

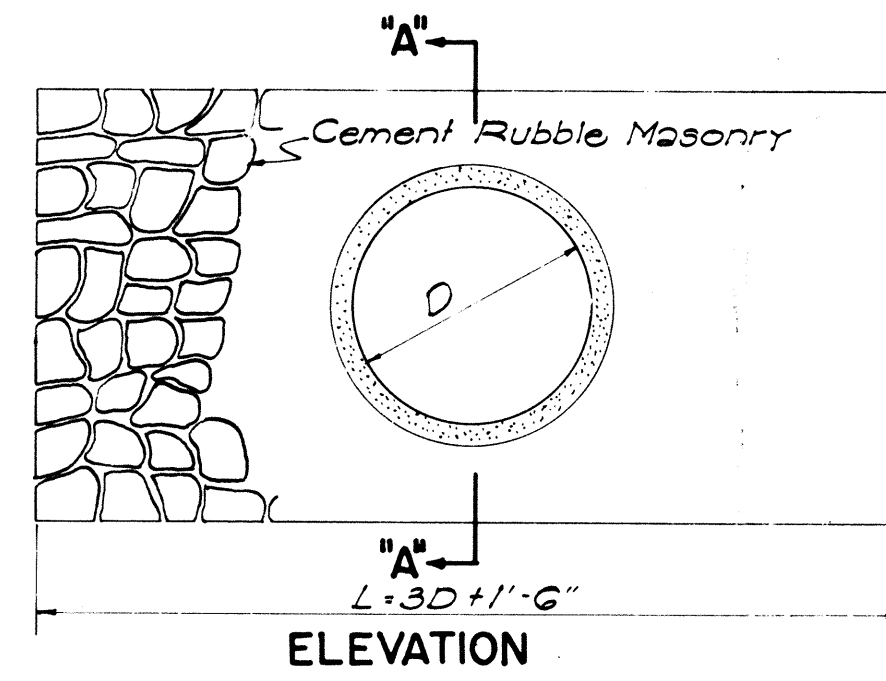
| DATA FOR OUTLET DITCH |     |       |       |  |
|-----------------------|-----|-------|-------|--|
| D                     | W   | H     | T+H+H |  |
| 18"                   | 24" | 2'-0" | 4'-0" |  |
| 24"                   | 30" | 2'-0" | 4'-6" |  |
| 30"                   | 30" | 2'-6" | 5'-0" |  |
| 36"                   | 36" | 3'-0" | 6'-0" |  |

DETAIL OF OUTLET DITCH  
Scale: 1/2" = 1'-0"

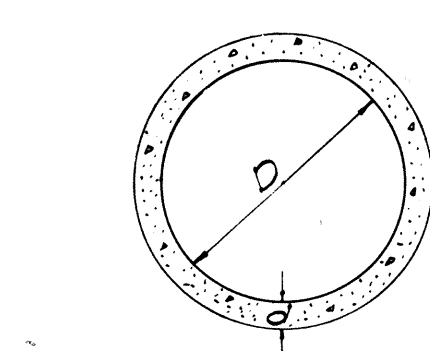
| DATA FOR MASONRY DROP INTAKE |     |        |         |       | Where Variables Equal |
|------------------------------|-----|--------|---------|-------|-----------------------|
| D'                           | D   | L+D+G' | Cu Yds. |       |                       |
| 23"                          | 18" | 2'-5"  | 3.02    | 4'-6" |                       |
| 30"                          | 24" | 3'-0"  | 3.61    | 5'-0" |                       |
| 37"                          | 30" | 3'-7"  | 4.21    | 5'-6" |                       |
| 44"                          | 36" | 4'-2"  | 4.85    | 6'-0" |                       |

NOTE:  
Dimension "X" is assumed as 2'-4" in figuring the above quantities.

| DATA - MASONRY HEADWALL |       |       |        |  | Cast-in-Place Conc. Culvert | Corrugated Pipe Culvert |
|-------------------------|-------|-------|--------|--|-----------------------------|-------------------------|
| D                       | H     | B     | L      |  | Cu Yds.                     | Cu Yds.                 |
| 18"                     | 3'-6" | 1'-0" | 6'-0"  |  | 0.85                        | 0.03                    |
| 24"                     | 4'-0" | 2'-0" | 7'-6"  |  | 1.28                        | 1.41                    |
| 30"                     | 4'-6" | 2'-3" | 9'-0"  |  | 2.06                        | 2.00                    |
| 36"                     | 5'-0" | 2'-6" | 10'-6" |  | 2.40                        | 2.72                    |

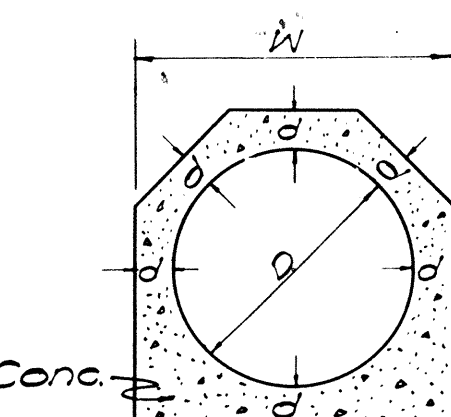


DETAIL OF MASONRY HEADWALL  
Scale: 1/2" = 1'-0"



