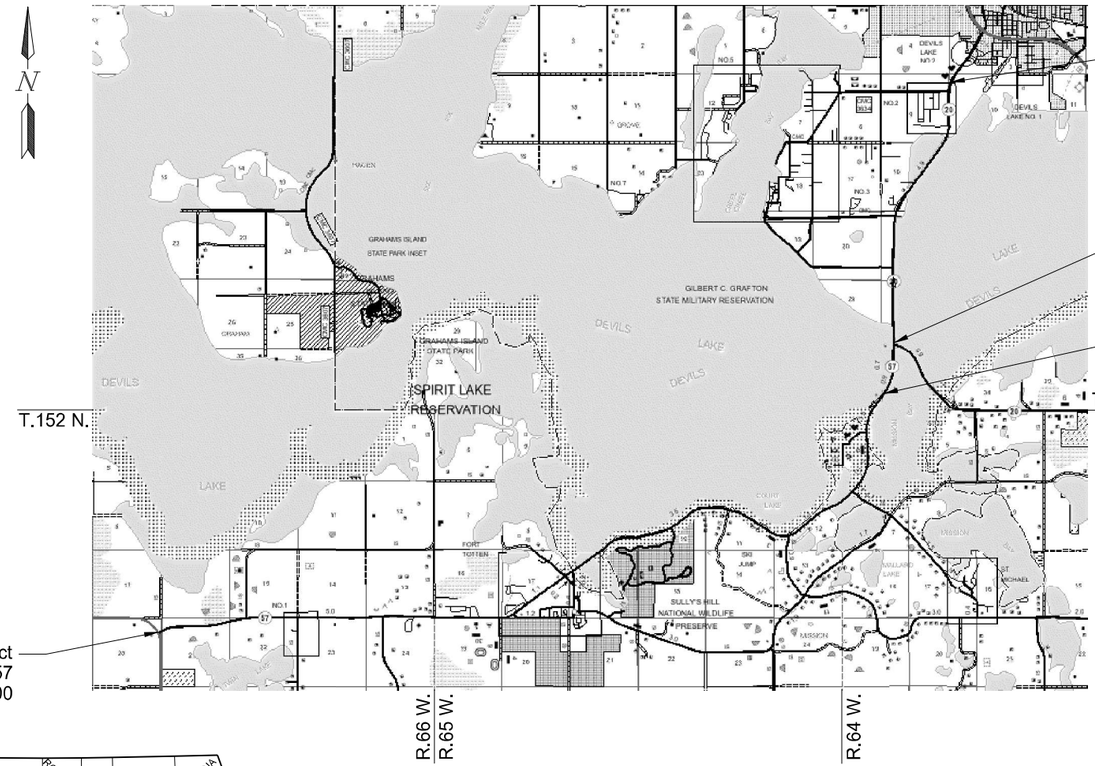
	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	24035	1	1

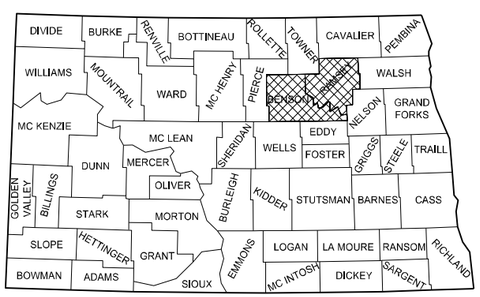
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

HEN-3-999(059)
Benson and Ramsey Counties
ND 57/20 - US 281 to CR 1
Signing, Pavement Marking, Dynamic Message Sign
Vision Zero Safety Corridor

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2024
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
HEN-3-999(059)		17.568





STATE COUNTY MAP

DESIGNER
Jaycee Allery
DESIGNER
Spencer Ulvestad
DESIGNER

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Kirk Hoff
12/03/24

NDDOT DESIGN DIVISION

REGISTERED PROFESSIONAL ENGINEER
MICHAEL E. JOHNSON
PE-6389
DATE
12/03/24
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	2	1

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SPECIAL PROVISIONS

Number	Description
PSP 28(24)	Permits and Environmental Considerations
SP 205(24)	Tribal Employment Rights Ordinance (TERO)
SP 245(24)	Portable Changeable Message Signs

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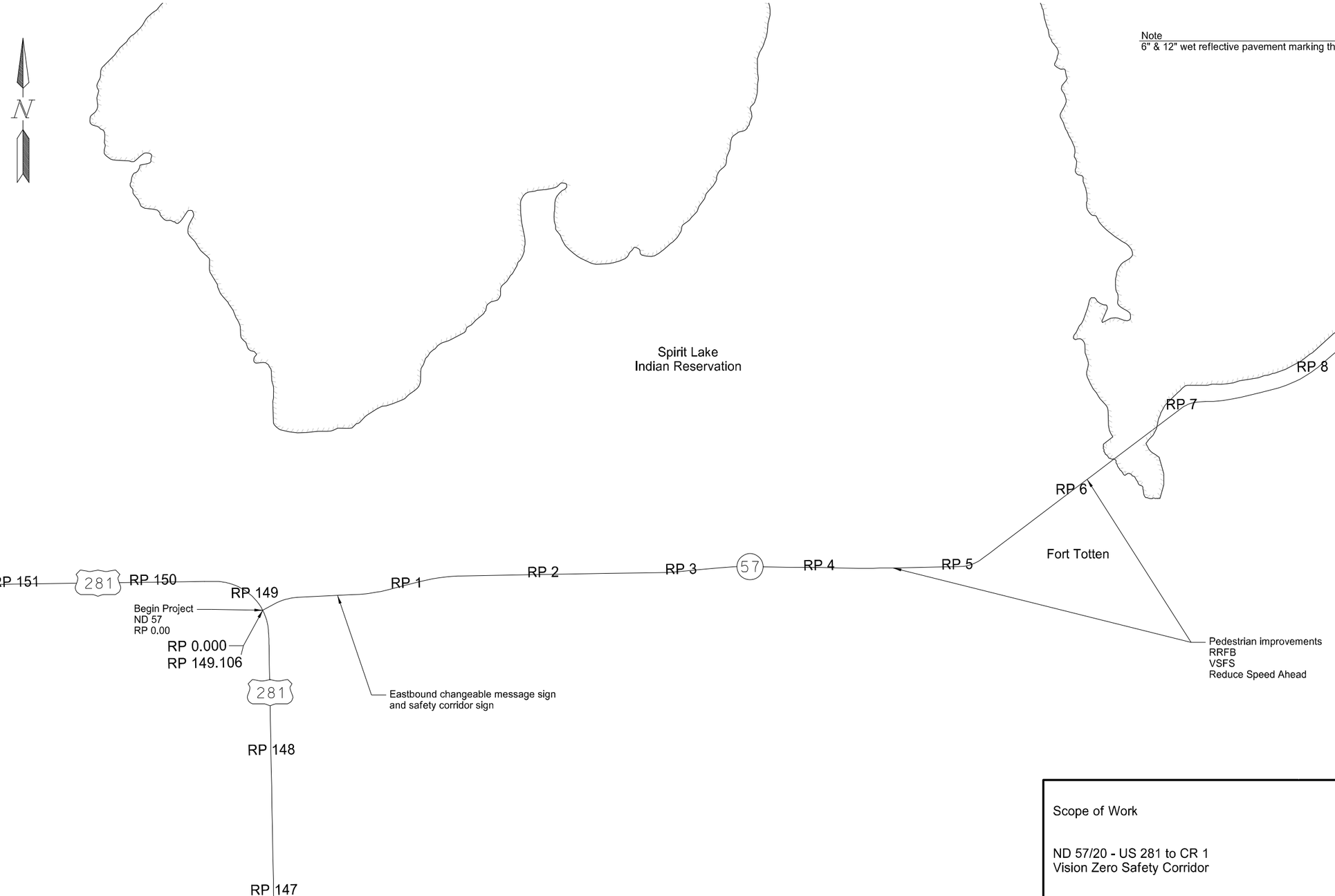
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	4	1



Scope of Work

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE
12/03/24
NORTH DAKOTA

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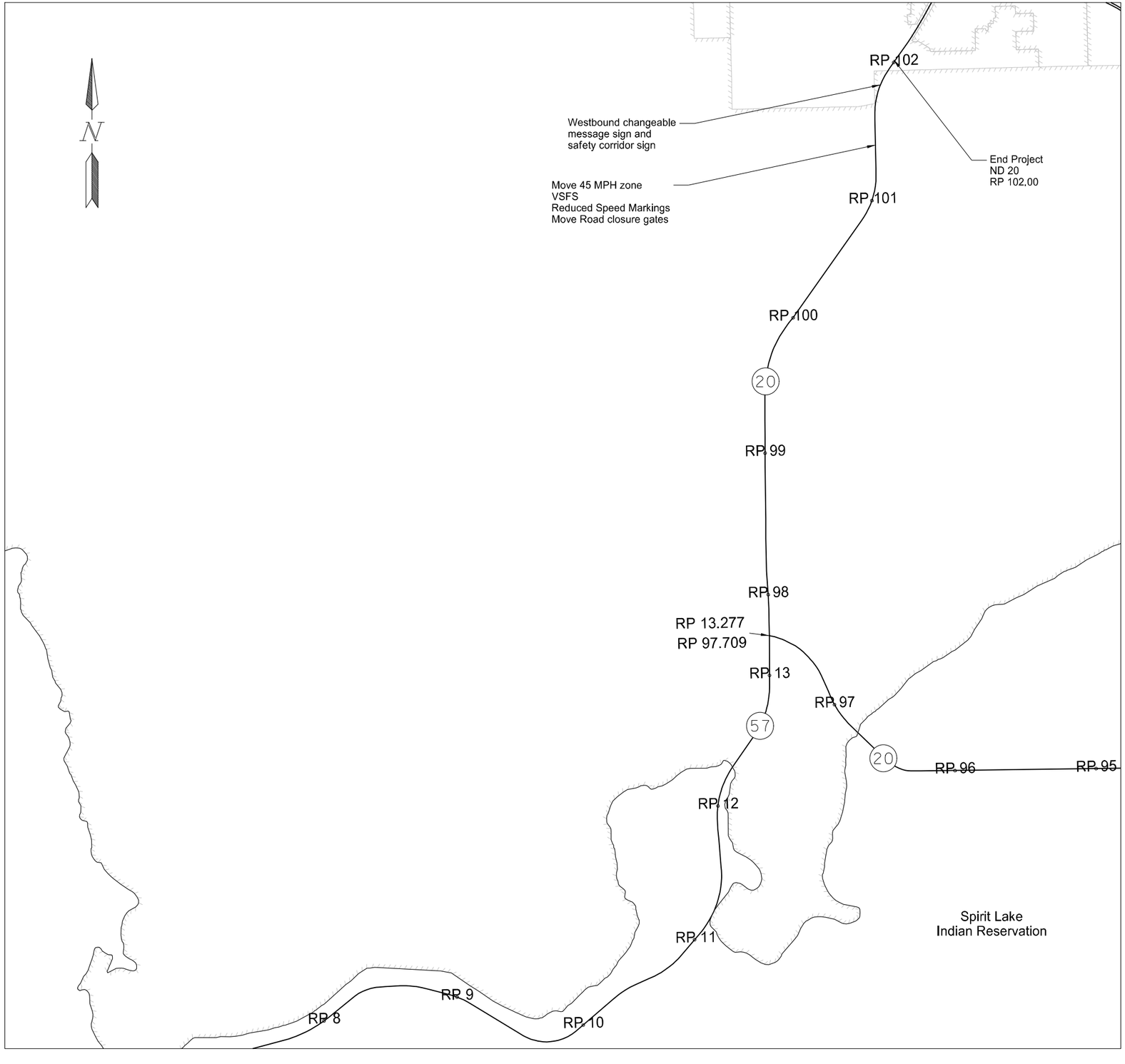
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	4	2



Note
6" & 12" wet reflective pavement marking through project limits

Scope of Work

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	6	1

NOTES

GENERAL NOTES

100-P01 COORDINATION OF PROJECTS: Projects NH-3-020(142)097, PCN 24045 and NH-3-057(060)066, PCN 24044, are mill and overlay projects and expected to be constructed during the 2025 construction season. The projects are on ND 57 & ND 20 from Fort Totten to US 2.

Ensure pavement markings are installed after the project is complete. Coordinate this work with the Engineer.

107-100 LAWS TO BE OBSERVED: All or a portion of this project lies within the exterior boundaries of an Indian Reservation. Review laws and ordinances pertaining to the work contained within the boundaries of the reservation.

108-500 TERO COORDINATION: Invite the Tribal TERO Office to the Preconstruction Conference.

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

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

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

Install PRS that meet the following criteria:

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

Use individual PRS constructed in one of the following manners:

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

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

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

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

704-P01 TRAFFIC CONTROL DEVICES LIST: The Traffic Control Devices List has been developed using the following Standard Drawing Layouts for traffic control:

- D-704-24 Type R: Two Lane Road Shoulder Closure
  - Sign installation
  - Road Closure Gate
- D-704-27 Mobile Operations: Two-Way Roadway
  - Pavement markings
- D-704-33 Two-Lane Roadway Portable Rumble Strips
  - In lane grooving/pavement marking messages
  - Embankment

The required traffic control signs and devices shown on the layout will be paid for at the unit price for the bid item "Traffic Control Signs."

SECTION 110

754-P01 SOLAR VEHICLE SPEED FEEDBACK SIGN: Provide installation, programming, and maintenance manuals to the Engineer prior to installation. Submit work drawings with mounting details prior to installation. Ensure the Dynamic Speed Display sign and controller are compliant with the current edition of the MUTCD. Ensure the sign and equipment have a minimum 2-year warranty.

Provide a sign that follows the minimum standards shown below.

Static Sign Requirements:

- Center the message "YOUR SPEED" on the sign above the Dynamic Speed Display,
- Use series D or E font,
- Provide a black legend with yellow background, and
- Letter height 4".

Feedback Sign Requirements:

- Sign dimensions 24"x30",
- Digital number height 10",
- Provide an LED display,
- Display the speed of the approaching vehicle as "XX" in MPH,
- Monitor traffic speed via radar detecting up to 1000 feet,
- Display legible at 1000 feet,
- Display face non-glare, UV resistant, and high impact polycarbonate,
- Weatherproof NEMA Type 3R rating,
- Display numerals yellow color,
- Operate at a temperature range of -34 degree C to +74 degree C,
- 22 degree viewing angle, and
- Type XI Retroreflective Sign Sheeting.

Controller Requirements:

- Programmable display for the posted speed limit,
- Blank or zero displayed when no advancing traffic is detected,
- Zero displayed when a vehicle exceeds the posted speed limit by 15 mph.
- Provide a controller that can take radar generated speed input and displaying it on the sign,
- Flash display at 50 to 60 cycles per minute if the detected speed exceeds the posted speed limit,
- Automatic nighttime dimming feature,
- Operates on solar power, and
- Operate 24 hours a day, 7 days a week.

Power Requirements:

- Provide solar panels to charge battery,
- Provide a solar charge controller,
- Provide AGM batteries sufficient to power the display sign for 3 days without sunlight, and

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DATE 12/03/24
NORTH DAKOTA

NOTES

- Install a ground wire and connect to a ground rod in the ground.

Sign Supports:
- Mount the dynamic speed display sign to the sign supports as shown in section 110.
- Securely fasten the ground wire to the sign supports using zip ties or other approved method.

Include costs associated with installation, supply, and testing of this sign equipment in the item “Vehicle Speed Feedback Sign”.

754-P02 BERM CONSTRUCTION: Install berm on ND 57 at RP 0.404 Rt and ND 20 at RP 101.345 Lt. Remove existing topsoil and store outside the clear zone. Place embankment according to section 203.04 G.4, Compaction Control, Type C. Place topsoil and apply Type II Seeding and mulch to all disturbed ground surfaces.

Include costs associated with this work in the item “Portable Changeable Message Sign.”

SECTION 120

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

762-P01 EPOXY PVMT MK-WET REFLECTIVE: Supply epoxy pavement marking, and retroreflective optics as outlined below.

The following pavement marking products may be used:
- 3M Series 51E All Weather Elements, or
- Potters Visimax Beads, or
- Approved equal.

Use epoxy pavement marking paint as specified in the section 880.02 of the standard specifications.

Apply pavement markings as specified in Section 762.04 C.3, “Epoxy Paint Pavement Markings”, with the following exceptions:

- Apply retroreflective optics using a double drop system. The first drop shall consist of applying 3M Series 51E All Weather Elements at a rate of 4.2 pounds per gallon of paint. The second drop shall consist of applying the glass beads specified in Section 880.02 D at a rate of 20 pounds per gallon of paint. or

- Apply retroreflective optics using a double drop system. The first drop shall consist of applying Potters Visimax Beads at a rate of 6.0 pounds per gallon of paint. The second drop shall consist of applying the glass beads specified in Section 880.02 D at a rate of 6.0 pounds per gallon of paint.

Ensure a company representative is present during the initial application of the retroreflective optics.

Include all costs associated with this work in the price bid for the item “Epoxy Pvmt Mk 6in Line-Wet Reflective”, “Epoxy Pvmt Mk 6 in Line-Wet Reflective-Grooved”, and “Epoxy Pvmt Mk 12in Line-Wet Reflective-Grooved”.

SECTION 140

770-P01 FEED POINT: A new feed point will be installed on ND 20 at RP 101.26 Lt. Contact Nodak Electric Coop at the address below to set up the electrical service. Set up a new billing account with the NDDOT Devils Lake District.

Duddy Weisser
Nodak Electric Coop
4000 32nd Ave S
Grand Forks, ND 58208
(701) 795-6755
dweisser@nodakelectric.com

Include all costs in the price bid for the item “Relocate Road Closure Gate”.

SECTION 150

772-P01 RRFB ASSEMBLY: Provide a Rectangular Rapid Flashing Beacon (RRFB) system that is operational as shown in the plans. This includes the following items:

- APS pedestrian push button actuation.
- RRFB LED unit.
- Mount the assembly on galvanized Type II posts or existing light standards.
- Provide galvanized transformer bases on all Type II posts.
- Cabinet with controller and locking cover.
- Program the flash rate and time according to the most current version of the MUTCD. Ensure the actuation is not less than 30 seconds.
- Mount RRFB LED unit and cabinet with vandal resistant hardware.
- Provide work drawings for this system as shown in Section 772.03.B “Work Drawings”.

Include costs associated with installation, supply, and testing of this sign equipment in the item “Flashing Beacon – Post Mounted”.

772-P02 ACCESSIBLE PEDESTRIAN SIGNALS (APS) PUSHBUTTON: Include the features, installation procedures, and be compliant with the following:

A. Features:
   1. Rapid tick WALK indication, no more than 2–5dBA above ambient sound
   2. Vibrotactile WALK indication
   3. Speaker and vibrotactile indication located at pushbutton
   4. Pushbutton locator tone
   5. Tactile arrow on each device aligned in direction of travel on the crosswalk

B. Installation Procedures
   1. APS should be reachable from the level landing of the curb ramp for the crossing or from a level surface with an accessible path to the ramp (MUTCD Section 4E.08 and Proposed and Draft PROWAG).
   2. APS should be within 5 feet of the crosswalk line furthest from the center of the intersection and within 10 feet of the curb (MUTCD Section 4E.08).
   3. Tactile arrow shall be aligned with parallel to the direction of travel on the crosswalk (MUTCD Section 4E.12, P1).

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Darell Arne
PE-6529
DATE 03/25/25
NORTH DAKOTA

NOTES

- Install a ground wire and connect to a ground rod in the ground.

Sign Supports:
- Mount the dynamic speed display sign to the sign supports as shown in section 110.
- Securely fasten the ground wire to the sign supports using zip ties or other approved method.

Include costs associated with installation, supply, and testing of this sign equipment in the item “Vehicle Speed Feedback Sign”.

754-P02 BERM CONSTRUCTION: Install berm on ND 57 at RP 0.404 Rt and ND 20 at RP 101.345 Lt. Remove existing topsoil and store outside the clear zone. Place embankment according to section 203.04 E.4, Compaction Control, Type C. Place topsoil and apply Type II Seeding and mulch to all disturbed ground surfaces.

Include costs associated with this work in the item “Portable Changeable Message Sign.”

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762-P01 EPOXY PVMT MK-WET REFLECTIVE: Supply epoxy pavement marking, and retroreflective optics as outlined below.

The following pavement marking products may be used:
- 3M Series 51E All Weather Elements, or
- Potters Visimax Beads, or
- Approved equal.

Use epoxy pavement marking paint as specified in the section 880.02 of the standard specifications.

Apply pavement markings as specified in Section 762.04 C.3, “Epoxy Paint Pavement Markings”, with the following exceptions:

- Apply retroreflective optics using a double drop system. The first drop shall consist of applying 3M Series 51E All Weather Elements at a rate of 5.3 pounds per gallon of paint. The second drop shall consist of applying the glass beads specified in Section 880.02 D at a rate of 20 pounds per gallon of paint. or

- Apply retroreflective optics using a double drop system. The first drop shall consist of applying Potters Visimax Beads at a rate of 6.0 pounds per gallon of paint. The second drop shall consist of applying the glass beads specified in Section 880.02 D at a rate of 6.0 pounds per gallon of paint.

Ensure a company representative is present during the initial application of the retroreflective optics.

Include all costs associated with this work in the price bid for the item “Epoxy Pvmt Mk 6in Line-Wet Reflective”, “Epoxy Pvmt Mk 6 in Line-Wet Reflective-Grooved”, and “Epoxy Pvmt Mk 12in Line-Wet Reflective-Grooved”.

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Duddy Weisser
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4000 32nd Ave S
Grand Forks, ND 58208
(701) 795-6755
dweisser@nodakelectric.com

Include all costs in the price bid for the item “Relocate Road Closure Gate”.

SECTION 150

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- RRFB LED unit.
- Mount the assembly on galvanized Type II posts or existing light standards.
- Provide galvanized transformer bases on all Type II posts.
- Cabinet with controller and locking cover.
- Program the flash rate and time according to the most current version of the MUTCD. Ensure the actuation is not less than 30 seconds.
- Mount RRFB LED unit and cabinet with vandal resistant hardware.
- Provide work drawings for this system as shown in Section 772.03.B “Work Drawings”.

Include costs associated with installation, supply, and testing of this sign equipment in the item “Flashing Beacon – Post Mounted”.

772-P02 ACCESSIBLE PEDESTRIAN SIGNALS (APS) PUSHBUTTON: Include the features, installation procedures, and be compliant with the following:

A. Features:
   1. Rapid tick WALK indication, no more than 2–5dBA above ambient sound
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   5. Tactile arrow on each device aligned in direction of travel on the crosswalk

B. Installation Procedures
   1. APS should be reachable from the level landing of the curb ramp for the crossing or from a level surface with an accessible path to the ramp (MUTCD Section 4E.08 and Proposed and Draft PROWAG).
   2. APS should be within 5 feet of the crosswalk line furthest from the center of the intersection and within 10 feet of the curb (MUTCD Section 4E.08).
   3. Tactile arrow shall be aligned with parallel to the direction of travel on the crosswalk (MUTCD Section 4E.12, P1).

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	6	3

NOTES

4. Pushbutton required to be located within reach range for wheelchair users (Proposed PROWAG, R406).

C. Code Compliance:
1. Functionality: MUTCD 2009 - 4E
2. Temperature and Humidity: NEMA TS 2
3. Transient Voltage Protection: NEMA TS 2
4. Transient Suppression: IEC 61000-4-4, IEC 61000-4-5
5. Electronic Noise: FCC Title 47, Part 15, Class A
6. Mechanical Shock and Vibration: NEMA TS 2
7. EN4 PBS Enclosure: NEMA 250 - Type 4X
8. Electrical Reliability: NEMA TS 4

Include all costs associated with this item in the price bid for the item "Flashing Beacon – Post Mounted".

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PE-6529
DATE 12/03/24
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ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	0.18	0.18
702	0100	MOBILIZATION	L SUM	0.18	0.18
704	0100	FLAGGING	MHR	100	100
704	1000	TRAFFIC CONTROL SIGNS	UNIT	774	774
704	1048	PORTABLE RUMBLE STRIPS	EA	2	2
704	1060	DELINEATOR DRUMS	EA	35	35
704	1067	TUBULAR MARKERS	EA	32	32
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	1	1
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	407	407
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	39	39
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	629	629
754	0592	RESET SIGN PANEL	EA	2	2
754	8005	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2	2
754	8015	VEHICLE SPEED FEEDBACK SIGN	EA	2	2
762	0122	PREFORMED PATTERNED PVMT MK-MESSAGE(GROOVED)	SF	1,429	1,429
762	0157	EPOXY PVMT MK 6IN LINE-WET REFLECTIVE-GROOVED	LF	257,791	257,791
762	0163	EPOXY PVMT MK 12IN LINE-WET REFLECTIVE-GROOVED	LF	5,466	5,466
772	2110	FLASHING BEACON-POST MOUNTED	EA	5	5
772	3150	REMOVE FLASHING BEACON SYSTEM	EA	1	1
980	0800	RELOCATE ROAD CLOSURE GATE	EA	1	1

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
CW21-10	**48"x48"**	**WORK CONVOY**	**1**	**19**	**19**
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**1**	**28**	**28**
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**26**	**52**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR		18	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		36	
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)		11	
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 (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**6**	**30**	**180**
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1aP-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**3**	**10**	**30**
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)		12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**2**	**35**	**70**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**3**	**35**	**105**
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
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		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or _ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**3**	**35**	**105**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT or _ MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE		35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE		35	
W20-7-48	**48"x48"**	**FLAGGER**	**2**	**35**	**70**
W20-8-18	**18"x18"**	**STOP - SLOW PADDLE Back to Back**	**2**	**5**	**10**
W20-52P-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		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 or _ MILE		35	
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	**48"x48"**	**RUMBLE STRIPS AHEAD**	**2**	**35**	**70**
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE		35	

SPECIAL SIGNS

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**774**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**100**
704-1048	**PORTABLE RUMBLE STRIPS**	**EACH**	**2**
704-1050	TYPE I BARRICADES	EACH	
704-1052	TYPE III BARRICADES	EACH	
704-1060	**DELINEATOR DRUMS**	**EACH**	**35**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**32**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	STACKABLE VERTICAL PANELS	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**	**1**
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	

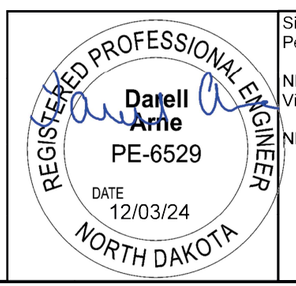
NOTE:
If additional signs are required, units will be calculated using the formula from Section III-18.06 of the Design Manual.
http://www.dot.nd.gov/

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

Traffic Control Devices List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	HEN-3-999(059)	110	1

Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Vert Clear-ance FT	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
ND Hwy 57																							
0.314 Rt	SN 1		19.5		11.7	12.2	12.7		5.0	2.5 x 2.5 12 ga	13.7						3	4	3 x 3 7 ga			3	
2.965 Lt		65		5.6	12.5				5.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
2.965 Rt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
3.168 Lt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
3.435 Rt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
3.610 Rt		65		5.6	12.5				5.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
3.610 Lt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
4.303 Rt	S.A.A			5.0	14.1				5.0	2.25 x 2.25 12 ga	15.1	4.6				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
4.365 Rt	S.A.F			7.5	12.5				5.0	2.25 x 2.25 12 ga	15.2	3.4				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
4.403 Rt		20		9.0	13.1				5.0	2.25 x 2.25 12 ga	14.7	4.1				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
4.515 Rt	S.A.D			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
4.573 Rt	S.A.B			19.4					7.0														Mount on Beacon Post
4.574 Lt				19.4					7.0														Mount on Light Standard
4.682 Lt	S.A.B			19.4					7.0														Mount on Beacon Post
4.682 Rt				19.4					7.0														Mount on Light Standard
4.740 Lt	S.A.D			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
4.798 Lt		20		9.0	13.1				5.0	2.25 x 2.25 12 ga	14.7	4.1				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
4.836 Lt	S.A.F			7.5	12.5				5.0	2.25 x 2.25 12 ga	15.2	3.4				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
4.954 Rt	S.A.E			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
5.012 Lt	S.A.C			23.8					7.0														Mount on Beacon Post
5.012 Rt				23.8					7.0														Mount on Light Standard
5.070 Lt	S.A.E			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
5.961 Rt	S.A.E			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
6.019 Rt	S.A.C			23.8					7.0														Mount on Beacon Post
6.020 Lt				23.8					7.0														Mount on Light Standard
6.078 Lt	S.A.E			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
6.087 Rt	S.A.D			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
6.145 Lt	S.A.B			19.4					7.0														Mount on Beacon Post
6.145 Rt	S.A.B			19.4					7.0														Mount on Beacon Post
6.183 Lt	S.A.D			9.5	13.8				5.0	2.5 x 2.5 10 ga	16.2	3.6				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga			1	
Sub Total			19.5	356.8	**Total**	285.7											**Total**	88.0		0	0	16	



Sign Summary
Perforated Tube

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & 20

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	HEN-3-999(059)	110	2

Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Vert Clear-ance FT	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
ND Hwy 20																							
100.660 Lt		65		5.6	12.5				5.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
100.660 Rt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
100.818 Lt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
100.954 Rt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
101.205 Lt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
101.205 Rt		65		5.6	12.5				5.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
101.300 Rt		20		9.0	13.1				5.0	2.25 x 2.25 12 ga	14.7	4.1				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
101.506 Lt		9		5.0	12.1				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
101.506 Rt	S.A.A			5.0	15.1	15.4			5.0	2.25 x 2.25 12 ga	17.0	4.3	4.5			2.5 x 2.5 12 ga	2	4	3 x 3 7 ga			2	
101.547 Rt					14.0				5.0	2.25 x 2.25 12 ga	15.4	4.3				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga	1		1	
101.585 Rt					11.9				5.0	2.5 x 2.5 10 ga	14.1	3.4				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga	1		1	
101.619 Lt	SN 1		19.5		11.7	12.2	12.7		5.0	2.5 x 2.5 12 ga	13.7						3	4	3 x 3 7 ga			3	
Sub Total			19.5	50.2		**Total**	191.6										**Total**	60.0		2	0	8	
Grand Total			**39.0**	**407.0**		**Total**	**477.3**										**Total**	**148**	**0**	**2**	**0**	**24**	

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

Sign Summary
Perforated Tube

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & 20

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	110	3

ND Hwy 57

Sign 1

RP 0.314 Rt

Signing Layout

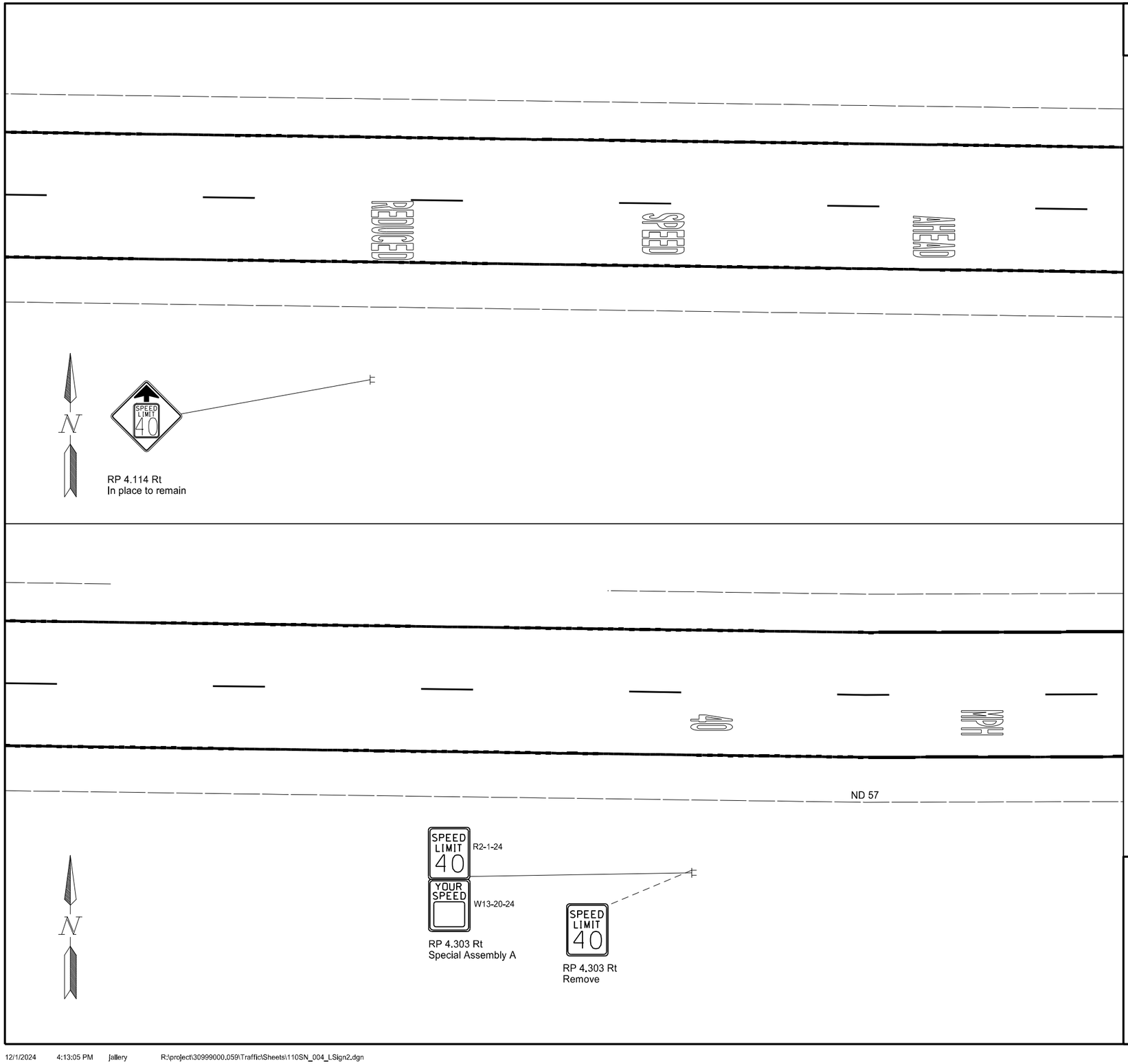
ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	110	4

SPEC	CODE	BID ITEM	QTY	UNIT
754	8015	VEHICLE SPEED FEEDBACK SIGN		
		RP 4.303 Rt	1	EA
762	0122	Preformed Patterned Pvmt Mkg-Message(grooved)		
		REDUCED SPEED AHEAD (x1)	103.1	SF
		40 MPH (x1)	30.6	SF
		Total	133.7	SF



Signing and Pavement Marking Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

12/1/2024 4:13:05 PM jallery R:\project\30999000.059\Traffic\Sheets\110SN_004_LSign2.dgn

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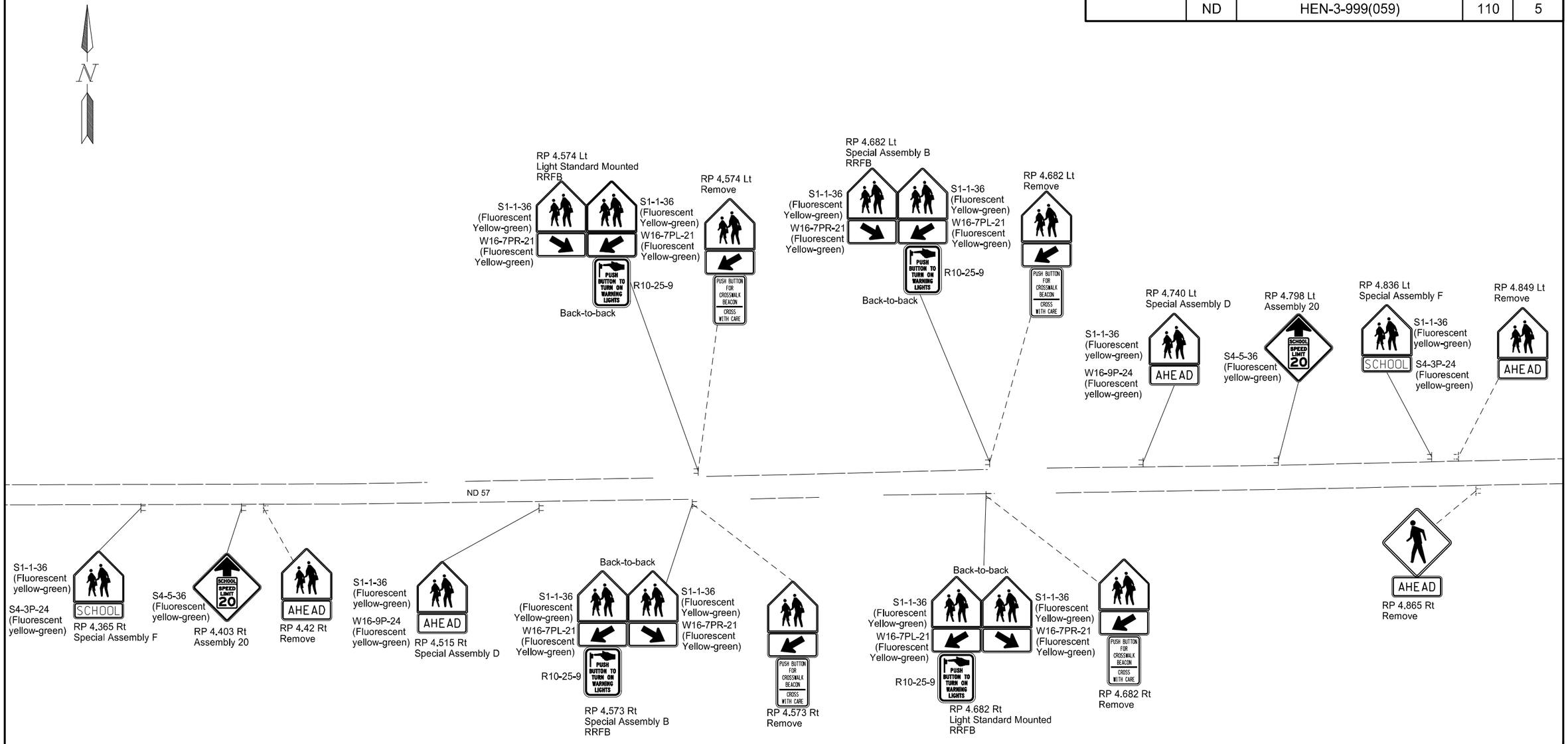

