
8	4

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

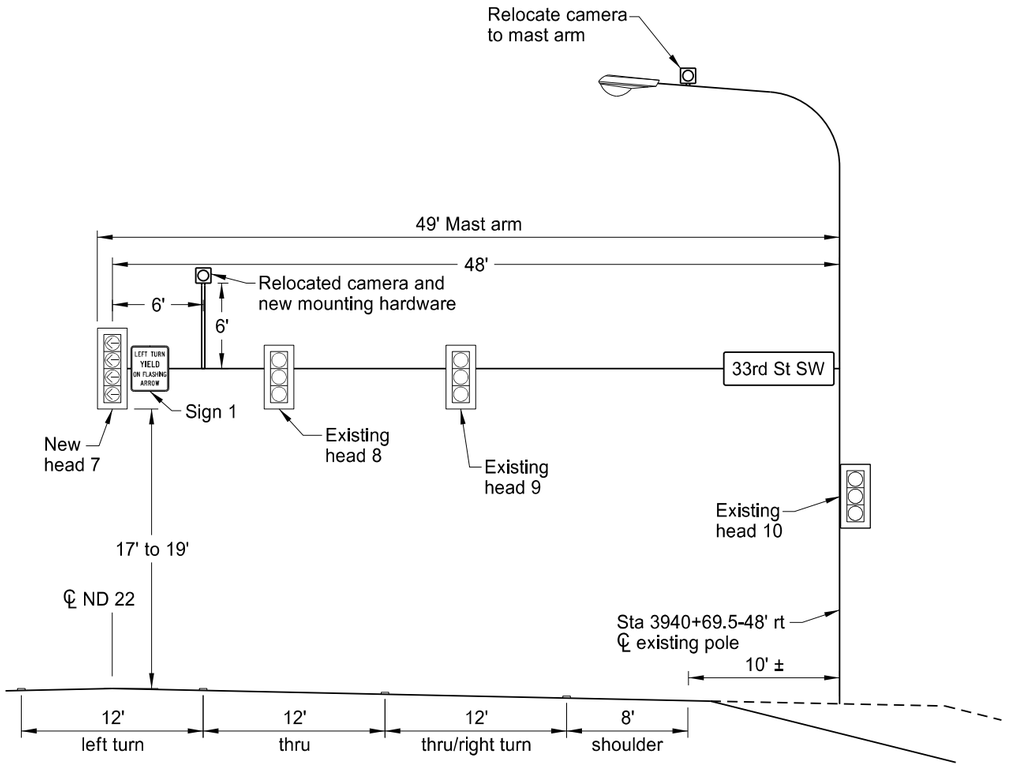
Revise Traffic Signal System

Controller Phasing and Timing Revisions

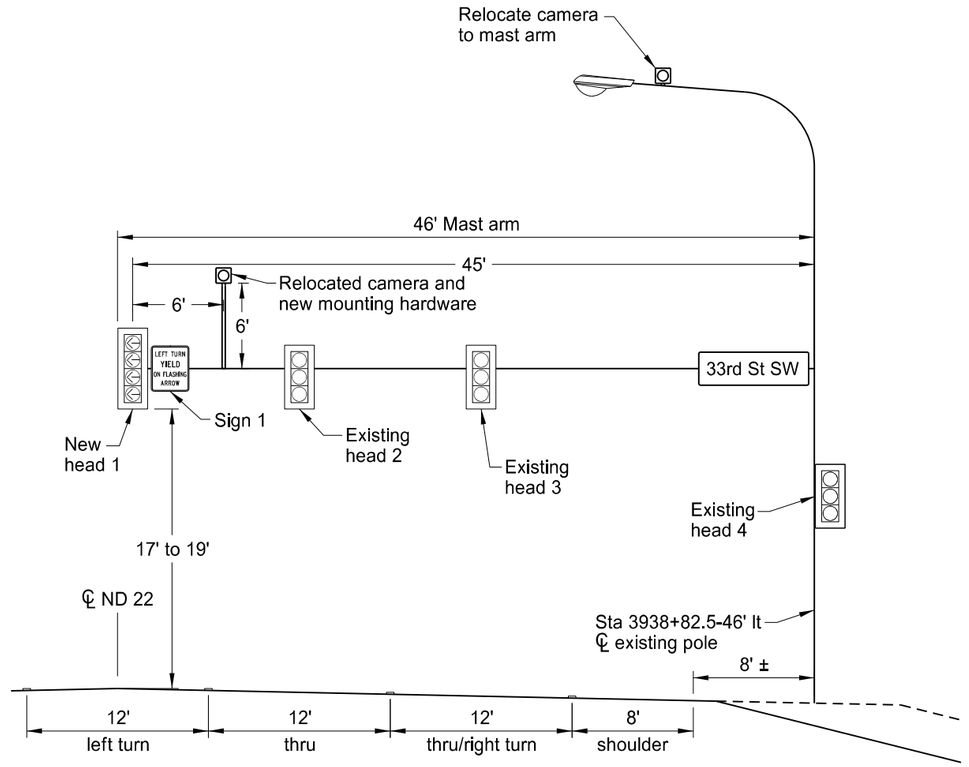
ND 22 and ND 22 Bypass/33rd St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	12



Northbound



Southbound

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

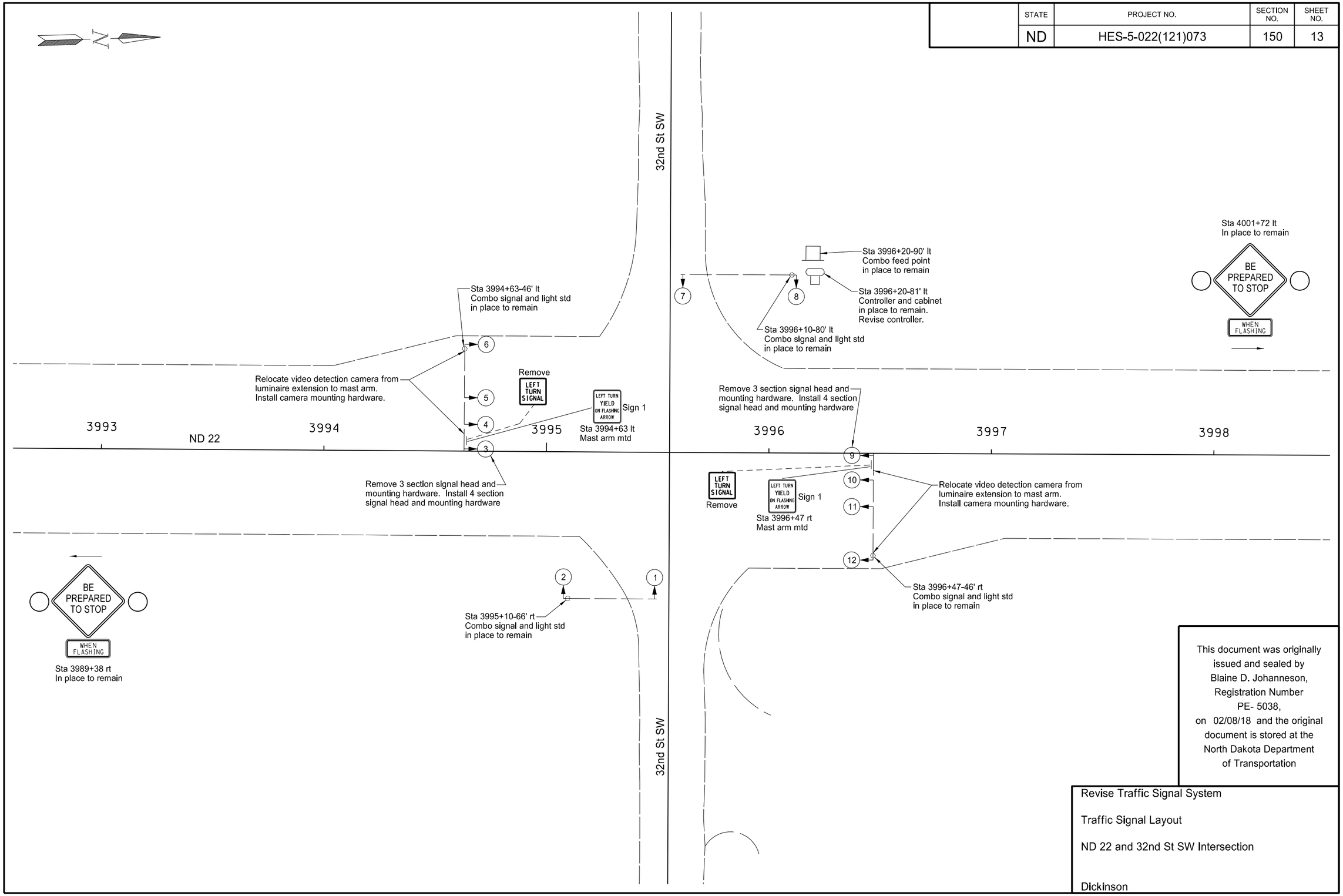
Signal Standards and Head Locations

ND 22 and ND 22 Bypass/33rd St SW Intersection

Dickinson

2/8/2018 8:00:08 AM bjohanne R:\project\50022073.121\traffic\150SL_012_DSIGDET_CROSSNS.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	13



This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

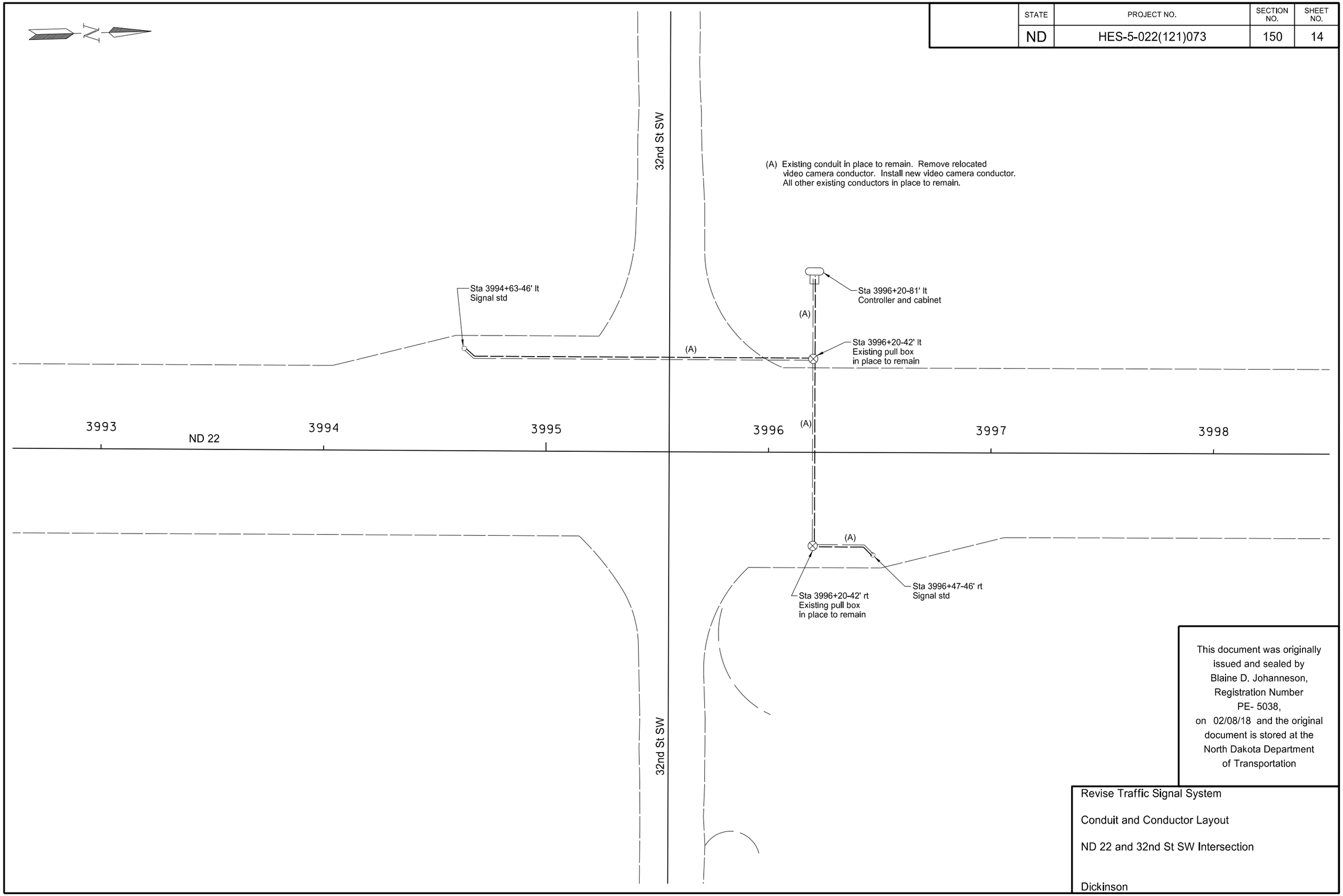
Revise Traffic Signal System

Traffic Signal Layout

ND 22 and 32nd St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	14



This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Conduit and Conductor Layout

