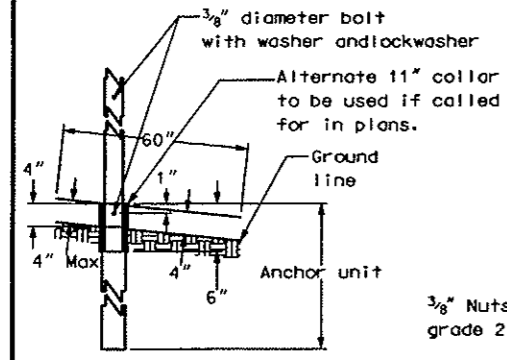
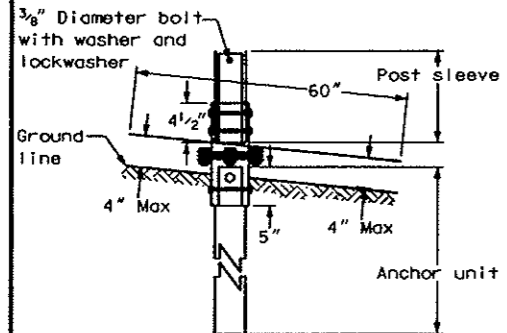


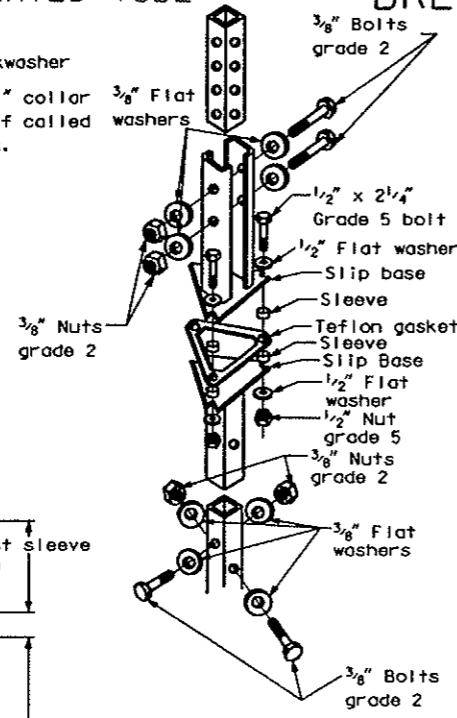
PERFORATED TUBE



Anchor Unit and Post Sleeve Assembly



Slip Base Anchor Unit and Post Sleeve Assembly



Slip Base Assembly Details

Notes

- Slip base bolts shall be torqued as specified by the manufacturer.
 - The 2 3/16 inch size 10 gauge is shown as 2.19 inch size on the plans. The 2 1/2 inch size 10 gauge is shown as 2.51 inch size on the plans.
- A - See Anchor for 2 1/2 inch 10 gauge posts detail.
 B - The 2 1/2 inch 12 gauge posts do not need slip bases when placed in standard soils. The breakaway base is required when the support is placed in weak soils. Weak soils are defined as boggy, wet or loose soil areas. The Engineer shall determine if soils are weak.

| TELESCOPING PERFORATED TUBE | | | | | | |
|-----------------------------|-----------|----------------------|-------------|-------------|----------------------|-----------|
| NUMBER OF POSTS | POST SIZE | WALL THICKNESS GAUGE | SLEEVE SIZE | ANCHOR SIZE | WALL THICKNESS GAUGE | SLIP BASE |
| 1 | 2 | 12 | | 2 1/4 | 12 | NO |
| 1 | 2 1/4 | 12 | | 2 1/2 | 12 | NO |
| 1 | 2 3/8 | 10 | | 2 1/2 | 12 | YES |
| 1 | 2 1/2 | 12 | | A | 3/8 | B |
| 1 | 2 1/2 | 10 | | A | 3/8 | YES |
| 1 | 2 1/4 | 12 | 2 | 2 1/2 | 12 | YES |
| 1 | 2 1/2 | 12 | 2 1/4 | 2 1/2 | 12 | YES |
| 2 | 2 | 12 | | 2 1/4 | 12 | NO |
| 2 | 2 1/4 | 12 | | 2 1/2 | 12 | NO |
| 2 | 2 3/8 | 10 | | 2 1/2 | 12 | YES |
| 2 | 2 1/2 | 12 | | 2 1/2 | 12 | YES |
| 2 | 2 1/2 | 10 | | A | 3/8 | YES |
| 2 | 2 1/4 | 12 | 2 | 2 1/2 | 12 | YES |
| 2 | 2 1/2 | 12 | 2 1/4 | 2 1/2 | 12 | YES |
| 3 & 4 | 2 1/2 | 12 | | 2 1/2 | 12 | YES |
| 3 & 4 | 2 1/2 | 10 | | A | 3/8 | YES |
| 3 & 4 | 2 1/2 | 12 | 2 1/4 | 2 1/2 | 12 | YES |
| 3 & 4 | 2 1/4 | 12 | 2 | 2 1/2 | 12 | YES |
| 3 & 4 | 2 1/2 | 10 | 2 3/8 | A | 3/8 | YES |