Signing Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

Docusign Envelope ID: 8A425E29-02F8-4ED4-B072-4E7E5A71A6BB

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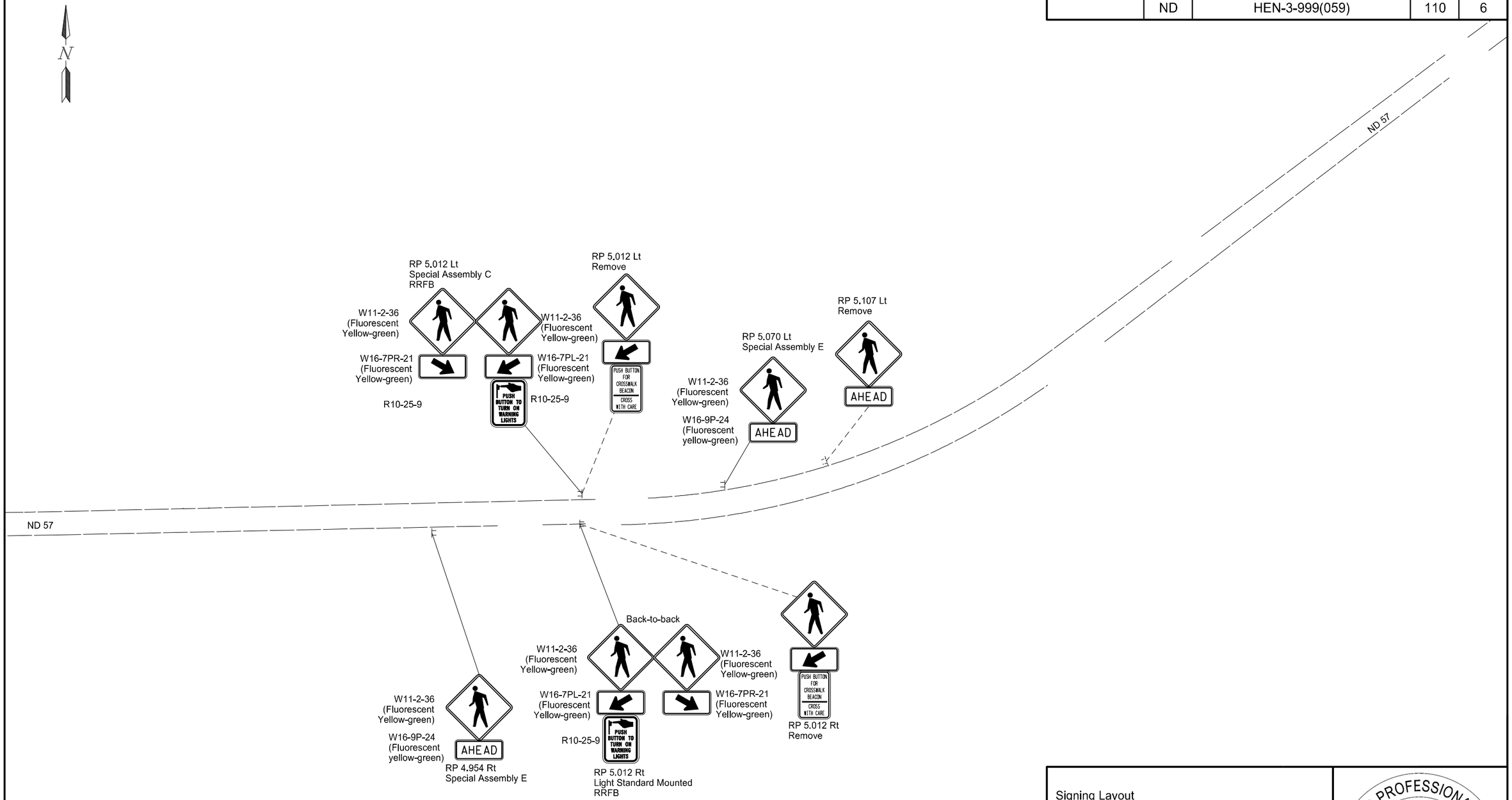
	ND	HEN-3-999(059)	110	6



Signing Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

11/27/2024 1:44:51 PM sulvestad R:\project\30999000.059\Traffic\Sheets\110SN_006_LSign4.dgn

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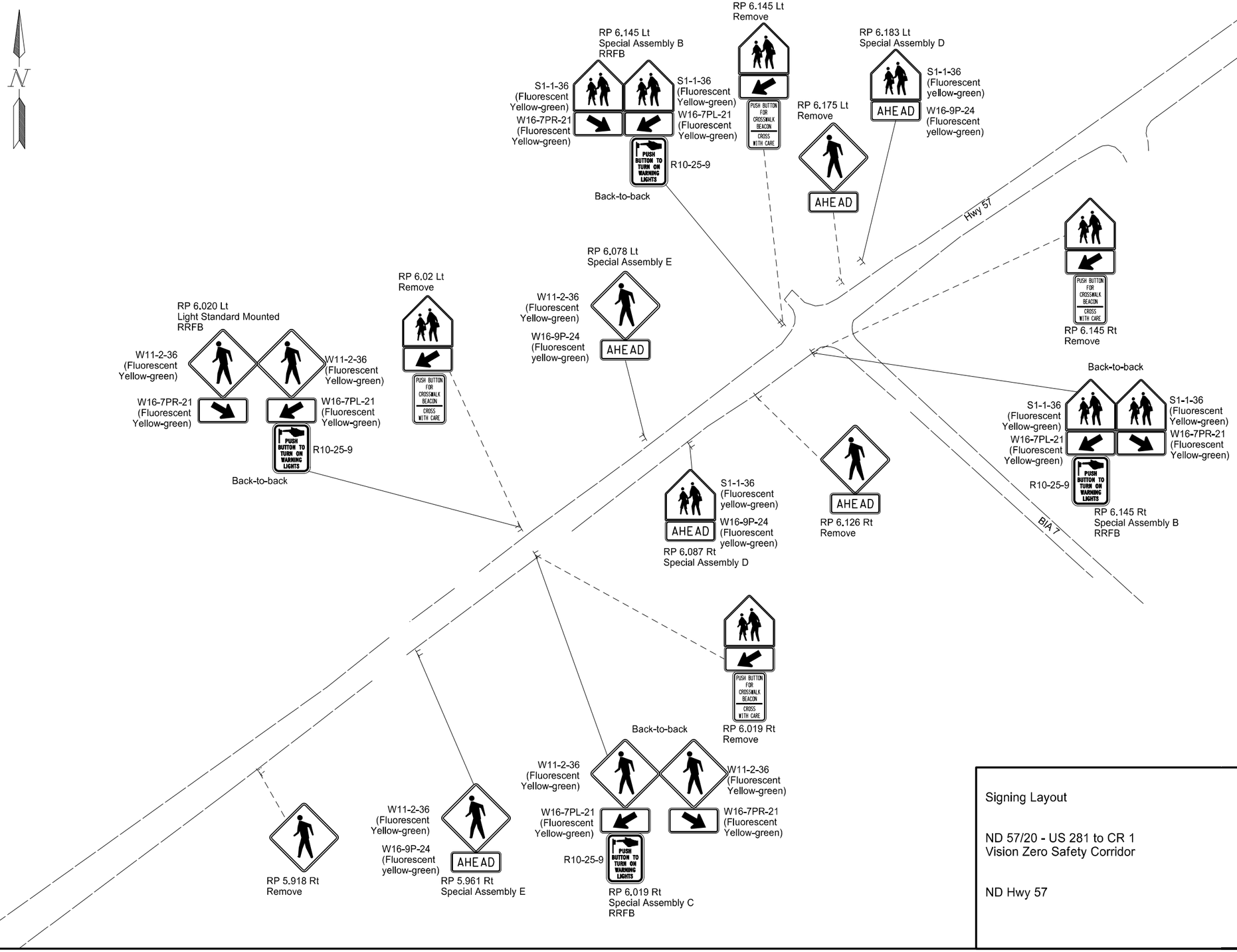
	ND	HEN-3-999(059)	110	7



Signing Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

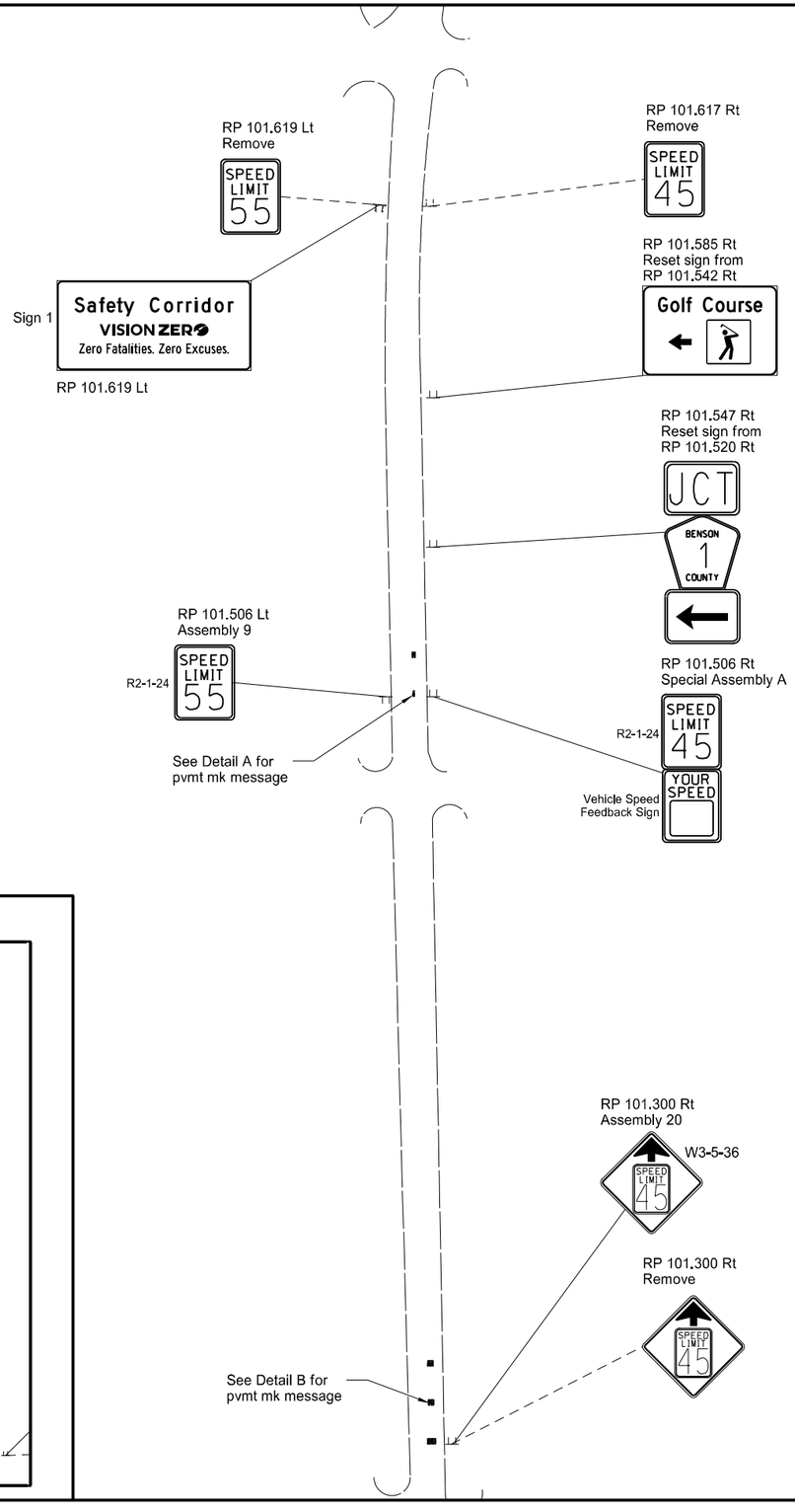
ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

11/27/2024 1:44:52 PM sulvestad R:\project\30999000.059\Traffic\Sheets\110SN_007_LSign5.dgn

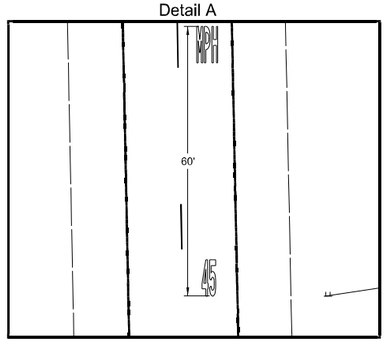
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	110	8

SPEC	CODE	BID ITEM	QTY	UNIT
754	8015	VEHICLE SPEED FEEDBACK SIGN		
		RP 101.506 Rt	1	EA
762	0122	Preformed Patterned Pvmt Mkg-Message(grooved)		
		REDUCED SPEED AHEAD (x1)	103.1	SF
		45 MPH (x1)	30.8	SF
		Total	133.9	SF

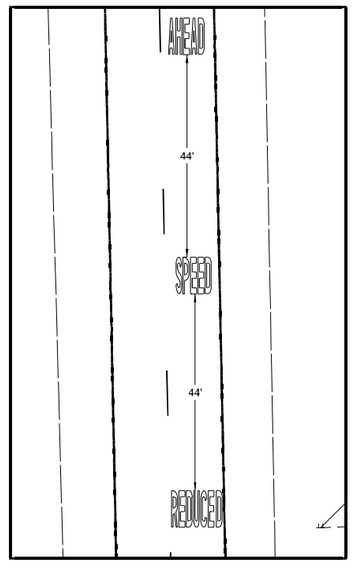


Pavement Marking Details

Detail A



Detail B



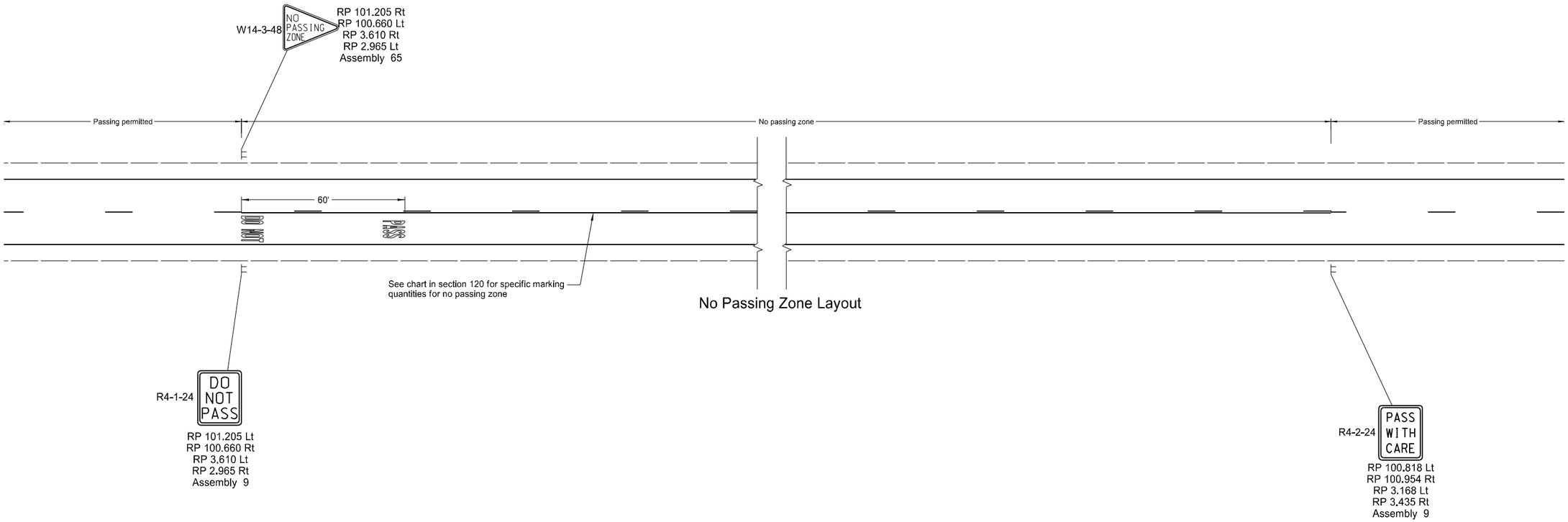
Signing and Pavement Marking Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	110	9



No Passing Zone Layout

Sign and Pavement Marking Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	110	10

SIGN NUMBER	Sign 1
WIDTH X HEIGHT	6'-6" x 3'-0"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_VISION_ZERO_WHITE	17.15	13.75	43.71	5	0

STATION(S):
ND 20 - RP 101.619 Lt
ND 57 - RP 0.314 Rt

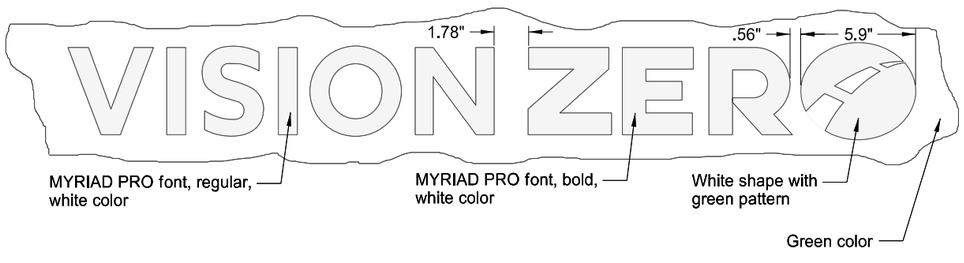
AREA: 19.5 Sq.Ft.

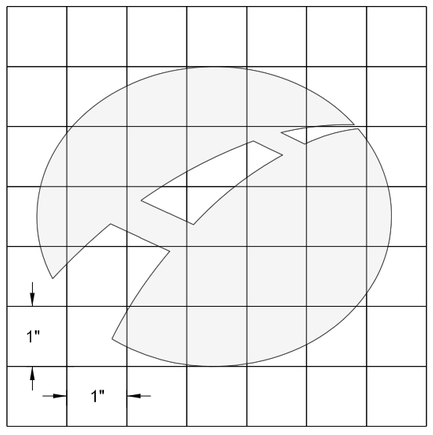
Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Boundary.ssl

LETTER POSITION (X)																													LENGTH	SIZE	SERIES
S	a	f	e	t	y		C	o	r	r	i	d	o	r															63.92	6/4.5	D 2000
7.04	12.17	16.96	19.96	24.02	26.74	31.24	37.24	43	48.34	51.88	55.42	58.06	63.34	68.68																	
Z	e	r	o	F	a	t	a	l	i	t	i	e	s	.	Z	e	r	o	E	x	c	u	s	e	s	.				60.08	4/3	C 2000
8.96	11.68	14.24	15.88	19.92	22.24	24.52	26.16	28.76	30.04	31	32.84	34	36.36	38.32	40.96	43.68	46.24	47.88	51.92	54.2	57.04	59.48	62.04	64.08	66.44	68.4					





Note: An image of the Vision Zero logo can be obtained from the Design Division.

Sign Details

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

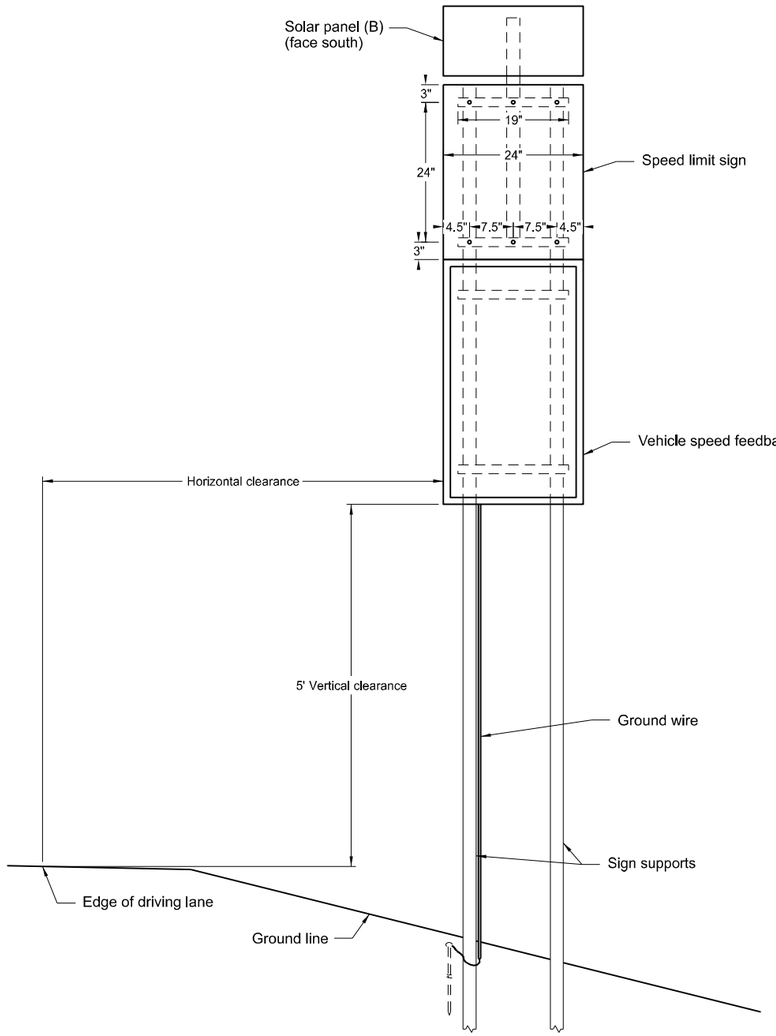
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

Docusign Envelope ID: 8A425E29-02F8-4ED4-B072-4E7E5A71A6BB

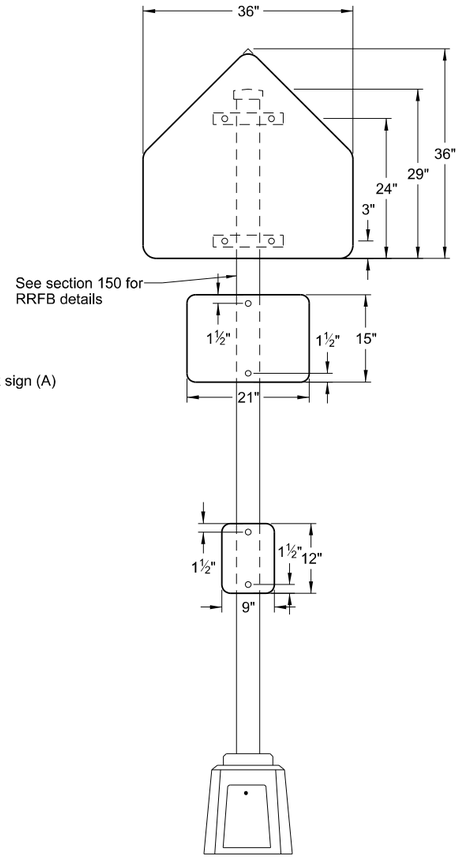
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	110	11

(A) Refer to manufacturer recommendations for mounting to sign supports.

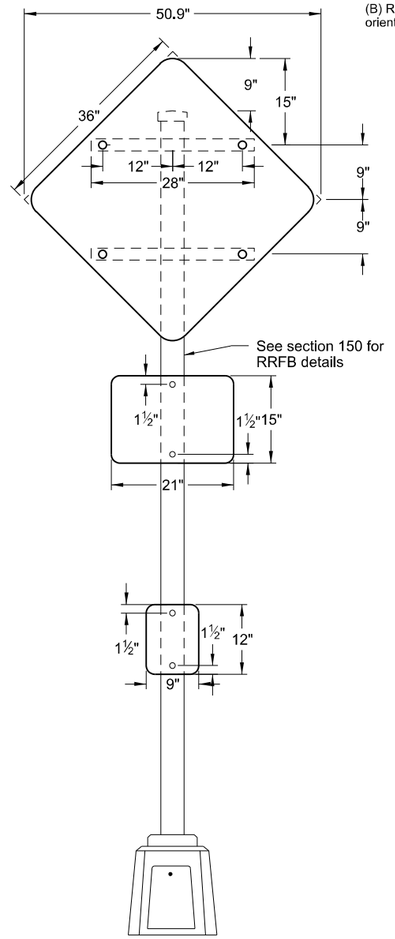
(B) Refer to manufacturer recommendations for solar panel mounting and orientation.



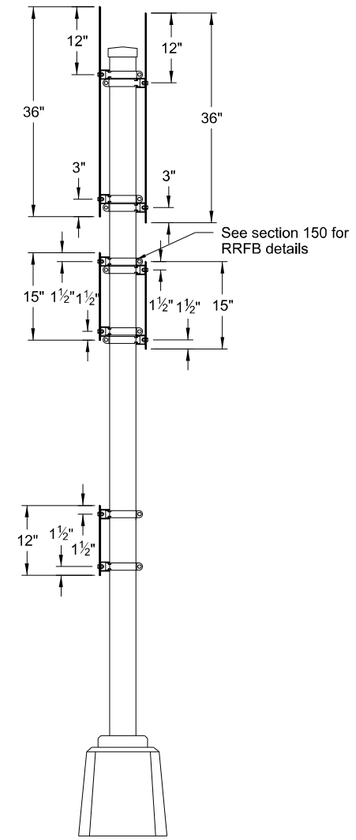
Special Assembly A
Solar Powered Vehicle Speed Feedback Sign
ND 57 - RP 4.303 Rt
ND 20 - RP 101.506 Rt



Special Assembly B
Back-to-Back (see detail)
Rectangular Rapid Flashing Beacon
ND 57 - RP 4.573 Rt
RP 4.682 Lt
RP 6.145 Rt
RP 6.145 Lt



Special Assembly C
Back-to-Back (see detail)
Rectangular Rapid Flashing Beacon
ND 57 - RP 5.012Rt
RP 6.019 Rt



Back-to-Back Detail
Rectangular Rapid Flashing Beacon

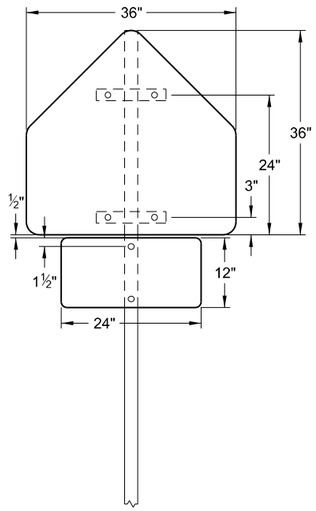
Sign Assemblies

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

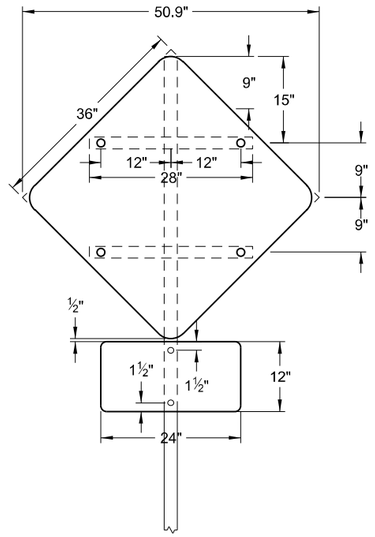
ND Hwy 57 & ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

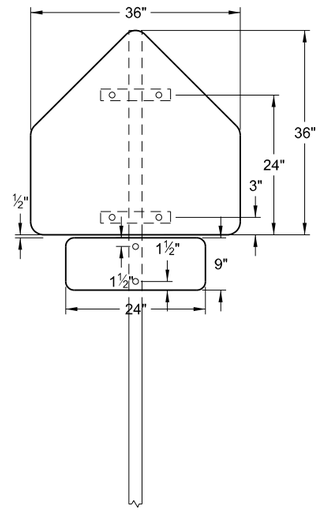
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	110	12



Special Assembly D
ND 57
RP 4.515 Rt
RP 4.740 Lt
RP 6.087 Rt
RP 6.183 Lt



Special Assembly E
ND 57
RP 4.954 Rt
RP 5.070 Lt
RP 5.961 Rt
RP 6.078 Lt



Special Assembly F
ND 57
RP 4.365 Rt
RP 4.836 Lt

Sign Assemblies

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
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DATE 12/03/24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	120	1

Location	Preformed Patterned Pvmt Mk-Message (Grooved)		6" wet refl epoxy grooved					12" wet refl epoxy grooved
	Right Turn Arrow	Left Turn Arrow	6" yellow left barrier line	6" yellow right barrier line	6" yellow double barrier line	6" yellow edge line	6" white centerline	12" white channel line
ND 20 - CR 1 to Jct ND 57	3	9	2650	1740	10584	41670	3475	1484
ND 57 - US 281 to Jct ND 20	22	19	4028	3081	27194	140205	13714	3982
Totals	25	28	6678	4821	37778	181875	17189	5466

SPEC	CODE	BID ITEM	QTY	UNIT
762	0122	PREFORMED PATTERENED PVMT MK-MESSAGE(GROOVED)		
		Right Turn Arrow (x25)	400	SF
		Left Turn Arrow (x28)	448	SF
		DO NOT PASS (x6)	312	SF
		Total	1160	SF
762	0157	EPOXY PVMT MK 6IN LINE-WET REFLECTIVE-GROOVED		
		6" white edge line	181875	LF
		6" yellow lane line	17189	LF
		6" yellow left barrier line	9489	LF
		6" yellow right barrier line	7204	LF
		6" yellow double barrier line	42034	LF
		Total	257791	LF
762	0163	EPOXY PVMT MK 12IN LINE-WET REFLECTIVE-GROOVED		
		12" white channel line	5466	LF

Hwy	Location of No Passing Zone along		6" wet refl epoxy grooved		
			6" yellow right barrier line	6" yellow left barrier line	6" double yellow barrier line
	start and stop location	direction	NB/EB passing restricted	SB\WB passing restricted	
ND 20					
	RP 101.205 to RP 100.818	SB		1656	1436
	RP 100.660 to RP 100.954	NB	1043		
ND 57					
	RP 3.61 to RP 3.168	WB		1155	2820
	RP 2.965 to RP 3.435	EB	1340		
	Totals		2383	2811	4256

Location		pvmt mkg message
		DO NOT PASS
RP 101.205	SB	1
RP 100.660	NB	1
RP 4.675	WB	1
RP 4.16	EB	1
RP 3.61	WB	1
RP 2.965	EB	1
Total		6

Pavement Marking

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

Docusign Envelope ID: 8A425E29-02F8-4ED4-B072-4E7E5A71A6BB

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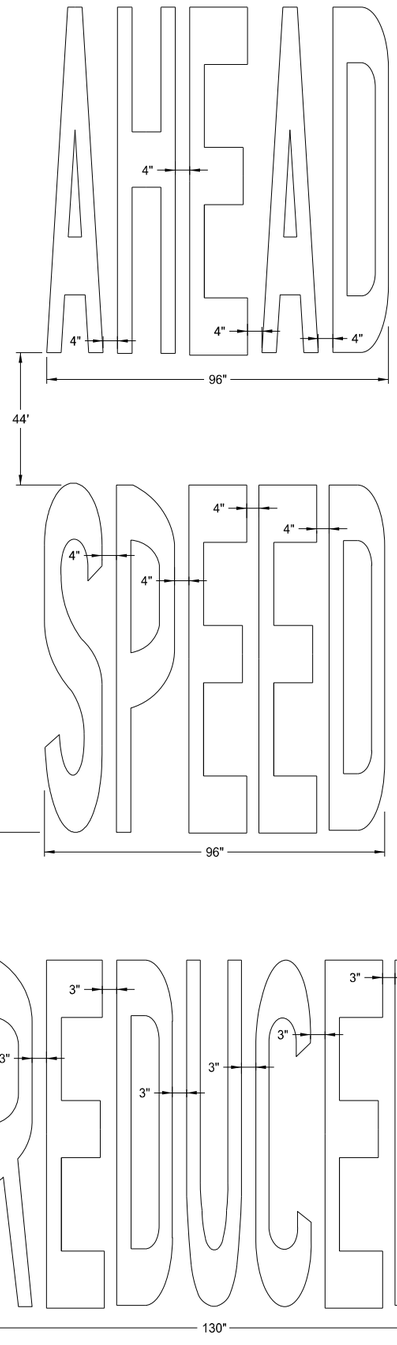

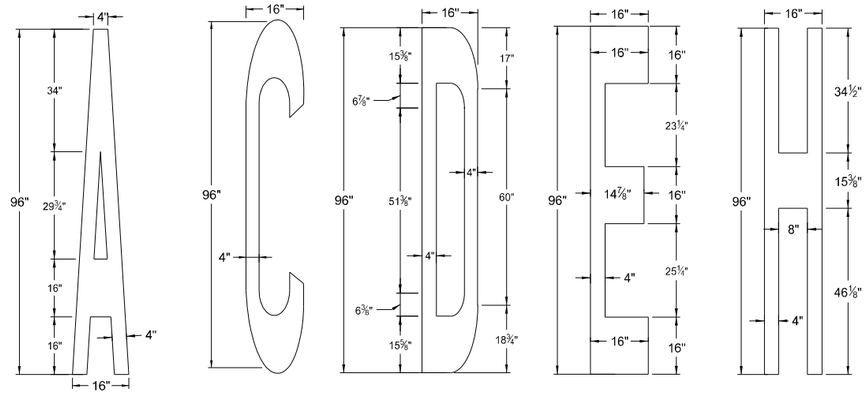

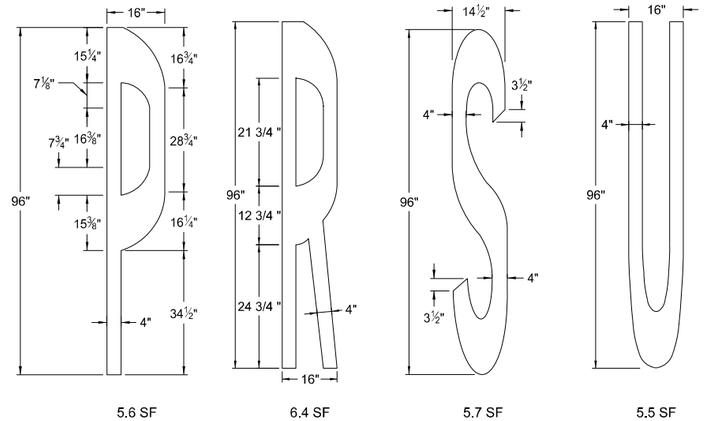

Pavement Marking Details

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

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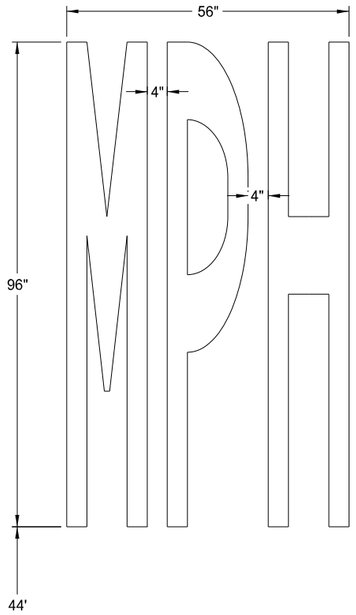
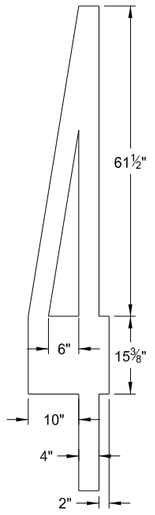
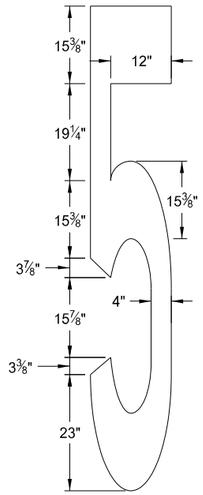




5.3 S. F.



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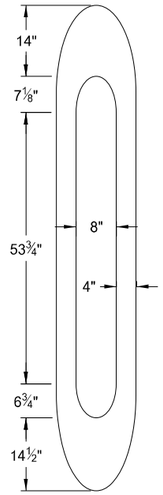

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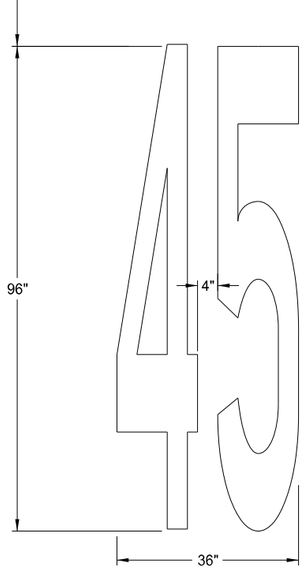
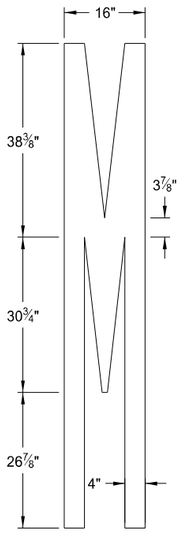
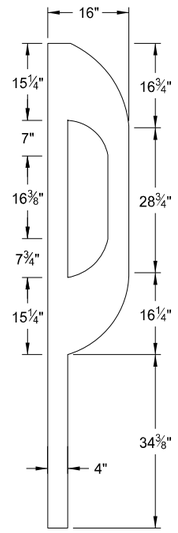
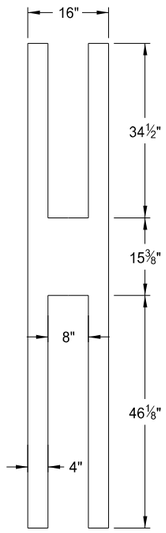








19.2 S. F.

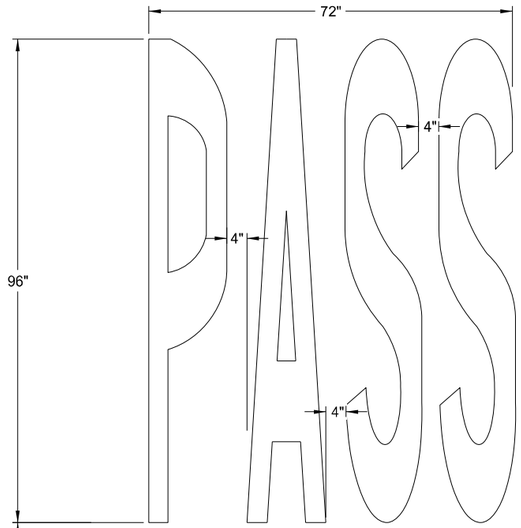
Pavement Marking Details

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	120	4



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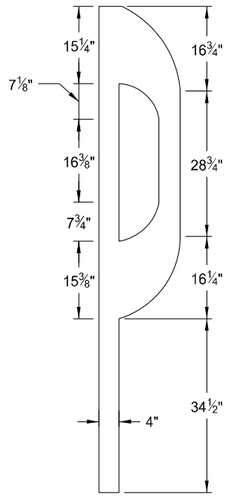