ND 22 and 32nd St SW Intersection

Dickinson

2/8/2018 8:00:10 AM bjohanne R:\project\50022073.121\traffic\150SL_014_LSCOP.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	15

	STATION	CONDUIT RUNS		CABLE RUNS	
		LF	DIA	LF	Type
Signal std Pull box	3994+63-46' lt to 3996+20-42' lt	158 (C)	2" (C)	200	No. 16 AWG 3 (B)
Signal std Pull box	3996+47-46' rt to 3996+20-42' rt	28 (C)	2" (C)	50	No. 16 AWG 3 (B)
Pull box Pull box	3996+20-42' rt to 3996+20-42' lt	83 (C)	3" (C)	84	No. 16 AWG 3 (B)
Pull box Controller cabinet	3996+20-42' lt to 3996+20-81' lt	38 (C)	3" (C)	96	(2) No. 16 AWG 3 (B)

(B) Video Detection Camera Power Cable
(C) Existing Conduit

QUANTITIES (A)										
	No. 16 AWG 3 Conductor Cable	1-Way 4 Section Head W/12" Lens - Mast Arm Mounted	Signal Head Mounting Hardware	Remove Signal Head	Relocate Video Detection Camera	Video Detection Camera Mounting Hardware	Revise Controller	Flat Sheet for Signs - Type XI Reflective Sheeting		Revise Traffic Signal System
STATION	LF	EA	EA	EA	EA	EA	EA	SF		EA
3994+63-46' lt		1	1	1	1	1		7.5		
3996+47-46' rt		1	1	1	1	1		7.5		
Various Locations	430						1			
TOTAL	430	2	2	2	2	2	1	15		1

(A) Do not bid these items separately but include in the item "Revise Traffic Signal System".

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Cable and Conduit Runs and Quantities

ND 22 and 32nd St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	16

CONDUCTORS			EXISTING CABLE 2 (NO.12 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	Black			Spare
2	White			Neutral
3	Red		4, 5, 6	Red
4	Green			Ground
5	Orange		4, 5, 6	Yellow
6	Blue		4, 5, 6	Green
7	White	Black		Spare
8	Red	Black	3	Red Arrow
9	Green	Black	3	Yellow Flashing Arrow (new)
10	Orange	Black	3	Yellow Arrow
11	Blue	Black	3	Green Arrow
12	Black	Black		Spare

CONDUCTORS			EXISTING CABLE 4 (NO.12 AWG 12)	
BASE		TRACER	HEAD	INDICATION
1	Black			Spare
2	White			Neutral
3	Red		10, 11, 12	Red
4	Green			Ground
5	Orange		10, 11, 12	Yellow
6	Blue		10, 11, 12	Green
7	White	Black		Spare
8	Red	Black	9	Red Arrow
9	Green	Black	9	Yellow Flashing Arrow (new)
10	Orange	Black	9	Yellow Arrow
11	Blue	Black	9	Green Arrow
12	Black	Black		Spare

Heads 3, 9

Flashing

12" Lenses
5" Louvered Backplate

All traffic signal heads shall be LED

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Conductors and Signal Heads

ND 22 and 32nd St SW Intersection

Dickinson

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HES-5-022(121)073	150	17

Head #	Phase 1 — Existing								Phase 2 — Revise								Phase 3 — Future							
	R/W	Clear To ∅							R/W	Clear To ∅							R/W	Clear To ∅						
		2		4	5	6		8			4	5	6		8	1		4	5	6	7	8	1	2
1																								
2																								
3																								
4									G		Y	(A)	(A)		Y	Y								
5									G		Y	(A)	(A)		Y	Y								
6									G		Y	(A)	(A)		Y	Y								
7																								
8																								
9	G	Y		Y	(A)	(A)		Y	FY		Y	(A)	(A)		Y	FY								
10																								
11																								
12																								

Head #	Phase 4 — Existing								Phase 5 — Existing								Phase 6 — Revise							
	R/W	Clear To ∅							R/W	Clear To ∅							R/W	Clear To ∅						
		5	6		8	1	2			6		8	1	2		4		8	1	2		4	5	
1	G	Y	Y		(A)	Y	Y																	
2	G	Y	Y		(A)	Y	Y																	
3									G	Y		Y	(A)	(A)		Y	FY		Y	(A)	(A)		Y	FY
4																								
5																								
6																								
7																								
8																								
9																								
10																	G		Y	(A)	(A)		Y	Y
11																	G		Y	(A)	(A)		Y	Y
12																	G		Y	(A)	(A)		Y	Y

Head #	Phase 7 — Future								Phase 8 — Existing							
	R/W	Clear To ∅							R/W	Clear To ∅						
		8	1	2	3	4	5	6		1	2		4	5	6	
1																
2																
3																
4																
5																
6																
7									G	Y	Y		(A)	Y	Y	
8									G	Y	Y		(A)	Y	Y	
9																
10																
11																
12																

Blank Squares Denote a Red Indication.

(A) When one phase is on alone, any nonconflicting phase may start timing concurrently without a clearance interval. (See Chart A)

Change phase 2 and 6 red time to 2.4 seconds.

CHART A

On Phase	Non-Conflicting Phase Allowed to Time Concurrently
1	5 or 6
2	5 or 6
3	Future
4	8
5	1 or 2
6	1 or 2
7	Future
8	4

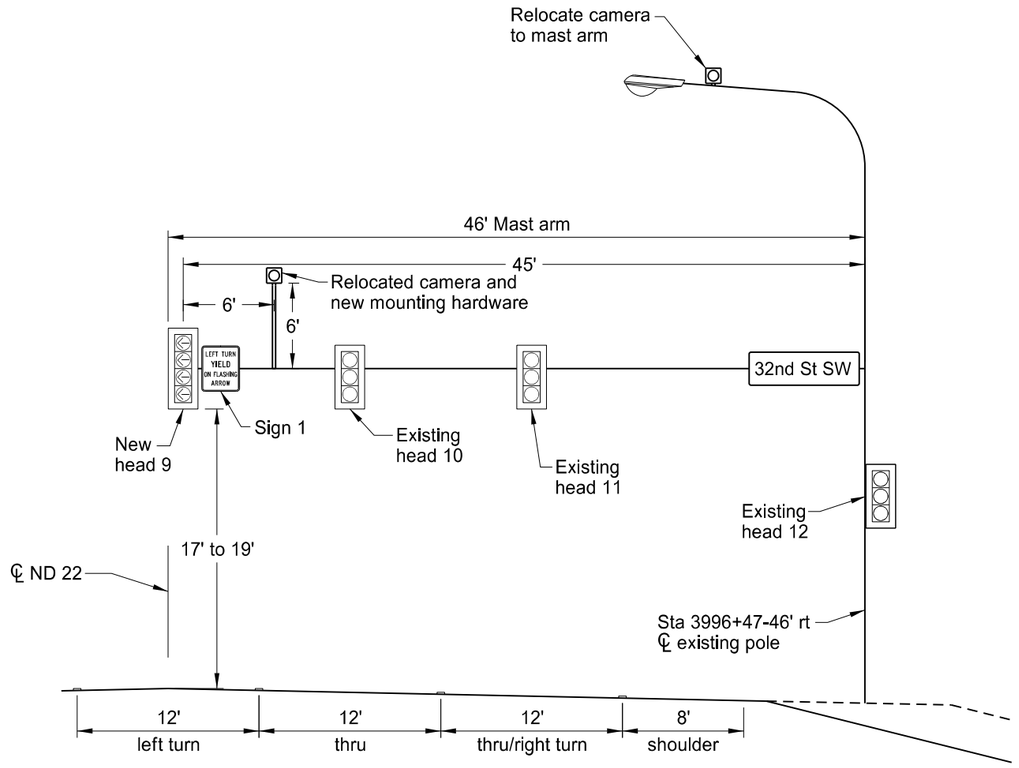
Revise Traffic Signal System

Controller Phasing and Timing Revisions

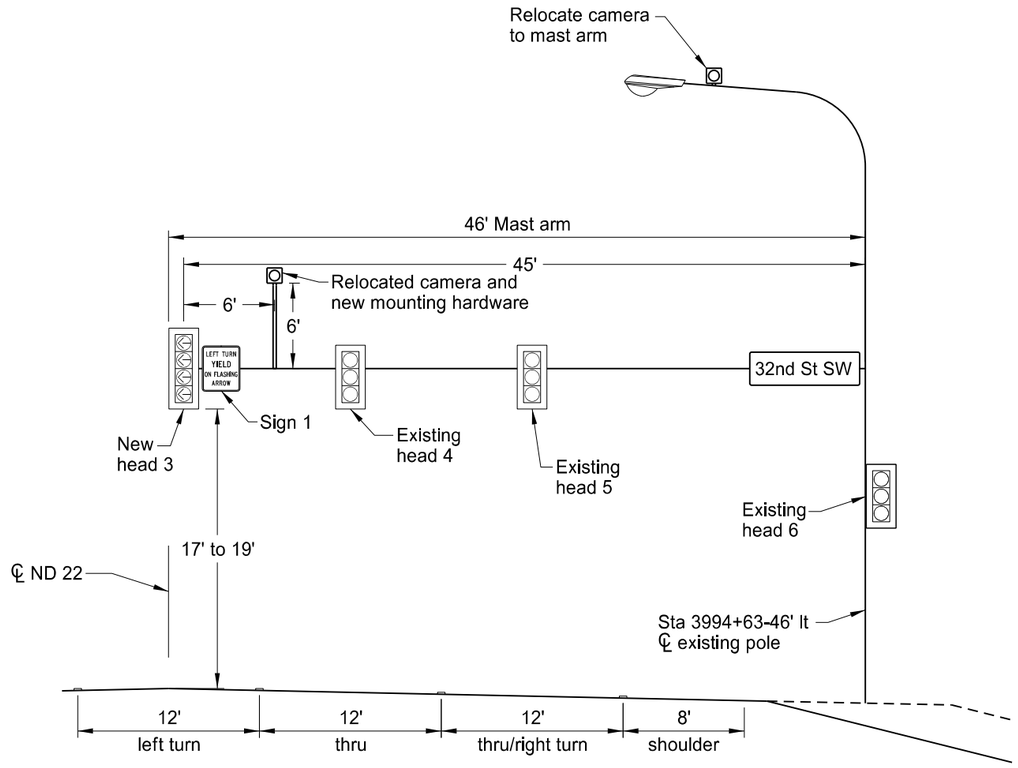
ND 22 and 32nd St SW Intersection

Dickinson

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	18



Northbound



Southbound

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Signal Standards and Head Locations