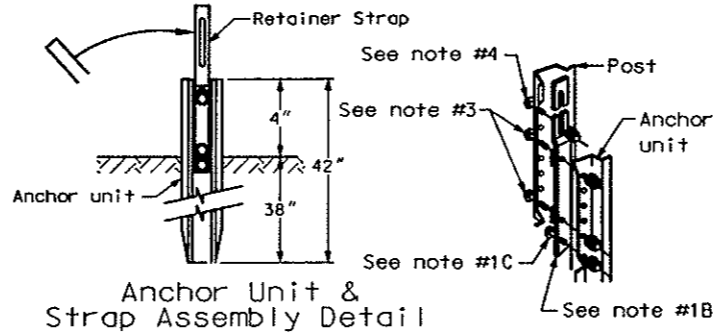
| TELESCOPING PERFORATED TUBES | | | | | | |
|------------------------------|--------------------|---------------------|----------------------|-------------------------|------------------------|-----------------------|
| TUBE SIZE IN. | WALL THICKNESS IN. | U.S. STANDARD GAUGE | WEIGHT PER FOOT LBS. | MOMENT OF INERTIA IN. 4 | CROSS SECT. AREA IN. 2 | SECTION MODULUS IN. 3 |
| 1 1/2 x 1 1/2 | .105 | 12 | 1.702 | .129 | .380 | .172 |
| 2 x 2 | .105 | 12 | 2.416 | .372 | .590 | .372 |
| 2 1/4 x 2 1/4 | .105 | 12 | 2.773 | .561 | .695 | .499 |
| 2 3/8 x 2 3/8 | .135 | 10 | 3.432 | .605 | .841 | .590 |
| 2 1/2 x 2 1/2 | .105 | 12 | 3.141 | .804 | .803 | .643 |
| 2 1/2 x 2 1/2 | .135 | 10 | 4.006 | .979 | 1.010 | .785 |
| 4 x 4 | .250 | 1/2 | 6.600 | 3.046 | 1.940 | 1.05 |

BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

3 LB/FT U POSTS

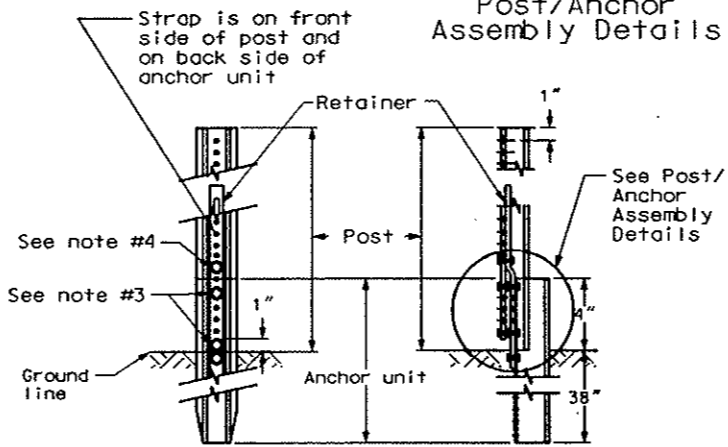
D-704-8

FLANGED CHANNEL

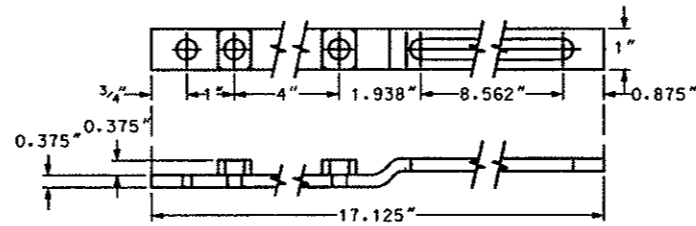


Anchor Unit & Strap Assembly Detail

Post/Anchor Assembly Details



Front View Side View Sign Post Assembly Detail

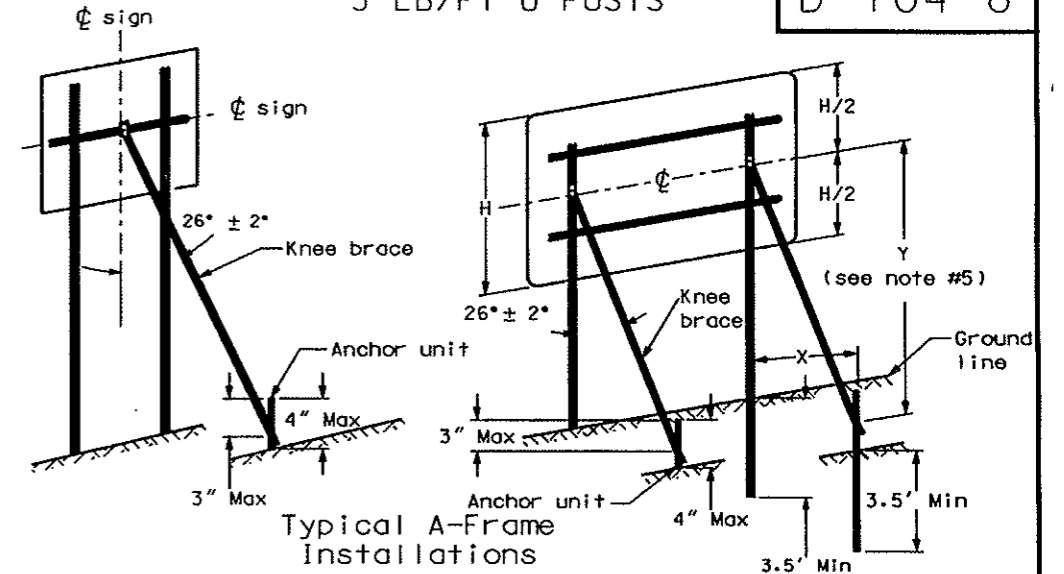


Retainer/Spacer Strap Detail

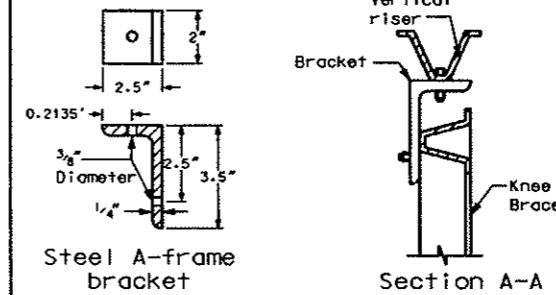
| CHANNEL SIZE IN. | WALL THICKNESS IN. | WEIGHT PER FOOT LBS. | MOMENT OF INERTIA IN. 4 | CROSS SECT. AREA IN. 2 | SECTION MODULUS IN. 3 |
|------------------|--------------------|----------------------|-------------------------|------------------------|-----------------------|
| 1.516 x 3.125 | .116 | 2.00 | .179 | .590 | .225 |
| 1.532 x 3.125 | .124 | 2.25 | .201 | .648 | .254 |
| 1.562 x 3.125 | .132 | 2.50 | .233 | .748 | .289 |
| 1.578 x 3.125 | .140 | 2.75 | .271 | .859 | .329 |
| 1.750 x 3.500 | .150 | 3.00 | .372 | .918 | .403 |
| 1.750 x 3.500 | .175 | 4.00 | .500 | 1.190 | .560 |

Notes

- A) Drive anchor unit to within 12 inch of ground level.
 B) Proper assembly established by lining up the top 3/4 inch slot of retainer spacer strap with top hole of anchor unit.
 C) Assemble strap to back of anchor unit using 3/8 inch-16 UNC x 2.0 inch long bolt, lock washer & nut.
 D) Rotate strap 90 degrees to left.
- A) Drive anchor unit to 4 inch dimension.
 B) Rotate strap to vertical position.
- A) Place 3/8 inch-16 UNC x 2 inch bolt, lock washer & nut in bottom of sign post to facilitate alignment of sign post with proper hole in anchor unit (this coincides with the bottom 3/4 inch slot in the strap).
 B) Alternately tighten two connector bolts.
 A) Complete assembly by tightening 3/8 inch-16 UNC x 2 inch long retainer bolt (this fastens sign post to retainer spacer strap).
- The base post, strap & sign post shall be properly nested. Proper nesting occurs when all flat surfaces of the base post, strap & sign post at the bolts have full contact across the entire width.