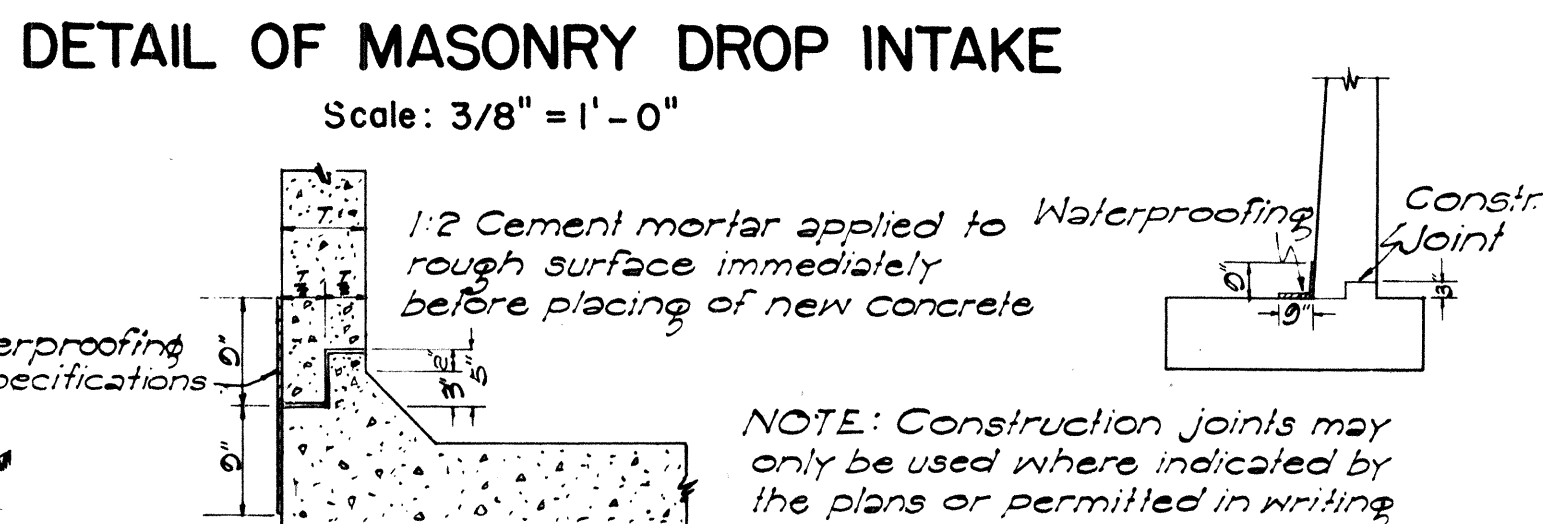
SECTION  
CONC. PIPE CULVERT

NOTE:  
Thickness "d", reinforcing, and concrete used, are to conform with the approved design as provided by the Specifications.

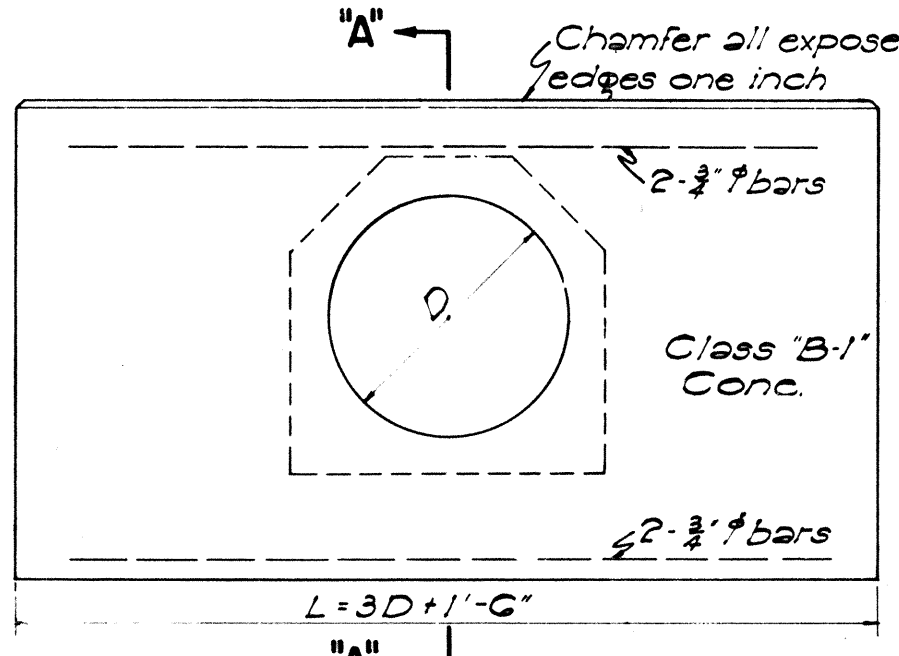


CAST-IN-PLACE  
CONC. CULVERT

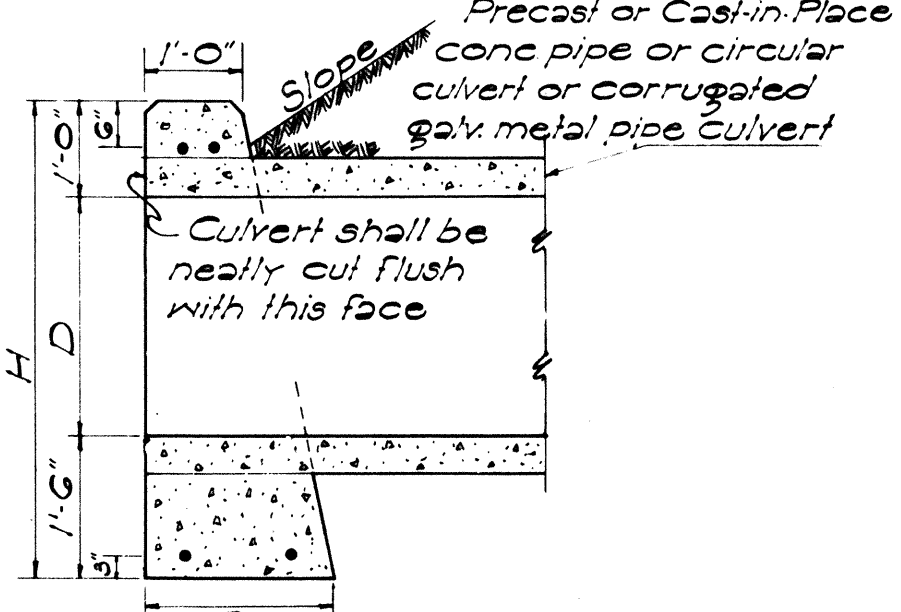
| DATA - CAST-IN-PLACE CONC. CULVERT |        |        |                 |  |
|------------------------------------|--------|--------|-----------------|--|
| D                                  | d      | W      | Cu Yds. per ft. |  |
| 18"                                | 4"     | 2'-2"  | 0.11            |  |
| 24"                                | 4 1/2" | 2'-2"  | 0.14            |  |
| 30"                                | 5"     | 3'-4"  | 0.19            |  |
| 36"                                | 5 1/2" | 3'-11" | 0.26            |  |