ND 22 and 32nd St SW Intersection

Dickinson

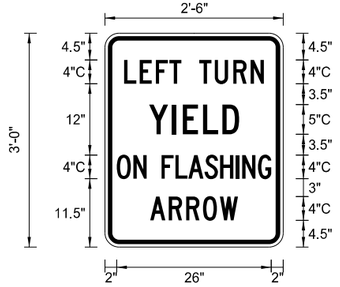
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HES-5-022(121)073	150	19

SIGN NUMBER	SN 1
WIDTH X HEIGHT	2'-6" x 3'-0"
BORDER WIDTH	0.75" (inset 0.5")
CORNER RADIUS	1.88"
MOUNTING	Signal Mast Arm
BACKGROUND	TYPE: XI Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
3888+98 lt, 3890+81 rt
3938+82.5 lt, 3940+69.5 rt
3994+63 lt, 3996+47 rt

AREA: 7.5 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Reg_30_Med.ssi

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
L	E	F	T	T	U	R	N											23.5	4	C 2000
3.2	5.8	8.6	10.8	15.9	18.5	21.6	24.5													
Y	I	E	L	D														15.2	5	C 2000
7.4	11.3	13.1	16.5	19.8																
O	N	F	L	A	S	H	I	N	G									26	4	C 2000
2	4.8	9.5	11.9	14	16.8	19.4	22.1	23.1	25.8											
A	R	R	O	W														14.8	4	C 2000
7.6	10.7	13.7	16.5	19.3																

This document was originally issued and sealed by Blaine D. Johanneson, Registration Number PE- 5038, on 02/08/18 and the original document is stored at the North Dakota Department of Transportation

Revise Traffic Signal System

Sign Details

ND 22

Dickinson

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
A	ampere
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	Crossroad
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
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
ESS	environmental sensor station
Eq	equal
Eq	equation
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
F	Fahrenheit
FS	far side
F	farad
Fed	Federal
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
FH	fire hydrant
Fl	flange
Flrd	flared
FES	flared end section
F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fs	foresight
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-2

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
HMA	hot mix asphalt
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
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
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 08/03/15 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

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
RAP	recycled asphalt pavement
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
RWIS	roadway weather information system
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
SN	sign number
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
SA	special assembly
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
SMA	stone matrix asphalt
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
WIM	weigh in motion
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	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 08/03/15 and the original document is stored at the North Dakota Department of Transportation

NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Line Styles

D-101-20

Existing Topography

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

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

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

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

Traffic Utilities

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

Sign Structures

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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

Line Styles

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

- Hidden Object
- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Centerline Main
- Centerline
- Existing Ground (Details)
- Existing Conditions
- Sheet Piling

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

Environmental

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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-30

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	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-31

- 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
- Iron Monument Found
- Iron Pin R/W Monument
- 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	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-32

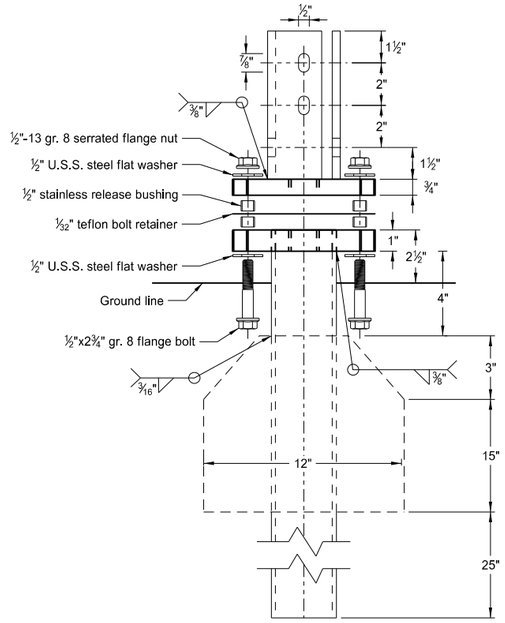
- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate Type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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

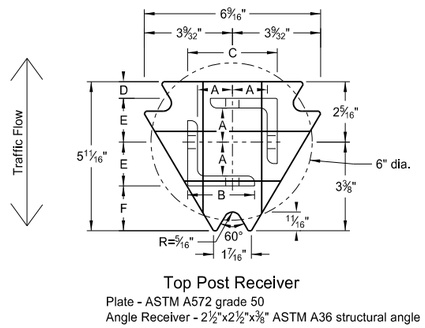
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

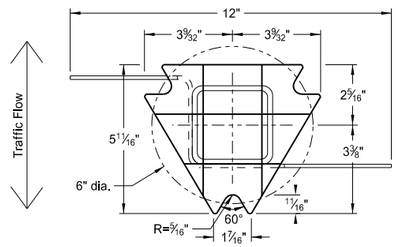


Multi-Directional
Slip Base Assembly

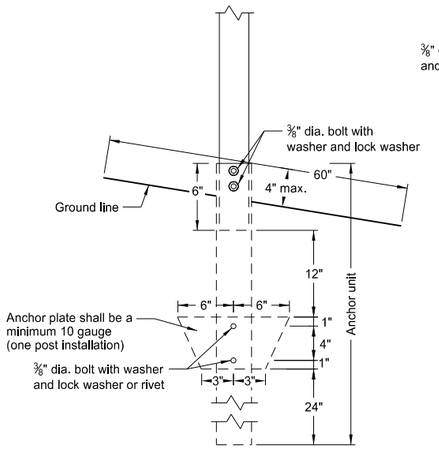
Perforated Tube



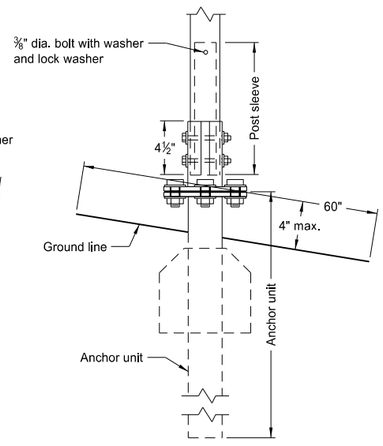
Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



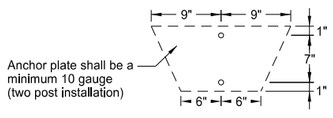
Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

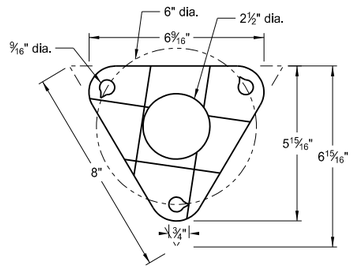


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





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

Notes:

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

Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³⁄₁₆	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia $in.^4$	Cross Sec. Area $in.^2$	Section Modulus $in.^3$
1½ x 1½	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
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³⁄₁₆ x 2³⁄₁₆	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⁵⁄₁₆"	⅝"	1²¹⁄₃₂"	1¾"

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

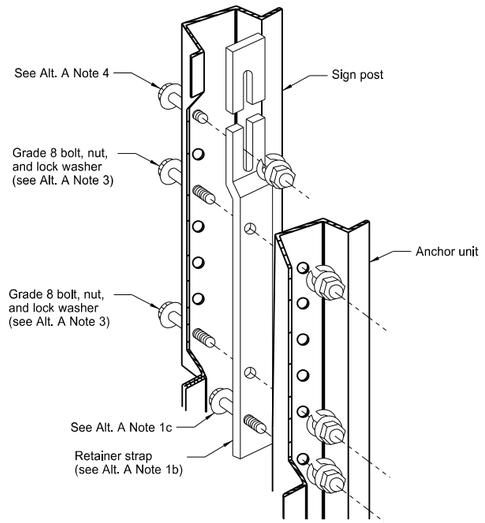
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 2/28/14 and the original document is stored at the North Dakota Department of Transportation

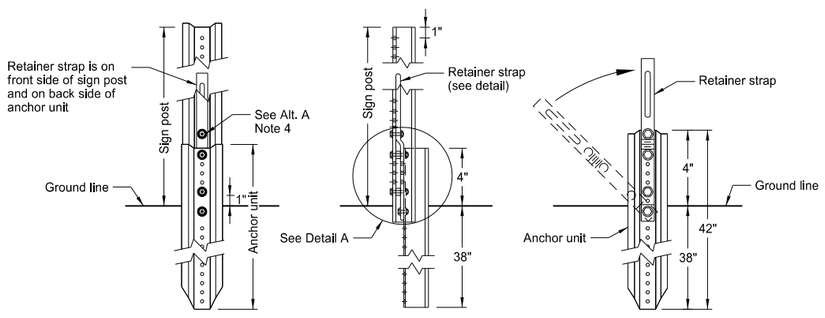
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



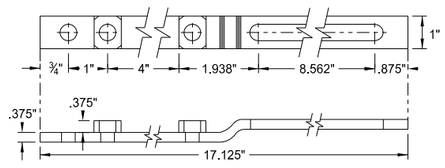
Detail A



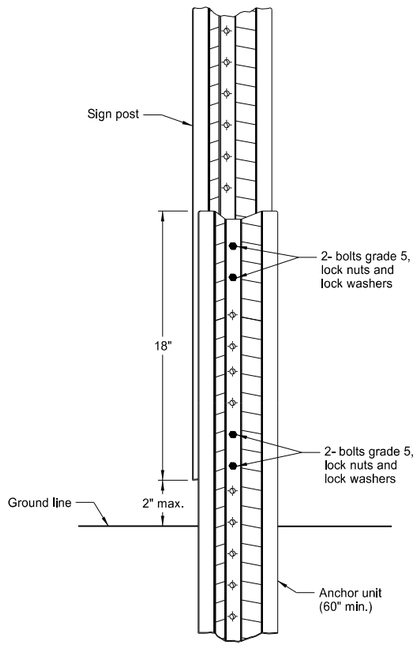
Front View | Side View | Back View

Breakaway U-Channel Detail
Alternate A

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

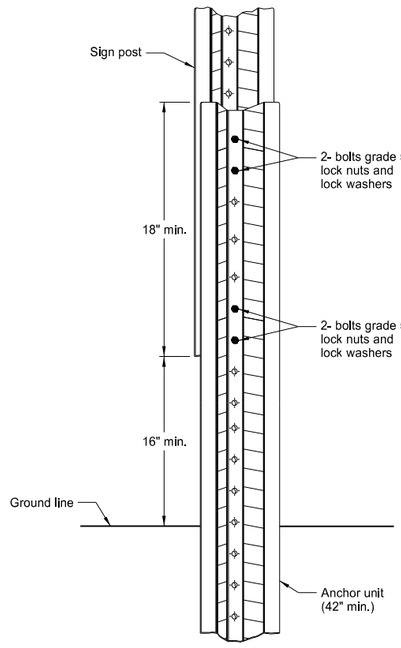


Retainer Strap Detail



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

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



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

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

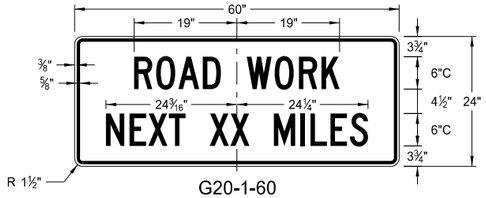
Alternate A Steps of Installation:

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

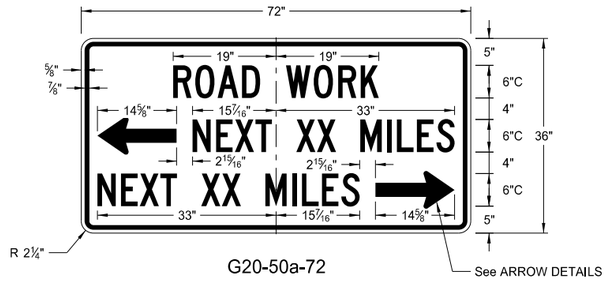
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 2/28/14 and the original document is stored at the North Dakota Department of Transportation

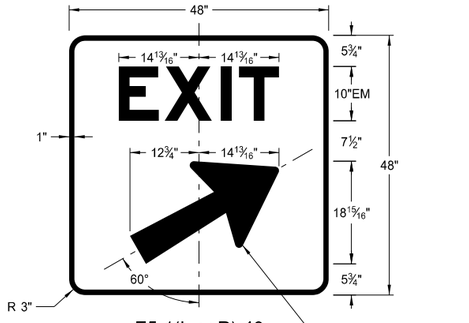
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



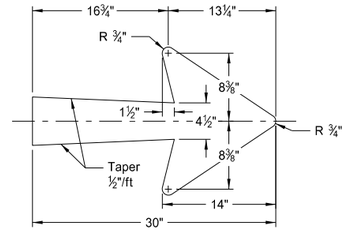
G20-1-60
Legend: black (non-refl)
Background: orange



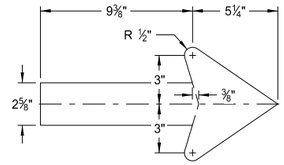
G20-50a-72
Legend: black (non-refl)
Background: orange



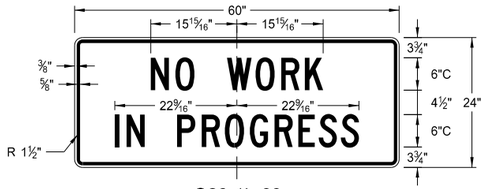
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



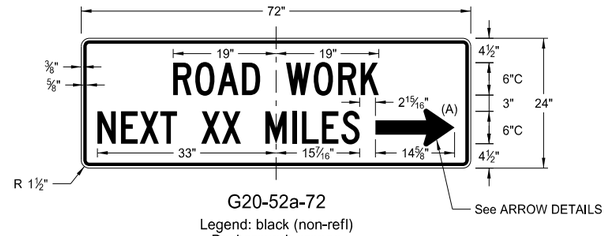
E5-1-48



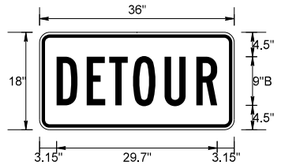
G20-50a-72
G20-52a-72



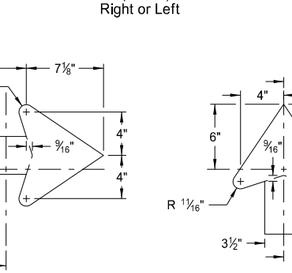
G20-1b-60
Legend: black (non-refl)
Background: orange



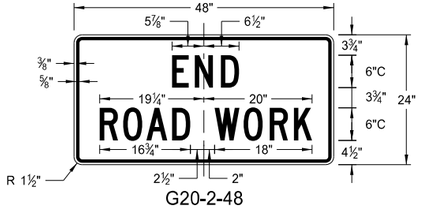
G20-52a-72
Legend: black (non-refl)
Background: orange



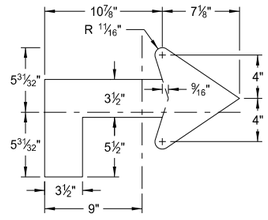
M4-8-36
Legend: black (non-refl)
Background: orange



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

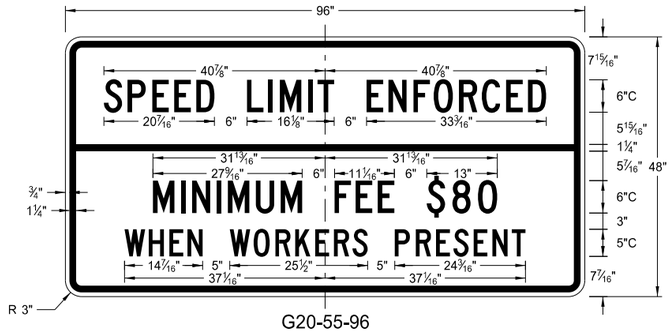


G20-2-48
Legend: black (non-refl)
Background: orange

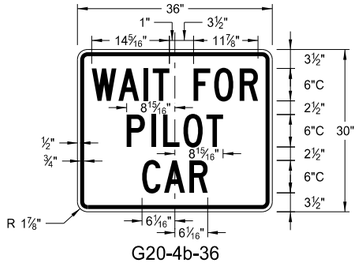


M4-9(L or R)-30
Advanced Right or Left

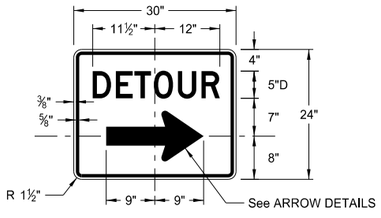
M4-9-30
Straight



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



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



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

ARROW DETAILS

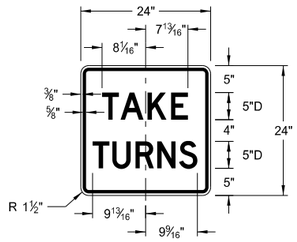
NOTES:

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

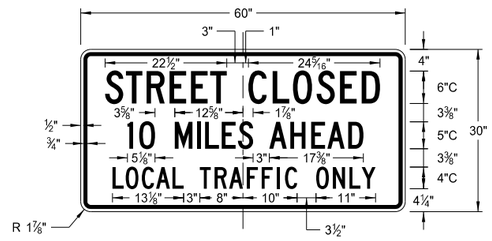
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8/17/17 and the original document is stored at the North Dakota Department of Transportation

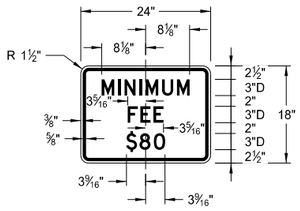
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



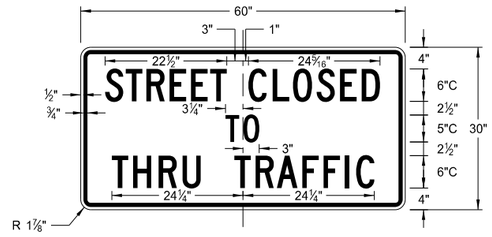
R1-50P-24
Legend: black (non-refl)
Background: white



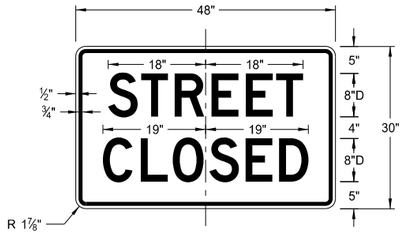
R11-3c-60
Legend: black (non-refl)
Background: white



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



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

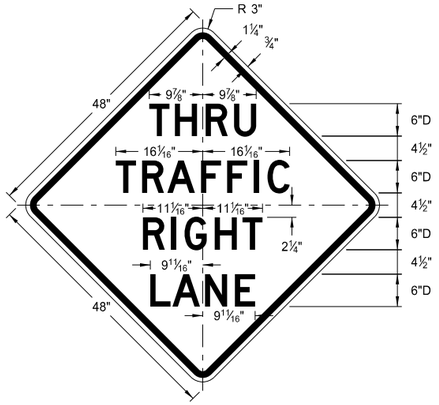


R11-2a-48
Legend: black (non-refl)
Background: white

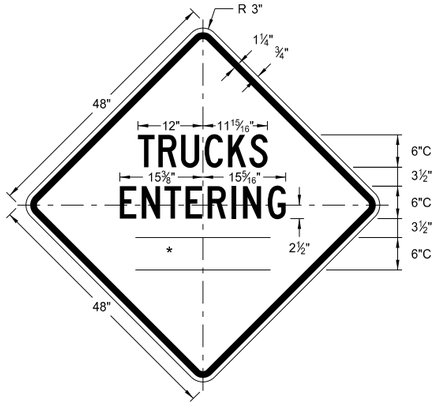
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/17/17 and the original document is stored at the North Dakota Department of Transportation

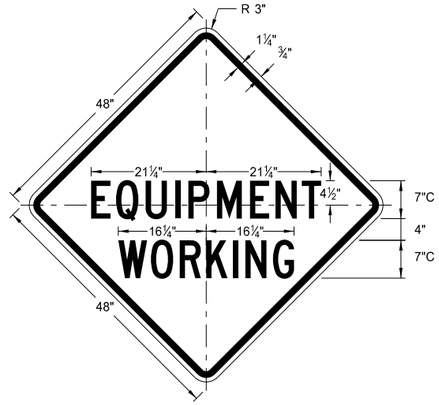
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



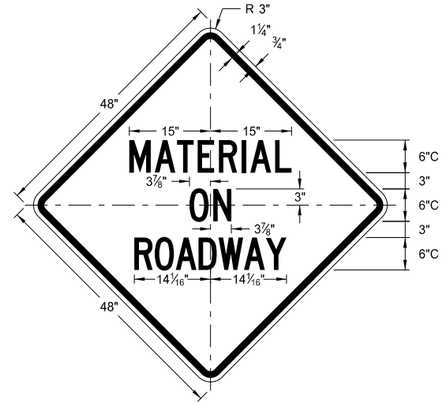
W5-8-48
Legend: black (non-refl)
Background: orange



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



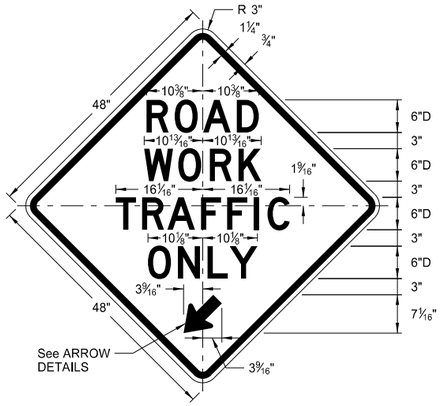
W20-51-48
Legend: black (non-refl)
Background: orange



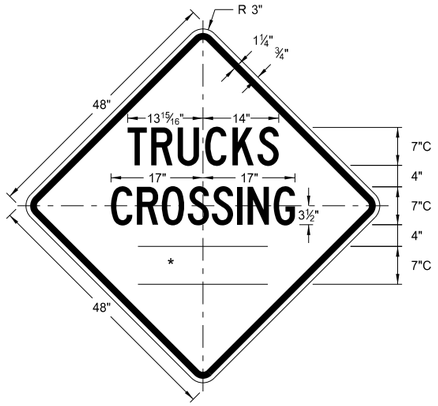
W21-51-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES

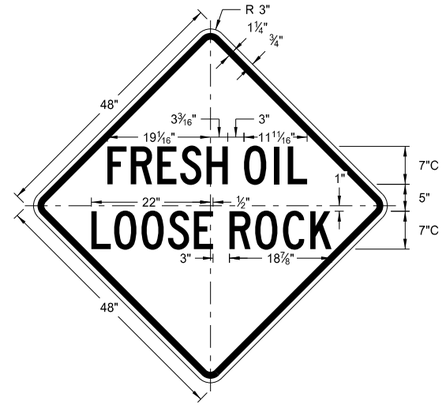


W5-9-48
Legend: black (non-refl)
Background: orange

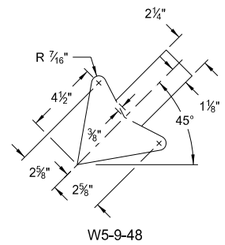


W8-55-48
Legend: black (non-refl)
Background: orange

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

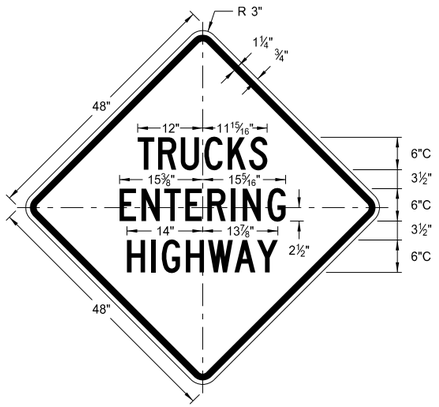


W22-8-48
Legend: black (non-refl)
Background: orange

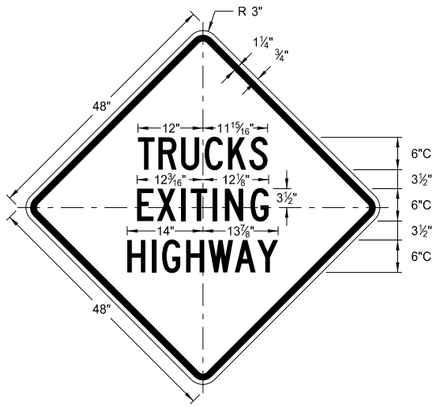


W5-9-48

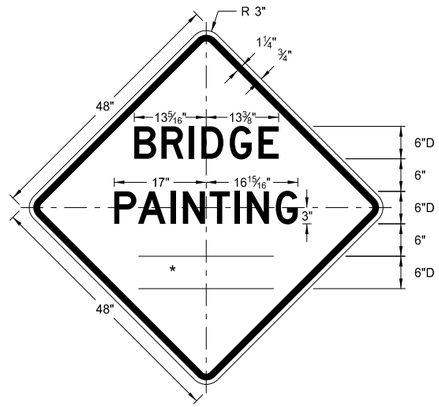
ARROW DETAILS



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



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



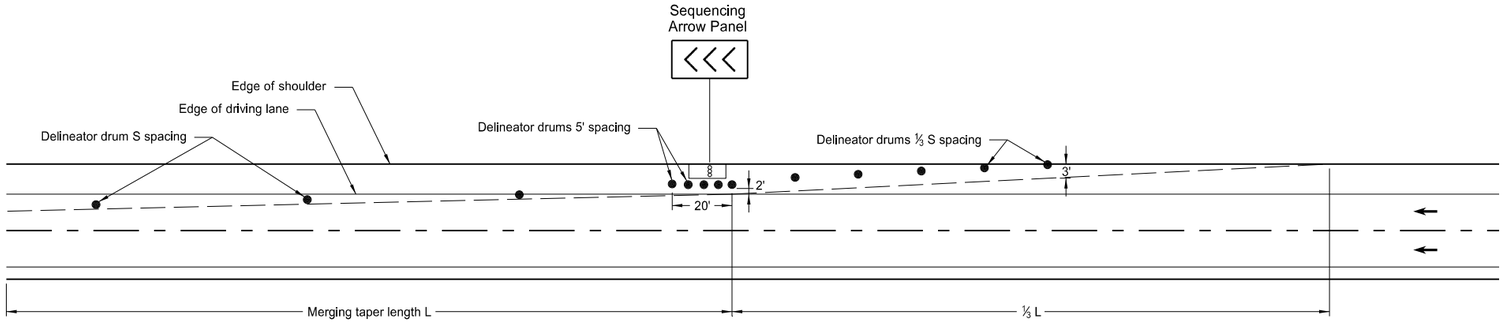
W21-50-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number

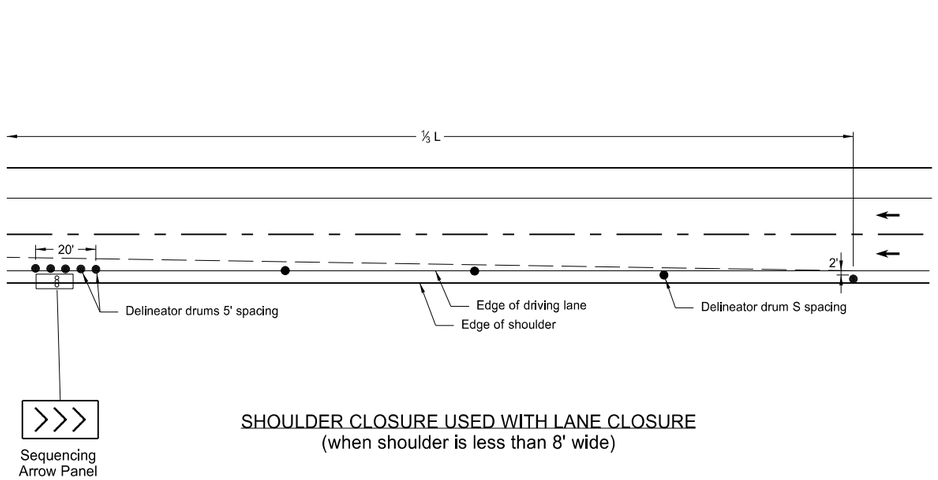
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/17/17 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURE TAPERS

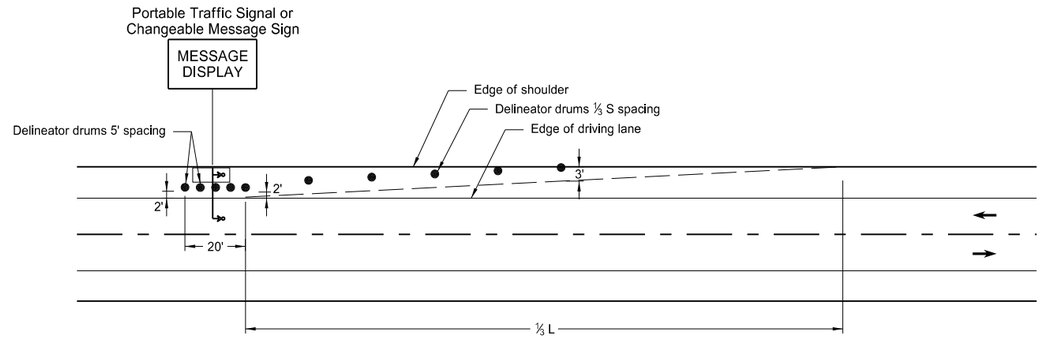
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY

● Delineator Drum	∞ Sequencing Arrow Panel
° Message Display	Portable Traffic Signal

Notes:

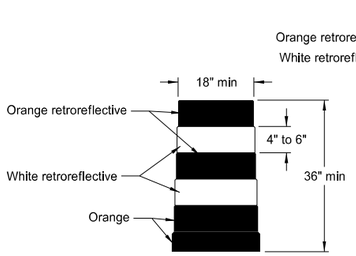
1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, it should have a length of approximately ⅓L. If a shoulder is used as a travel lane, a normal merging or shifting taper should be used.
3. When paved shoulders of 8 foot width or more are closed, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.

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

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

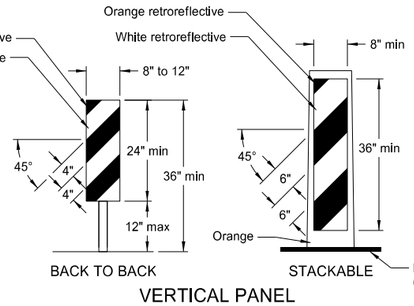
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



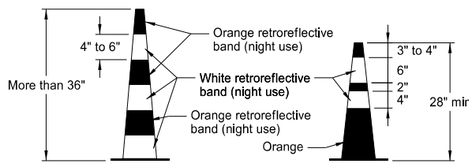
DELINEATOR DRUM

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



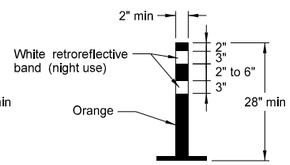
VERTICAL PANEL

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



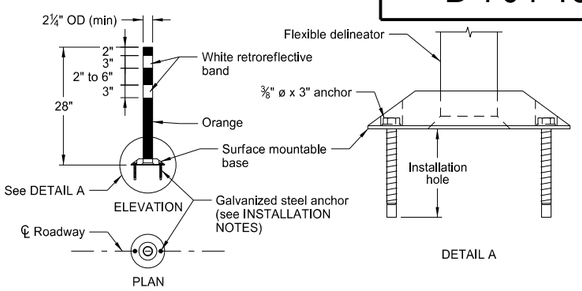
TRAFFIC CONE

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



TUBULAR MARKER

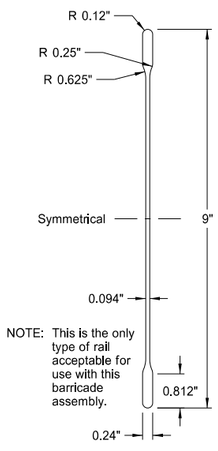
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

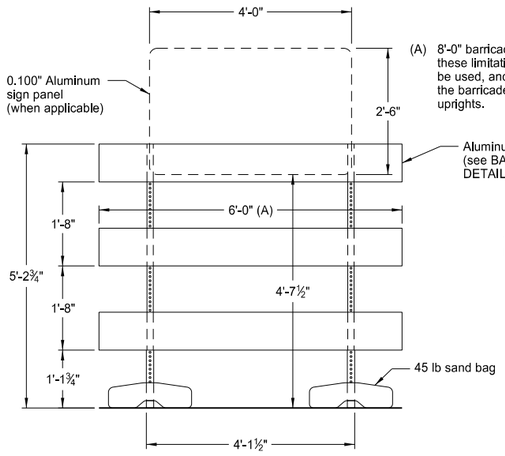
INSTALLATION NOTES:

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



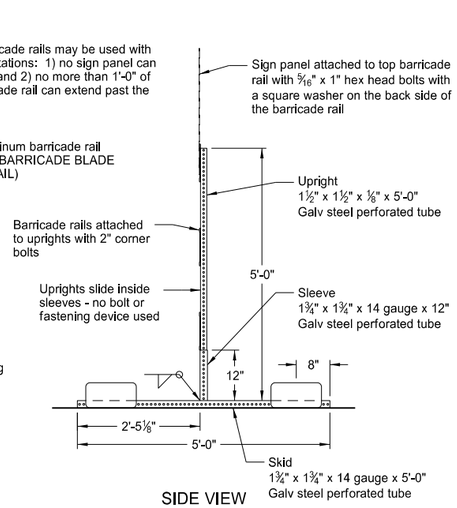
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



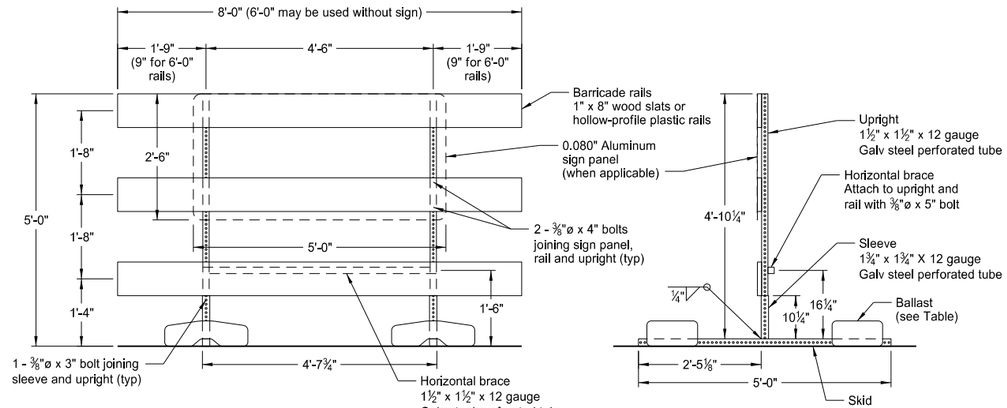
(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.