Typical A-Frame Installations

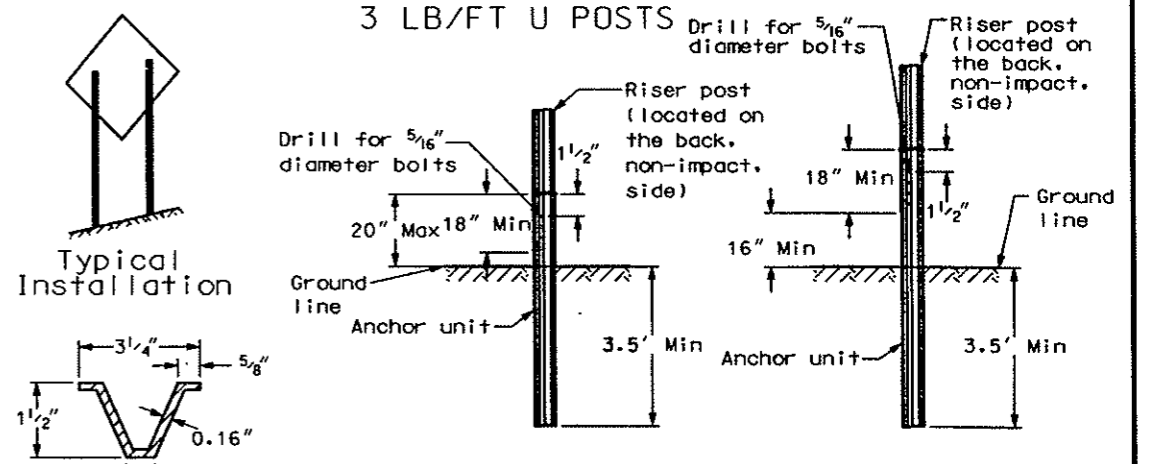


Steel A-frame bracket

Section A-A

Notes

- Use 3 lb/ft riser anchor units, risers, stringers, knee braces, lateral braces and knee brace anchor units. Offset knee brace anchor unit 1 inch toward roadway relative to vertical post.
- Use 5/16 inch bolts, washers and nuts for all connections. A splice shall overlap 12 inch minimum and have bolts in the top and bottom holes of the splice.
- Driven riser anchor units shall be at least 7 feet long and embedded at least 3.5 feet. Bracing anchor units shall be no more than 4 feet above the ground and embedded at least 3.5 feet.
- 0.5Y = X +/- 6 inches



Typical Installation

U-Post Detail (3 lb/ft)

U-Channel Splice Option 1

U-Channel Splice Option 2

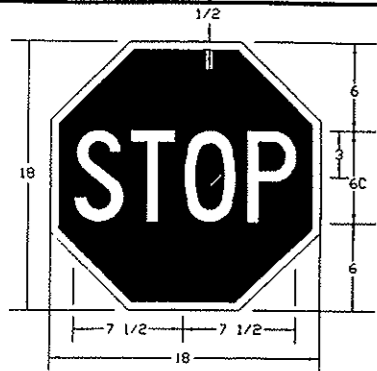
Notes

- Use 3 lb/ft riser anchor units and risers
- Driven riser posts shall be at least 7 feet long and embedded at least 3.5 feet.
- Use 5/16 inch bolts, washers and nuts for all connections. A splice shall overlap 18 inch as a minimum.
- Anchor unit for guy wires shall be no more than 4 feet above ground and embedded at least 3.5 feet.