CONSTR. JOINT DETAILS



ELEVATION

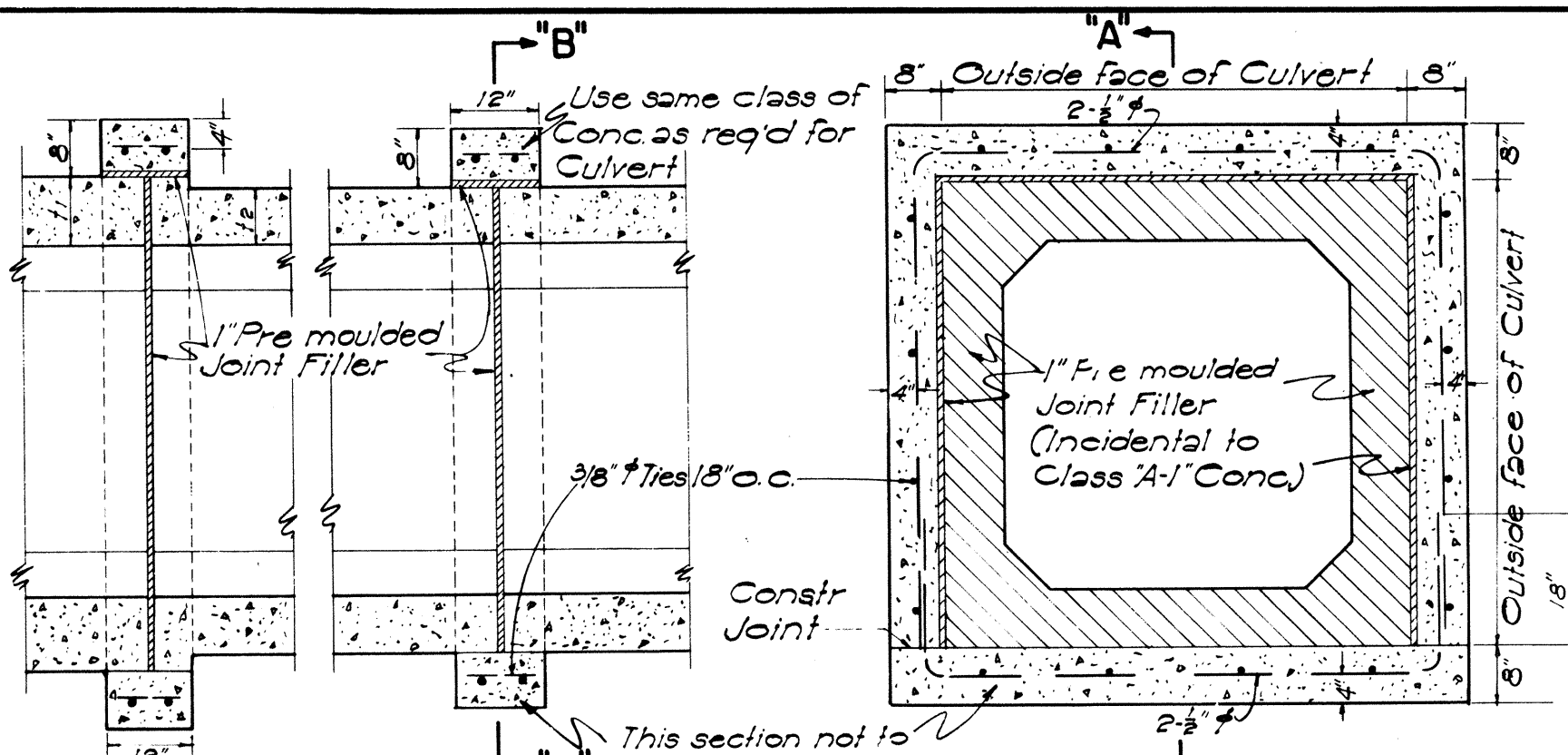


SECTION "A-A"

| DATA FOR CONC. HEADWALL |       |        |       |  | Cast-in-Place Conc. Culvert | Corrugated Pipe Culvert | Steel For One Headwall       |
|-------------------------|-------|--------|-------|--|-----------------------------|-------------------------|------------------------------|
| D                       | B     | L      | H     |  | Cu Yds.                     | Cu Yds.                 | No. of Bars Size Length Lbs. |
| 18"                     | 1'-6" | 6'-0"  | 4'-0" |  | 0.92                        | 1.00                    | 4 #3 5'-6" 33                |
| 24"                     | 1'-6" | 7'-6"  | 4'-6" |  | 1.25                        | 1.38                    | 4 #3 7'-0" 42                |
| 30"                     | 2'-0" | 9'-0"  | 5'-0" |  | 1.95                        | 2.17                    | 4 #3 8'-6" 51                |
| 36"                     | 2'-0" | 10'-6" | 5'-6" |  | 2.45                        | 2.74                    | 4 #3 10'-0" 60               |
| 42"                     | 2'-6" | 12'-0" | 6'-0" |  | 3.87                        | 4.26                    | 4 #3 11'-6" 69               |
| 48"                     | 2'-6" | 13'-6" | 6'-6" |  | 4.66                        | 5.14                    | 4 #3 13'-0" 78               |