ELEVATION VIEW



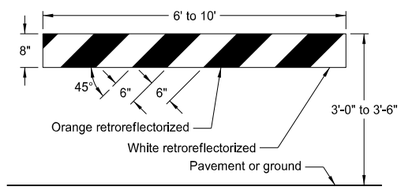
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

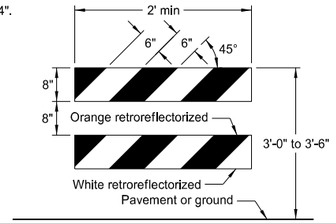


BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

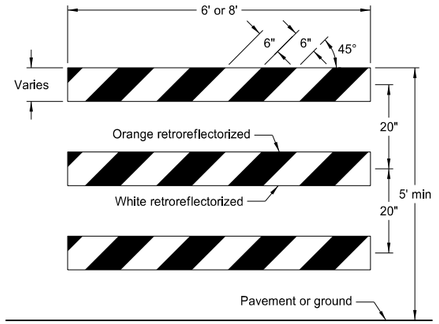
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular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



TYPE I BARRICADE

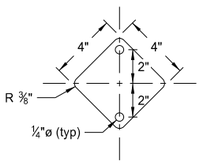


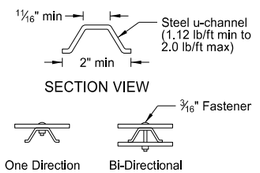
TYPE II BARRICADE

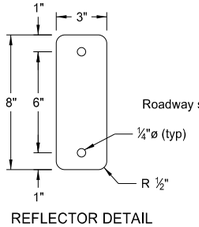


TYPE III BARRICADE

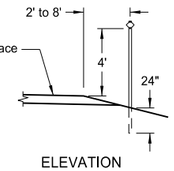
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

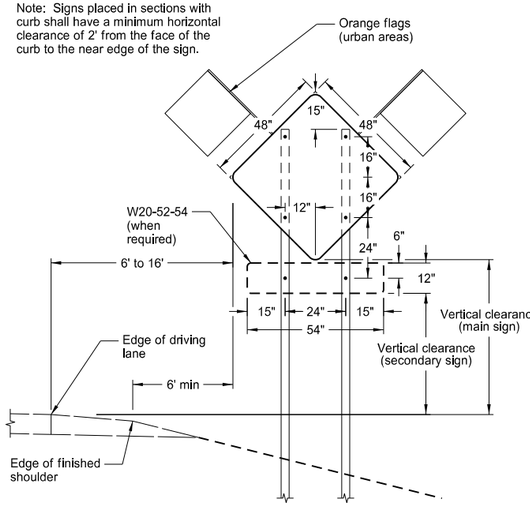
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

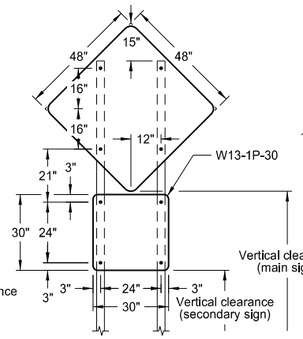
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

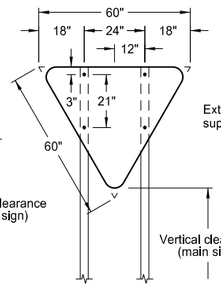
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



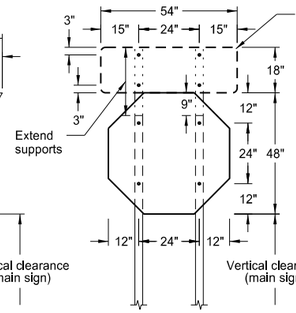
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



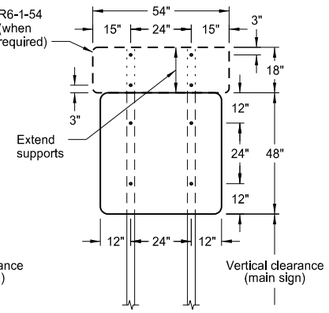
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



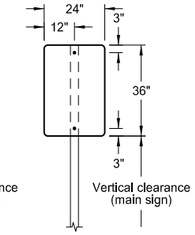
R1-2-60 - YIELD SIGN



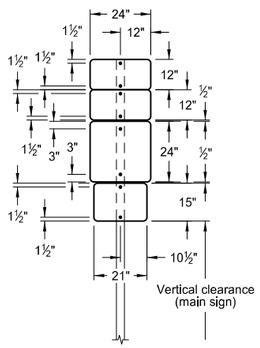
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



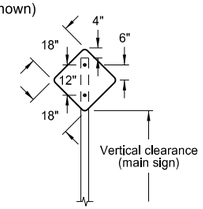
48" x 48" SIGN
(with R6-1-54 sign as required)



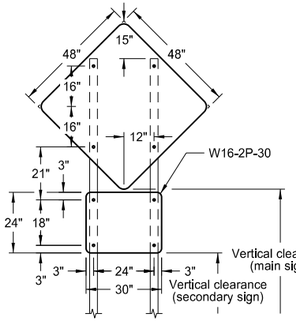
24" x 36" SIGN



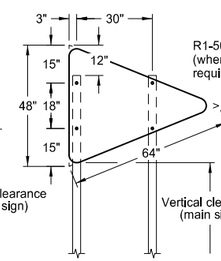
24" x 24"
ROUTE MARKER
ASSEMBLY



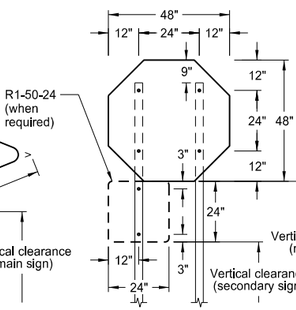
18" x 18"
DIAMOND SIGN



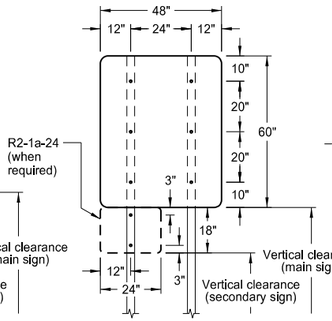
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



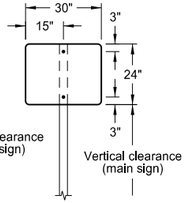
W14-3-64 - PENNANT SIGN



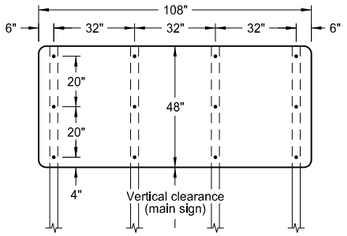
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



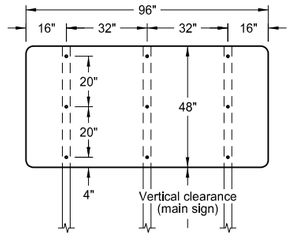
48" x 48" SIGN
(with R2-1a-24 sign as required)



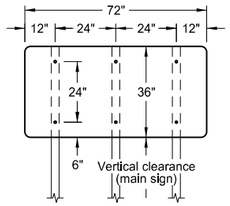
30" x 24" SIGN



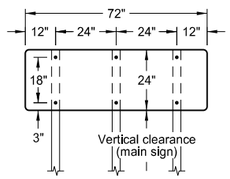
108" x 48" SIGN



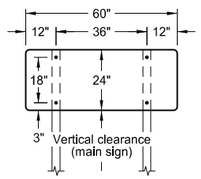
96" x 48" SIGN



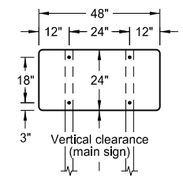
72" x 36" SIGN



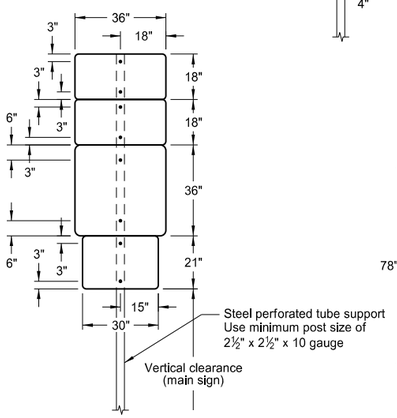
72" x 24" SIGN



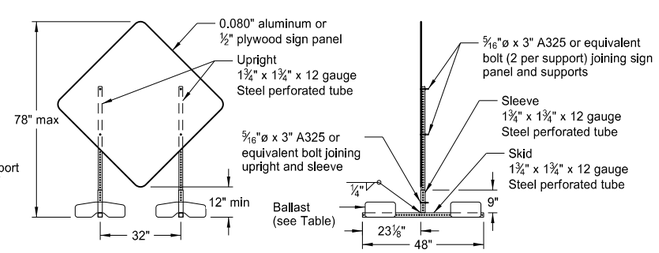
60" x 24" SIGN



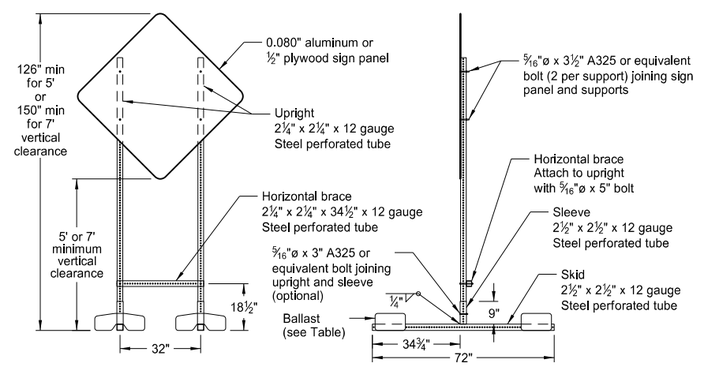
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

   Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

   Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

2. Sign Panels: Provide sign panels made of 0.100" aluminum, ½" plywood, or other approved material, except where noted. All holes to be punched round for ⅜" bolts.