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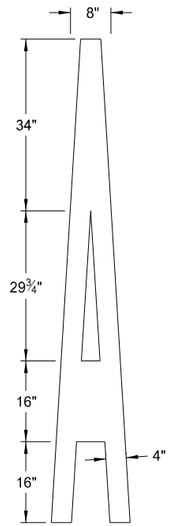

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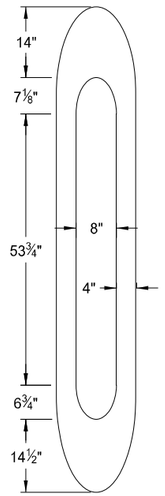

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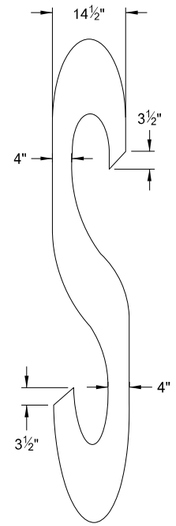

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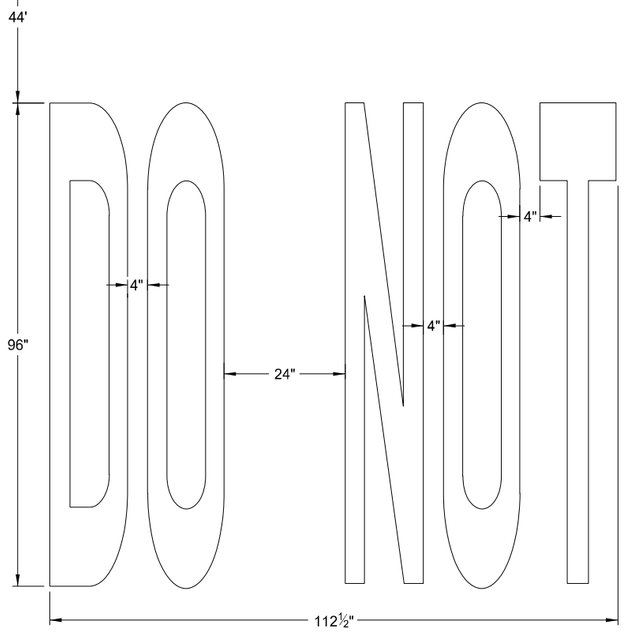

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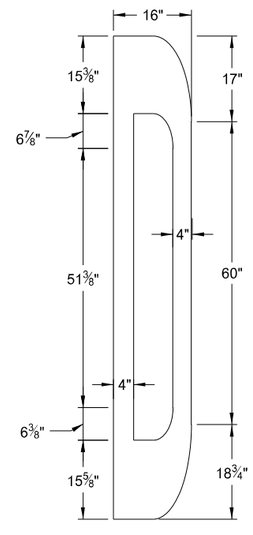

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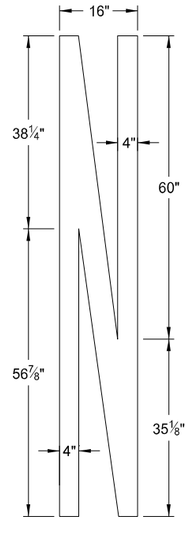

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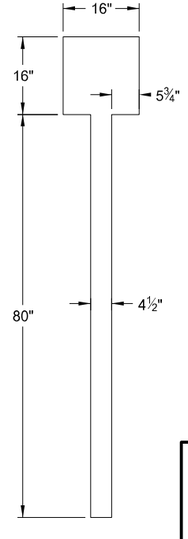

3.9 SF

Pavement Marking Details

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

Docusign Envelope ID: 8A425E29-02F8-4ED4-B072-4E7E5A71A6BB

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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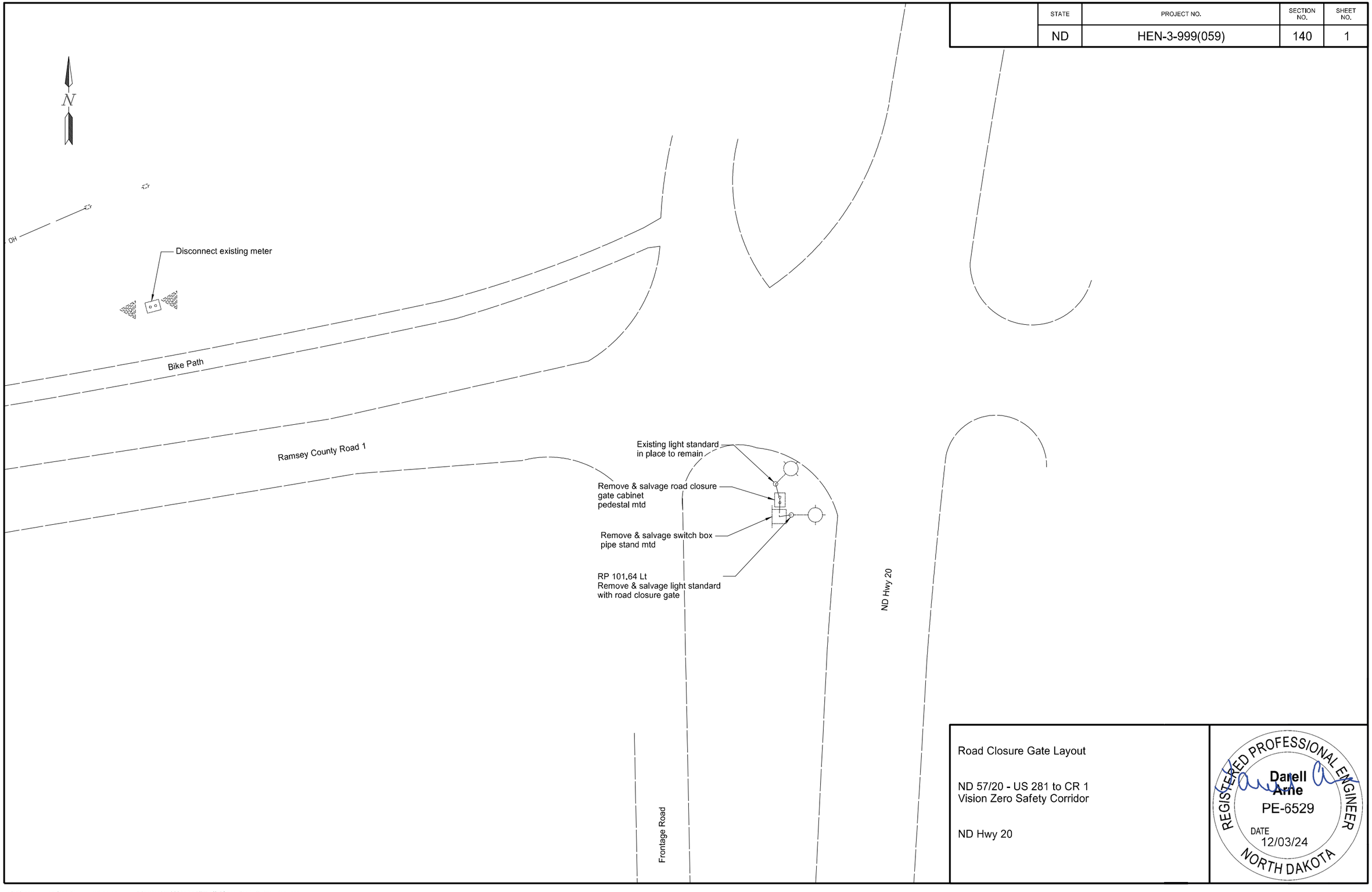

Road Closure Gate Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

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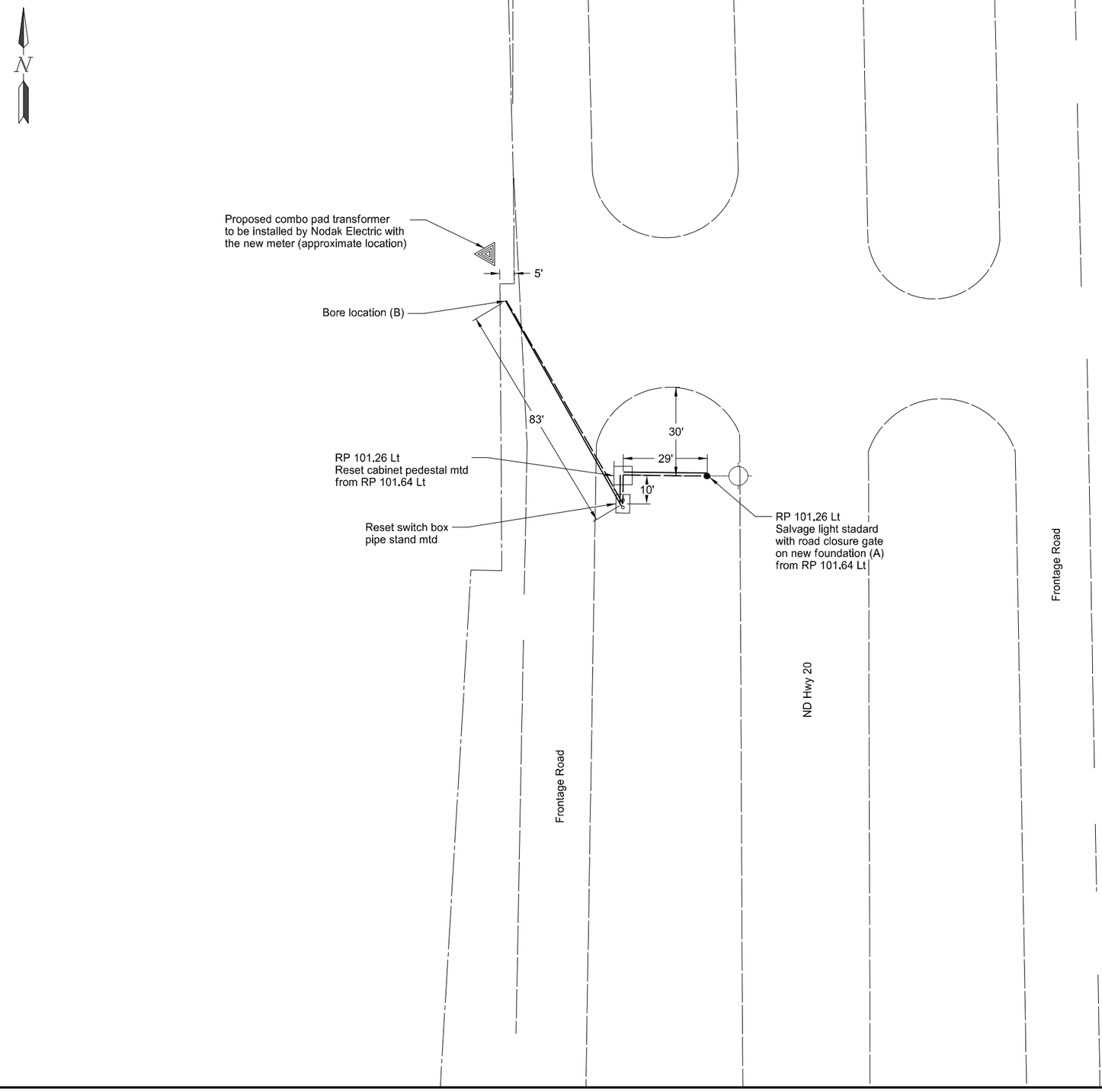
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	140	2

(A) Install the road closure gate foundation 22 ft from the edge of the driving lane.

(B) Bore to the approximate location shown within the right of way line. Coil 30 ft of extra conduit and conductor at this location. Nodak Electric Coop will make the final connection to the meter that will be located on their new combo unit.



Road Closure Gate Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	140	3

Road Closure Gate Quantities (A)		
Underground Conductor No 4 Type RHW	LF	246
Underground Conductor No 6 Type RHW	LF	146
Underground Conductor No 6 Type THW	LF	196
No 14 AWG 5 Conductor Cable	LF	69
2 Inch Diameter Conduit	LF	196
Reset Light Standard with Road Closure Gate System	EA	1
Concrete Foundation - Highway Lighting	EA	1
Reset Pedestal Mounted Cabinet on new concrete foundation	EA	1
Reset Switch Box Pipe Stand Mounted	EA	1
Feed Point Pipe Stand Mounted	EA	1
Seeding & Mulch	SY	40
Remove Road Closure Gate Foundation and Cabinet Foundation	EA	1

SPEC	CODE	BID ITEM	QTY	UNIT
980	0800	Relocate Road Closure Gate	1	EA

(A) Include these quantities in the price bid for the item "Relocate Road Closure Gate"

Road Closure Gate - Cable & Conduit Chart				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
Light Std with Gate to Cabinet	43	2	69 86 43	No 14 AWG 5 (2) No 6 RHW (1) No 6 THW
Cabinet to Switch Box	30	2	60 30	(2) No 6 RHW (1) No 6 THW
Switch Box to bore location	123	2	246 123	(2) No 4 RHW (1) No 6 THW

Road Closure Gate Quantities

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 20

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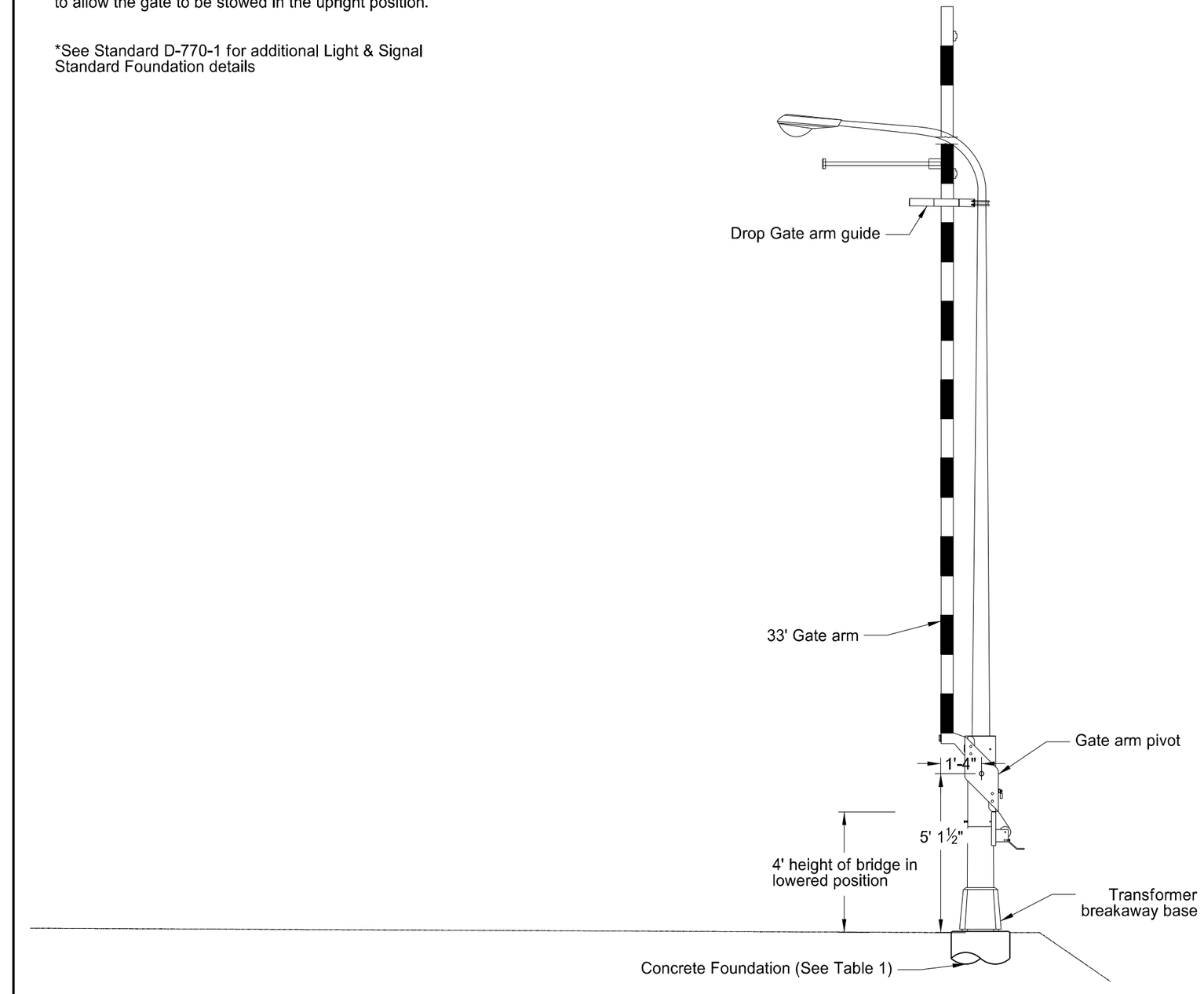
PE-6529
DATE 12/03/24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	140	4

NOTES:
When mounting the Road closure gate on the light standard, the luminaire arm will be rotated slightly to allow the gate to be stowed in the upright position.

*See Standard D-770-1 for additional Light & Signal Standard Foundation details



ROAD CLOSURE GATE ASSEMBLY

TABLE 1	
Concrete Foundation*	
Depth	Diameter
6'	24" or 30"
5'	36" or 42"

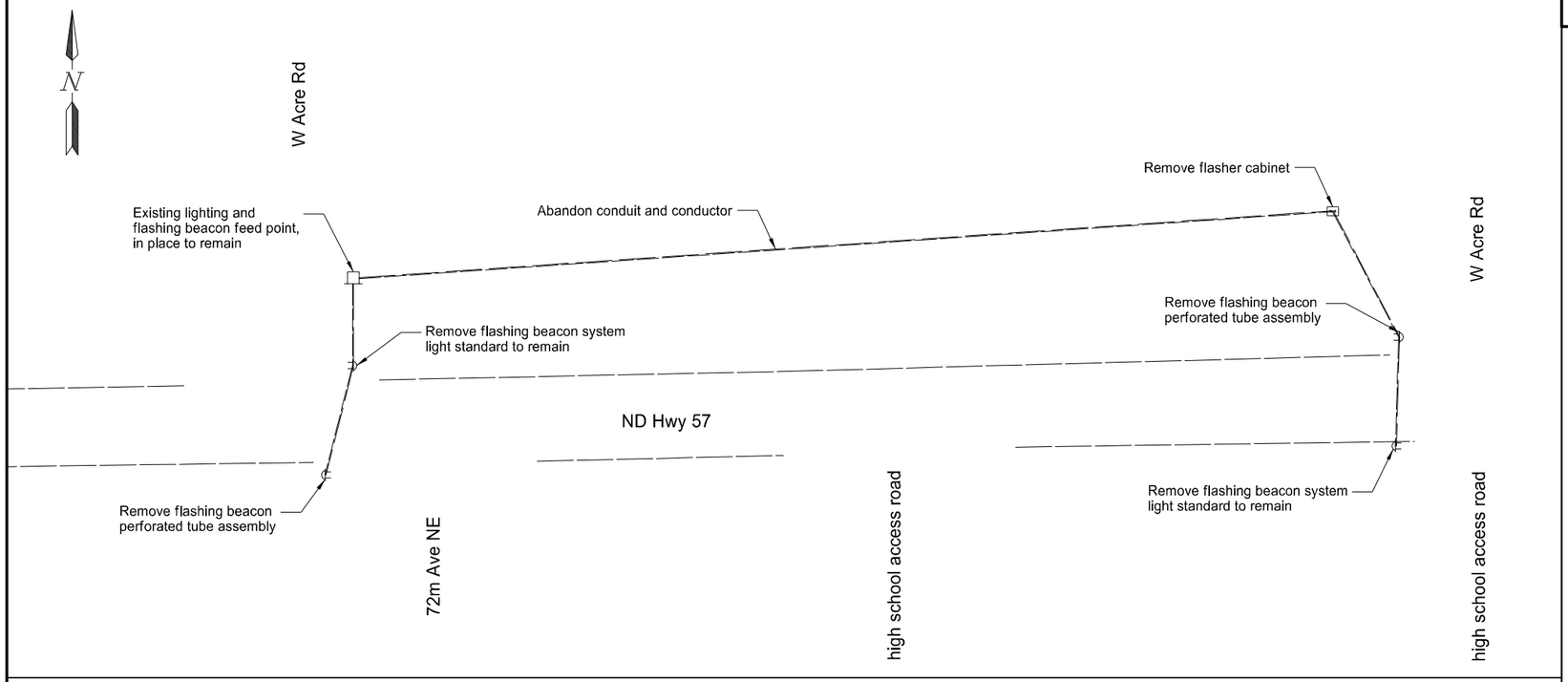
Reset Existing Light Standard with Road Closure Gate

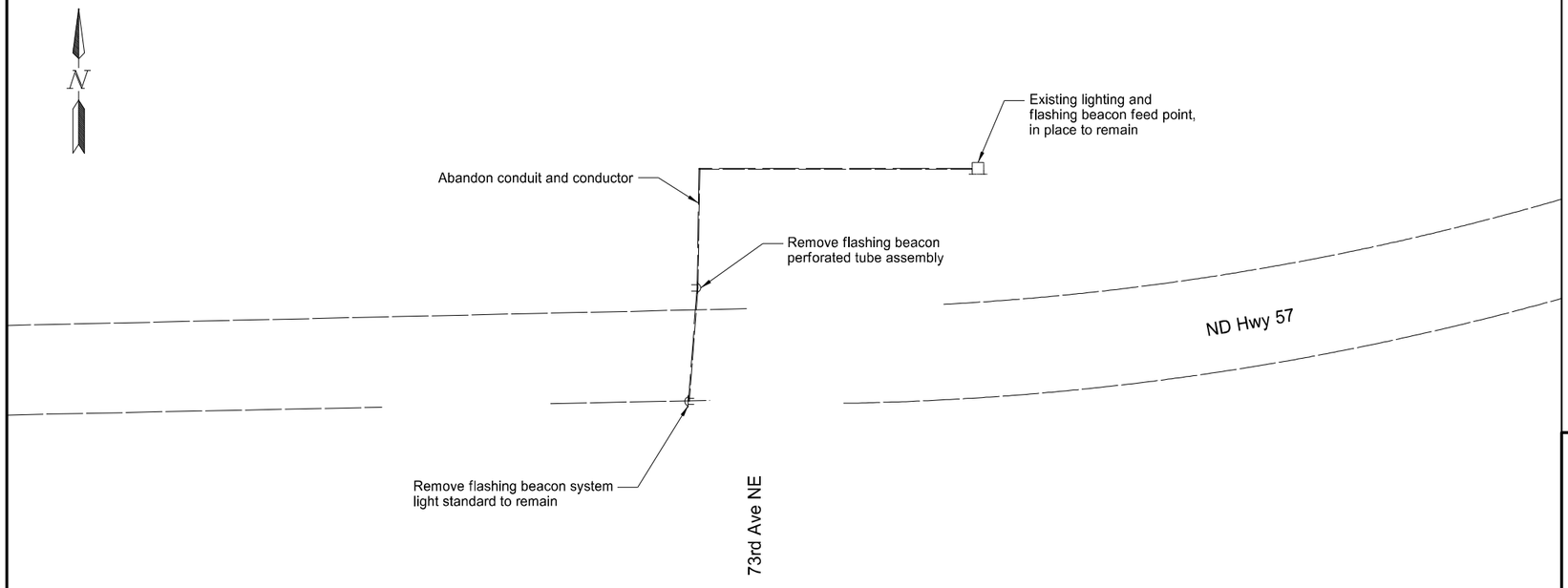
ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 20

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	150	1





Flashing Beacon Removal Layouts

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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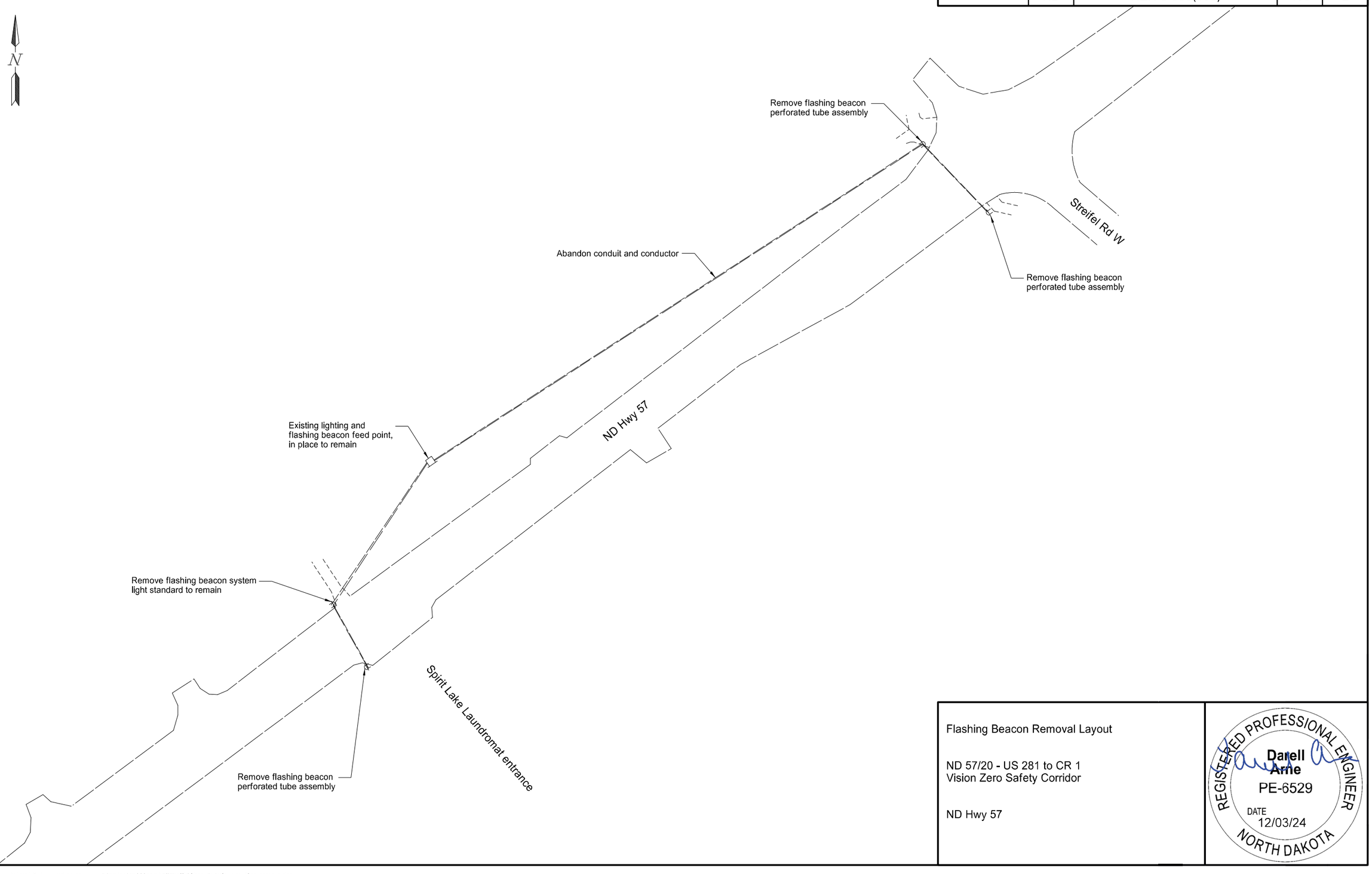

Flashing Beacon Removal Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	150	3

Removal Quantities (A)		
Remove flashing beacon head, and push button from light standard	EA	4
Remove flashing beacon head, steel conduit, push button, and perforated tube supports	EA	6
Remove flasher cabinet and supports	EA	1

SPEC CODE	BID ITEM	QTY	UNIT
772 3150	Remove Flashing Beacon System	1	EA

(A) Include these quantities in the price bid for the item "Remove Flashing Beacon System."

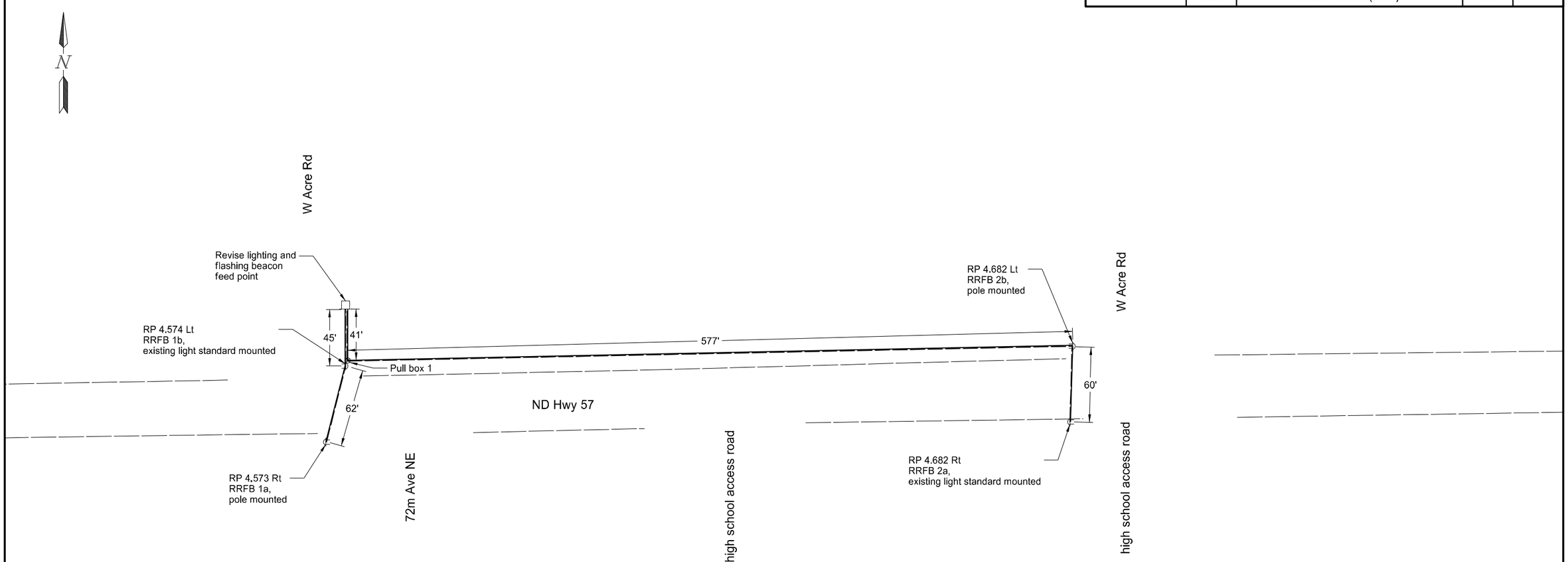
Flashing Beacon Removal Quantities

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	150	4



RRFB Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 12/03/24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	150	5

RRFB 1 Quantities (A)		
Pull Box	EA	1
Underground Conductor No 6 Type RHW	LF	118
Underground Conductor No 6 Type THW	LF	59
No 14 AWG 7 Conductor Cable	LF	178
2 Inch Diameter Conduit	LF	66
Rectangular Rapid Flashing Beacon assembly-light standard mounted	EA	2
Rectangular Rapid Flashing Beacon assembly-post mounted	EA	2
APS Pushbutton Assembly	EA	2
Post Type II with concrete foundation	EA	1
RRFB cabinet post mounted	EA	1
Seeding & Mulch	SY	10
Revise lighting and flashing beacon feed point	EA	1

RRFB 1 Cable & Conduit Chart				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
RRFB 1a Pole Mtd to RRFB 1b Lt Std Mtd	66	2	130	No 14 AWG 7
RRFB 1b Lt Std Mtd to RRFB 1b Jct Box			48	No 14 AWG 7
RRFB 1b Jct Box to Existing ltg & FB Feed Point	57	2	118 59	(2) No 6 RHW (1) No 6 THW

SPEC	CODE	BID ITEM	QTY	UNIT
772	2110	Flashing Beacon - Post Mounted	2	EA

(A) Include these quantities in the price bid for the item "Flashing Beacon - Post Mounted".

RRFB 2 Quantities (A)		
Pull Box	EA	1
Underground Conductor No 6 Type RHW	LF	1284
Underground Conductor No 6 Type THW	LF	642
No 14 AWG 7 Conductor Cable	LF	160
2 Inch Diameter Conduit	LF	698
Rectangular Rapid Flashing Beacon assembly-light standard mounted	EA	2
Rectangular Rapid Flashing Beacon assembly-post mounted	EA	2
APS Pushbutton Assembly	EA	2
Post Type II with concrete foundation	EA	1
RRFB cabinet post mounted	EA	1
Seeding & Mulch	SY	150
Revise flasher cabinet	EA	1

RRFB 2 Cable & Conduit Chart				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
RRFB 2a Pole Mtd to RRFB 2b Lt Std Mtd	64	2	112	No 14 AWG 7
RRFB 2b Lt Std Mtd to RRFB 2b Jct Box			48	No 14 AWG 7
RRFB 2b Jct Box to Pull box 1	581	2	1172 586	(2) No 6 RHW (1) No 6 THW
Pull box 1 to Existing ltg & FB Feed Point	53	2	112 56	(2) No 6 RHW (1) No 6 THW

RRFB Quantities

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

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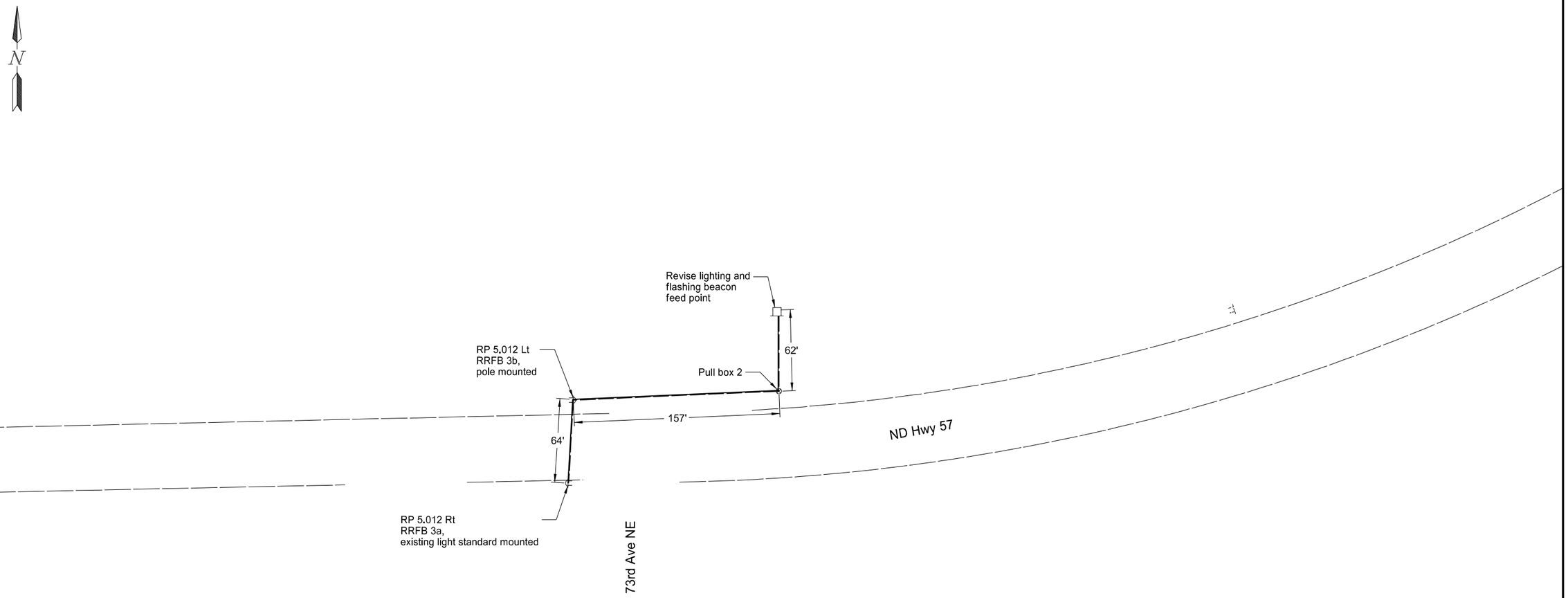
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	150	6



RRFB Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

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DATE 12/03/24
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	HEN-3-999(059)	150	7

RRFB 3 Quantities (A)		
Pull Box	EA	1
Underground Conductor No 6 Type RHW	LF	482
Underground Conductor No 6 Type THW	LF	241
No 14 AWG 7 Conductor Cable	LF	160
2 Inch Diameter Conduit	LF	301
Rectangular Rapid Flashing Beacon assembly-light standard mounted	EA	2
Rectangular Rapid Flashing Beacon assembly-post mounted	EA	2
APS Pushbutton Assembly	EA	2
Post Type II with concrete foundation	EA	1
RRFB cabinet post mounted	EA	1
Seeding & Mulch	SY	55
Revise lighting and flashing beacon feed point	EA	1

SPEC	CODE	BID ITEM	QTY	UNIT
772	2110	Flashing Beacon - Post Mounted	1	EA

(A) Include these quantities in the price bid for the item "Flashing Beacon - Post Mounted".