DETAIL OF CONCRETE HEADWALL

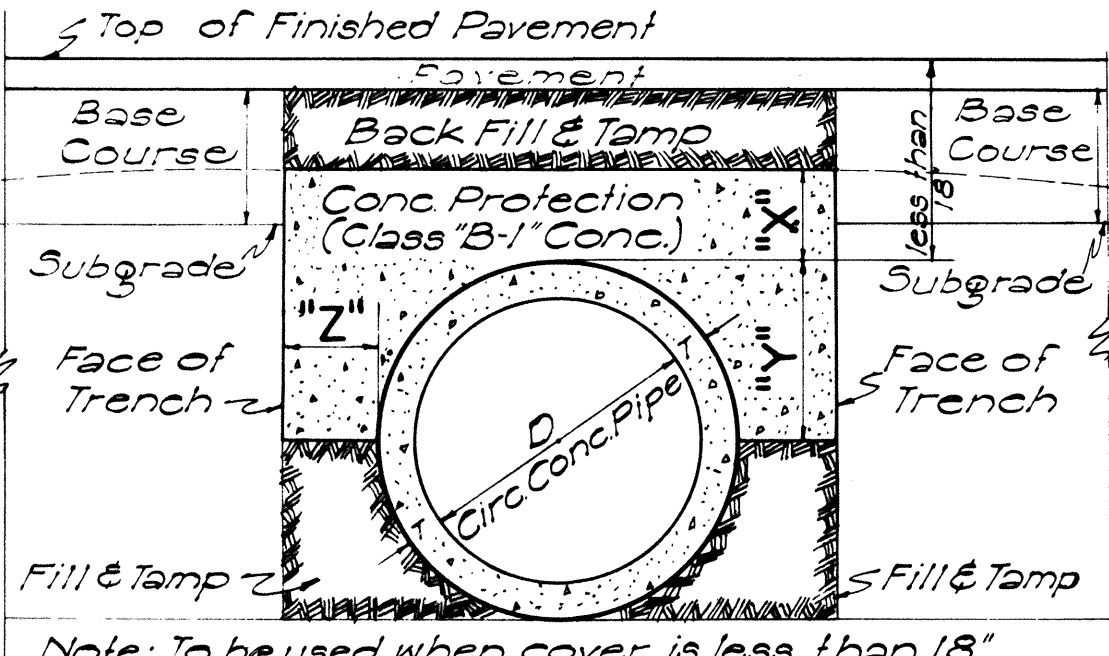
Scale: 1/2" = 1'-0"



SECTION "A-A" SECTION "B-B"  
CONC. COLLAR FOR CONC. BOX CULVERT

Scale: 1/2" = 1'-0"

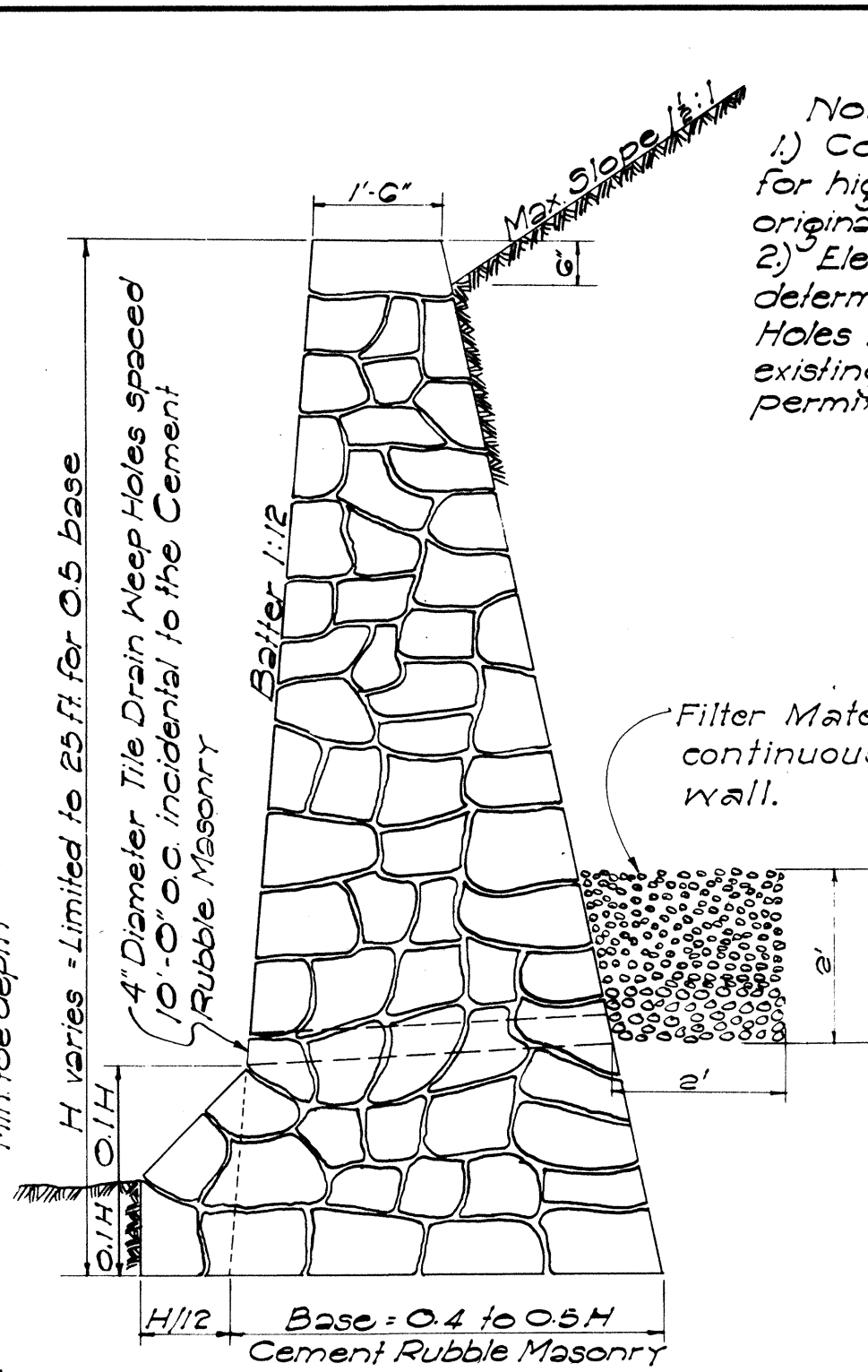
REINFORCING BARS  
All reinforcing bars for concrete shall be Billet Steel bars, ASTM A15, intermediate grade. Steel shall be made by the open-hearth process. All bars shall be deformed type conforming to ASTM A-305.