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

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

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

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

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

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

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

   When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used as long as the view of the sign is not obstructed. Time delays caused by unforseen circumstances, such as equipment breakdown, rain, subgrade failures, etc., will not accrue towards the 5 day period. The R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

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

MINIMUM BALLAST
(For each side of sign support base)

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

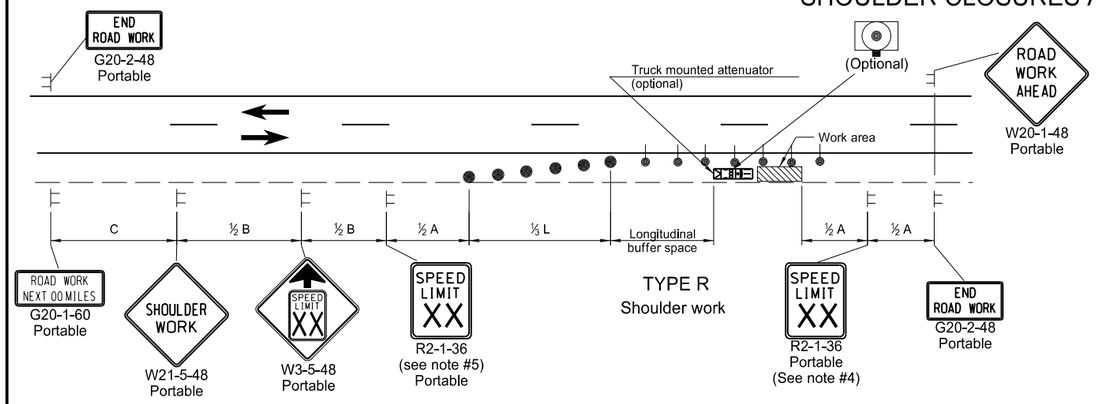
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

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

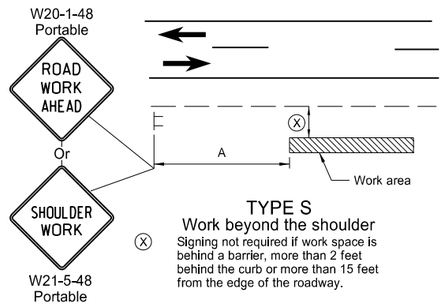
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/14/13 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24

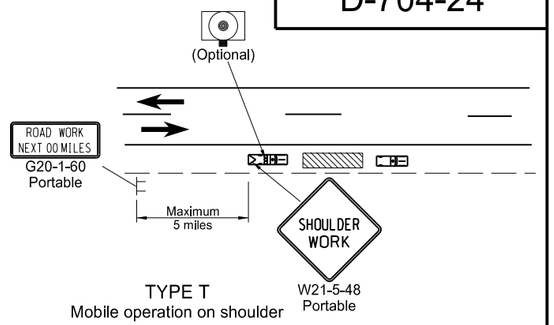


TYPE R
Shoulder work

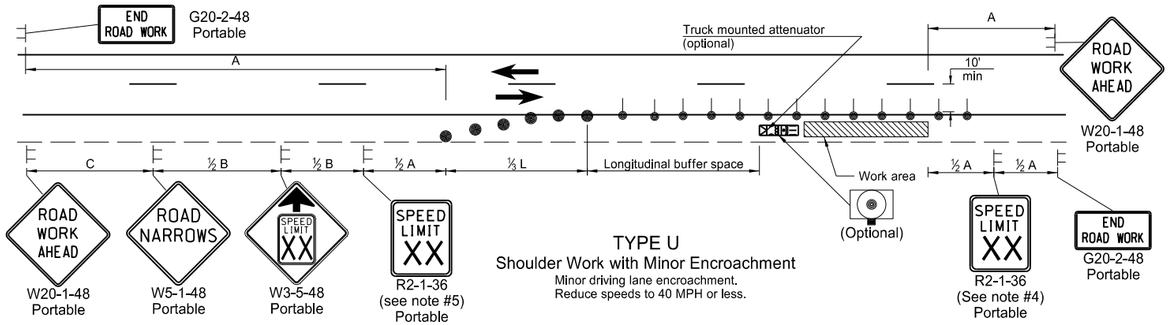


TYPE S
Work beyond the shoulder

Signing not required if work space is behind a barrier, more than 2 feet behind the curb or more than 15 feet from the edge of the roadway.



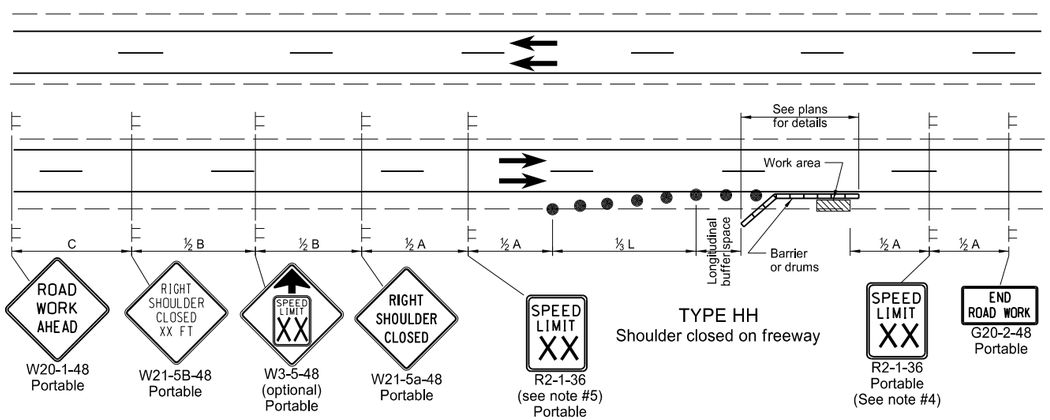
TYPE T
Mobile operation on shoulder



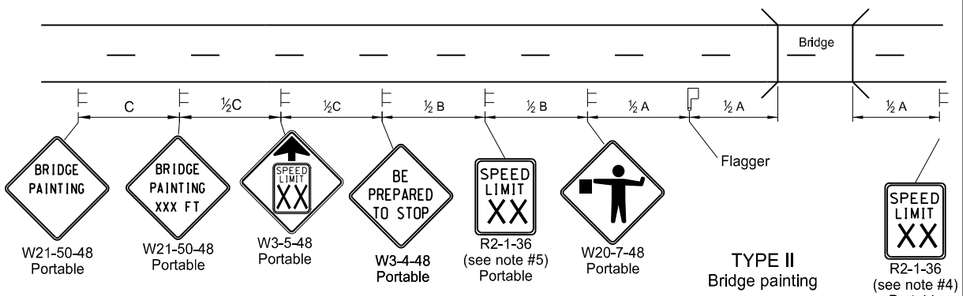
TYPE U
Shoulder Work with Minor Encroachment

Minor driving lane encroachment.
Reduce speeds to 40 MPH or less.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper in feet.
   L = Minimum length of taper, 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. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
3. Sequencing Arrow Panels
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   UseType B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
6. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
7. Cover existing speed limit signs within a reduced speed zone.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.
9. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



TYPE HH
Shoulder closed on freeway



TYPE II
Bridge painting

KEY

Sign	Work area
Delineator Drum	Tubular Marker
Sequencing Arrow Panel (Caution Mode)	

ADVANCE WARNING SIGN SPACING

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

Longitudinal Buffer Space

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
9-27-13

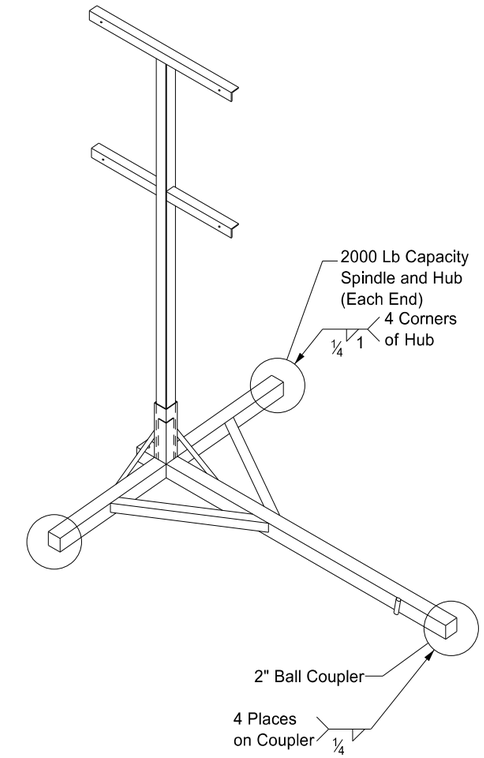
REVISIONS

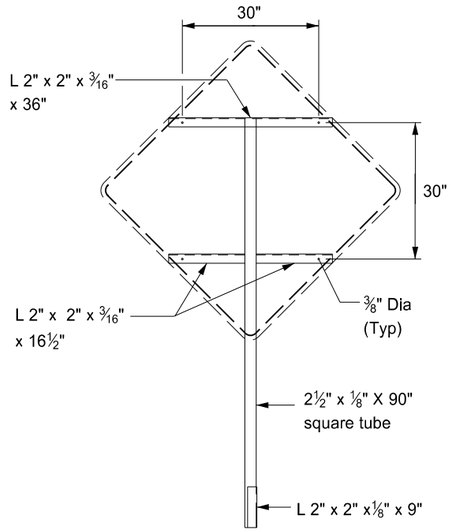
DATE	CHANGE
8-17-17	Updated notes & revised signs

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 08/17/17 and the original document is stored at the North Dakota Department of Transportation

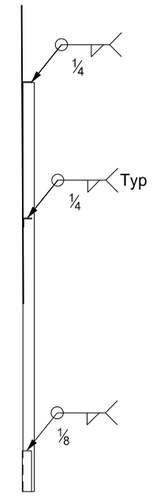
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



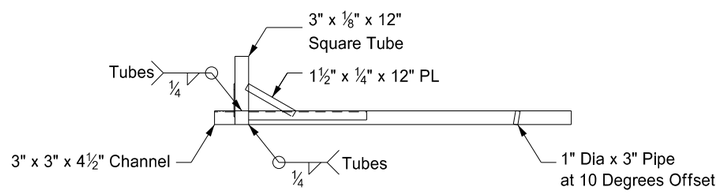


FRONT

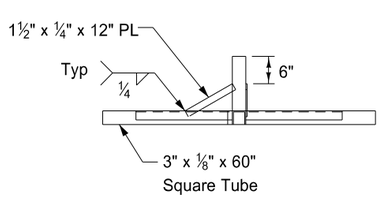


RIGHT

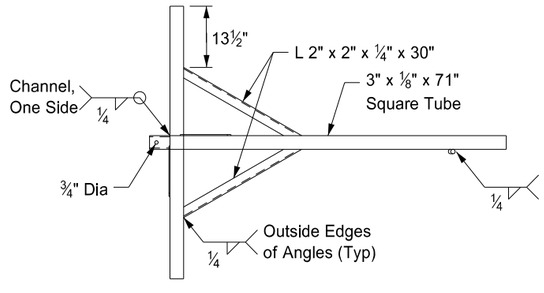
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

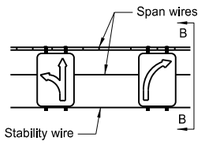
Notes:

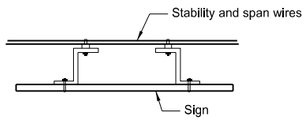
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

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

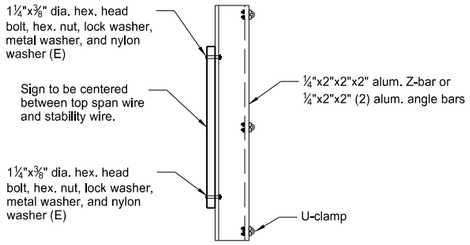
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