RRFB 3 Cable & Conduit Chart				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
RRFB 3a Lt Std Mtd to RRFB 3b Pole Mtd	68	2	112	No 14 AWG 7
RRFB 3b Pole Mtd to RRFB 3b Jct Box			48	No 14 AWG 7
RRFB 3b Jct Box to Pull box 2	161	2	162 166	(2) No 6 RHW (1) No 6 THW
Pull box 2 to Existing ltg & FB Feed Point	72	2	150 75	(2) No 6 RHW (1) No 6 THW

RRFB Quantities

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

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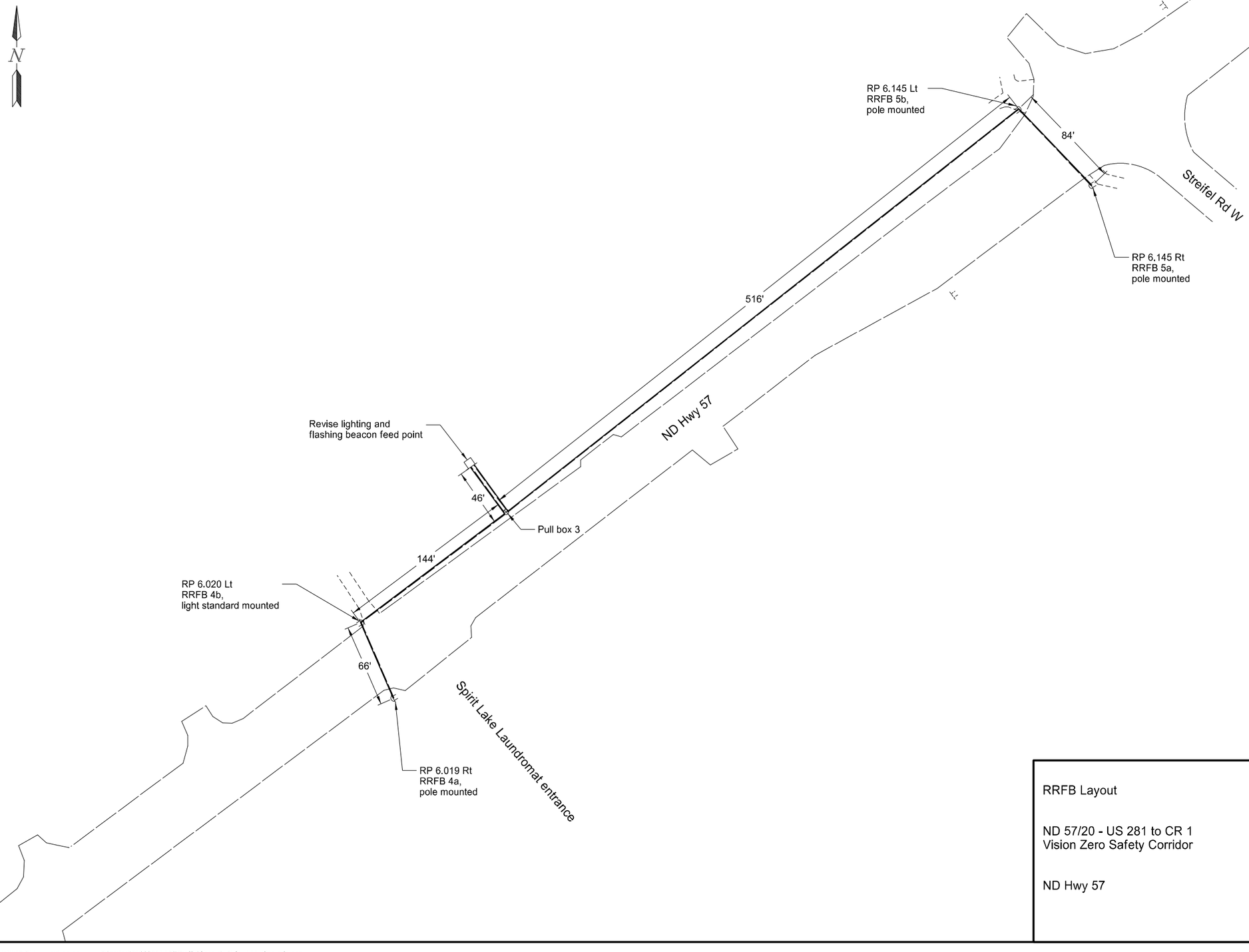
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	150	8



RRFB Layout

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	150	9

SPEC	CODE	BID ITEM	QTY	UNIT
772	2110	Flashing Beacon - Post Mounted	2	EA

(A) Include these quantities in the price bid for the item "Flashing Beacon - Post Mounted".

RRFB 4 Quantities (A)		
Pull Box	EA	1
Underground Conductor No 6 Type RHW	LF	428
Underground Conductor No 6 Type THW	LF	214
No 14 AWG 7 Conductor Cable	LF	162
2 Inch Diameter Conduit	LF	274
Rectangular Rapid Flashing Beacon assembly-light standard mounted	EA	2
Rectangular Rapid Flashing Beacon assembly-post mounted	EA	2
APS Pushbutton Assembly	EA	2
Post Type II with concrete foundation	EA	1
RRFB cabinet post mounted	EA	1
Seeding & Mulch	SY	50
Revise lighting and flashing beacon feed point	EA	1

RRFB 4 Cable & Conduit Chart				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
RRFB 4a Pole Mtd to RRFB 4b Lt Std Mtd	68	2	114	No 14 AWG 7
RRFB 4b Lt Std Mtd to RRFB 4b Jct Box			48	No 14 AWG 7
RRFB 4b Jct Box to Pull box 3	148	2	306 153	(2) No 6 RHW (1) No 6 THW
Pull box 3 to Existing ltg & FB Feed Point	58	2	122 61	(2) No 6 RHW (1) No 6 THW

RRFB 5 Quantities (A)		
Underground Conductor No 6 Type RHW	LF	1176
Underground Conductor No 6 Type THW	LF	588
No 14 AWG 7 Conductor Cable	LF	180
2 Inch Diameter Conduit	LF	666
Rectangular Rapid Flashing Beacon assembly-post mounted	EA	2
APS Pushbutton Assembly	EA	2
Post Type II with concrete foundation	EA	1
RRFB cabinet post mounted	EA	1
Seeding & Mulch	SY	120

RRFB 5 Cable & Conduit Chart				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
RRFB 5a Pole Mtd to RRFB 5b Pole Mtd	88	2	132	No 14 AWG 7
RRFB 5b Pole Mtd to RRFB 5b Jct Box			48	No 14 AWG 7
RRFB 5b Jct Box to Pull box 3	520	2	1054 527	(2) No 6 RHW (1) No 6 THW
Pull box 3 to Existing ltg & FB Feed Point	58	2	122 61	(2) No 6 RHW (1) No 6 THW

RRFB Quantities

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57

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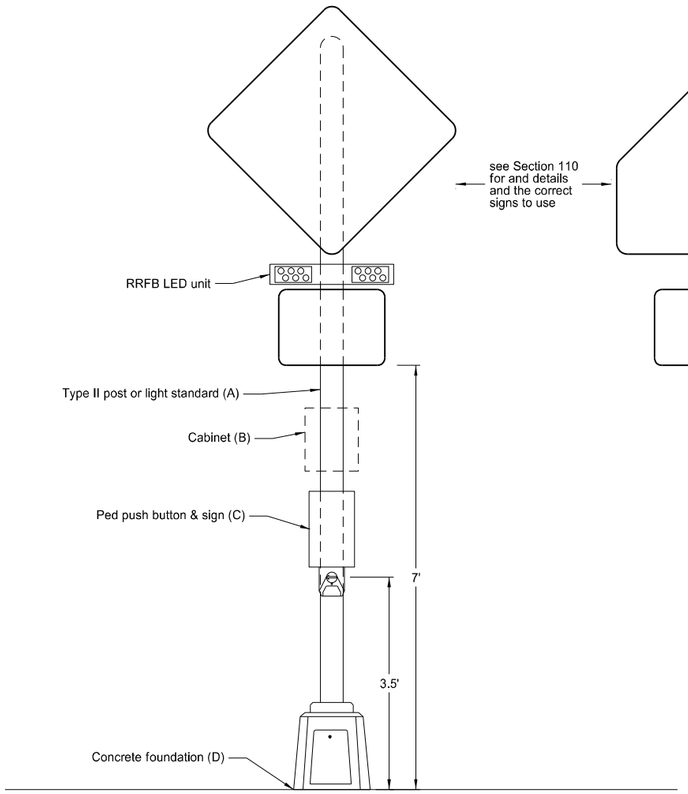
	ND	HEN-3-999(059)	150	10

(A) See standard drawing D-772-2 for details on the Type II post and installation details. See standard drawing D-754-80 for light standard mounting details.

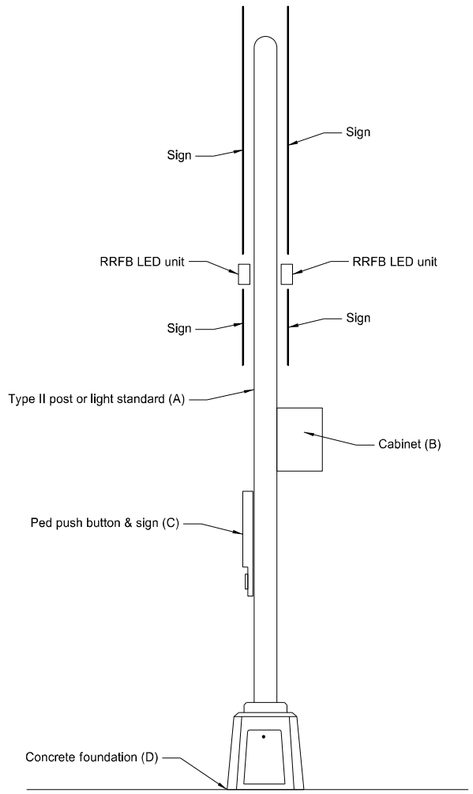
(B) Install the cabinet on the post opposite from the push button on the flashing beacon assembly that is closest to the feed point.

(C) The pushbutton and sign are to face the crosswalk.

(D) See standard drawing D-770-1 for post foundation details. Refer to the foundation size table below.



Front View
Post Mounted RRFB Assembly



Side View

Traffic Signal Foundation Table		
Type II Signal Standard		
Description	Footing Depth "D" 24" and 30" Dia	Footing Depth "D" 36" and 42" Dia
Signal Standard	4'	3'

RRFB Details

ND 57/20 - US 281 to CR 1
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ND Hwy 57

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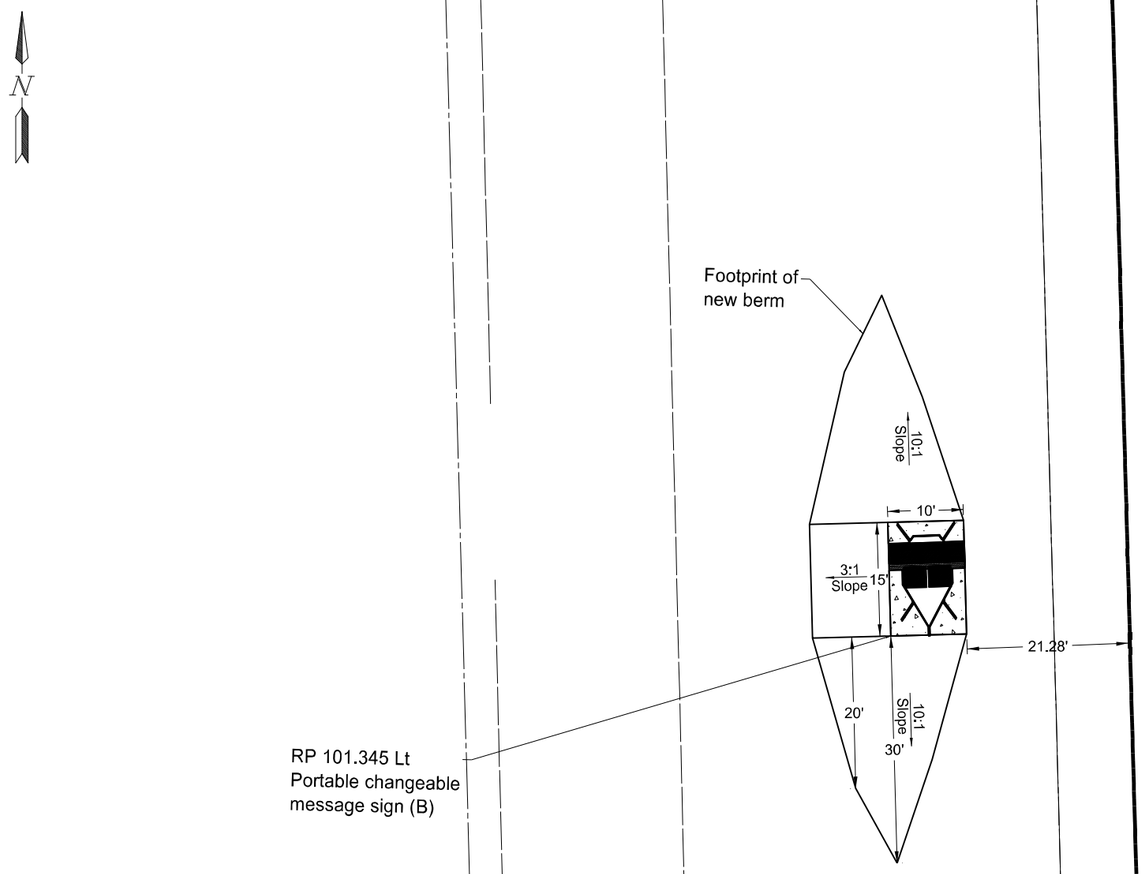
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	160	1

SPEC	CODE	BID ITEM	QTY	UNIT
754	8005	PORTABLE CHANGEABLE MESSAGE SIGN		
		RP 101.345 Lt	1	EA

Quantities (A)		
Borrow/Excavation Type C	CY	50
4" Concrete Slab	EA	1
Remove/Replace Topsoil	CY	12
Portable Changeable Message Sign Solar Powered	EA	1
Seeding & Mulch	SY	93

(A) Include these quantities in the price bid for item "Portable Changeable Message Sign."

(B) Install the CMS sign on the berm as shown.



Berm Details
Changeable Message Sign

ND 57/20 - US 281 to CR 1
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ND Hwy 20

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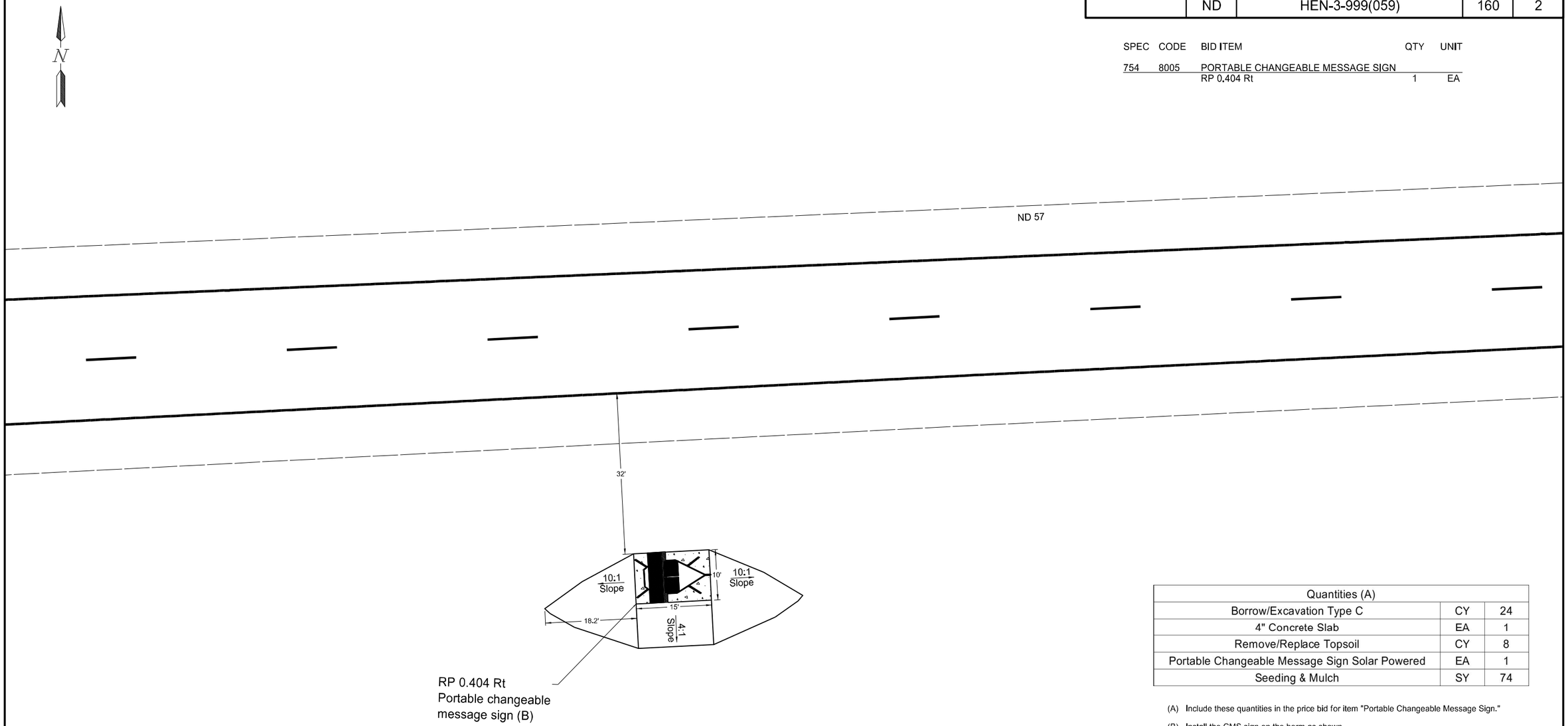
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	160	2

SPEC	CODE	BID ITEM	QTY	UNIT
754	8005	PORTABLE CHANGEABLE MESSAGE SIGN RP 0.404 Rt	1	EA



Quantities (A)		
Borrow/Excavation Type C	CY	24
4" Concrete Slab	EA	1
Remove/Replace Topsoil	CY	8
Portable Changeable Message Sign Solar Powered	EA	1
Seeding & Mulch	SY	74

(A) Include these quantities in the price bid for item "Portable Changeable Message Sign."

(B) Install the CMS sign on the berm as shown.

Berm Details
Changeable Message Sign

ND 57/20 - US 281 to CR 1
VIsion Zero Safety Corridor

ND Hwy 57

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DATE 12/03/24
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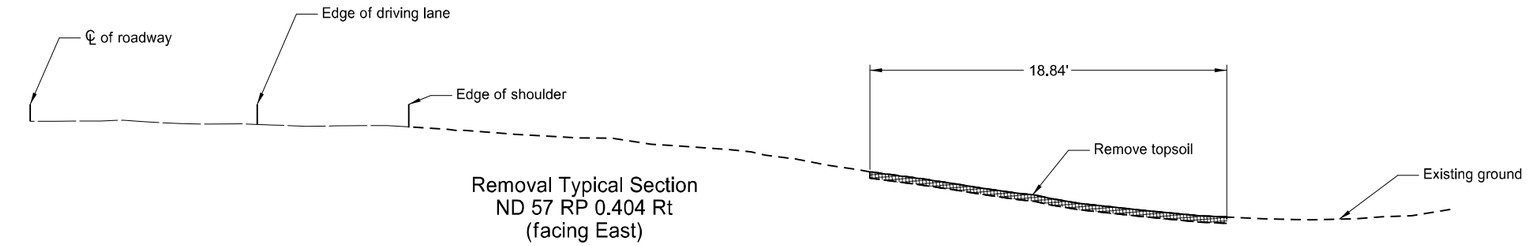
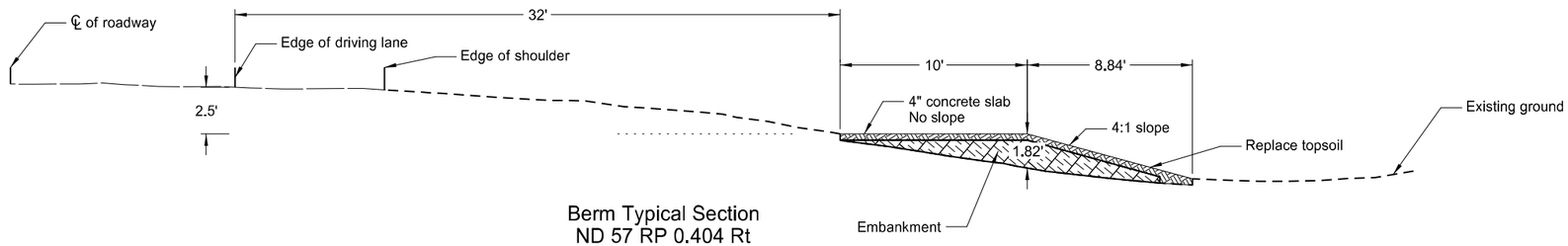
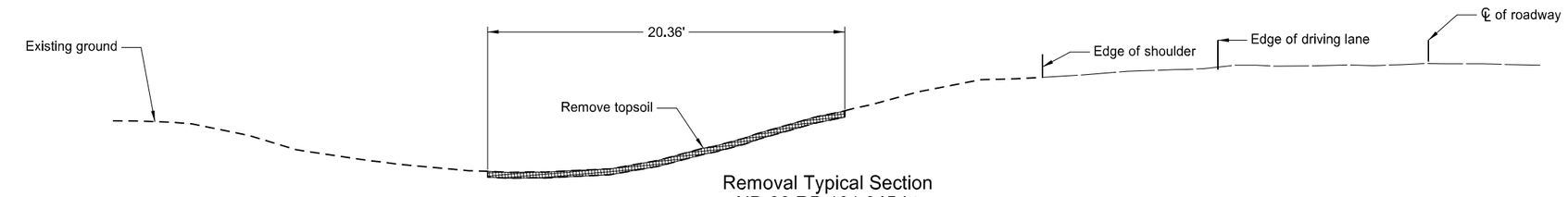
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	HEN-3-999(059)	160	3



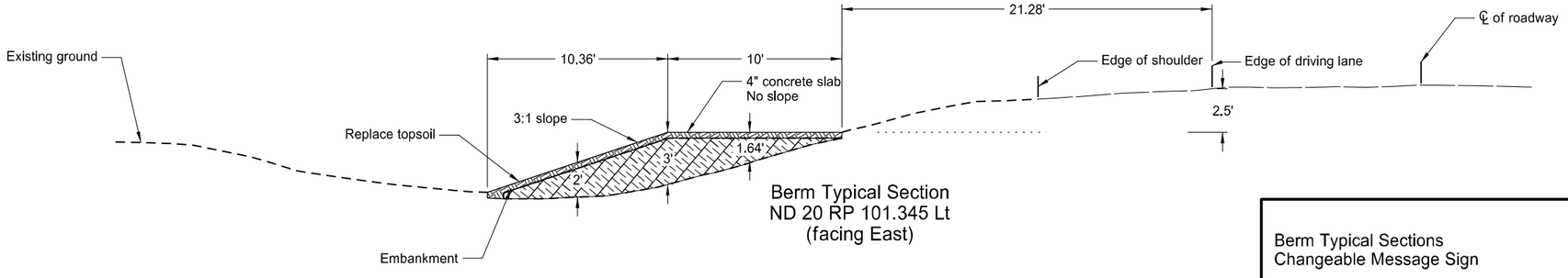
Removal Typical Section
ND 57 RP 0.404 Rt
(facing East)



Berm Typical Section
ND 57 RP 0.404 Rt
(facing East)



Removal Typical Section
ND 20 RP 101.345 Lt
(facing East)



Berm Typical Section
ND 20 RP 101.345 Lt
(facing East)

Berm Typical Sections
Changeable Message Sign

ND 57/20 - US 281 to CR 1
Vision Zero Safety Corridor

ND Hwy 57 & ND Hwy 20

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DATE 12/03/24
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NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Bk	back
BF	back face
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
BI	beehive inlet
Beg	begin
BG	below grade
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
BH	bore hole
Bot	bottom
Blvd	Boulevard
Bndry	boundary
Brkwy	breakaway
Br	bridge
Bldg	building
Bus.	business
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
CL or ℄	centerline
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
CECB	concrete erosion control blanket
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
Co	County
Crse	course
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	crossroad
Crn	crown
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia or ø	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
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
Fed	Federal
FP	feed point
Fn	fence
Fn P	fence post
FO	fiber optic
FD	field drive
F	fill
FAA	fine aggregate angularity
FH	fire hydrant
Fl	flange
Flrd	flared
FES	flared end section
F Bcn	flashing beacon
FA	flight auger sample
FL	flow line
Ftg	footing
FM	force main
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser
FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

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08/16/22

NDDOT ABBREVIATIONS

D-101-2

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
Gov	government
Grd	graded/grade
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ht	height
Hel	helical
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
HTCG	high tension cable guardrail
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IP	iron pipe
Jt	joint
Jct	junction
Ln	lane
Lg	large
Lat	latitude
Lt	left
Lens	lenses
Lvl	level
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Liq	liquid
LL	liquid limit
Loc	location
Long.	longitude
Lp	loop
LD	loop detector
Lum	luminaire
Mb	mailbox
ML	main line
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
MGS	Midwest Guardrail System
MM	mile marker
MP	mile post
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Neop	neoprene
Ntwk	network
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Ocpd	occupied
Ocpy	occupy
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
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
Perm	permanent
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl or ℄	plate
Pt	point
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd or Pref	preformed
Prep	preperation
Press.	pressure
PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box
Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
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
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
RCTES	reinforced concrete traversable end section
Reinf	reinforcement
Res	reservation
Res	residence
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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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08-03-15	General Revisions
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12-18-20	General Revisions
08-16-22	General Revisions

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08/16/22

Salv	salvage(d)
San	sanitary sewer line
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw or Sdwk	sidewalk
SD	sight distance
SN	sign number
Sig	signal
Sgl	single
SRCP	slotted reinforced concrete pipe
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
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
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
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical

Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	thinwall tube sample
Ts	topsoil
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
Trans	transition
TT	transmission tower
TES	traversable end section
Trans	transverse
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VCP	vitrified clay pipe
Vol	volume
VSFS	vehicle speed feedback sign
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
Wrng	wearing
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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08-03-15	General Revisions
04-23-18	General Revisions
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08-16-22	General Revisions

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NDDOT ABBREVIATIONS

MEASUREMENTS

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

SURVEY DESCRIPTIONS

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

SOIL TYPES

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
07-01-14

REVISIONS

DATE	CHANGE
12-18-20	Sheet Added - Continued from D-101-3

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
AGC	Assiociated General Contractors of America
ALL PL	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BAKER ELEC	Baker Electric
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway
BOEING	Boeing
BRNS RWD	Barnes Rural Water District
BURK-DIV ELEC	Burke-Divide Electric Cooperative
BURL WU	Burleigh Water Users
CABLE ONE	Cable One
CABLE SERV	Cable Services
CAP ELEC	Capital Electric Cooperative Incorporat
CASS CO ELEC	Cass County Electric Cooperative
CASS RWU	Cass Rural Water Users Incorporated
CAV ELEC	Cavalier Rural Electric Cooperative
CBLCOM	Cablecom Of Fargo
CENEX PL	Cenex Pipeline
CENT PL WATER DIST	Central Pipe Line Water District
CENT PWR ELEC	Central Power Electric Cooperative
CENTURYLINK	CenturyLink
COE	Corps of Engineers
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
ENVENTIS	Enventis Telephone
EQUINOR	Equinor Pipeline
FALK MNG	Falkirk Mining Company
FHWA	Federal Highway Administration
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GTR RAMSEY WD	Greater Ramsey Water District
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
IDEA1	Idea1
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
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
MIDCO	MidContinent Communications
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS VALL COMM	Missouri Valley Communications
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
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
NWRWD	Northwest Rural Water District
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
PAAP	Plains All American Pipeline
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RED RIV COMM	Red River Rural Communications
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Cooperative
RRVW	Red River Valley & Western Railroad
S CENT REG WD	South Central Regional Water District
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STER ENG	Sterling Energy
STUT RWU	Stutsman Rural Water Users
SW PL PRJ	Southwest Pipeline Project
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TESORO 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
WAPA	Western Area Power Administration
WAWSA	Western Area Water Supply Authority
WEB	W. E. B. Water Development Association
WILLI RWA	Williams Rural Water Association
WILSTN BAS PL	Williston Basin Interstate Pipeline Company
WLSH RWD	Walsh Water Rural Water District
WOLVRTN TEL	Wolverton Telephone
XLENER	Xcel Energy
YSVR	Yellowstone Valley Railroad

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

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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
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

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

Traffic Utilities

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

Sign Structures

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

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

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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

Countours

- Failure Line
- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- 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	
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SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

Right of Way Marker (Exst, Ppsd, Reset)

Existing Federal Reference Corner

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

Existing Witness Corner

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

Existing Traverse PI Aerial Panel

Existing Reference Marker Point NGS

Existing EFB Misc

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	General Revisions

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SYMBOLS

D-101-31

- Flexible Delineator
- Flexible Delineator Type A (Exst, Ppsd)
- Flexible Delineator Type B (Exst, Ppsd)
- Flexible Delineator Type C (Exst, Ppsd)
- Flexible Delineator Type D (Exst, Ppsd)
- Flexible Delineator Type E (Exst, Ppsd)
- Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type C (Exst, Ppsd, Diamond Grade)
- Delineator Type D (Exst, Ppsd, Diamond Grade)
- Delineator Type E (Exst, Ppsd, Diamond Grade)
- Barricade (Type I, Type II, Type III}
- Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)
- Attenuation Device
- Truck Mounted Attenuator
- Delineator Drums
- Flagger
- Tubular Marker
- Traffic Cone
- Back to Back Vertical Panel Sign

- Highway Sign (Exst, Ppsd)
- Mile Post Type A (Exst-Ppsd-Reset)
- Mile Post Type B (Exst, Ppsd)
- Mile Post Type C (Exst, Ppsd)
- Object Marker Type I (Exst, Ppsd)
- Object Marker Type II (Exst, Ppsd)
- Object Marker Type III (Exst, Ppsd)
- Existing Reference Marker
- Road Closure Gate 18 Ft (Exst, Ppsd)
- Road Closure Gate 28 Ft (Exst, Ppsd)
- Road Closure Gate 40 Ft (Exst, Ppsd)
- Existing Railroad Battery Box
- Existing RR Profile Spot
- Existing Railroad Crossbuck
- Existing Railroad Frog
- Existing Mailbox (Private, Federal)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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SYMBOLS

D-101-32

- Existing Luminaire
- Luminaire LED
- Existing Light Standard Luminaire
- Relocate Light Standard
- Light Standard Light LED Luminaire
- Light Standard 35 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 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 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 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Emergency Vehicle Detector
- Video Detection Camera

- High Mast Light Standard 3 Luminaire (Exst, Ppsd)
- High Mast Light Standard 4 Luminaire (Exst, Ppsd)
- High Mast Light Standard 5 Luminaire (Exst, Ppsd)
- High Mast Light Standard 6 Luminaire (Exst, Ppsd)
- High Mast Light Standard 7 Luminaire (Exst, Ppsd)
- High Mast Light Standard 8 Luminaire (Exst, Ppsd)
- High Mast Light Standard 9 Luminaire (Exst, Ppsd)
- High Mast Light Standard 10 Luminaire (Exst, Ppsd)
- Overhead Sign Structure Load Center (Exst, Ppsd)
- Traffic Signal Controller (Exst, Ppsd)
- Pad Mounted Traffic Signal Controller (Exst, Ppsd)
- Flashing Beacon (Exst, Ppsd)
- Concrete Foundation (Exst, Ppsd)
- Pipe Mounted Flasher (Exst, Ppsd)
- Pad Mounted Feed Point (Exst, Ppsd)
- Pipe Mounted Feed Point with Pad (Exst, Ppsd)
- Pole Mounted Feed Point (Exst, Ppsd)
- Junction Box (Exst, Ppsd)
- Existing Pedestrian Head with Number
- Existing Signal Head
- Pole Mounted Head
- Existing Lighting Standard Pole

- Existing Traffic Signal Standard
- Pull Box (Exst-Ppsd-Undefined)
- Intelligent Transportation Pull Box (Exst, Ppsd)
- Transformer (Exst, Ppsd)
- Power Pole (Exst-Ppsd-with Transformer)
- Wood Pole (Exst, Ppsd)
- Pedestrian Push Button Post (Exst, Ppsd)
- Existing Pole
- Existing Telephone Pole
- Existing Post
- Connection Conductor (Ground, Neutral, Phase 1, Phase 2)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	General Revisions

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SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)

Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)

Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)

Force Main Storm Drain Manhole (Exst, Exst with Valve)

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

Existing Curb Inlet (Round, Square)

Existing Slotted Reinforced Concrete Pipe

Catch Basin (Riser 30 Inch, Beehive, Type A)

Inlet Mountable Curb (Type A, Type B)

Inlet Saddle Base (Type 1, Type 2)

Inlet Special (Catch Basin, Type 1, Type A)

Inlet (Tee, Type 1, Type 2, Type 2 Double)

Median Drain

Headwall (Exst, Ppsd, Ppsd Single with Vegitation Barrier,
Ppsd Double with Vegitation Barrier)

Cap or Stub
Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water

Existing Pedestal
Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined

Existing Pipe Vent
Gas, Fuel, Sanitary, Storm Drain, Water, Undefined

Valve
Exst Gas, Exst Water, Ppsd Water, Exst Undefined

Pump
Sanitary, Storm Drain, Exst Water

Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

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

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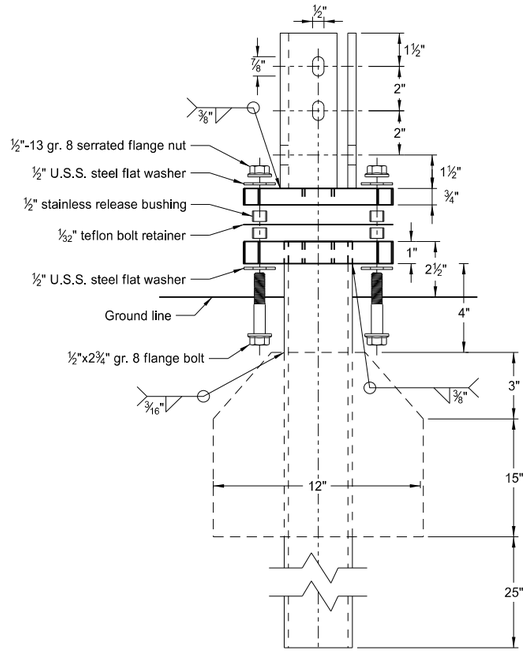
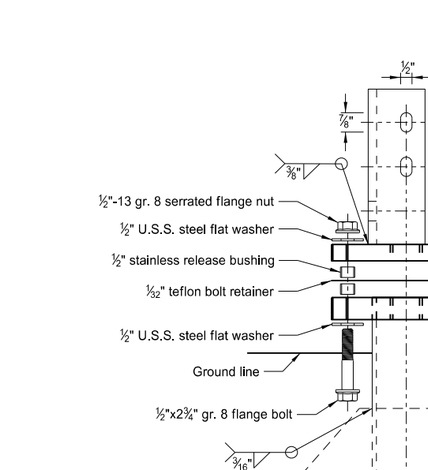
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

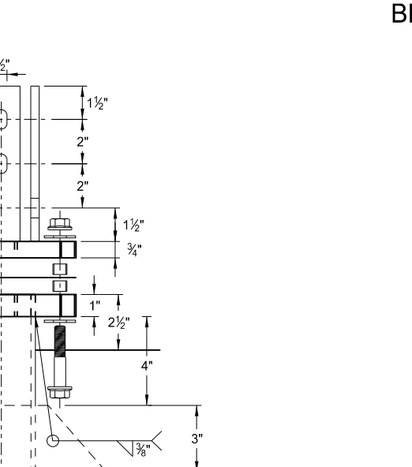
D-704-7



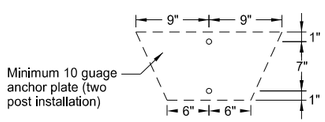
Multi-Directional
Slip Base Assembly



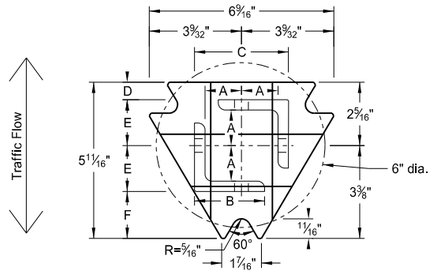
Anchor Unit and Post Assembly



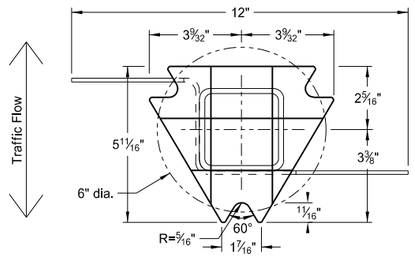
Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



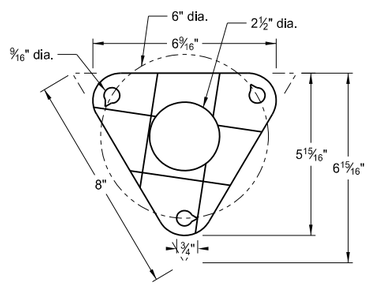
Perforated Tube



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



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

Notes:

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

Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall 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) Use breakaway base when support is placed in weak soils. Engineer determines if soils are weak.

(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.