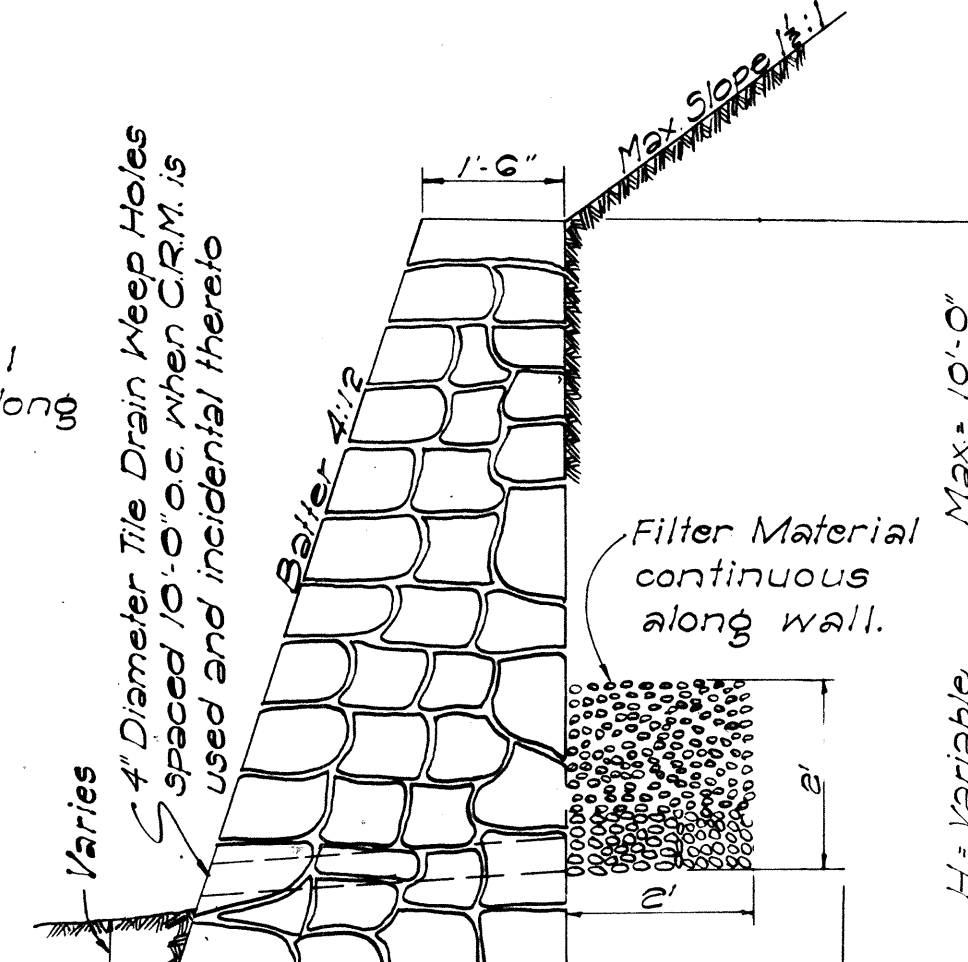
| DATA FOR CONCRETE PROTECTION OVER CULVERTS |   |                                       |
|--------------------------------------------|---|---------------------------------------|
| X                                          | Y | Z                                     |
| 6" for 18"D                                |   | Z must be from pipe to face of trench |
| 7" " 24"D                                  |   |                                       |
| 8" " 30"D                                  |   |                                       |
| 9" " 36"D                                  |   |                                       |
| 10" " 42"D                                 |   |                                       |
| 11" " 48"D                                 |   |                                       |
| 12" " 54"D                                 |   |                                       |

SECT. OF CULVERT WITH CONC. PROTECTION

Scale: 1" = 1'-0"