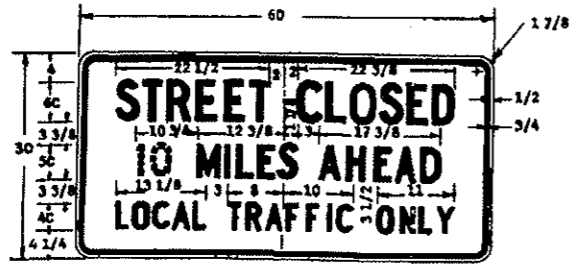
| 7-28-93 REVISIONS | |
|-------------------|--------------------|
| DATE | CHANGE |
| 5-11-94 | U-post |
| 7-19-95 | U-post splice |
| 5-13-96 | Table & option 1 |
| 7-3-97 | U-post anchor unit |

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
 APPROVED: [Signature] DESIGN ENGINEER

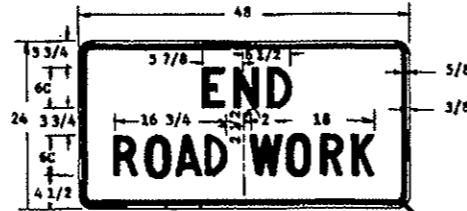
CONSTRUCTION SIGN DETAILS



STOP-SLOW PADDLE
RED & WHITE
FLAGPERSON PADDLE



R11-3c-60
BLACK & WHITE



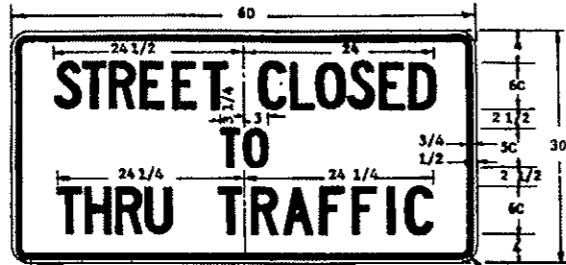
G20-2a-48
BLACK & ORANGE



G20-8-48
BLACK & ORANGE



R11-2-48
BLACK & WHITE

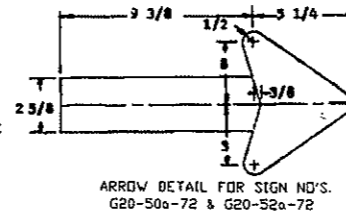


R11-4a-60
BLACK & WHITE

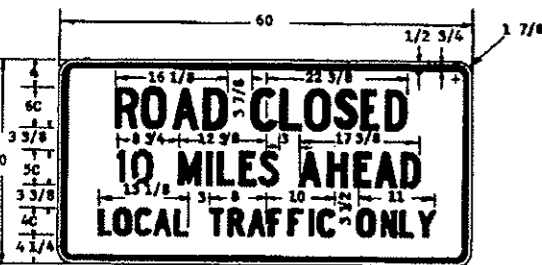


G20-4-36
BLACK & ORANGE

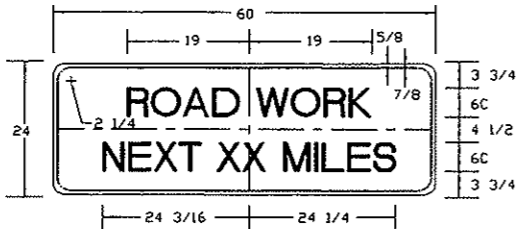
PILOT CAR SIGN SHALL BE MOUNTED ON REAR OF A VEHICLE USED FOR GUIDING CONTROLLED ONE-WAY TRAFFIC THROUGH A CONSTRUCTION AREA.



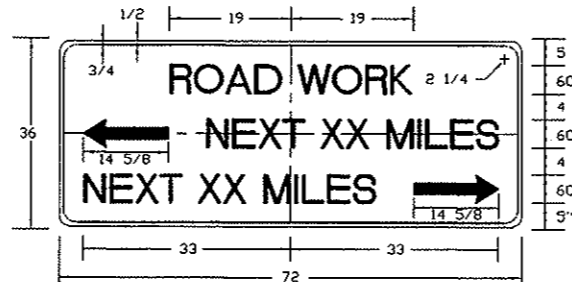
ARROW DETAIL FOR SIGN NO'S.
G20-50a-72 & G20-52a-72