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

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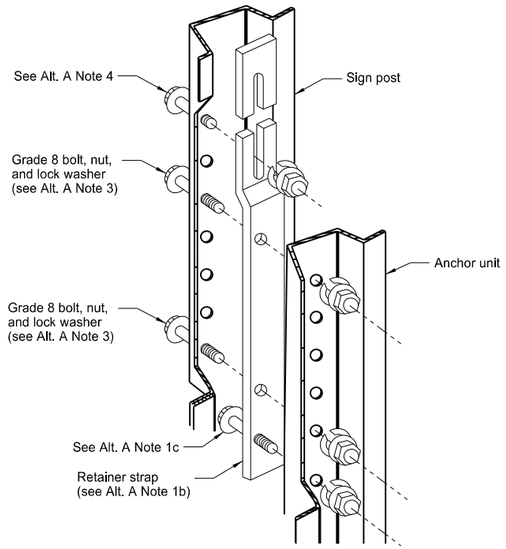
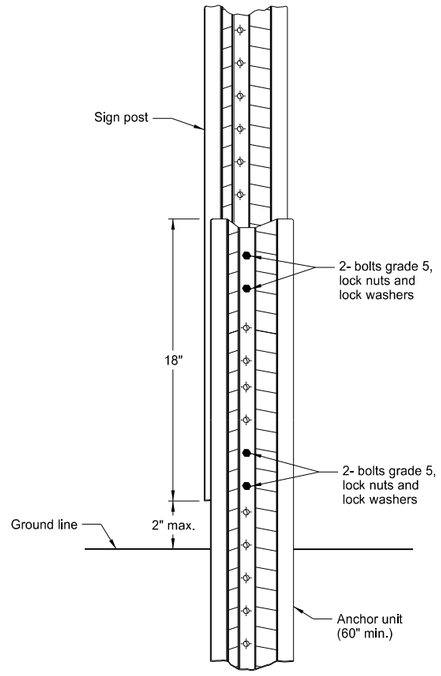
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

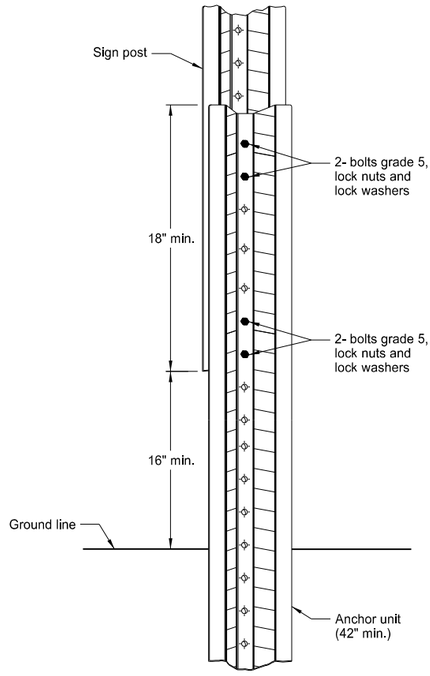


Detail A



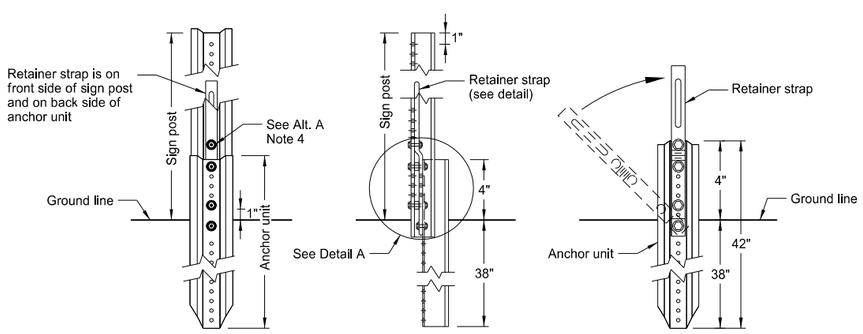
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

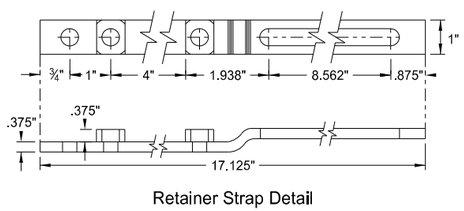
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

1. a) Drive anchor unit to within 12" of ground level.
   b) Establish proper assembly by lining up bottom hole of retainer strap with 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. Properly nest base post, strap, and sign post. Proper nesting occurs when all flat surfaces of the base post, strap, and sign post at the bolts have full contact across the entire width.

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

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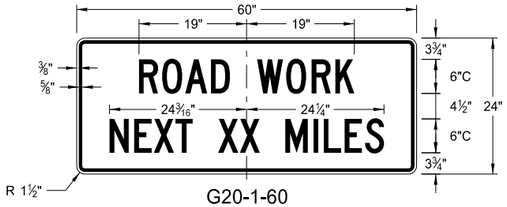
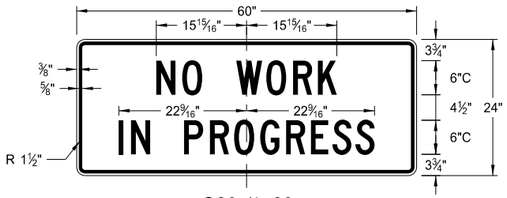
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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



G20-1b-60
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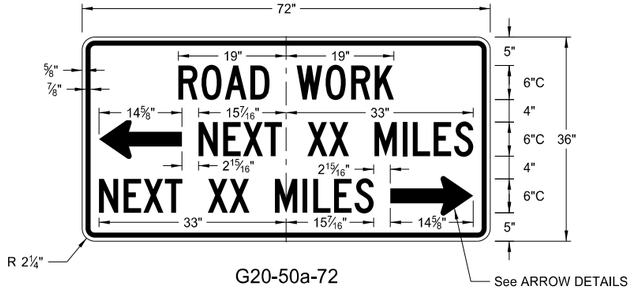
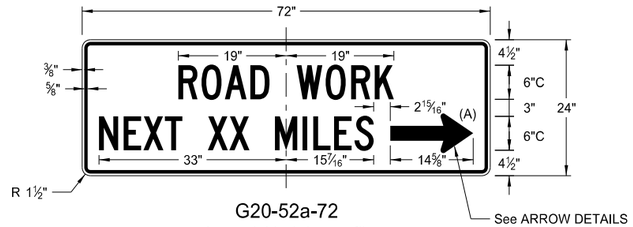
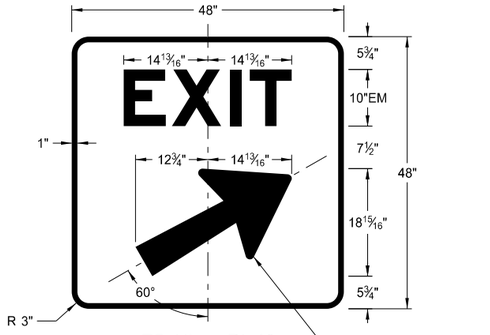
Background: orange



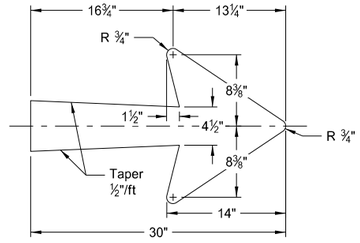
G20-50a-72
Legend: black (non-refl)
Background: orange



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



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



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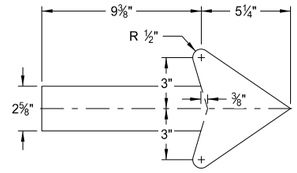
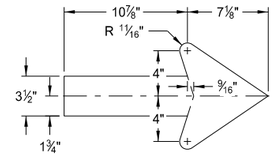
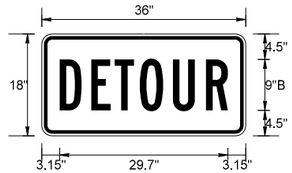


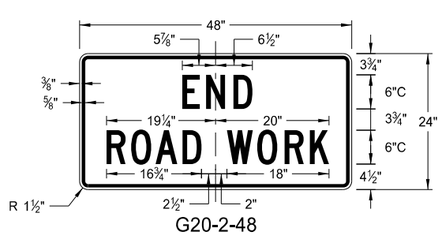
G20-50a-72
G20-52a-72



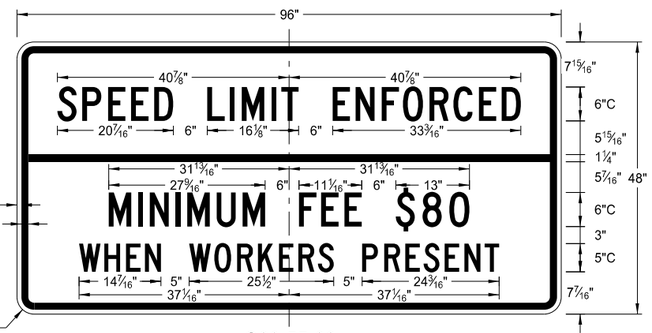
M4-9(L or R)-30
Right or Left



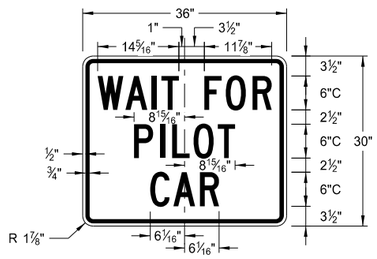
M4-8-36
Legend: black (non-refl)
Background: orange



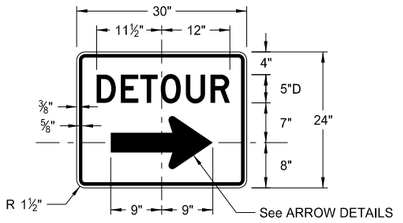
G20-2-48
Legend: black (non-refl)
Background: orange



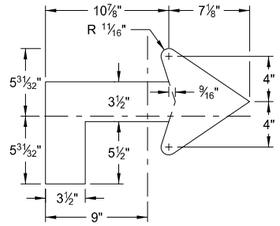
G20-55-96
Legend: black (non-refl)
Background: orange



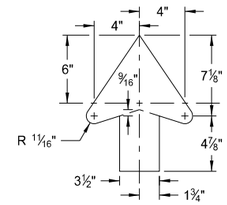
G20-4b-36
Legend: black (non-refl)
Background: orange



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



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



M4-9-30
Straight

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 10-03-19	Added sign & background color New Design Engineer PE Stamp

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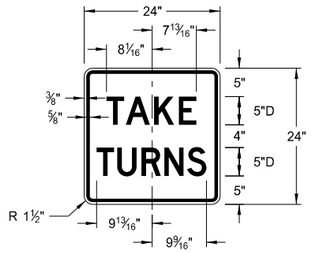
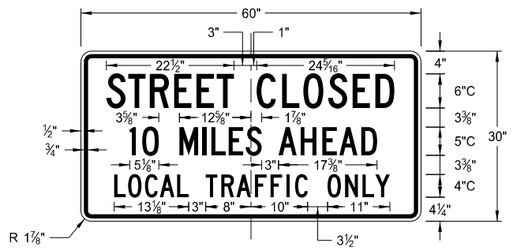
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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



R11-3c-60
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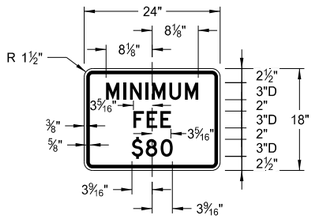
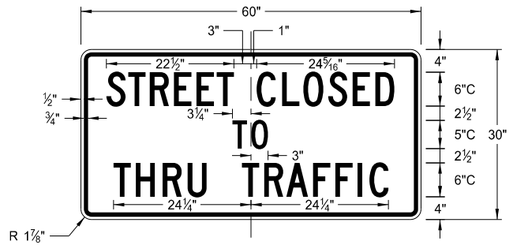
Background: white



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



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

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

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

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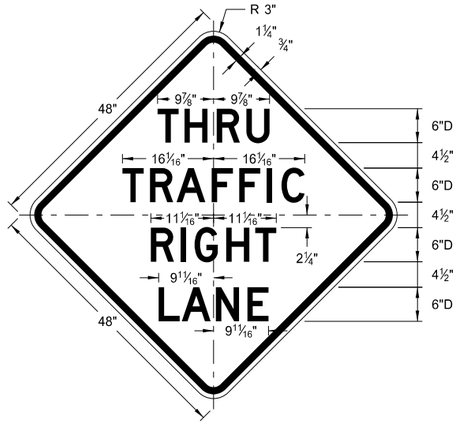
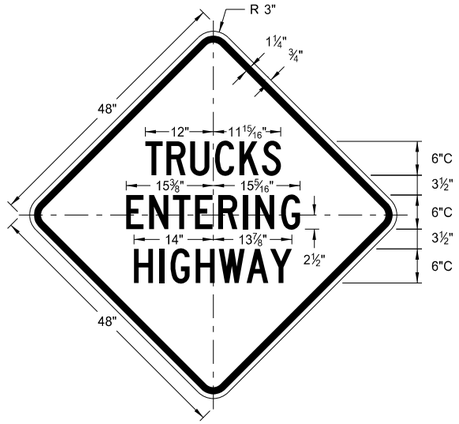
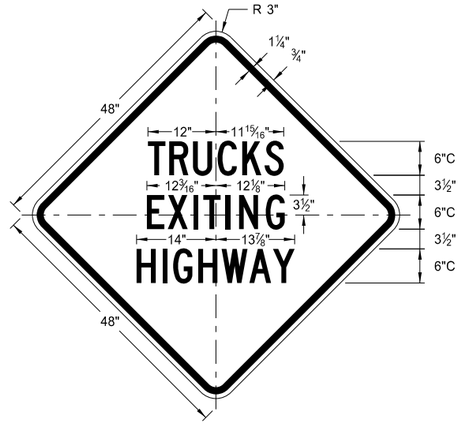
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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



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



W8-56-48
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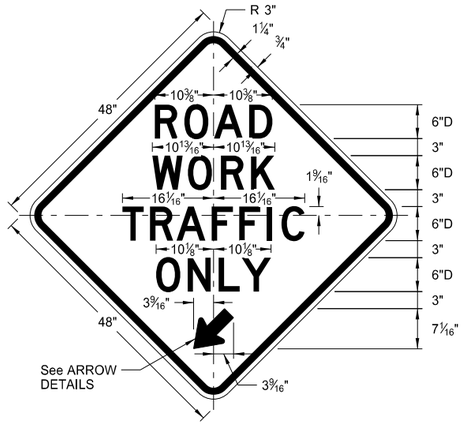
Background: orange



W5-9-48
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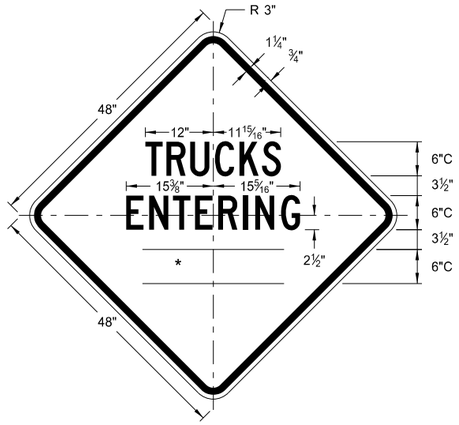
Background: orange



W8-54-48
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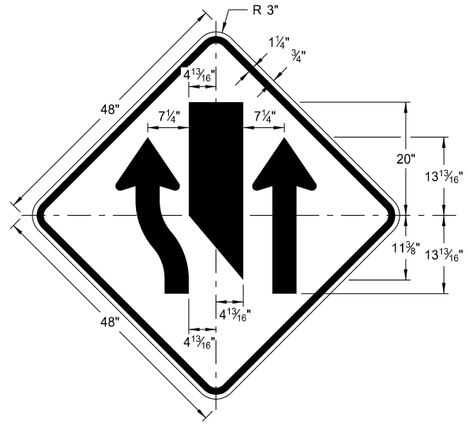
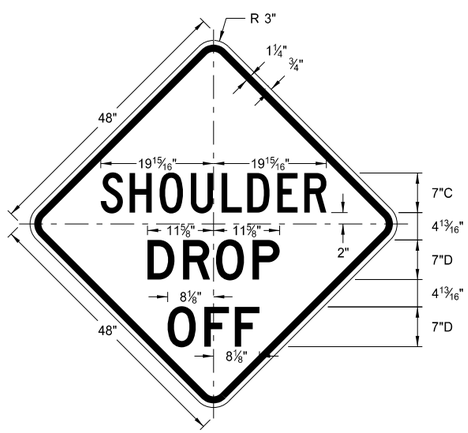
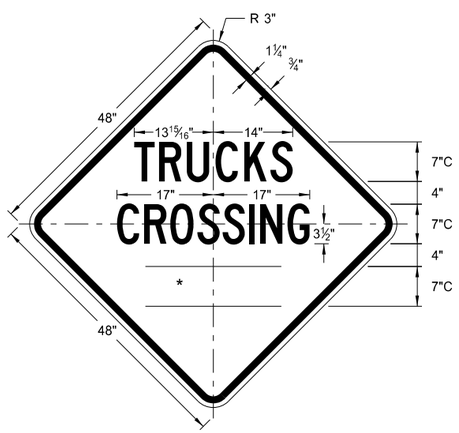
Background: orange



W9-3a-48
Legend: black (non-refl)
Background: orange



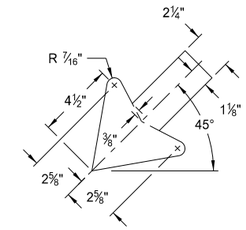
W8-9a-48
Legend: black (non-refl)
Background: orange



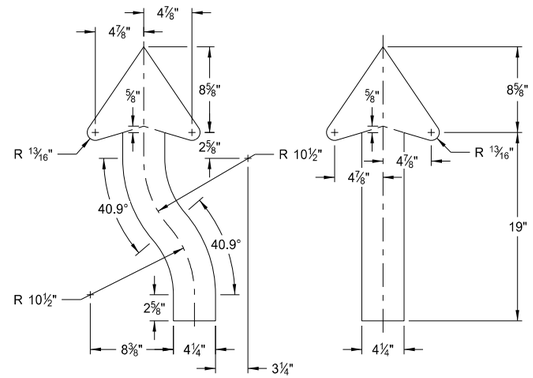
W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

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

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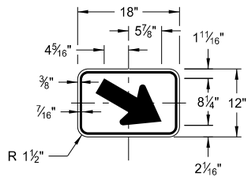
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W16-7aP-18
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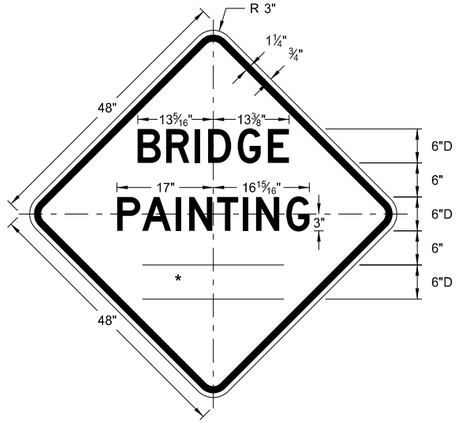
Background: orange



W21-50-48
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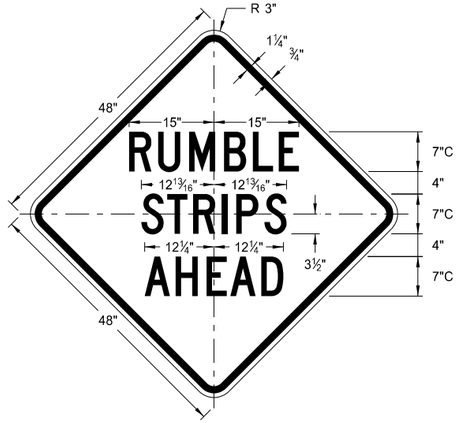
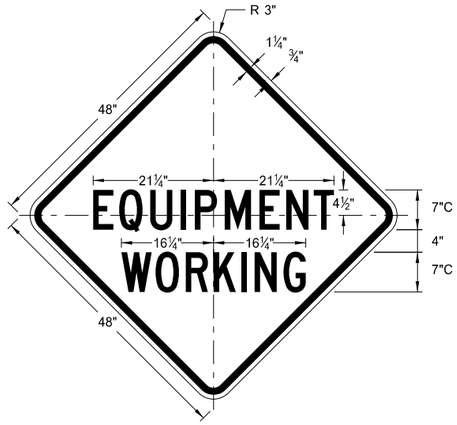
Background: orange



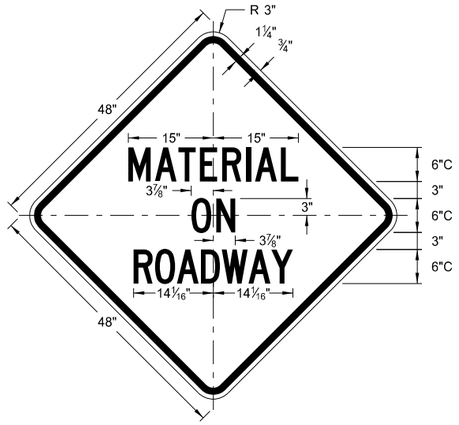
W21-53-48
Legend: black (non-refl)
Background: orange

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



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



W21-51-48
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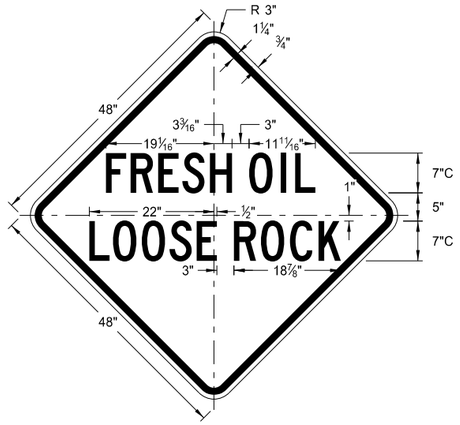
Background: orange



W22-8-48
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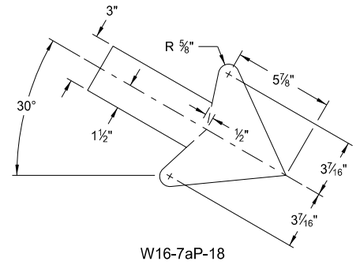
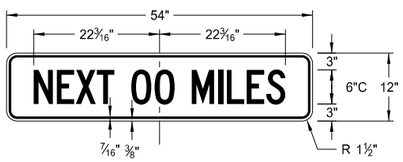
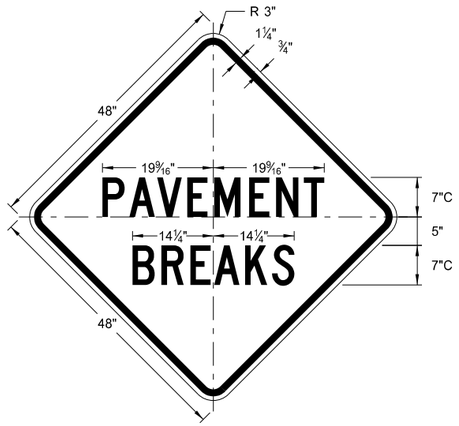
Background: orange



W16-7aP-18



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



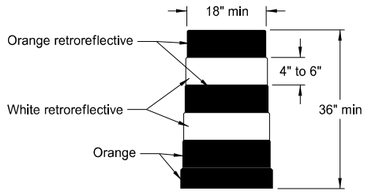
W21-52-48
Legend: black (non-refl)
Background: orange

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

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

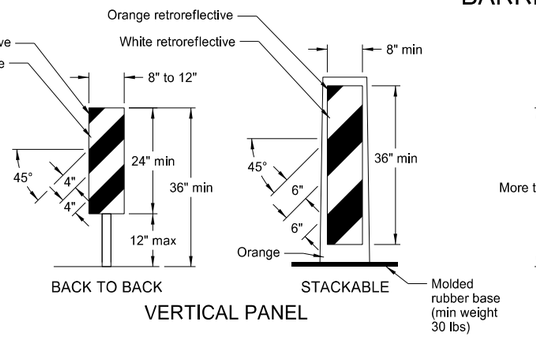
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



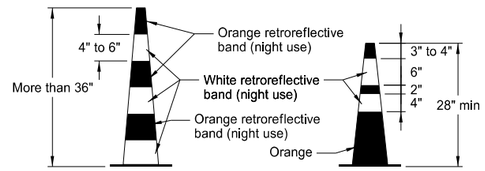
DELINEATOR DRUM

Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectorized spaces between the horizontal orange and white stripes. Avoid placement of stripes on drum ribs or indentations. Use closed top drums that will not allow collection of debris. Do not place ballast on the top of drum.



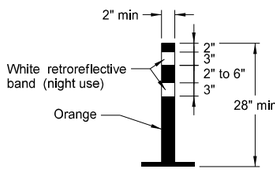
VERTICAL PANEL

Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with 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, use a stripe width of 6 inches.



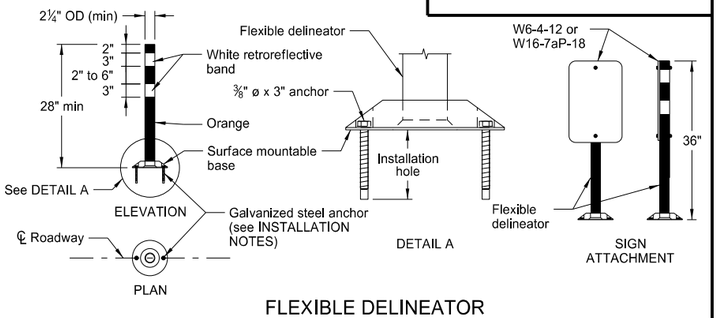
TRAFFIC CONE

Provide retroreflectorization of cones more than 36" in height by alternating orange and white retroreflective stripes. Use a minimum of two orange and two white stripes for each cone with the top stripe being orange. Use maximum 3" nonretroreflectorized space between the orange and white stripes.



TUBULAR MARKER

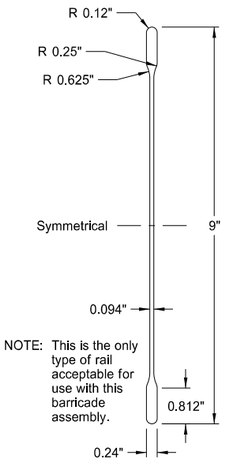
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



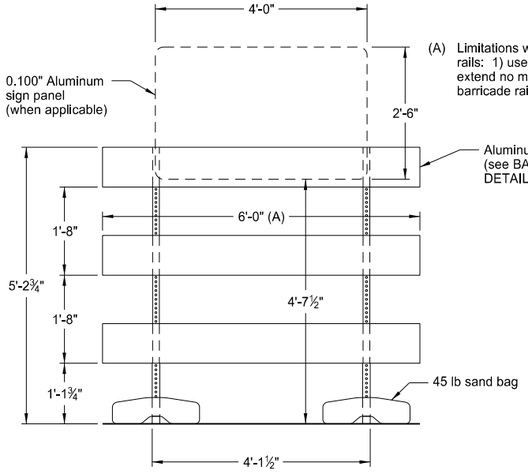
FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth 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, use an 8" x 8" butyl pad or hot melt butyl. Remove butyl as close as possible to pavement surface.

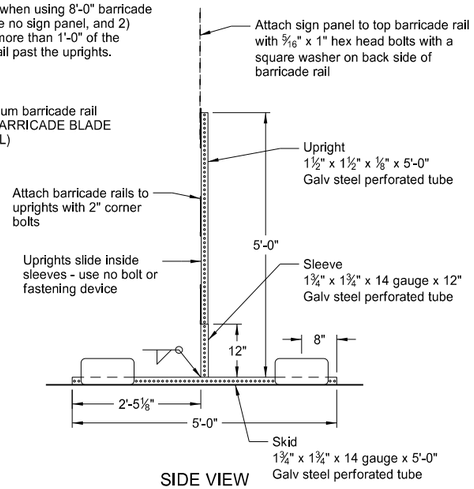


BARRICADE BLADE DETAIL



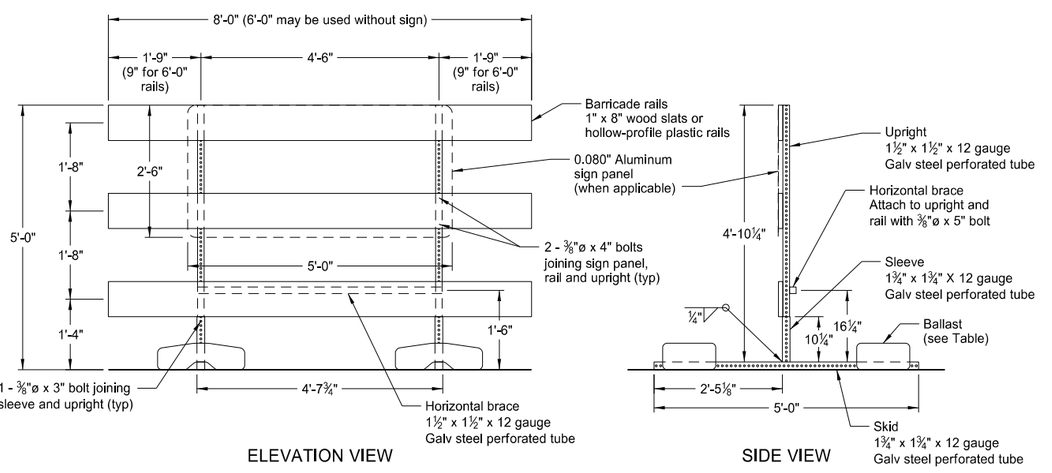
ELEVATION VIEW

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.



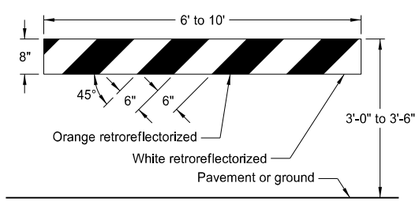
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

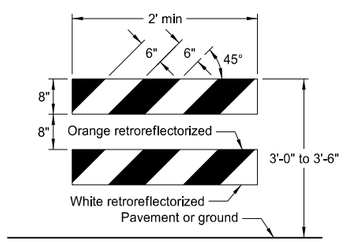


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

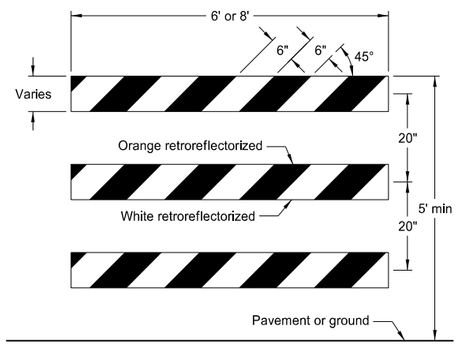
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", use a rail stripe width of 4".



TYPE I BARRICADE

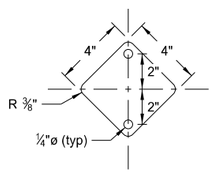


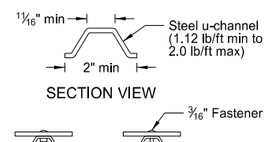
TYPE II BARRICADE

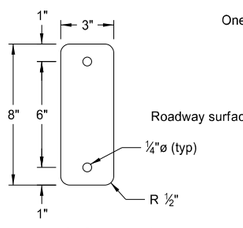


TYPE III BARRICADE

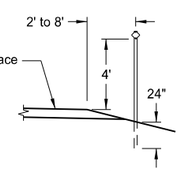
BARRICADE RAIL DETAILS







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: Number of sandbags based on a wind speed of 55 MPH. Sandbags assumed to be placed at or near the ends of the skids.

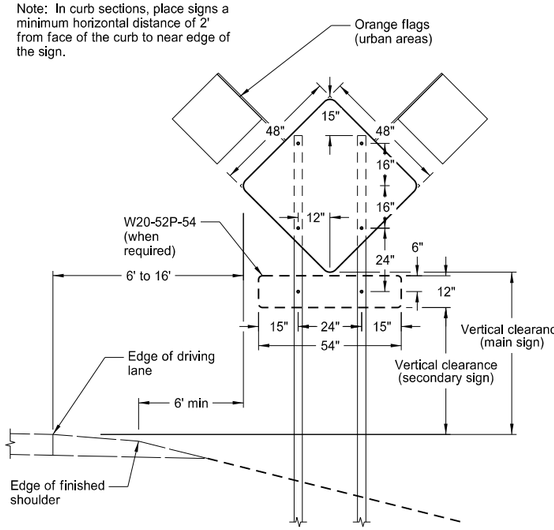
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

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

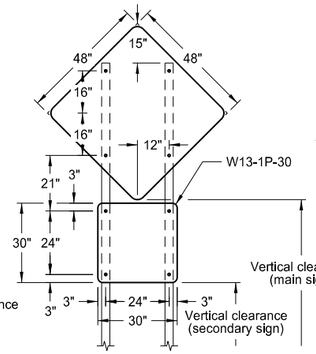
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

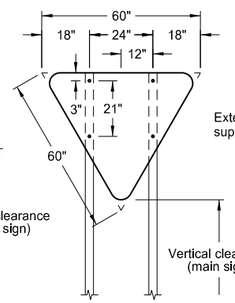
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



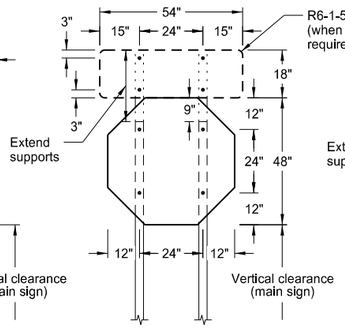
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



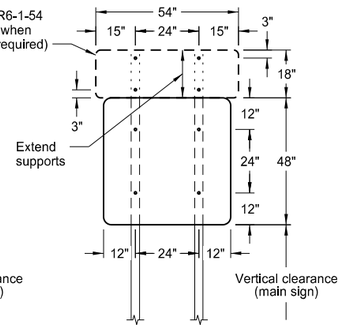
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



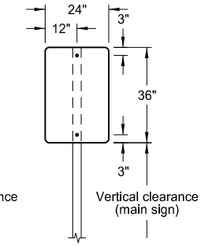
R1-2-60 - YIELD SIGN



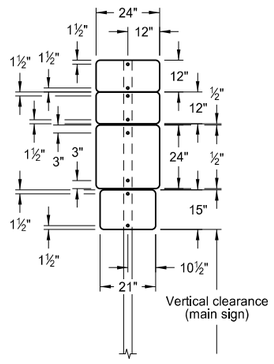
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



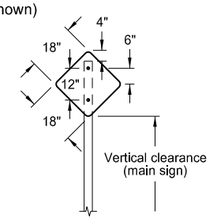
48" x 48" SIGN
(with R6-1-54 sign as required)



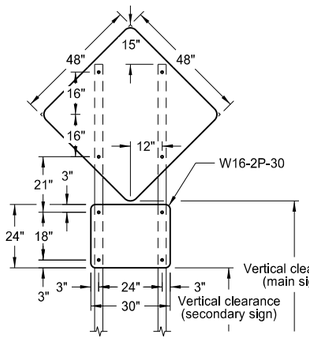
24" x 36" SIGN



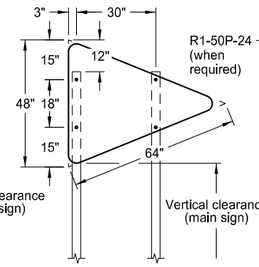
24" x 24"
ROUTE MARKER
ASSEMBLY



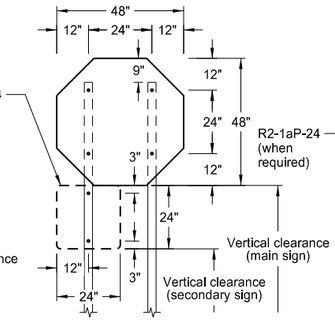
18" x 18"
DIAMOND SIGN



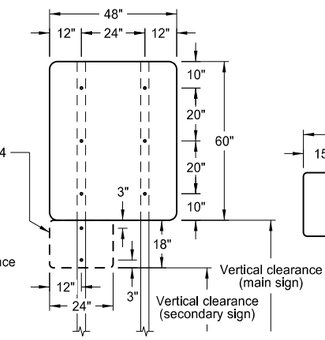
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



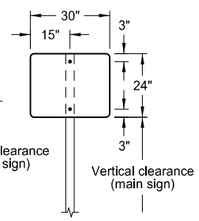
W14-3-64 - PENNANT SIGN



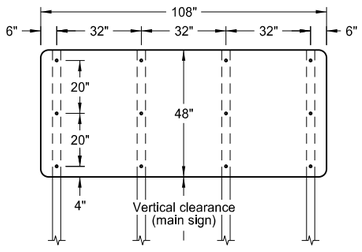
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



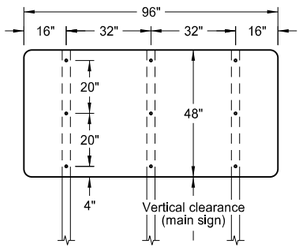
48" x 48" SIGN
(with R2-1aP-24 sign as required)



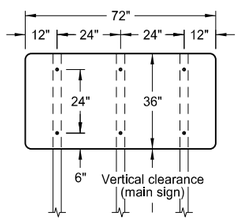
30" x 24" SIGN



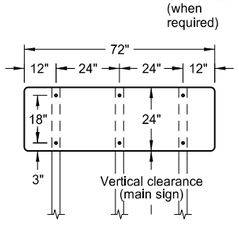
108" x 48" SIGN



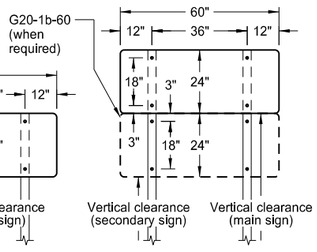
96" x 48" SIGN



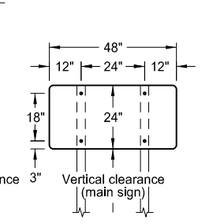
72" x 36" SIGN



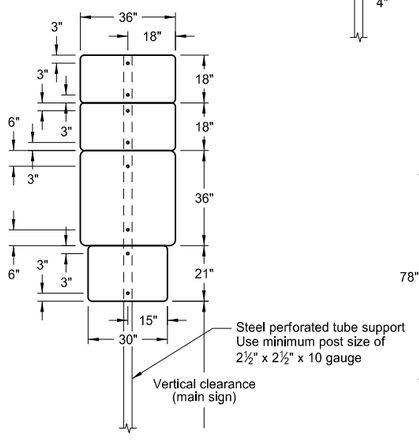
72" x 24" SIGN



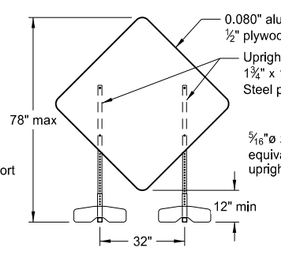
60" x 24" SIGN



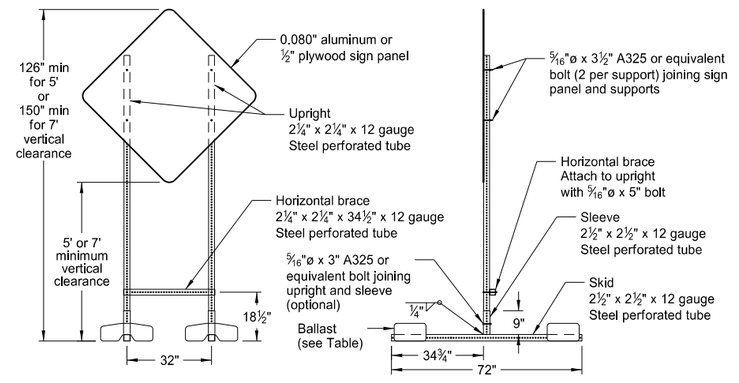
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

   Place signs over 50 square feet on 2½" x 2½" perforated tube supports as a minimum.