SECTION OF HIGH CEMENT  
RUBBLE MASONRY RETAINING  
WALL OR SEAWALL

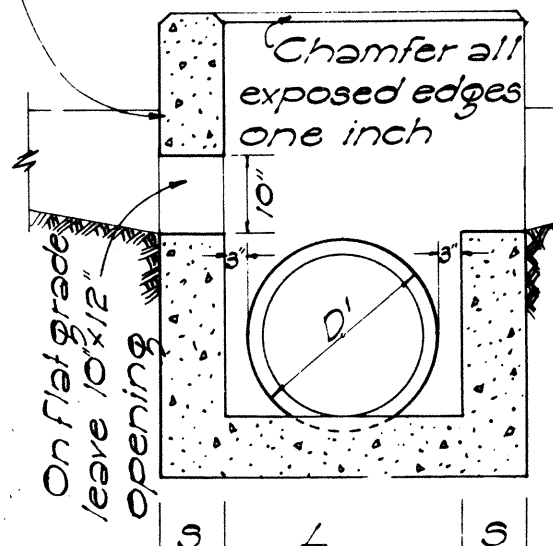


SECTION OF LOW  
MASONRY RETAINING  
WALL OR SEAWALL

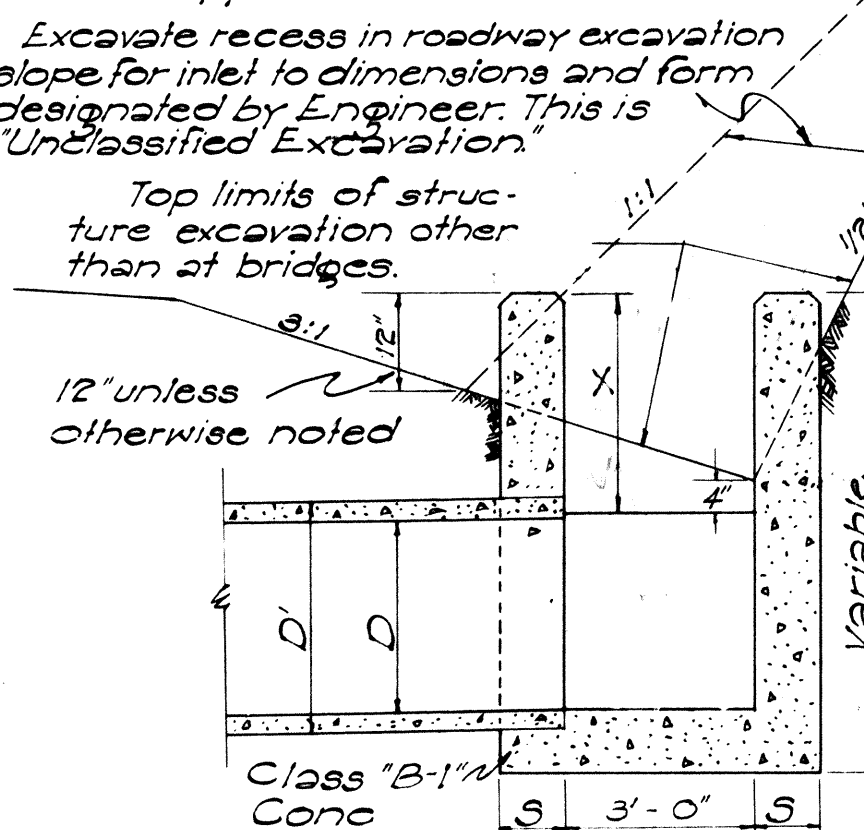
| DATA - CONC. DROP INTAKE |     |        |     |         | Where Variables Equal |
|--------------------------|-----|--------|-----|---------|-----------------------|
| D'                       | D   | L+D+G' | S   | Cu Yds. |                       |
| 23"                      | 18" | 2'-5"  | 8"  | 1.41    | 4'-6"                 |
| 30"                      | 24" | 3'-0"  | 8"  | 1.72    | 5'-0"                 |
| 37"                      | 30" | 3'-7"  | 8"  | 2.32    | 5'-6"                 |
| 44"                      | 36" | 4'-2"  | 8"  | 2.73    | 6'-0"                 |
| 51"                      | 42" | 4'-9"  | 10" | 3.54    | 6'-6"                 |
| 58"                      | 48" | 5'-4"  | 10" | 4.01    | 7'-0"                 |

Note: Dimension "X" is assumed as 2'-4" in figuring the above quantities.

Note: This type of structure shall also be used for the Drop Intakes of Syphons connected with Irrigation Ditches or Flumes with appropriate changes to dimensions. In this case all joints must be made water tight.



SECTION "B-B"