R11-3a-60
BLACK & WHITE



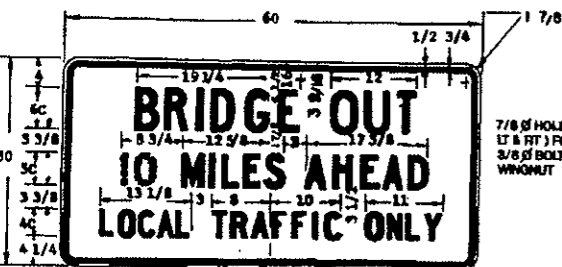
G20-1a-60
BLACK & ORANGE



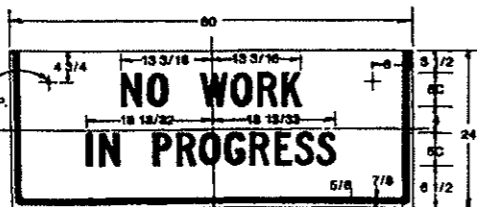
G20-50a-72
BLACK & ORANGE



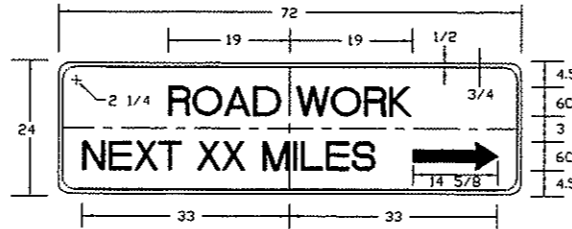
R11-2A-48
BLACK & WHITE



R11-3b-60
BLACK & WHITE

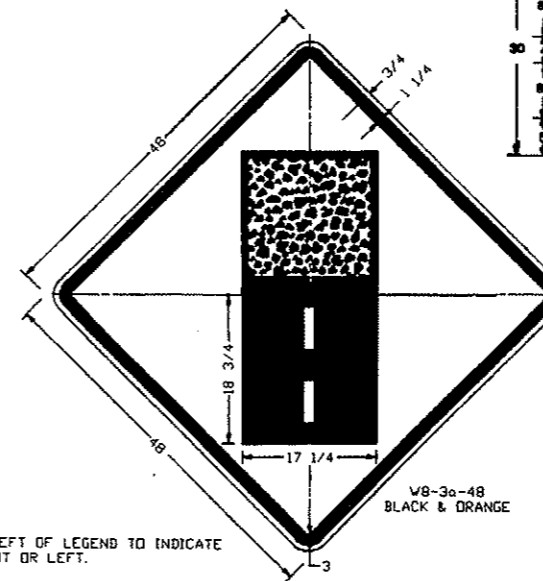


G20-1b-60
DOUBLE FACE SIGN
LEGEND: BLACK (NON-REFL.)
BACKGROUND: ORANGE

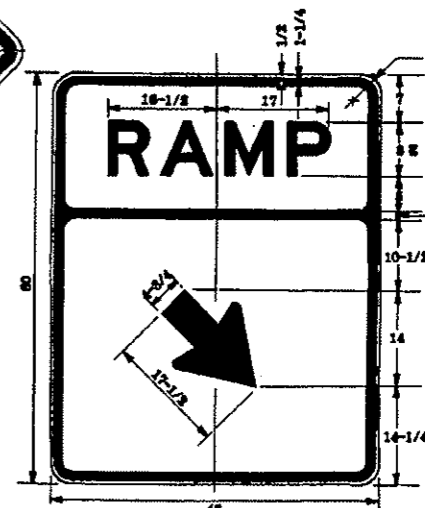


G20-52a-72
BLACK & ORANGE

ARROW MAY BE RIGHT OR LEFT OF LEGEND TO INDICATE CONSTRUCTION TO THE RIGHT OR LEFT.



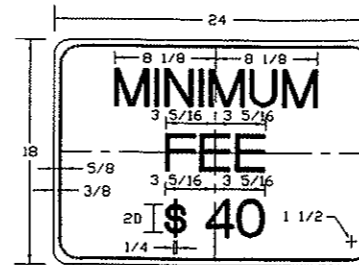
V8-3a-48
BLACK & ORANGE



W13-4-48
BLACK & ORANGE



G20-54-48
BLACK & ORANGE



R2-1a-24
BLACK & WHITE

| 10-1-86 | |
|-----------|------------------------------------|
| REVISIONS | |
| DATE | CHANGE |
| 5-1-92 | GENERAL REVISIONS |
| 7-26-95 | ADD SIGNS G20-1a, G20-50a, & R2-1a |
| 3-4-96 | REMOVE G20-2-60 |

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
APPROVED: *Frank C. Lee*
DESIGN ENGINEER