LIGHT STANDARD, SIGNAL STANDARD, AND SPAN WIRE MOUNTED SIGN ASSEMBLY DETAIL

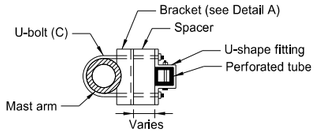




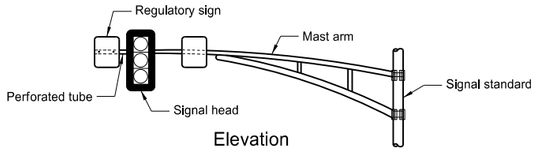
Plan



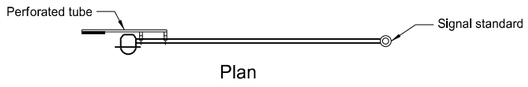
Section B-B
Span Wire Mounted Sign Detail



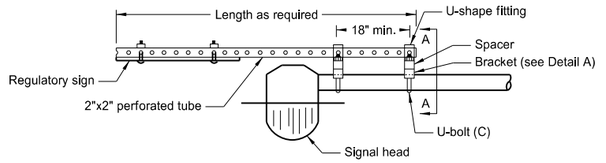
Section A-A



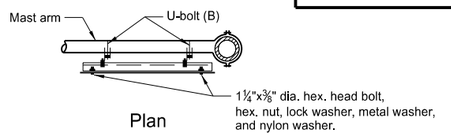
Elevation



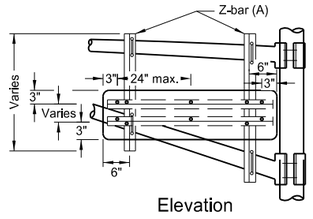
Plan



Sign Mounted Beyond End of Mast Arm Detail

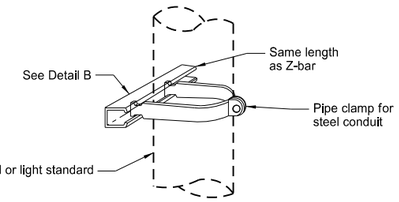


Plan

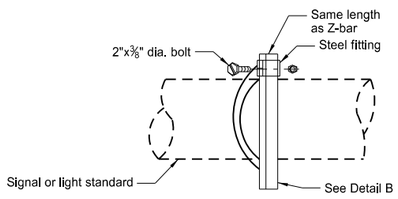


Elevation

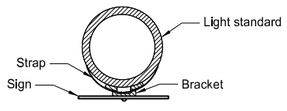
Mast Arm Mounted Street Name Sign Detail



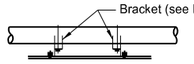
Vertical Mounting
(2 clamps required per sign)



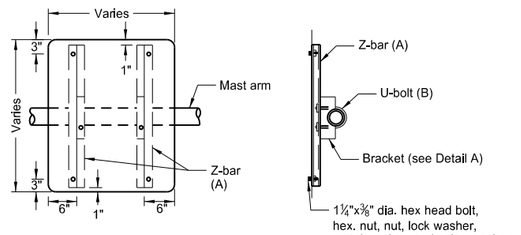
Horizontal Mounting
alternate clamp mounting
(2 clamps required per sign)



Light Standard Mounted Sign Bracket Detail
Max. 24"x30" signs (D)



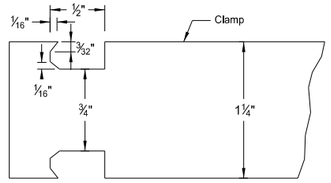
Plan



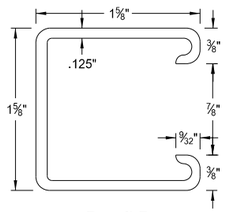
Elevation

Side View

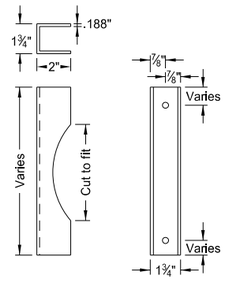
Mast Arm Mounted Regulatory Sign Detail



Clamp Detail



Detail B
Steel Channel



Detail A

Post Size dia.	Clamp Gauge min.
3½" to 5"	11
6" to 12"	10

Clamp	
Post Size dia. in.	D in.
3½	3
4	3 3/16
5	5⅛
6	7 7/16
8	13 1/16
10	20¾
12	29⅝

Notes:

(A) Z-bar - Use 1¾"x3/16" thick 1.08 lb/ft aluminum alloy. In place of Z-bar, two angles bolted together may be used or a channel. 1¾"x1¾"x3/16" angles or 1¾"x2"x.188" channels.

(B) ⅜" U-bolt, hex. nut, lock washer, and length depends on dia. of mast arm.

(C) ⅜" U-bolt, hex. nut, lock washer, and length depends on dia. of mast arm.
2"x2" maximum support length 9.9'
2¼"x2¼" maximum support length 12.6'
2½"x2½" maximum support length 15.7'

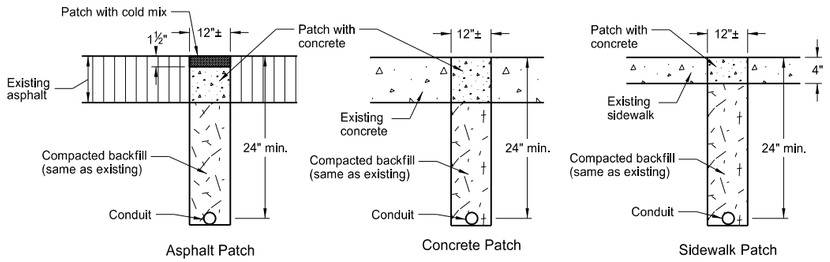
(D) Bracket shall be of galv. steel consisting of strap and sign attachment bracket similar to the one shown in the detail. The cost of the bracket assembly is to be included in the price bid for flat sheet signs. Punching shall be as shown on the Standard Drawings. There shall be a 7' vertical clearance to the bottom of all signs mounted on light standards.

(E) Metal washers and nylon washers used on sign face shall have a minimum outside dia. of 15/16" ± 1/16" and 10 gauge thickness.

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

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

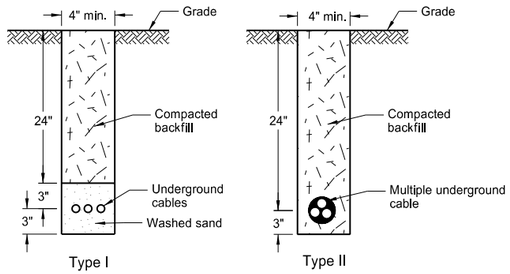
LIGHTING AND SIGNAL DETAILS



Asphalt Patch | Concrete Patch | Sidewalk Patch

Surface Patch Details

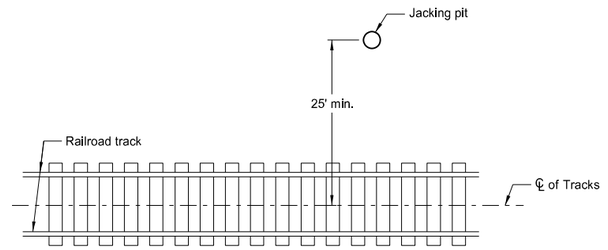
Note: All trenches shall be saw cut. The replacement concrete shall be P.C.C. pavement and the coarse aggregate gradation, maximum size and method of curing shall be as approved by the Engineer. Immediately prior to pouring replacement concrete, all surfaces shall be painted with an approved epoxy compound.



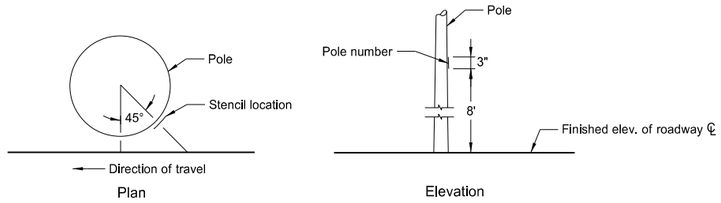
Type I | Type II

Cable Trench

Note: The entire area which is disturbed by the trenching shall be sodded or as directed by the Engineer.



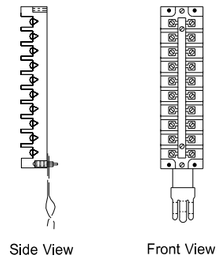
Plan View



Plan | Elevation

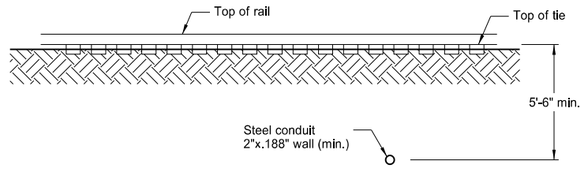
Light Standard Numbering

Note: On the roadway side of each light standard, the Contractor shall stencil on the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.



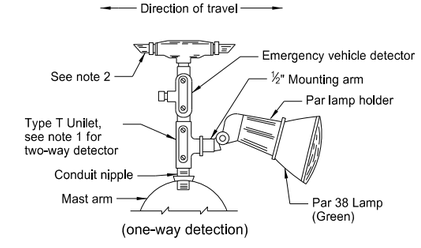
Side View | Front View

Terminal Block Detail



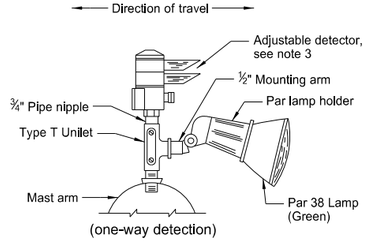
Elevation View

Conduit Placement under Railroad Tracks



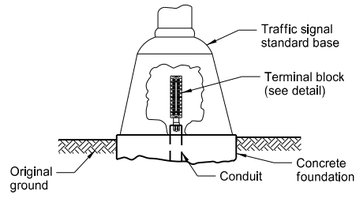
(one-way detection)

Emergency Vehicle Detector Detail



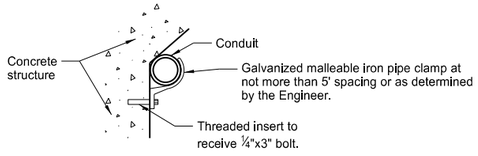
(one-way detection)

Alternate Emergency Vehicle Detector Detail (adjustable)

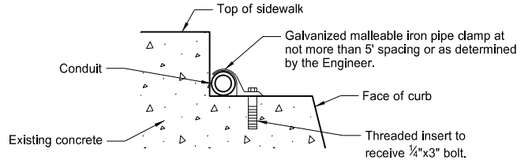


Terminal Block
(rigid mounted)

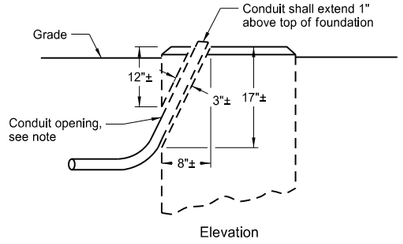
Notes:
1. Two-way Detector shall have Type X Unilet with two Par lamp holders and lamps. (one in each direction).
2. One-way Detector shall have the unused end plugged with metal pipe plug.
3. Two-way Detector shall have the detector lens rotated to face the direction of travel, and shall have Type X Unilet with two Par lamp holders and lamps (one in each direction).



Bridge Mounted Conduit Hanger



Curb Mounted Conduit



Elevation

Revise Concrete Foundation

Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 10/08/13 and the original document is stored at the North Dakota Department of Transportation