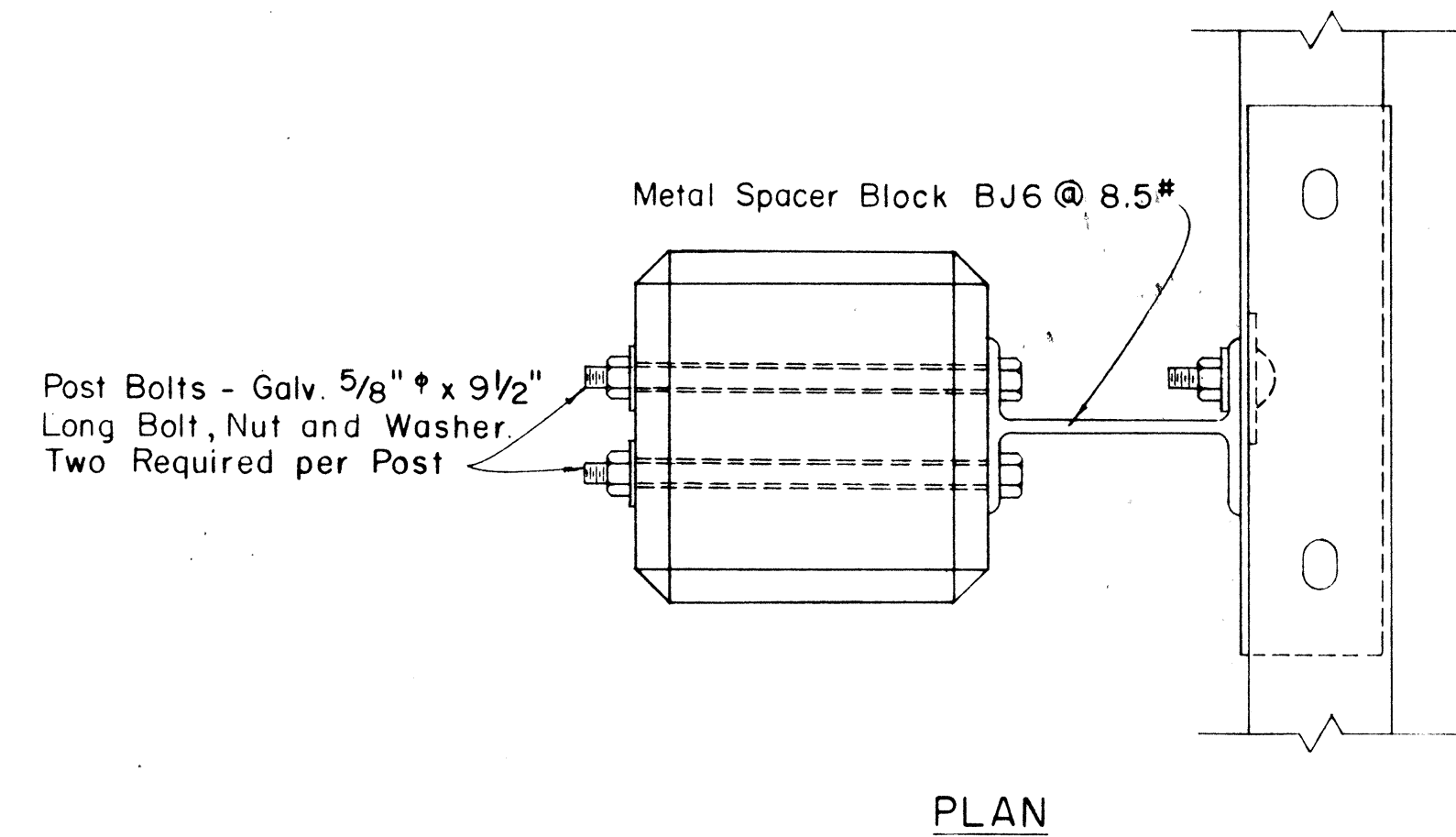
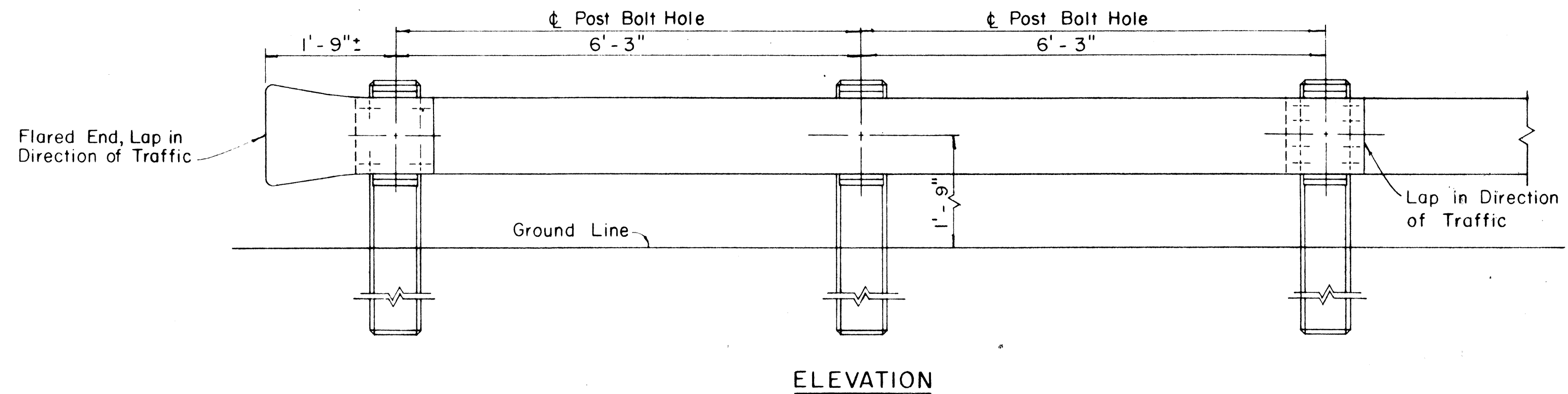