   Do not attach guy wires to sign supports. Attach wind beams behind sign panels when used with u-posts.

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

3. Alternate Messages: Install and remove alternate message signs on reflectorized plate (without borders) as required. (i.e. "Left" and "Right" message on lane closure sign)

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 stated above.

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

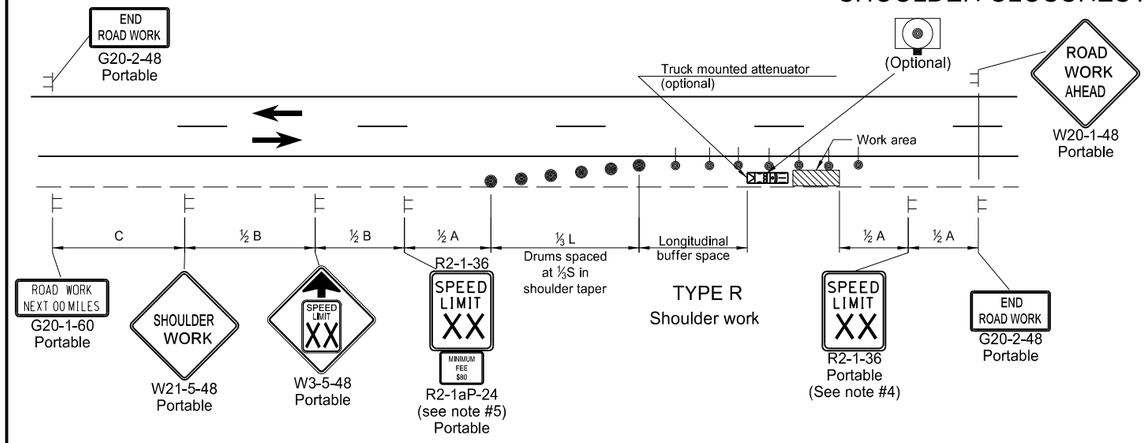
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

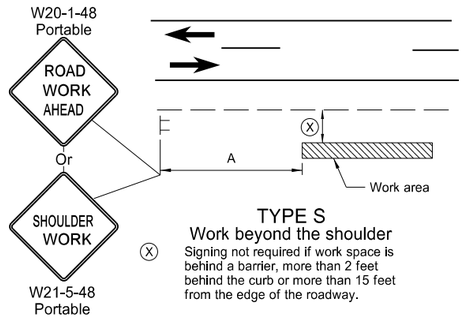
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

D-704-24

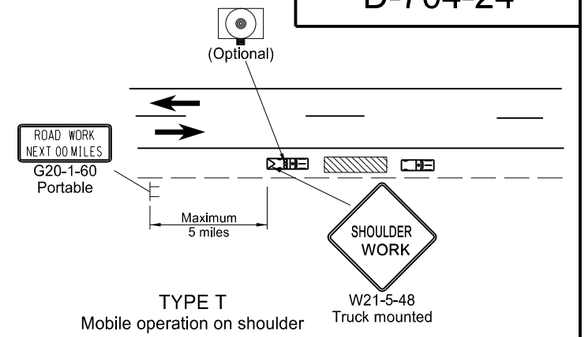


TYPE R
Shoulder work

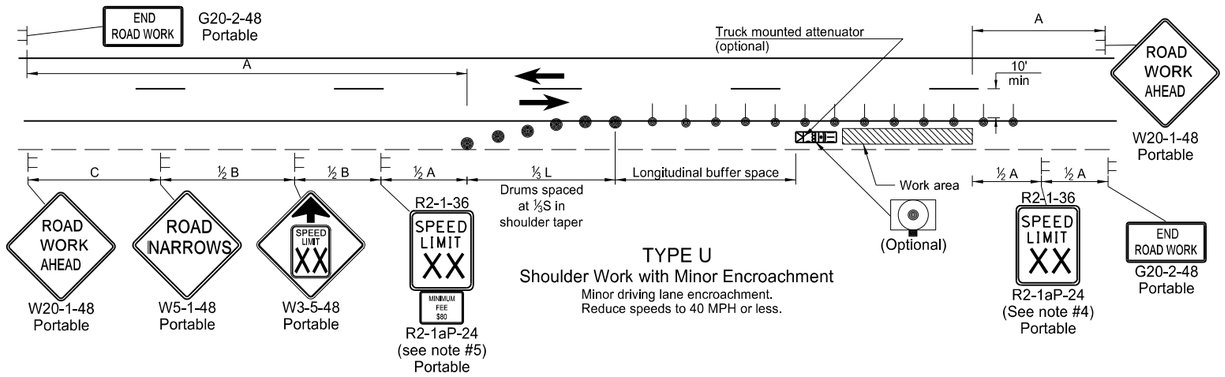


TYPE S
Work beyond the shoulder

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.

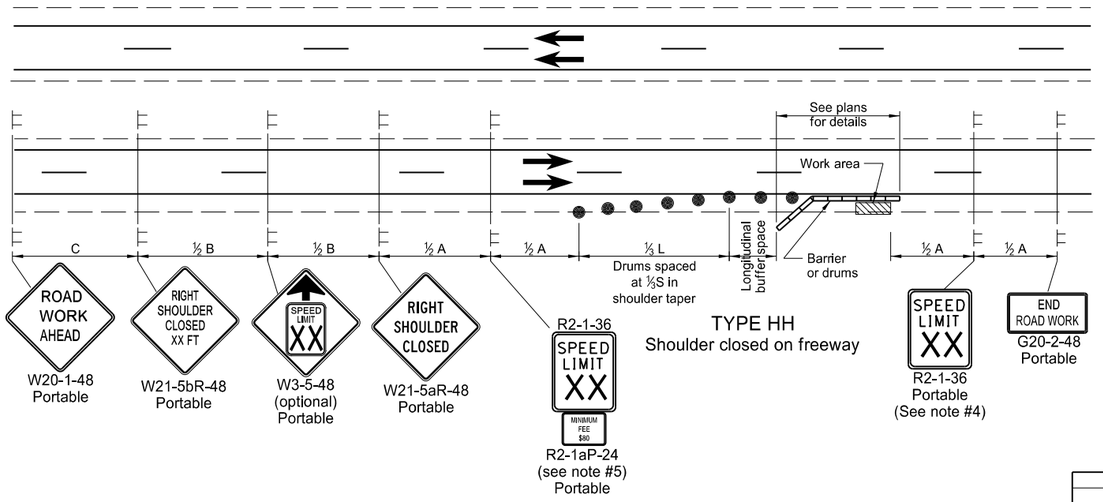


TYPE T
Mobile operation on shoulder

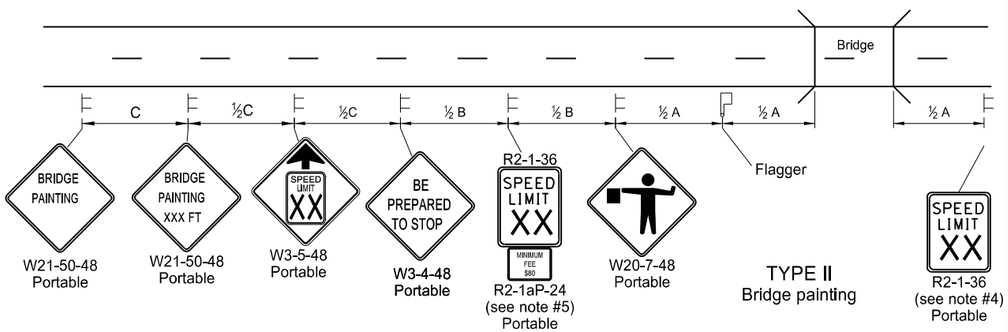


TYPE U
Shoulder Work with Minor Encroachment

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



TYPE HH
Shoulder closed on freeway



TYPE II
Bridge painting

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 Drawing D-704-14.
9. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

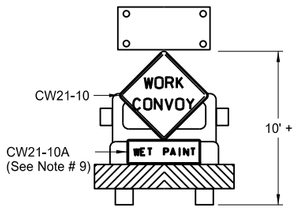
9-27-13

REVISIONS

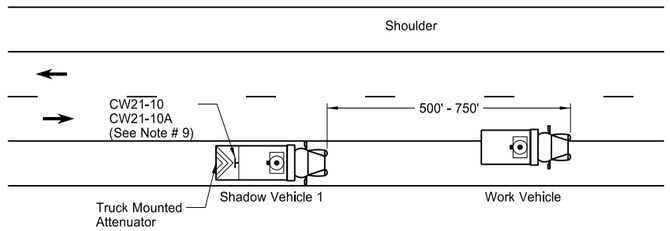
DATE	CHANGE
8-17-17	Updated notes & revised signs
11-01-19	Revised drum spacing & signs nos.

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

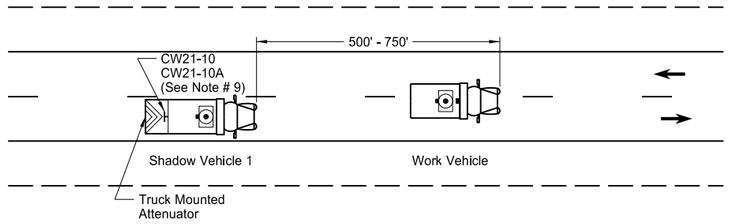
MOBILE OPERATION
(PAVEMENT MARKING)



Typical Shadow Vehicle 1
Two-Way Roaday

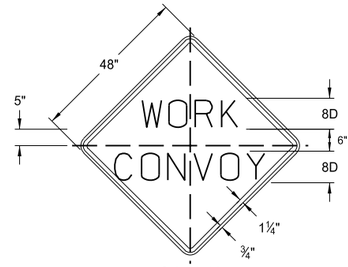


Two-Way Roadway with Paved Shoulders

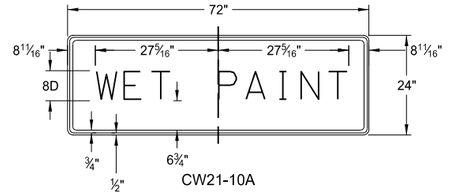


Two-Way Roadway without Paved Shoulders

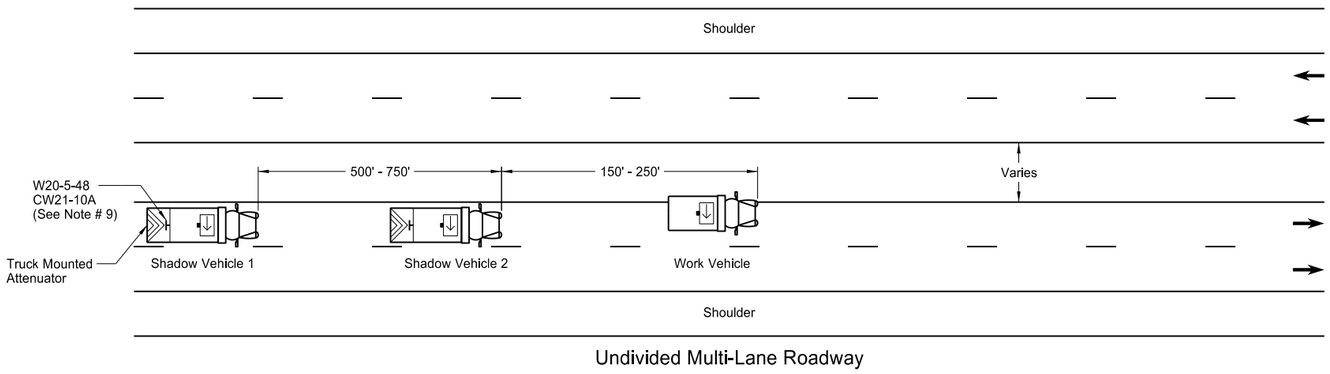
Sign Details



CW21-10

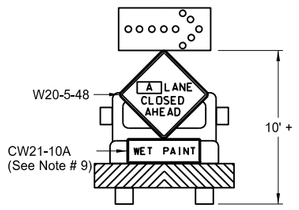


CW21-10A



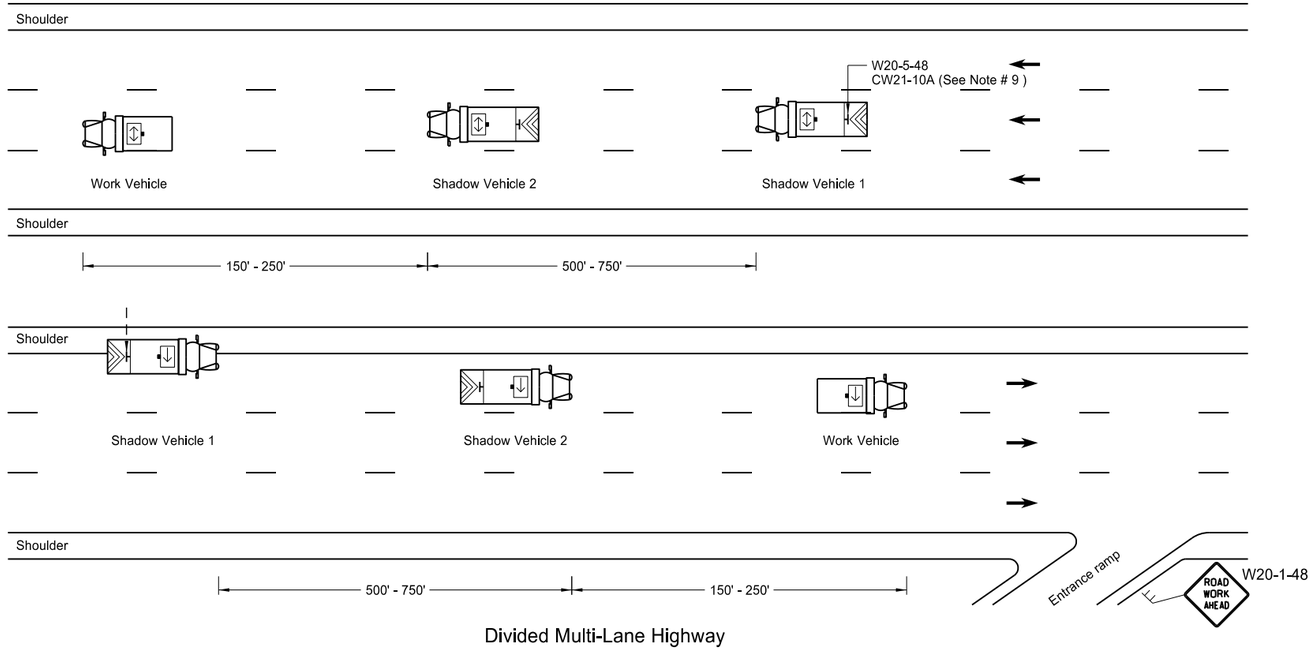
Undivided Multi-Lane Roadway

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



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center



Divided Multi-Lane Highway

KEY

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

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

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

D-704-33

Two-Lane Roadway Portable Rumble Strips

KEY

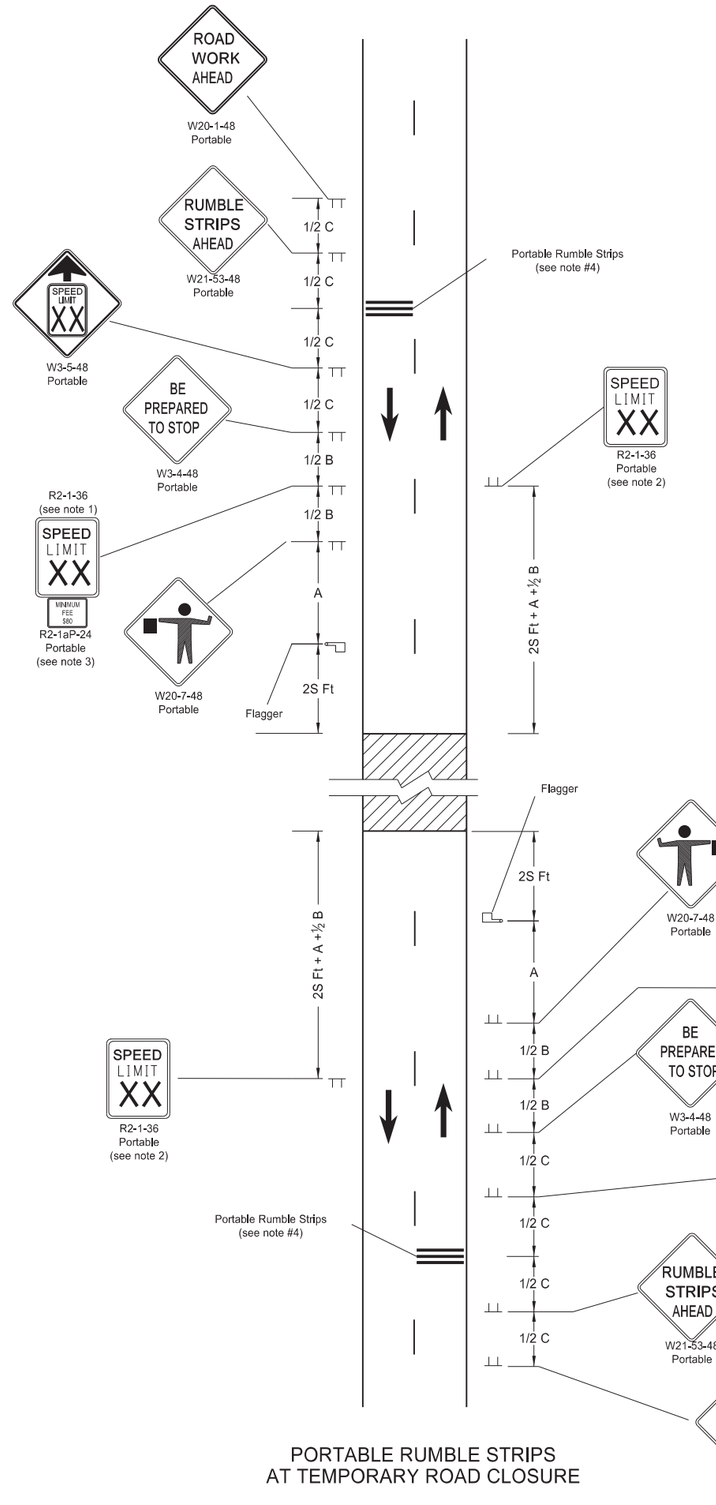
Work area

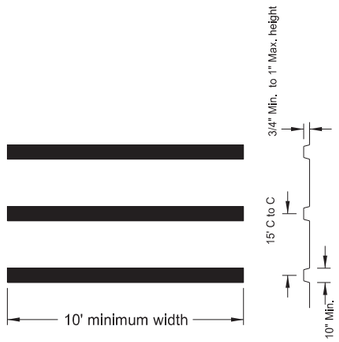
Flagger

Sign

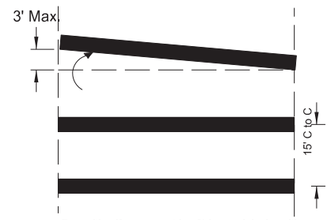
S = Numerical value of speed limit or 85th percentile.

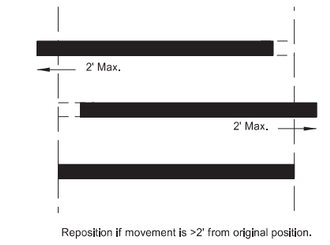
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - High Speed (over 45 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720

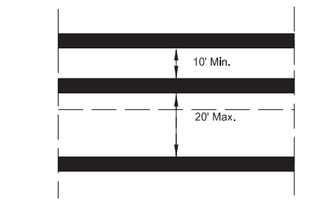




PORTABLE RUMBLE STRIPS ARRAY DETAIL







PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

Notes:

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

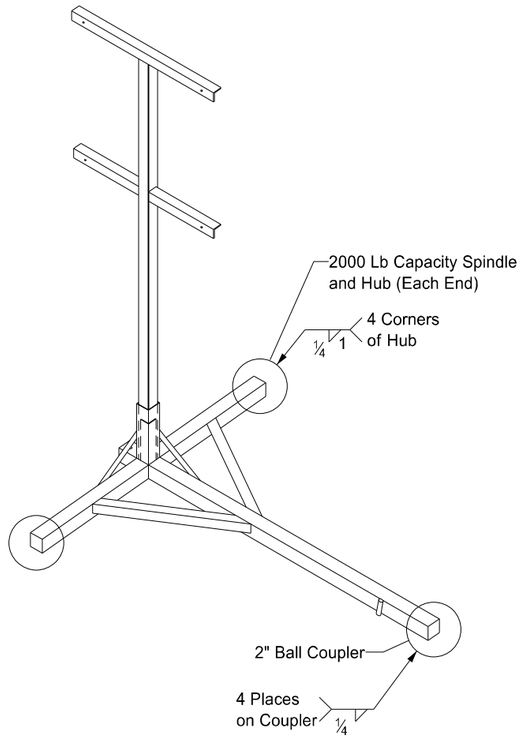
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
02-22-22	
REVISIONS	
DATE	CHANGE
03/07/23	Use changed to min 45 mph.

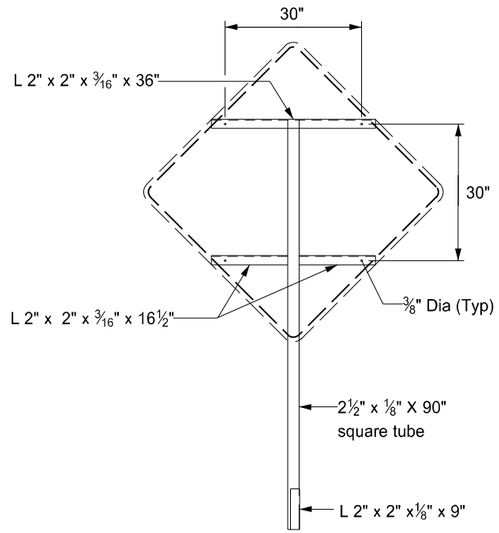
KIRK J. HOFFMANN
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

03/07/23

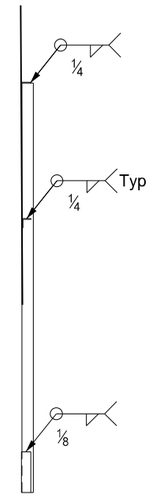
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

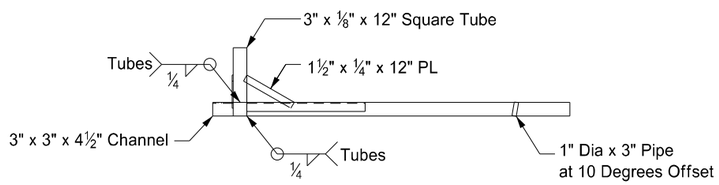


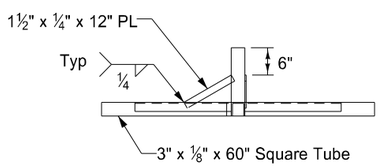
RIGHT

SIGN SUPPORT

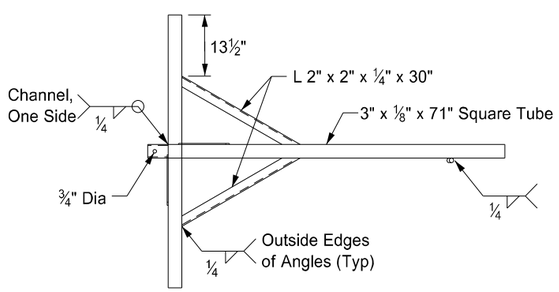
Notes:

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





RIGHT



TOP

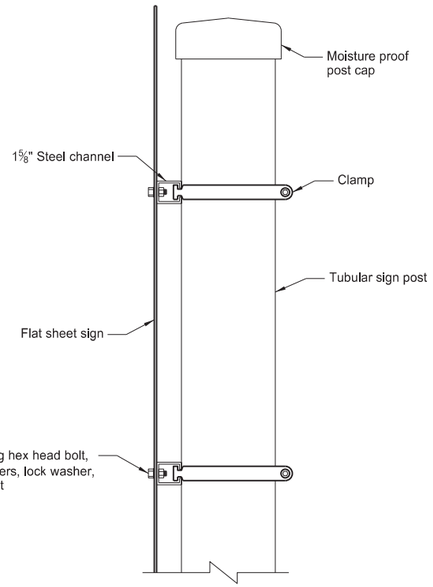
TRAILER

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

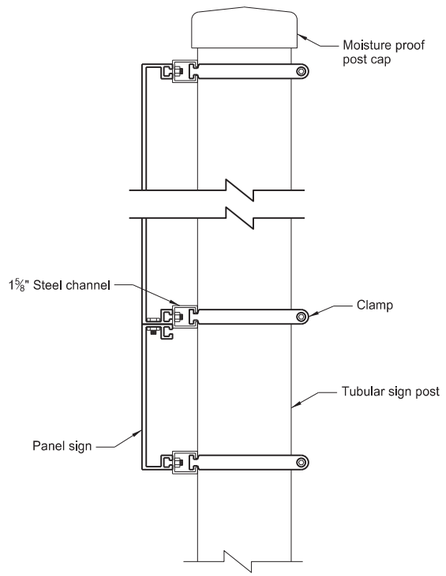
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
Kirk J Hoff
12 02 2020

PIPE SUPPORT AND SIGN MOUNTING DETAILS

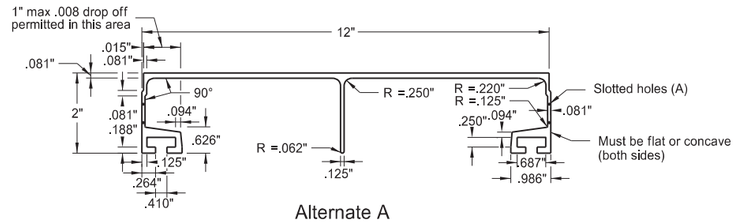
D-754-7



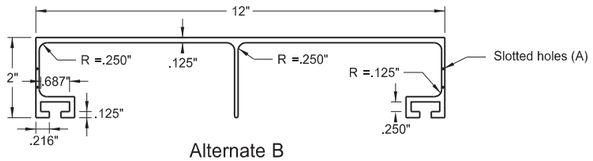
Side View



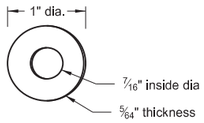
Side View



Alternate A
12" Extruded Panel

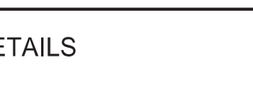


Alternate B
12" Extruded Panel



Flat Washer Detail

Slotted Hole Detail



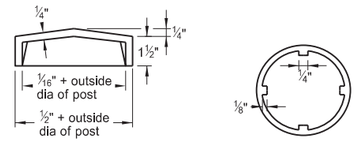
6" Extruded Panel

Aluminum Panel Details

(A) Punch slotted holes in aluminum panels at 1'-0" on center, space from end as listed below:

12" even length panels	4'-0" etc.
9" odd + 6" length panels	5'-6" etc.
6" odd length panels	5'-0" etc.
3" even + 6" length panels	4'-6" etc.

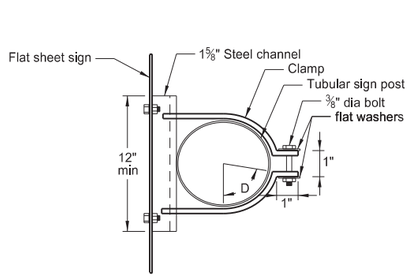
Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



Side View Top View

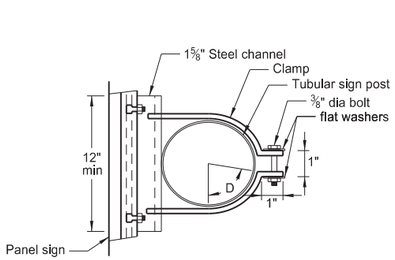
Post Cap Detail

Furnish post caps for all steel or aluminum posts or weld a ⅛" plate all around.



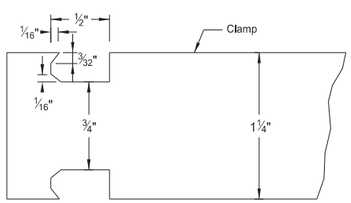
Top View

Flat Sheet Sign Clamp Mounting Details

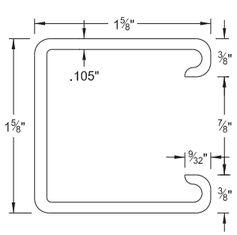


Top View

Panel Sign Clamp Mounting Details



Clamp Detail



Steel Channel Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

2-21-14

REVISIONS

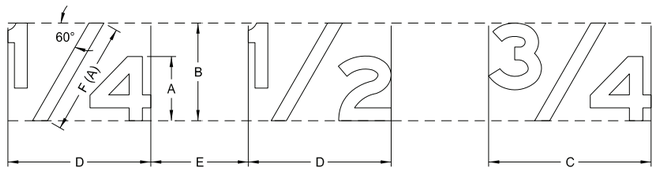
DATE	CHANGE
08-30-18	Updated to active voice, defined bolt & washer for fastening sign.
08-29-19	New Design Engineer PE Stamp.
10-19-22	Added washers to clamp.

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

10/20/22

LETTER AND ARROW DETAILS

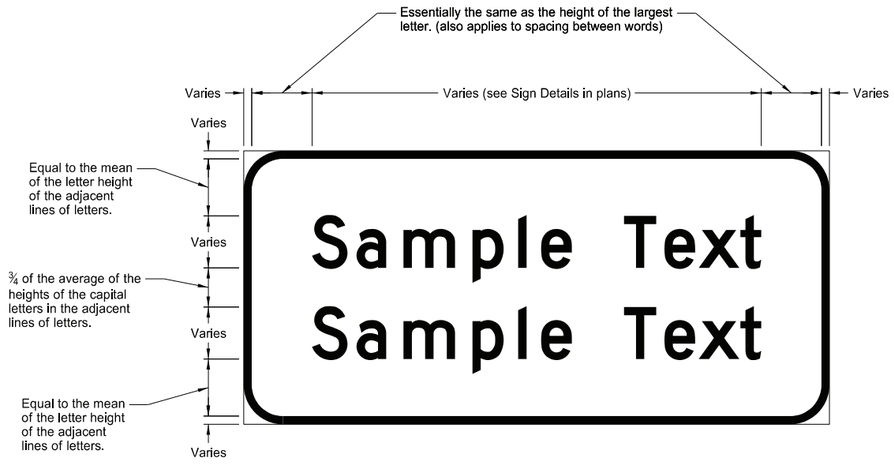
D-754-9



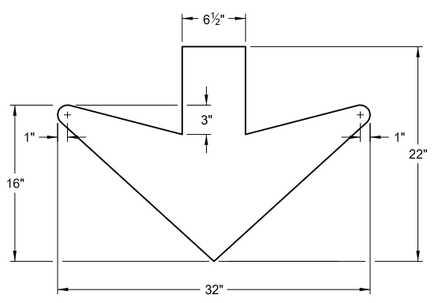
DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

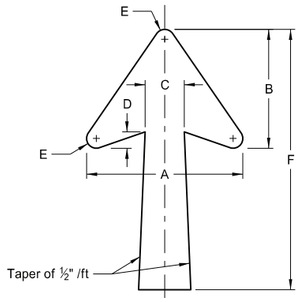
(A) Center diagonal stroke of fraction optically.



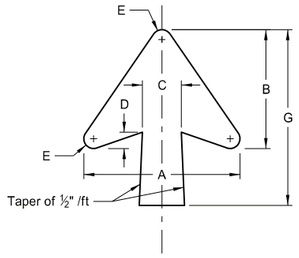
TYPICAL SPACING



DOWN ARROW



TYPE A

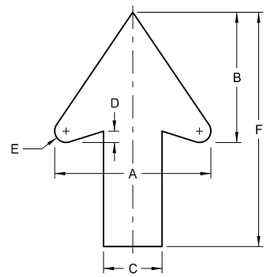


TYPE B

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G
ND_6IN	6"	12"	9.125"	3"	1"	0.625"	20"	13.5"
ND_8IN	8"	15.125"	11.563"	3.75"	1.313"	0.813"	25"	17"
ND_10IN	10"	18.25"	14"	4.5"	1.5"	0.75"	30"	20"
ND_12IN	12"							
ND_13IN	13.3"							
ND_16IN	16"	22.25"	17"	5.375"	1.75"	1"	35"	25"
ND_20IN	20"							

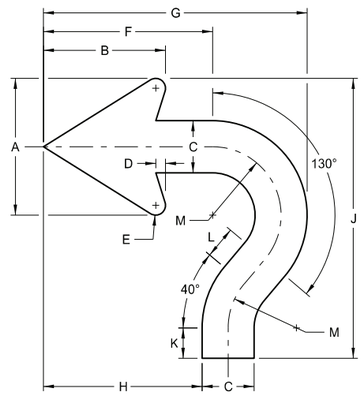
NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

NOTE: Measure rotation angle of arrows counterclockwise from positions shown in details.



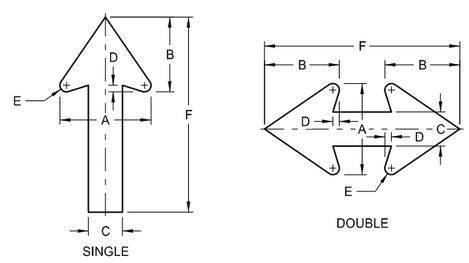
TYPE D

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F
ND_2IN	2"	2"	1.625"	0.75"	0.125"	0.125"	3"
ND_4IN	4"	4"	3.313"	1.5"	0.25"	0.25"	6"
ND_6IN	6"	6"	4.875"	2.25"	0.375"	0.375"	9"
ND_8IN	8"	8"	6.625"	3"	0.5"	0.5"	12"
ND_10IN	10"	10"	8.375"	3.75"	0.75"	0.75"	15"
ND_12IN	12"	12"	10"	4.5"	0.875"	0.875"	18"



ROUNDABOUT

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G	H	J	K	L	M
ND_6IN	6"	5.25"	4.688"	2"	0.375"	0.375"	6.5"	10.125"	6.094"	10.75"	1.168"	1.25"	2.625"
ND_8IN	8"	7"	5.75"	2.625"	0.5"	0.5"	8.688"	13.5"	8.166"	14.333"	1.557"	1.667"	3.5"



SPECIAL

DESIGNATION	A	B	C	D	E	F	USES
ND_0.75IN	2"	1.625"	0.75"	0.125"	0.125"	7.75"	Parking Signs (Regulatory)
ND_2.625IN	7"	5.75"	2.625"	0.5"	0.5"	15"	Frontage Road Signs

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-3-11

REVISIONS

DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow
5-4-16	Revised Distance & Destination and Typical Spacing details
4-23-18	Revised arrow details
8-30-18	Updated notes to active voice.
8-29-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.

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

08/05/24

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.

2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.

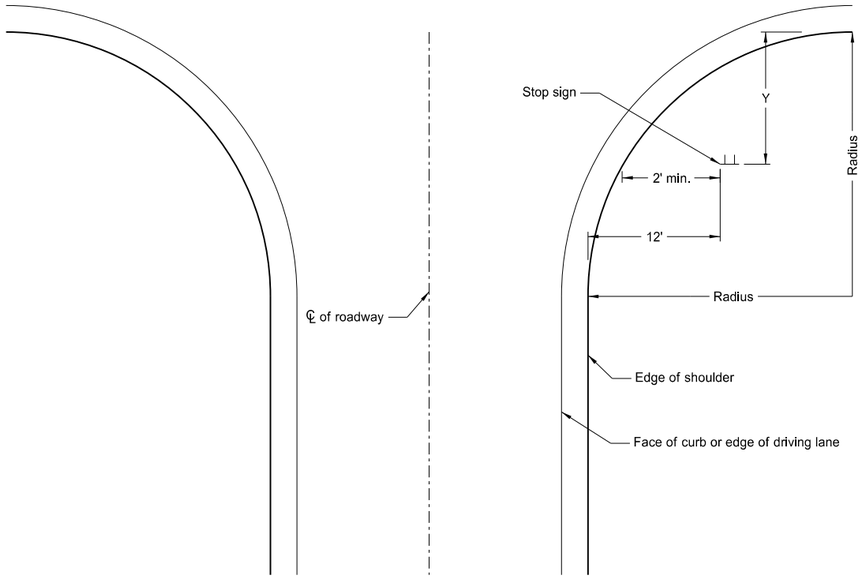
   Install signs on expressways a minimum height of 7'.

   Install adopt-a-highway signs on Freeways at least 7' above the edge of the driving lane.

   Maximum vertical clearance is 6" greater than the minimum vertical clearance.

3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.

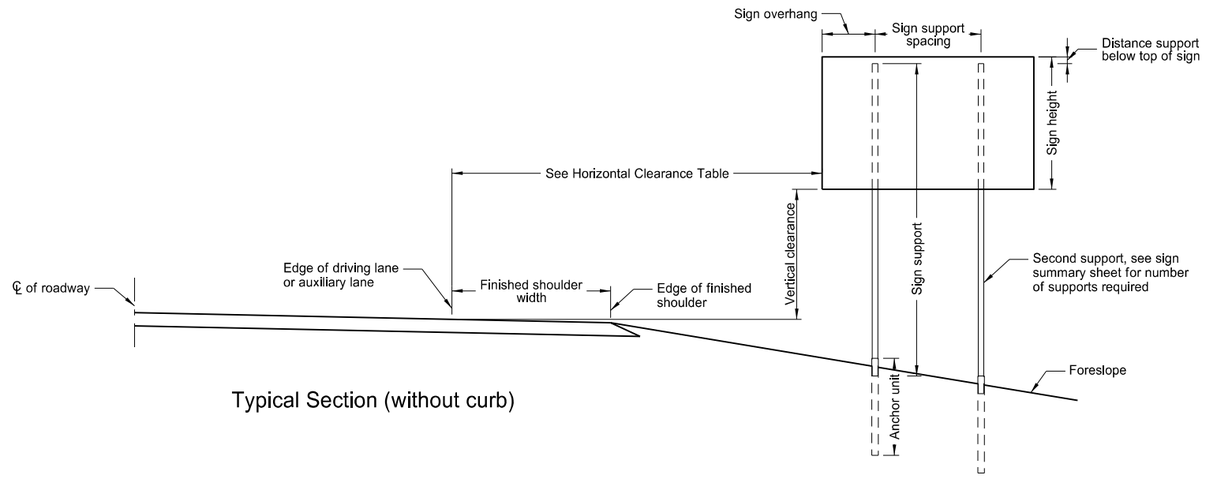
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

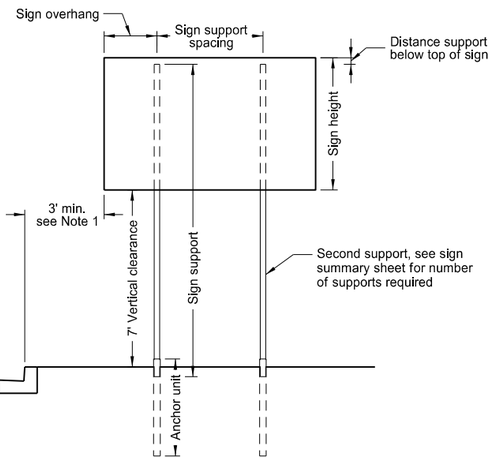
Use layout for the placement of "Stop" signs.

Radius ft.	Y-max. ft.	Y-min. ft.
40	50	15
45	50	18
50	50	21
55	50	25
60	50	28
65	50	32
70	50	35
75	50	39
80	50	43



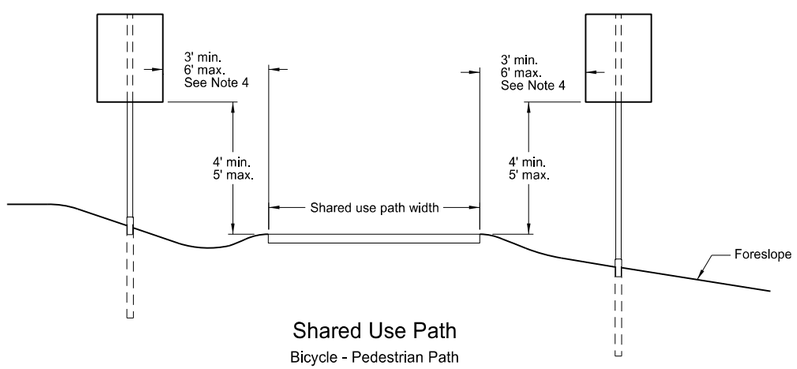
Typical Section (without curb)

Horizontal Clearance Table	
Shoulder Width ft	Offset ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

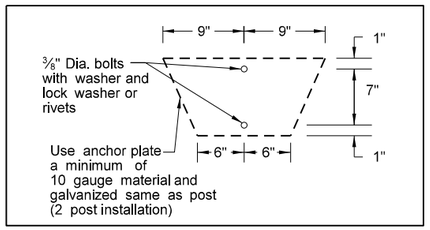
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

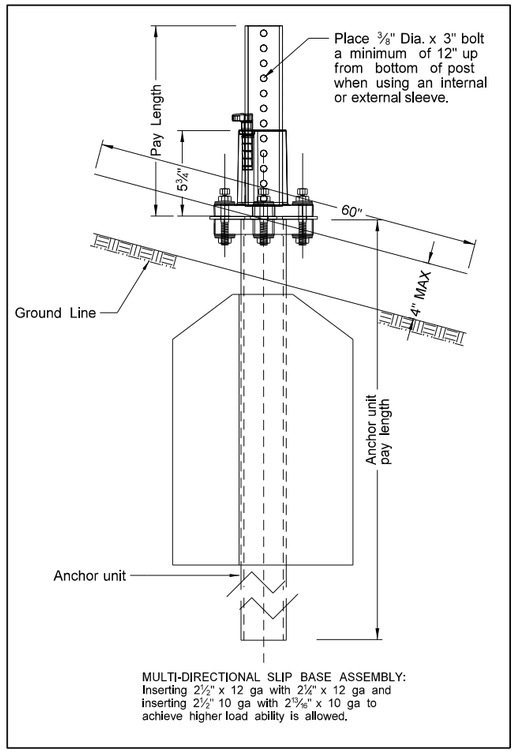
Mounting Details Perforated Tube

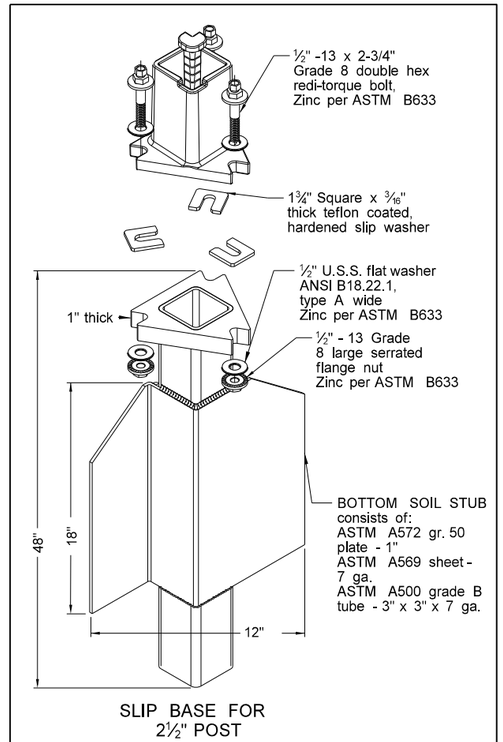
D-754-24

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2⅜16	10	Yes		7

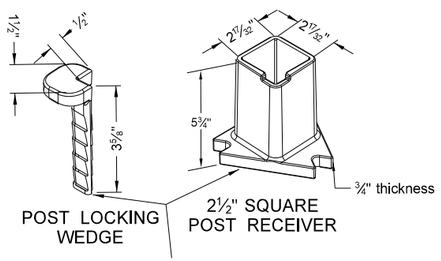
(B) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

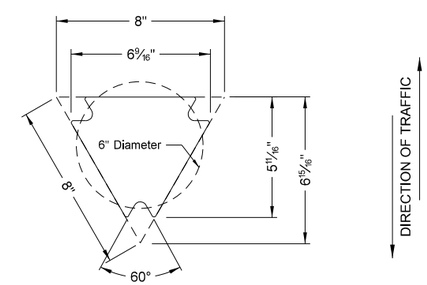






SLIP BASE FOR 2½" POST





SLIP BASE DETAIL

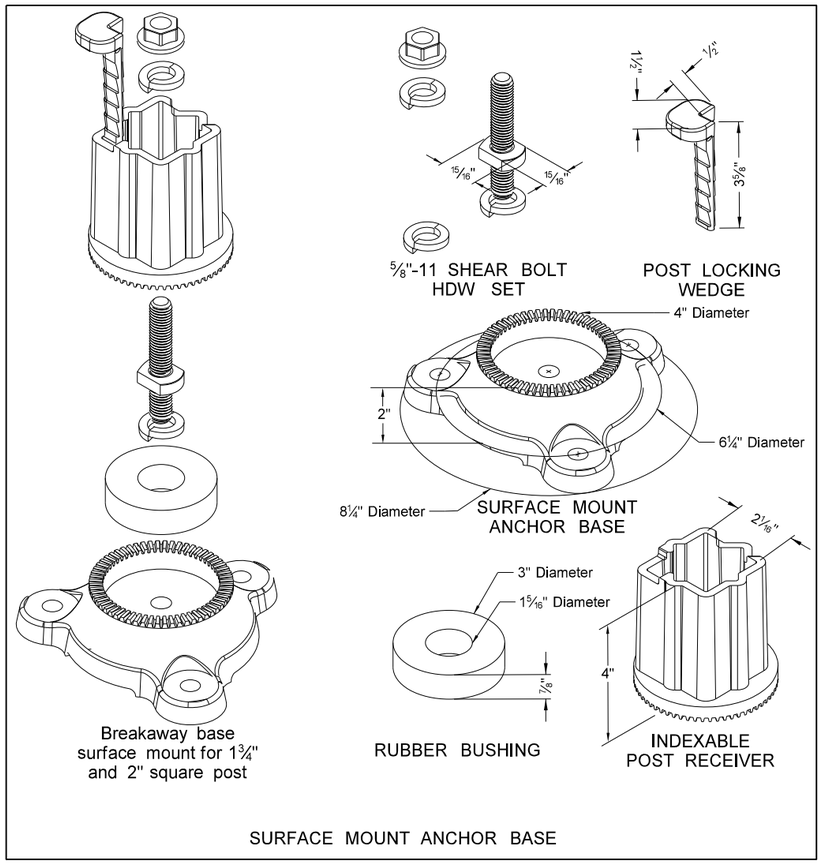
Properties of Telescoping Perforated Tubes

Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud 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
2⅜16 x 2⅜16	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	0.783

The 2 ⅜16" size 10 gauge is shown as 2.19" size on the plans;
The 2½" size is shown as 2.51" size on the plans.

NOTE:

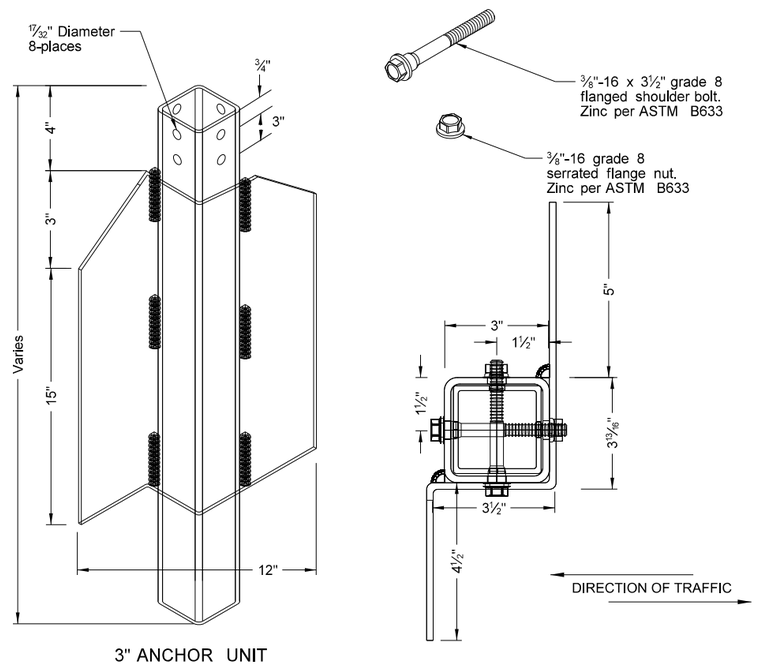
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(use standard ⅜" diameter grade 8 bolt with proper shim)



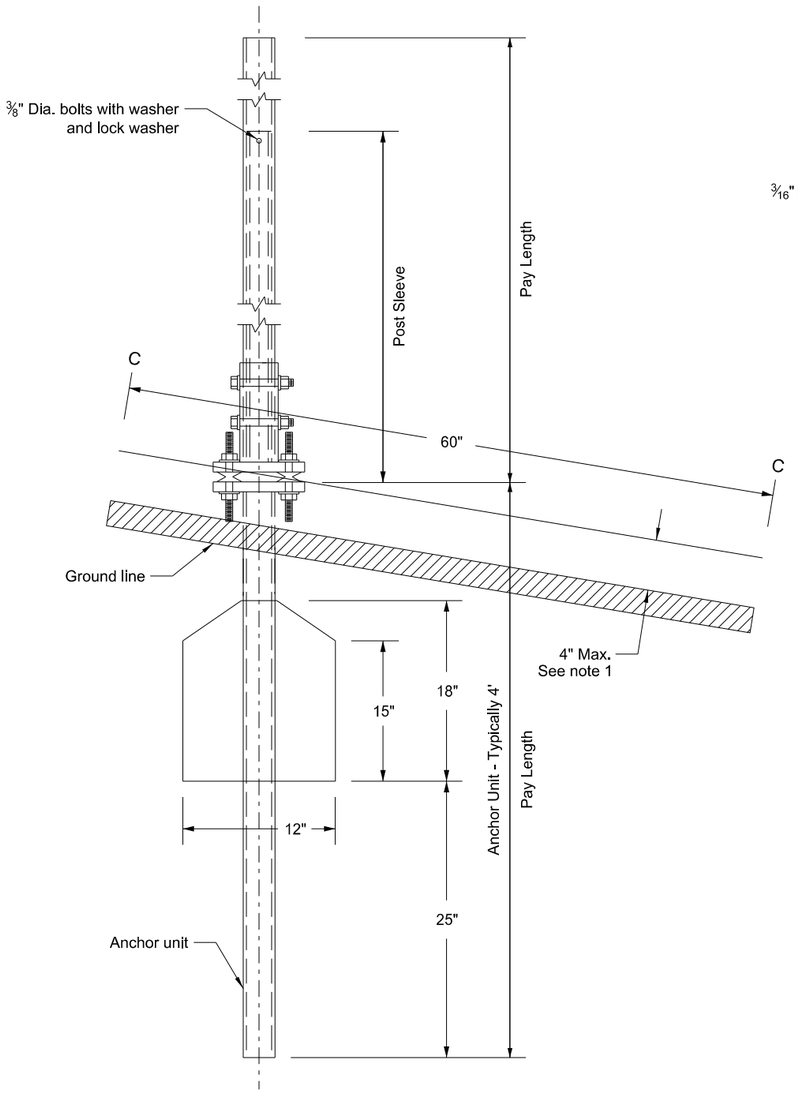
3" ANCHOR UNIT

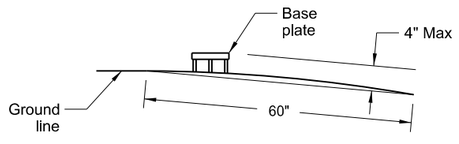
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

D-754-24A

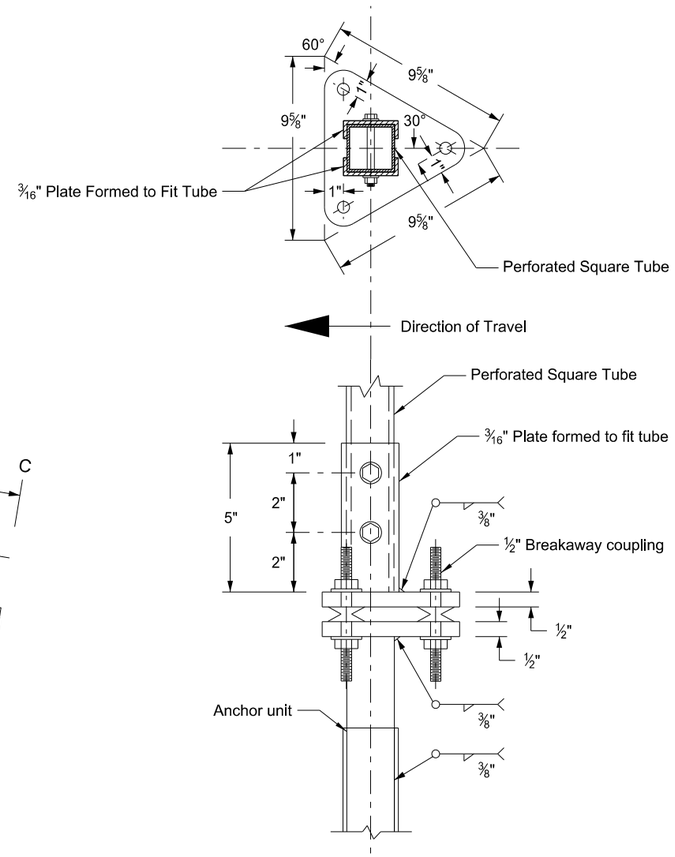
Breakaway Coupler System for Perforated Tubes



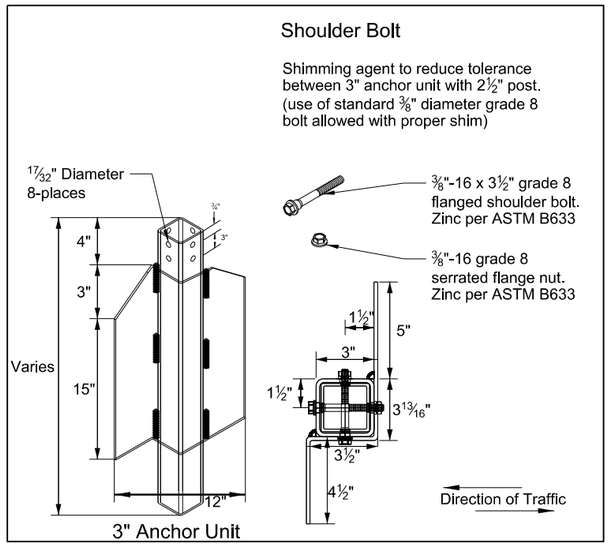


Section C-C

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



Base Plate with Breakaway Coupler



Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4. Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thickness Guage
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

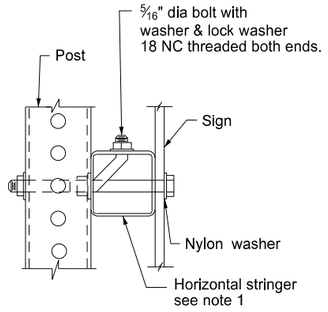
(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

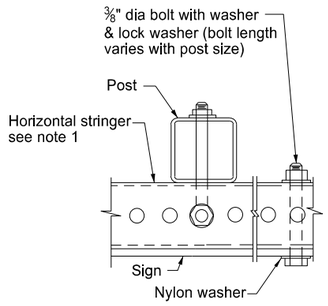
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

Mounting Details Perforated Tube

D-754-25

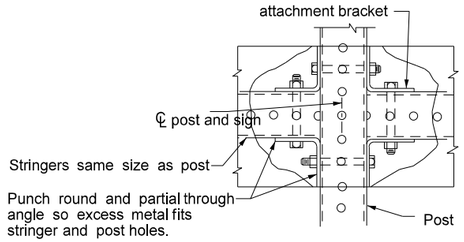


Side View



Top View

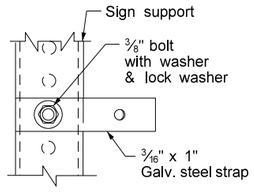
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



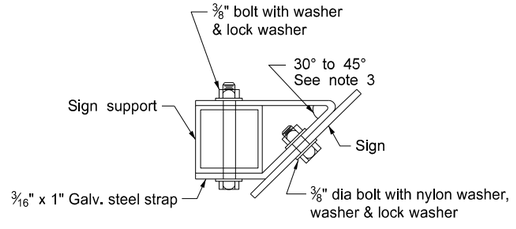
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

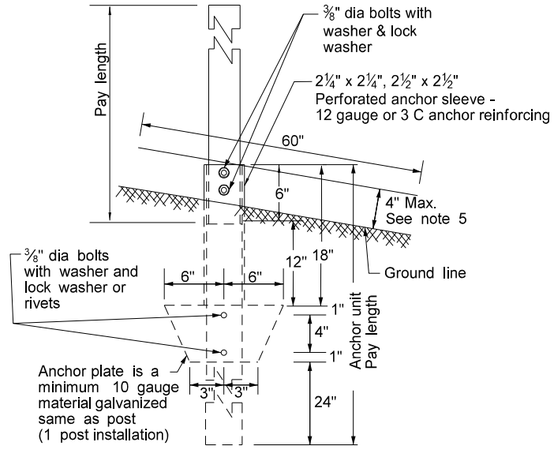


Side View



Top View

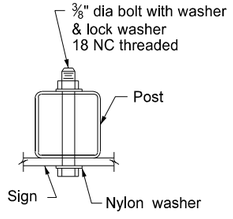
STRAP DETAIL



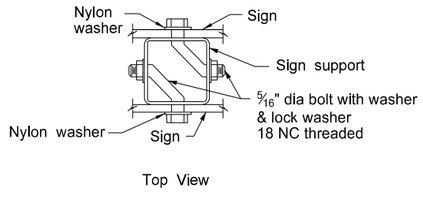
ANCHOR UNIT AND POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

(B) - When placing 2½", 12 gauge posts in standard soils without breakaway bases, provide a shim as specified by the manufacturer. Provide breakaway base when placing the support in weak soils. Engineer will determine if soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

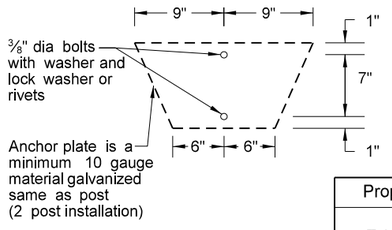


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



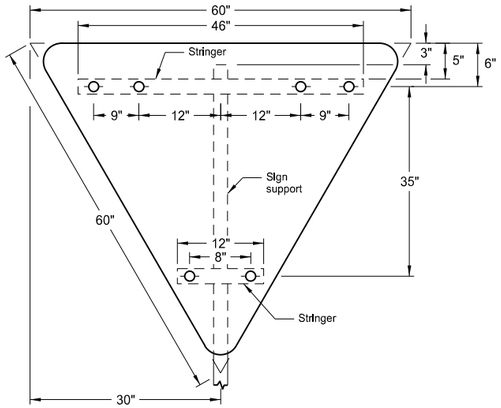
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.4	Cross Sect. area In.2	Section Modulus In.3
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	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	0.783

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

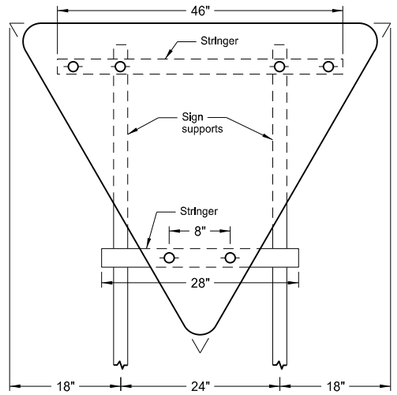
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

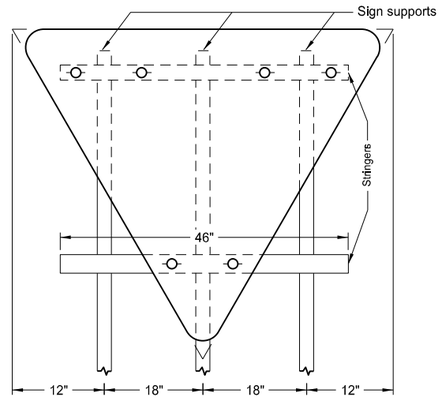
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

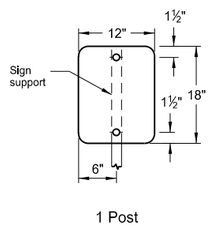


3 Posts

Assembly No. 6

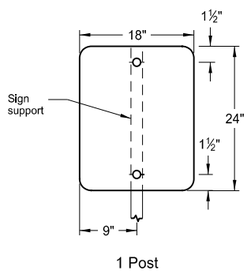
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



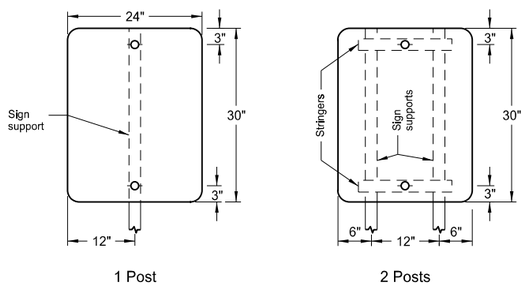
1 Post

Assembly No. 7



1 Post

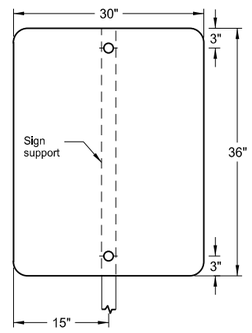
Assembly No. 8



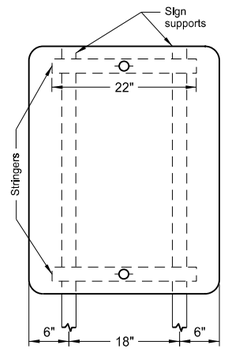
1 Post

2 Posts

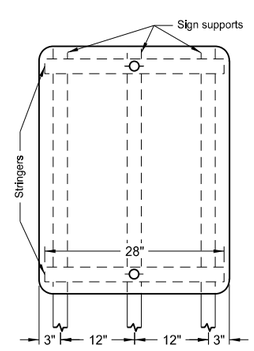
Assembly No. 9



1 Post

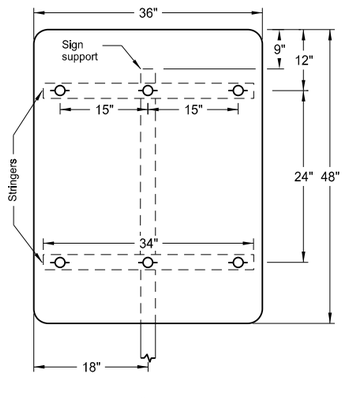


2 Posts

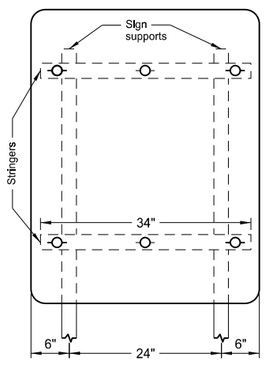


3 Posts

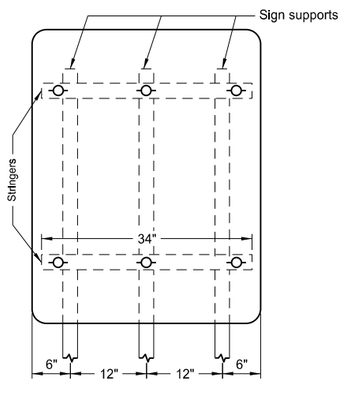
Assembly No. 10



1 Post



2 Posts



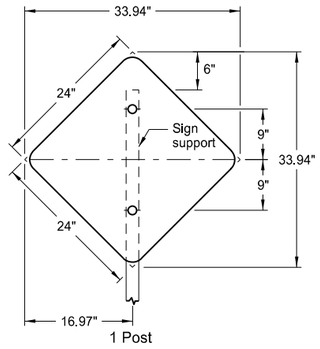
3 Posts

Assembly No. 11

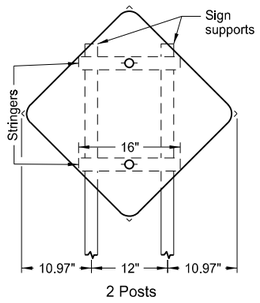
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

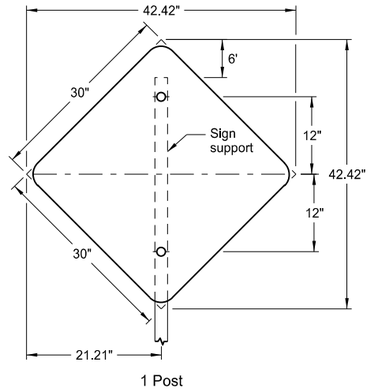


1 Post

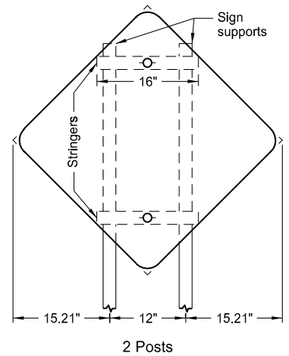


2 Posts

Assembly No. 18

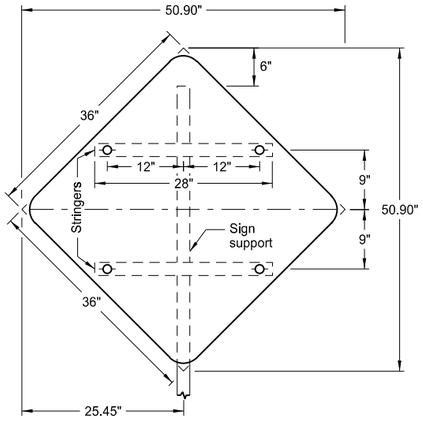


1 Post

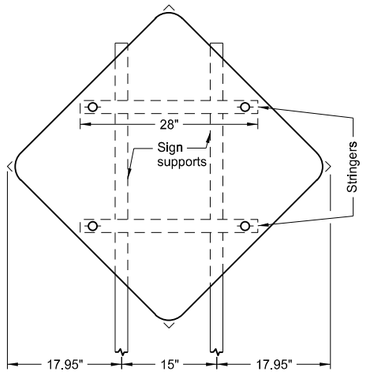


2 Posts

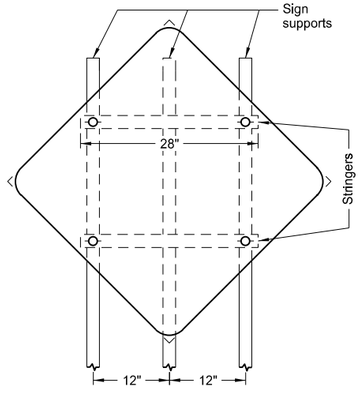
Assembly No. 19



1 Post

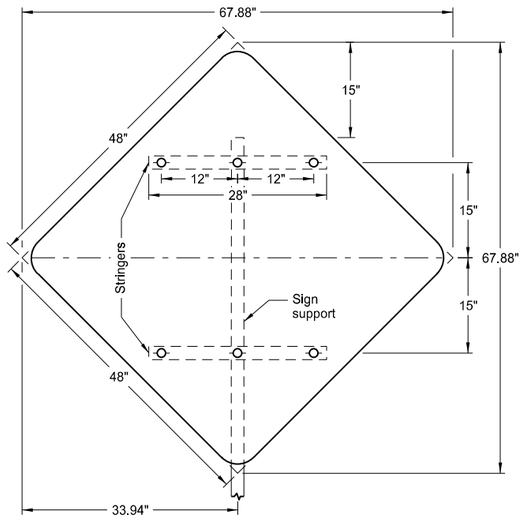


2 Posts

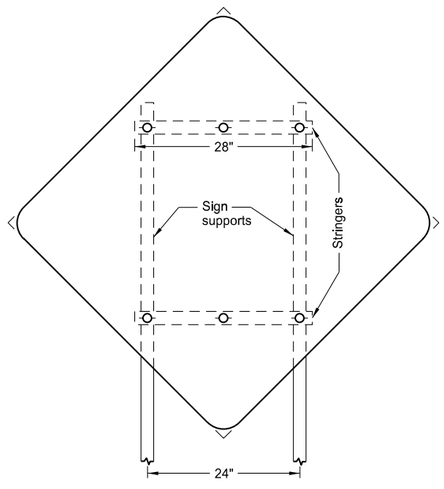


3 Posts

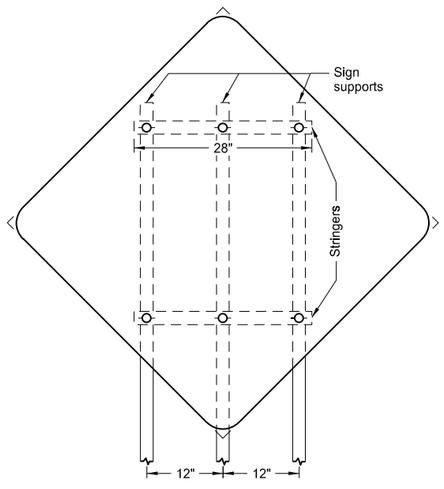
Assembly No. 20



1 Post



2 Posts



3 Posts

Assembly No. 21

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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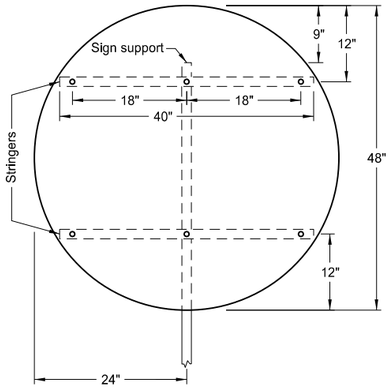
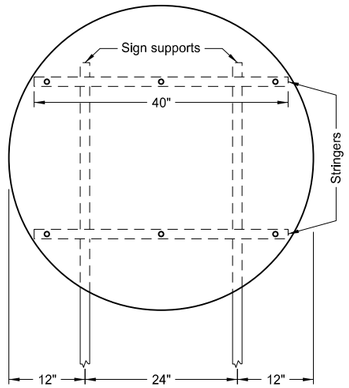
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS
REGULATORY, WARNING AND GUIDE SIGNS

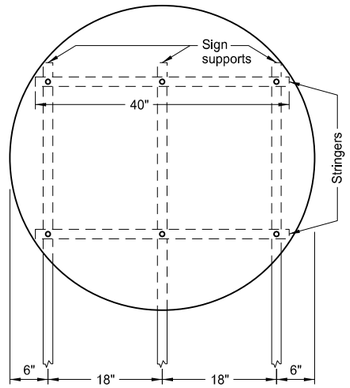
D-754-41



1 Post



2 Posts

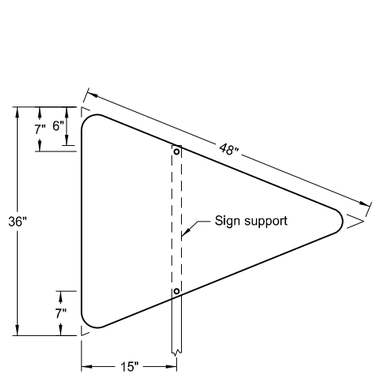


3 Posts

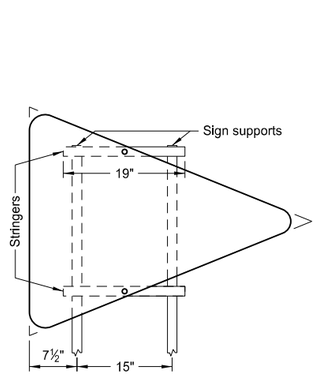
ASSEMBLY NO. 64

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

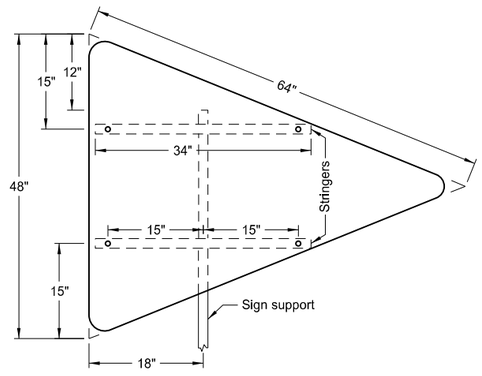


1 Post

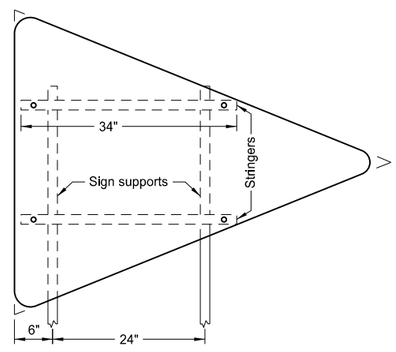


2 Posts

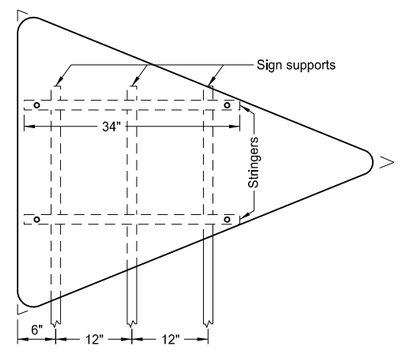
ASSEMBLY NO. 65



1 Post

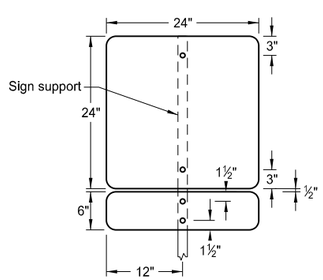


2 Posts

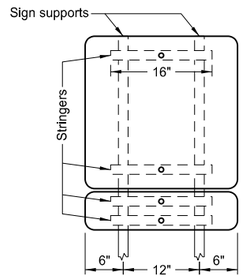


3 Posts

ASSEMBLY NO. 66



1 Post



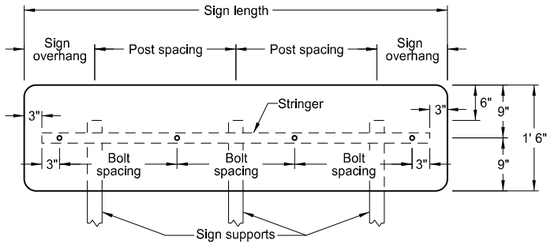
2 Posts

ASSEMBLY NO. 67

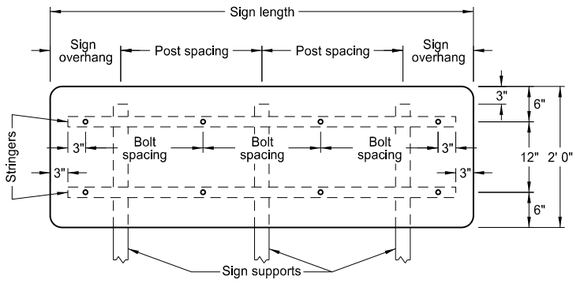
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS

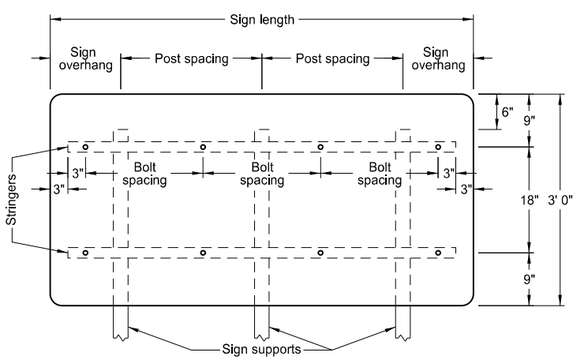


VARIES X 1'-6"

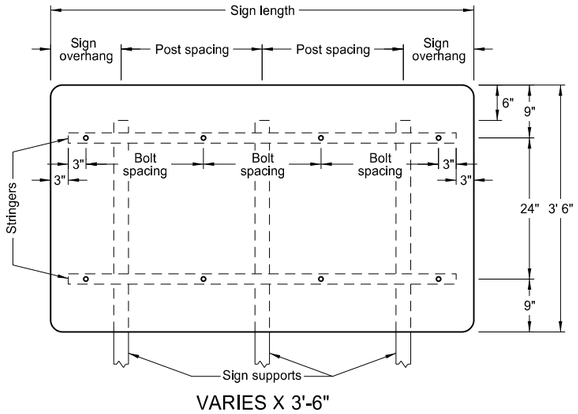


VARIES X 2'-0"

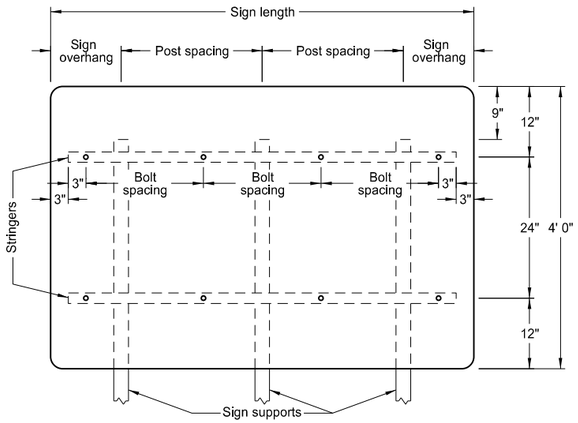
VARIES X 2'-6"



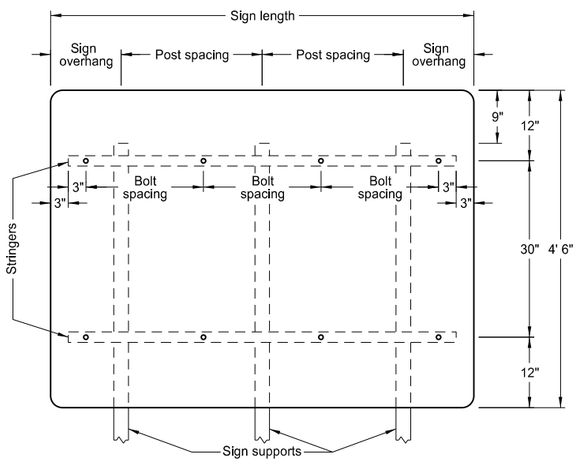
VARIES X 3'-0"



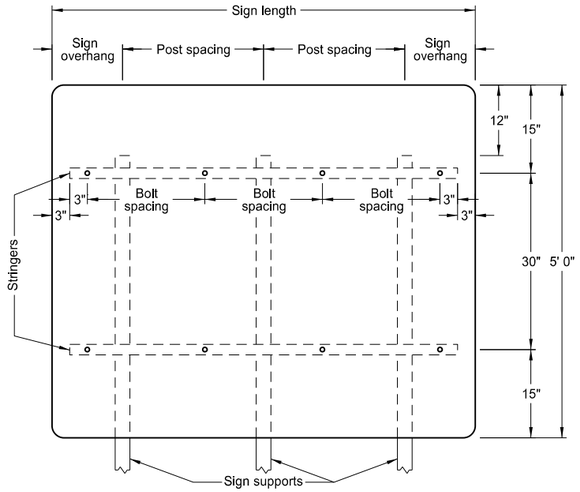
VARIES X 3'-6"



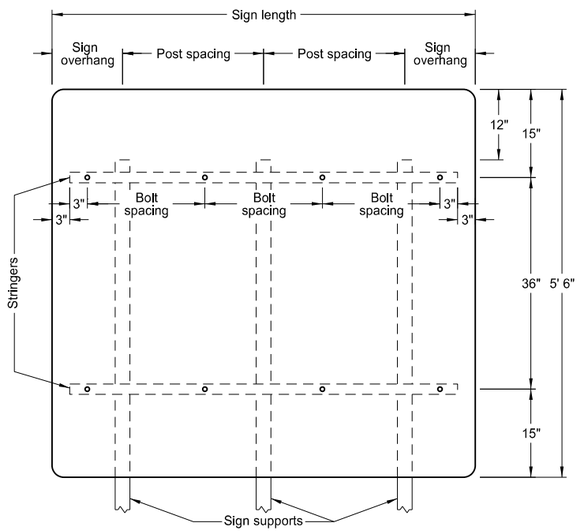
VARIES X 4'-0"



VARIES X 4'-6"



VARIES X 5'-0"



VARIES X 5'-6"

3 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	0'-6"	1'-6"	18"
4'-6"	0'-6"	1'-9"	21"
5'-0"	0'-6"	2'-0"	24"
5'-6"	1'-3"	1'-6"	18"
6'-0"	1'-0"	2'-0"	20"
6'-6"	1'-3"	2'-0"	22"
7'-0"	1'-6"	2'-0"	24"
7'-6"	1'-6"	2'-3"	2-20" & 2-19"
8'-0"	1'-9"	2'-3"	21"
8'-6"	2'-0"	2'-3"	2-22" & 2-23"
9'-0"	1'-6"	3'-0"	24"
9'-6"	1'-9"	3'-0"	4-20" & 1-22"
10'-0"	1'-9"	3'-3"	2-21" & 3-22"
10'-6"	1'-9"	3'-6"	4-23" & 1-22"
11'-0"	2'-0"	3'-6"	24"
11'-6"	2'-3"	3'-6"	21"
12'-0"	2'-4"	3'-8"	22"
12'-6"	2'-5"	3'-10"	23"
13'-0"	2'-6"	4'-0"	24"
13'-6"	2'-9"	4'-0"	3-22" & 4-21"
14'-0'	3'-0"	4'-0"	2-23" & 5-22"
14'-6"	3'-3"	4'-0"	6-23" & 1-24"
15'-0"	3'-6"	4'-0"	24"
15'-6"	2'-4"	5'-5"	6-22" & 2-21"
16'-0"	2'-5"	5'-7"	4-23" & 4-22"
16'-6"	2'-5"	5'-10"	6-23" & 2-24"
17'-0"	2'-6"	6'-0"	24"
17'-6"	3'-3"	5'-6"	22"
18'-0"	3'-6"	5'-6"	6-23" & 3-22"
18'-6"	3'-9"	5'-6"	6-23" & 3-24"
19'-0"	3'-6"	6'-0"	24"
19'-6"	4'-3"	5'-6"	8-22" & 2-23"
20'-0"	4'-4"	5'-8"	8-23" & 2-22"

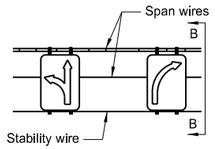
Notes:

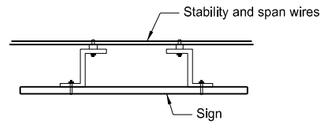
1. Use 0.100 minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.

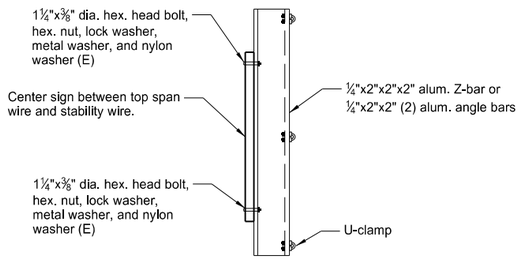
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

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



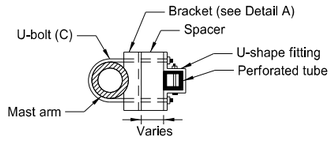


Plan

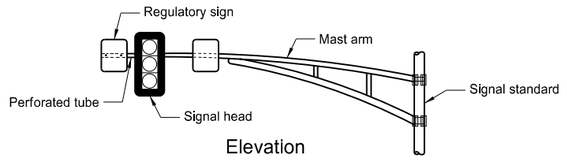


Section B-B

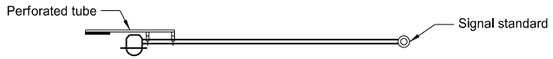
Span Wire Mounted Sign Detail



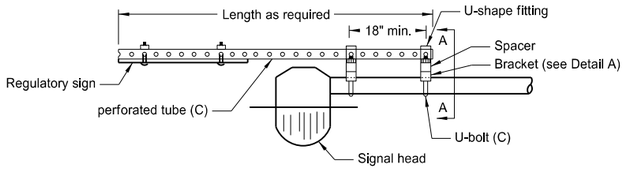
Section A-A



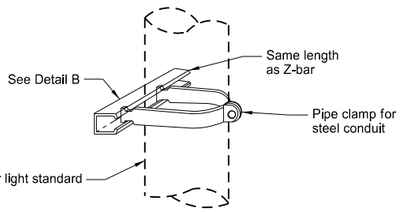
Elevation



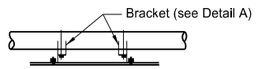
Plan



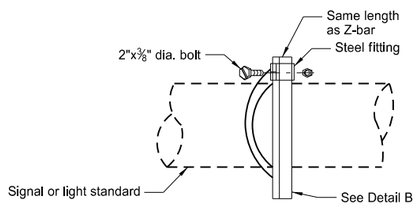
Sign Mounted Beyond End of Mast Arm Detail



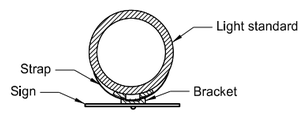
Vertical Mounting
(Use 2 clamps per sign)



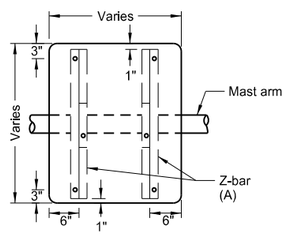
Plan



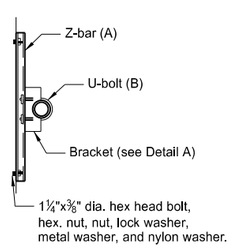
Horizontal Mounting
alternate clamp mounting
(Use 2 clamps per sign)



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

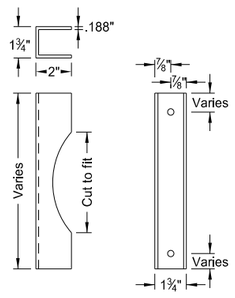


Elevation

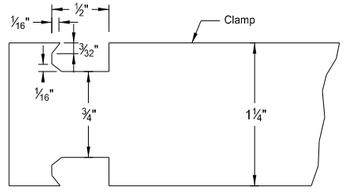


Side View

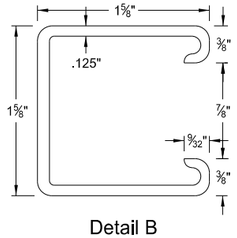
Mast Arm Mounted Regulatory Sign Detail



Detail A



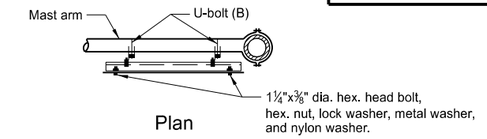
Clamp Detail



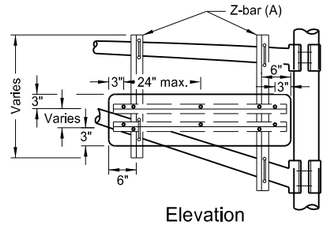
Detail B
Steel Channel

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	5 1/8
6	7 7/16
8	13 1/16
10	20 3/4
12	29 5/8

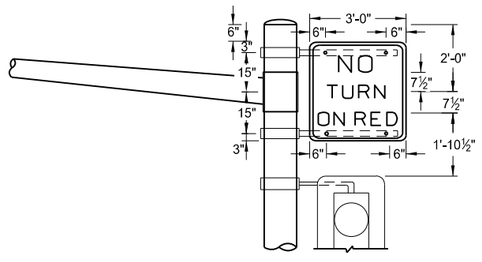


Plan



Elevation

Mast Arm Mounted Street Name Sign Detail



Signal Standard Mounted Sign Attachment Detail

Notes:

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

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

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

Maximum perforated tube lengths for mounting signs beyond end of mast arm:
2"x2" maximum support length 9.9'
2½"x2½" maximum support length 12.6'
2½"x2½" maximum support length 15.7'

(D) Use galv. steel strap and sign attachment bracket similar to the one shown in the detail. Include all costs of bracket assembly in the price bid for flat sheet signs. Punch as shown on Standard Drawings. Provide a 7' minimum vertical clearance to the bottom of signs mounted on light standards.

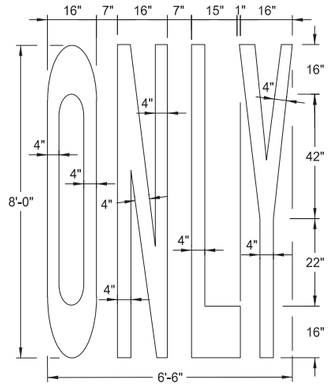
(E) Use metal washers and nylon washers with a minimum outside dia. of 15/16" ± 1/16" and 10 gauge thickness on sign face.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

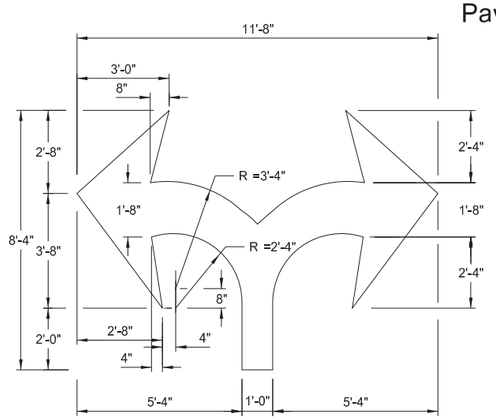
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Message Details

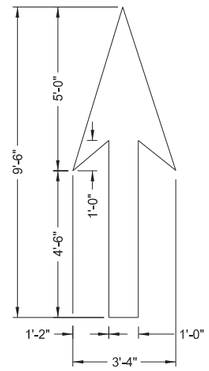
D-762-1



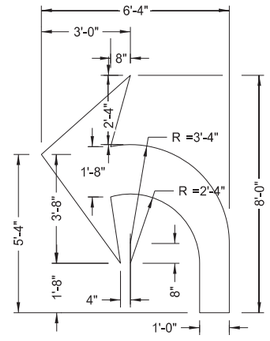
22 S. F.



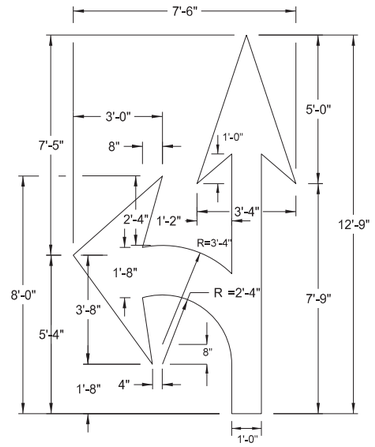
29 S. F.



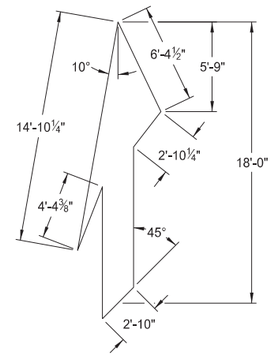
12 S. F.



16 S. F.

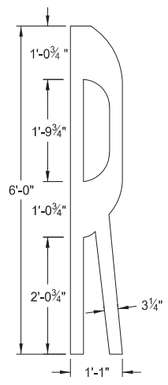


27 S. F.

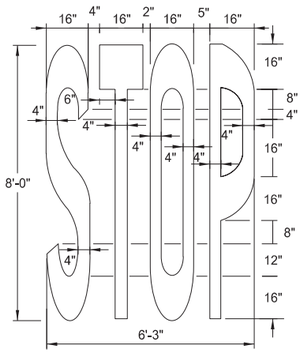


41 S. F.

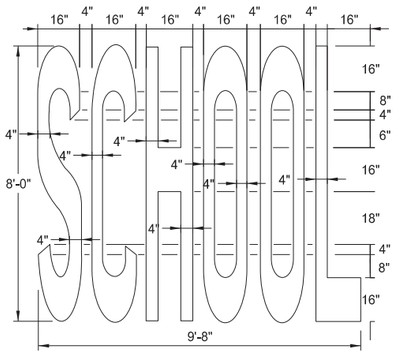
Note: Rotate merge arrow 20° from edge of roadway.



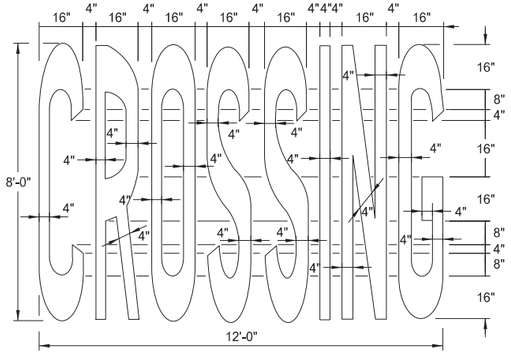
4 S. F.



22 S. F.



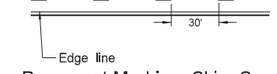
34.5 S. F.



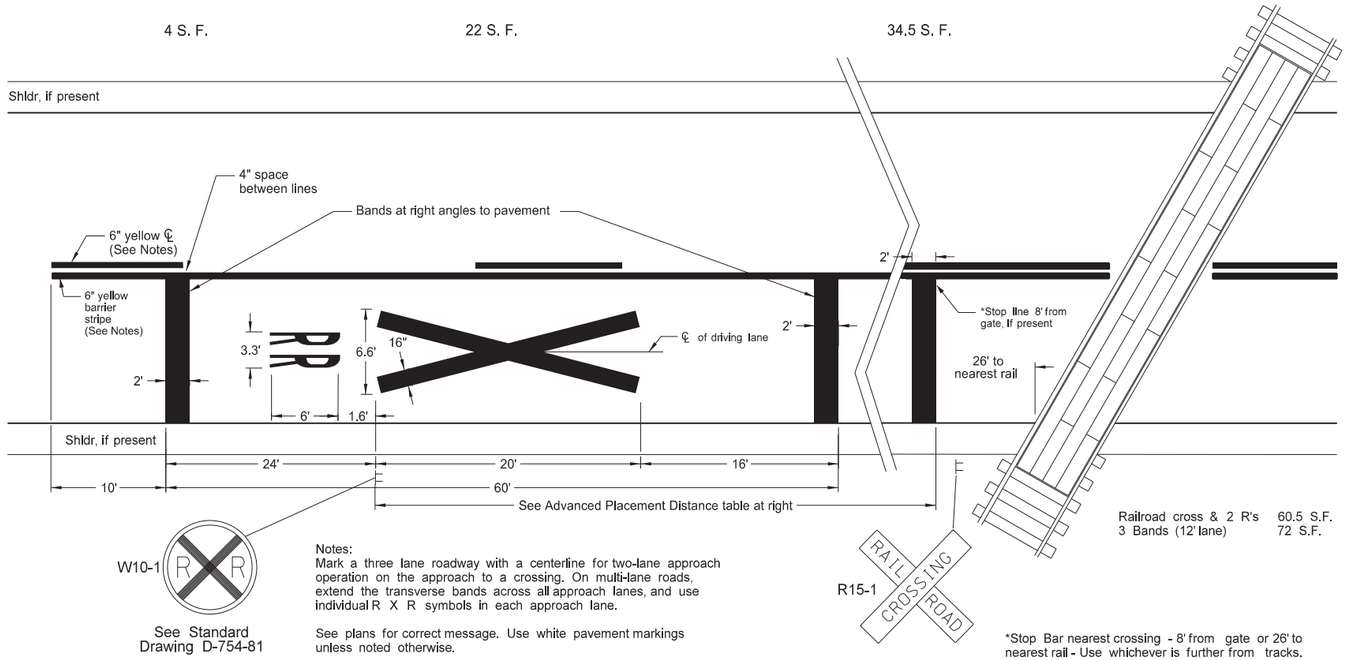
46 S. F.

Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table



Centerline Pavement Marking Skip Spacing Detail



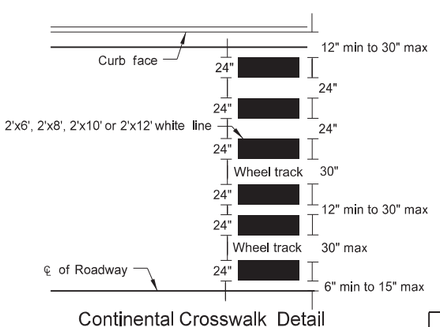
Notes:
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.

See plans for correct message. Use white pavement markings unless noted otherwise.

Railroad cross & 2 R's 60.5 S.F.
3 Bands (12' lane) 72 S.F.

*Stop Bar nearest crossing - 8' from gate or 26' to nearest rail - Use whichever is further from tracks.

Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft



Continental Crosswalk Detail

NOTES:

1. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
2. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

12-6-11

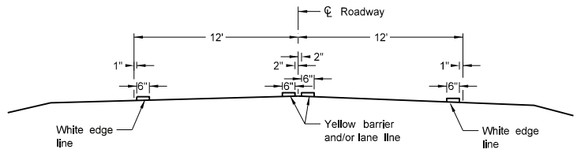
REVISIONS

DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
01-28-2020	Revised min Stop Bar distance to rail.
11-22-2023	Revised pavement marking widths.

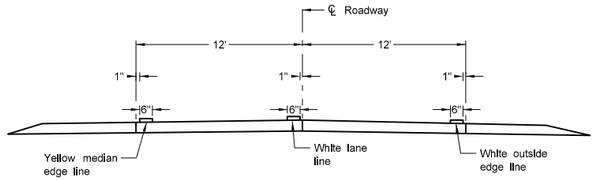
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 11/22/23 ENGINEER NORTH DAKOTA

PAVEMENT MARKING

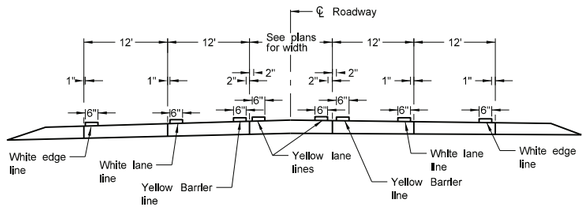
D-762-4



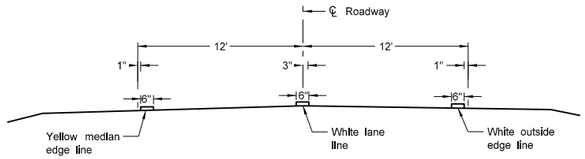
Two Lane Two Way
RURAL ROADWAY



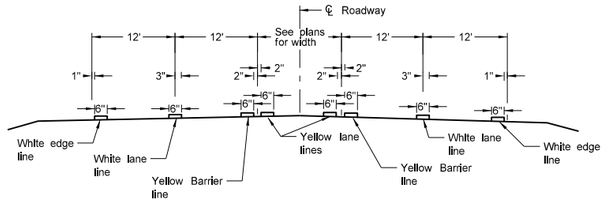
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



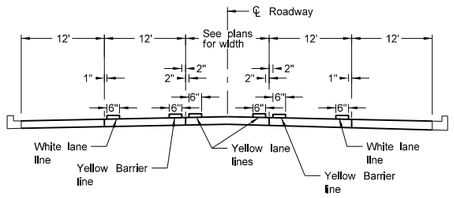
RURAL FIVE LANE ROADWAY
Concrete Section



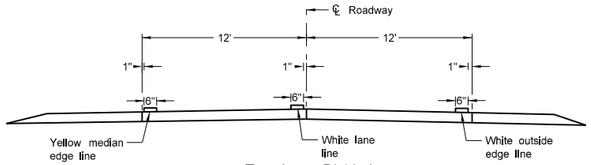
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphat Section



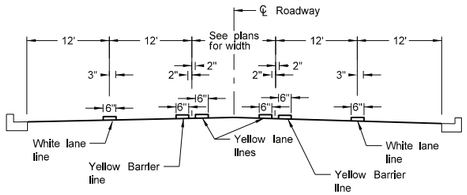
RURAL FIVE LANE ROADWAY
Asphalt Section



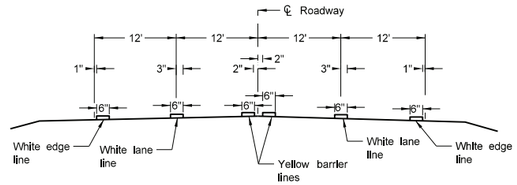
URBAN FIVE LANE SECTION
Concrete Section



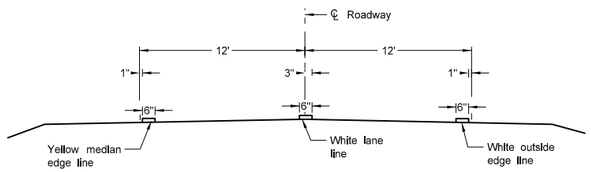
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



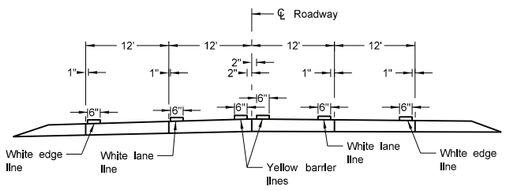
URBAN FIVE LANE SECTION
Asphalt Section



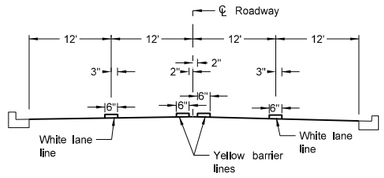
RURAL FOUR LANE ROADWAY
Asphalt Section



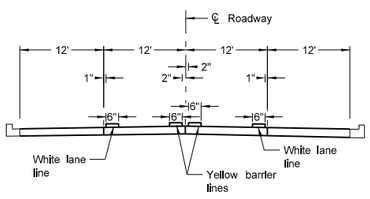
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



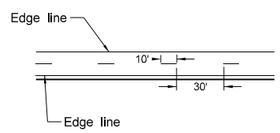
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

1. Continue edge lines through private drives and field drives. Break edge lines for intersections.

   For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.

2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.

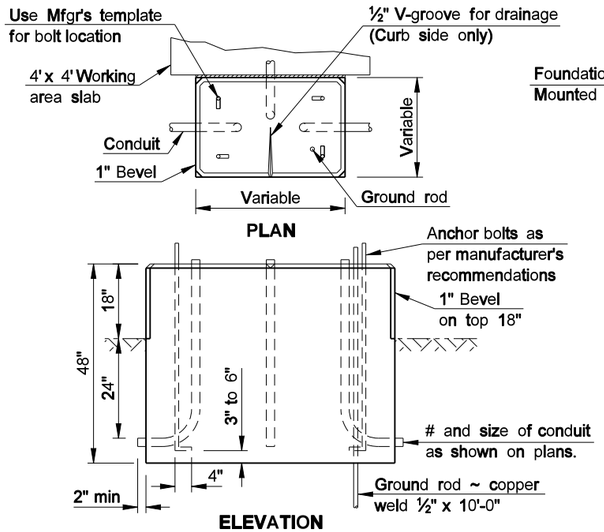
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
07-09-24	Modified Note 1.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
07/09/24
ENGINEER
NORTH DAKOTA

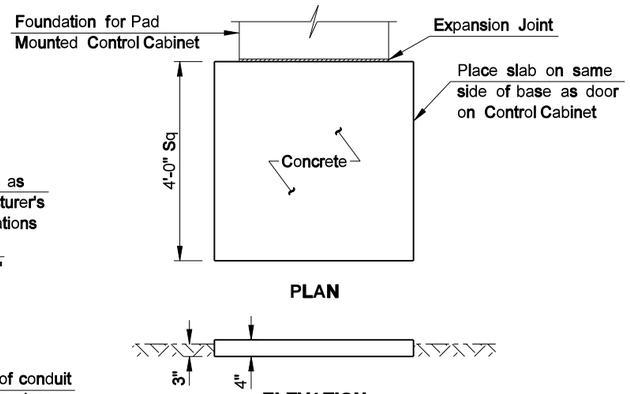
CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

D-770-1



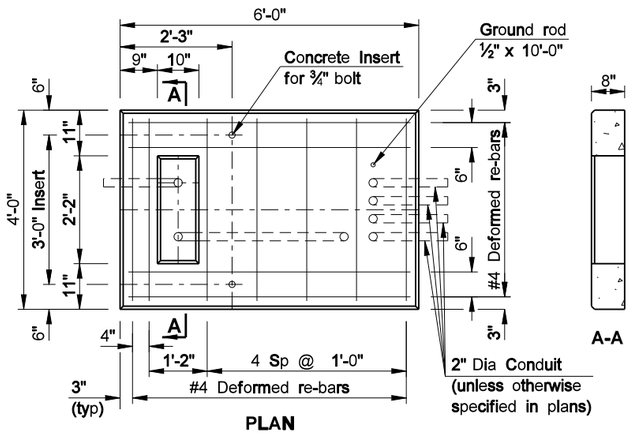
CONTROLLER CABINET FOUNDATION PAD MOUNT

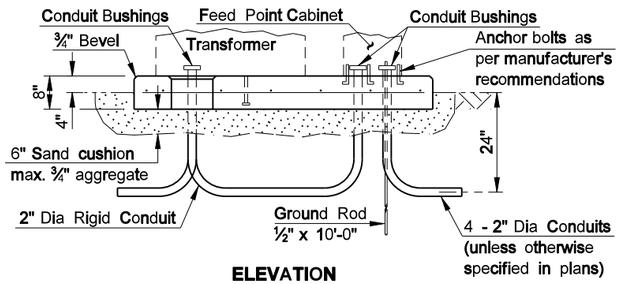
The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.



WORKING AREA SLAB

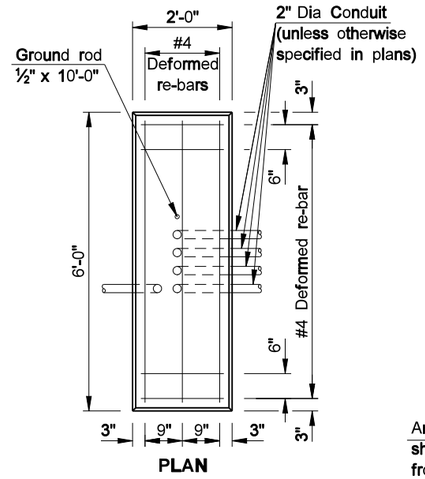
The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

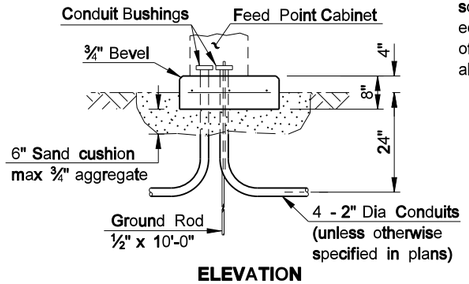




TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

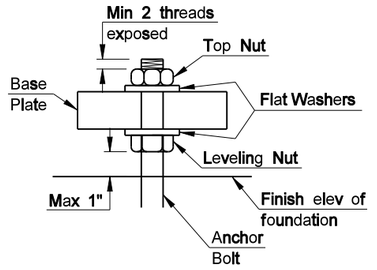
The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.



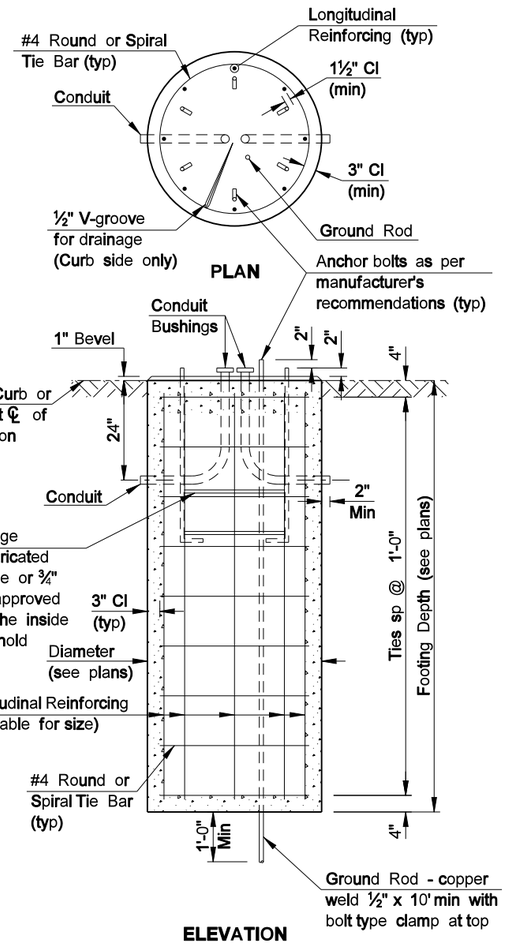


FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.



ANCHOR BOLT DETAIL



LIGHT & SIGNAL STANDARD FOUNDATION

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS: See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controler cabinet and the foundation by caulking, except for V-groove.

WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

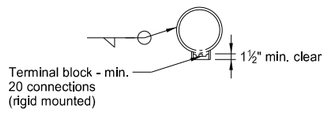
FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

LIGHT & SIGNAL FOUNDATION TABLE	
FOOTING DEPTH (ft)	LONGITUDINAL REINFORCING
≤ 12	8 - #5
13 - 14	8 - #6
15 - 16	8 - #7
17 - 19	8 - #8

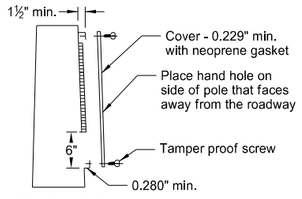
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Terrence R. Udland Registration Number PE- 2674 , on 6/15/10 and the original document is stored at the North Dakota Department of Transportation

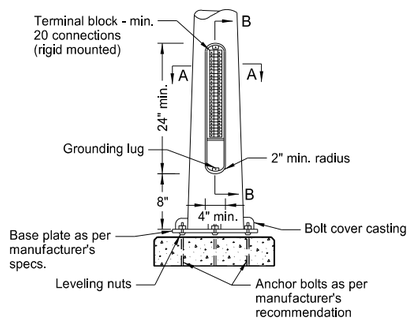
TRAFFIC SIGNAL STANDARDS



Section A-A

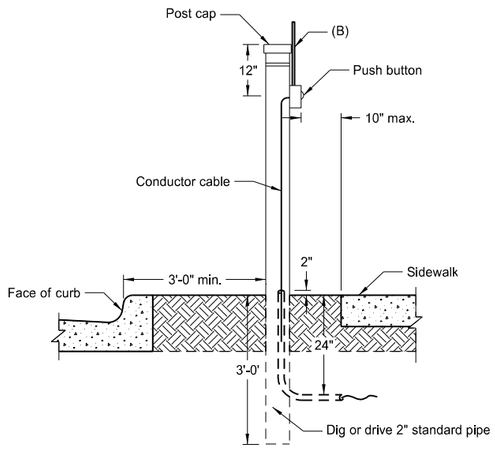


Section B-B

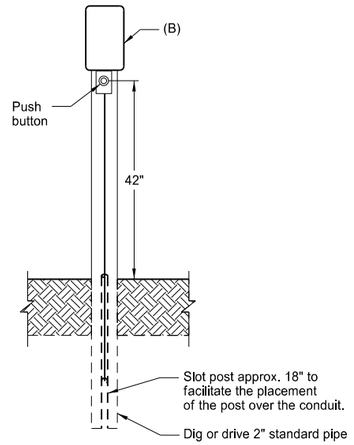


Alternate Signal Standard Base

For use only with Type V, VI, and VII signal standards.

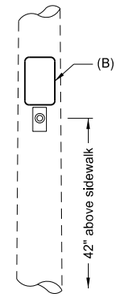


Side View

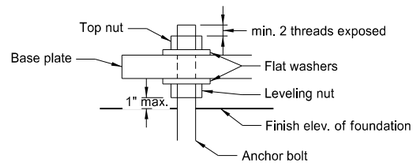


Front View

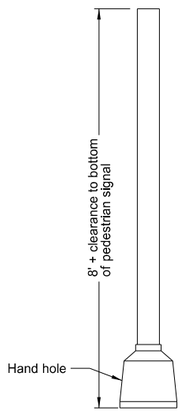
Pedestrian Push Button Post Details (A)



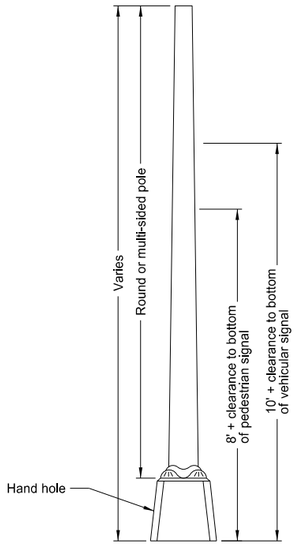
Signal Standard Mounted
Pedestrian Push Button Detail



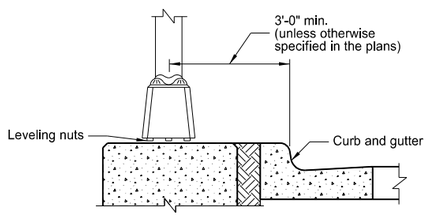
Anchor Bolt Detail

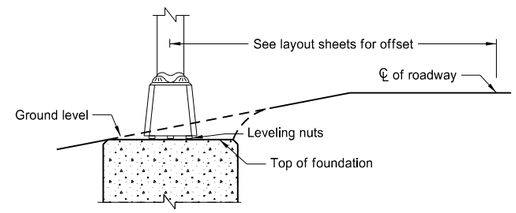


Type II



Type V, VI, VII





Signal Standard
Minimum Clearance Details

(A) Use positioning of the sign, pushbutton, and direction of arrow to clearly indicate which crosswalk is actuated by the push button. Place type of sign based on the jurisdiction in which placed.

(B) Attach sign to post using rust resistant 0.081 aluminum bracket and banding. See Standard Signs book for dimensions and legend series. See plans for type of sign.

Notes:

Signal Heads: See traffic signal layout for correct mounting position, number, size, and arrangement of lenses.

Steel Standards: Place signal standard a minimum of 3 ft. from the face of the curb to center of signal standard, unless shown otherwise on layout sheets.

Paint: See note sheet for required color of paint.

Transformer Base: In lieu of transformer base use alternate signal standard base.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-14-13	
REVISIONS	
DATE	CHANGE
10-17-17 10-25-19	Updated to active voice. Added 10" dim for ped pushbutton.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/25/19 and the original document is stored at the North Dakota Department of Transportation