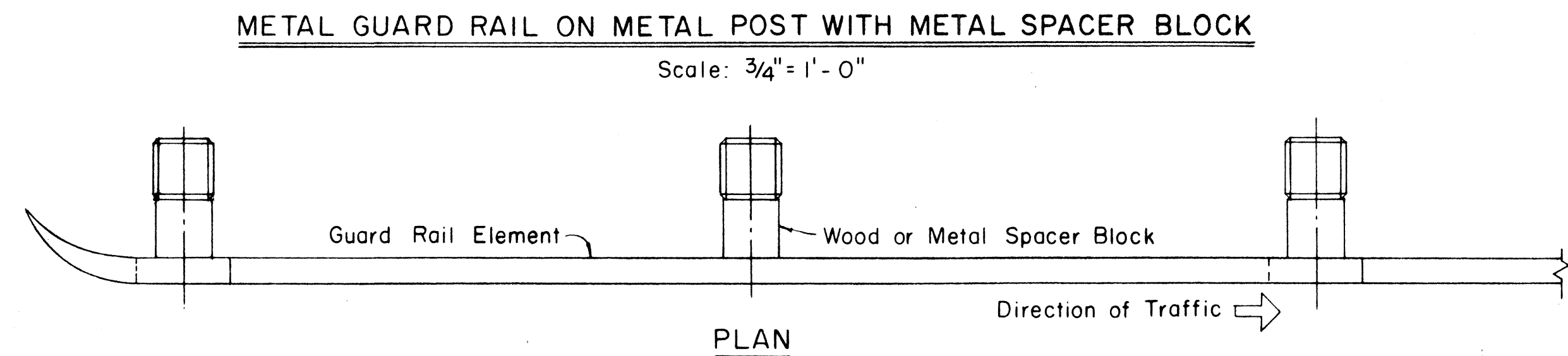
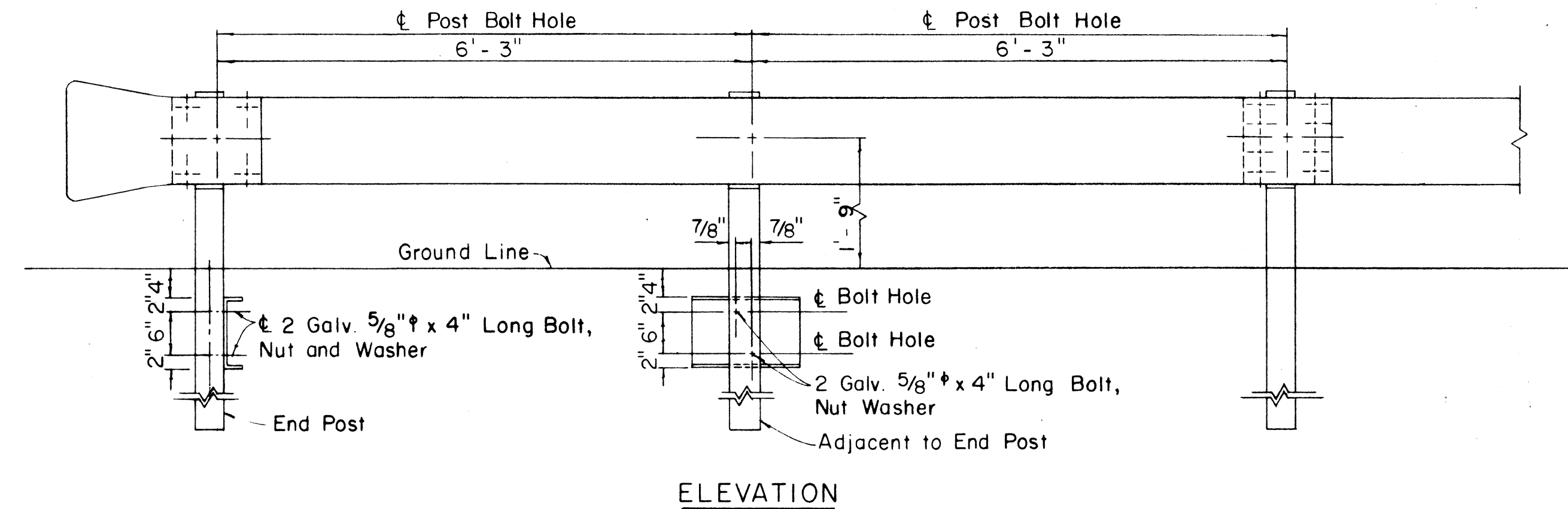
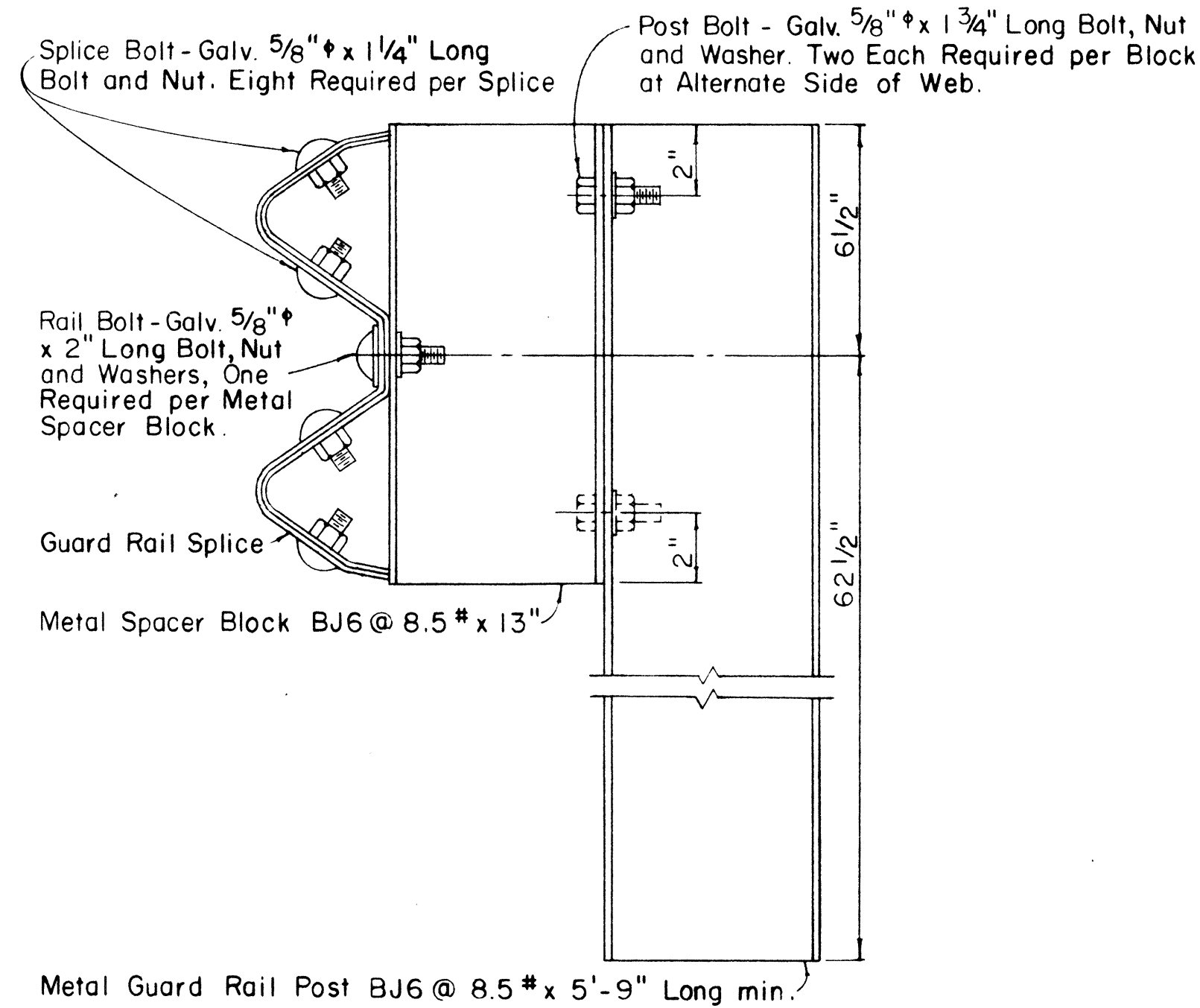
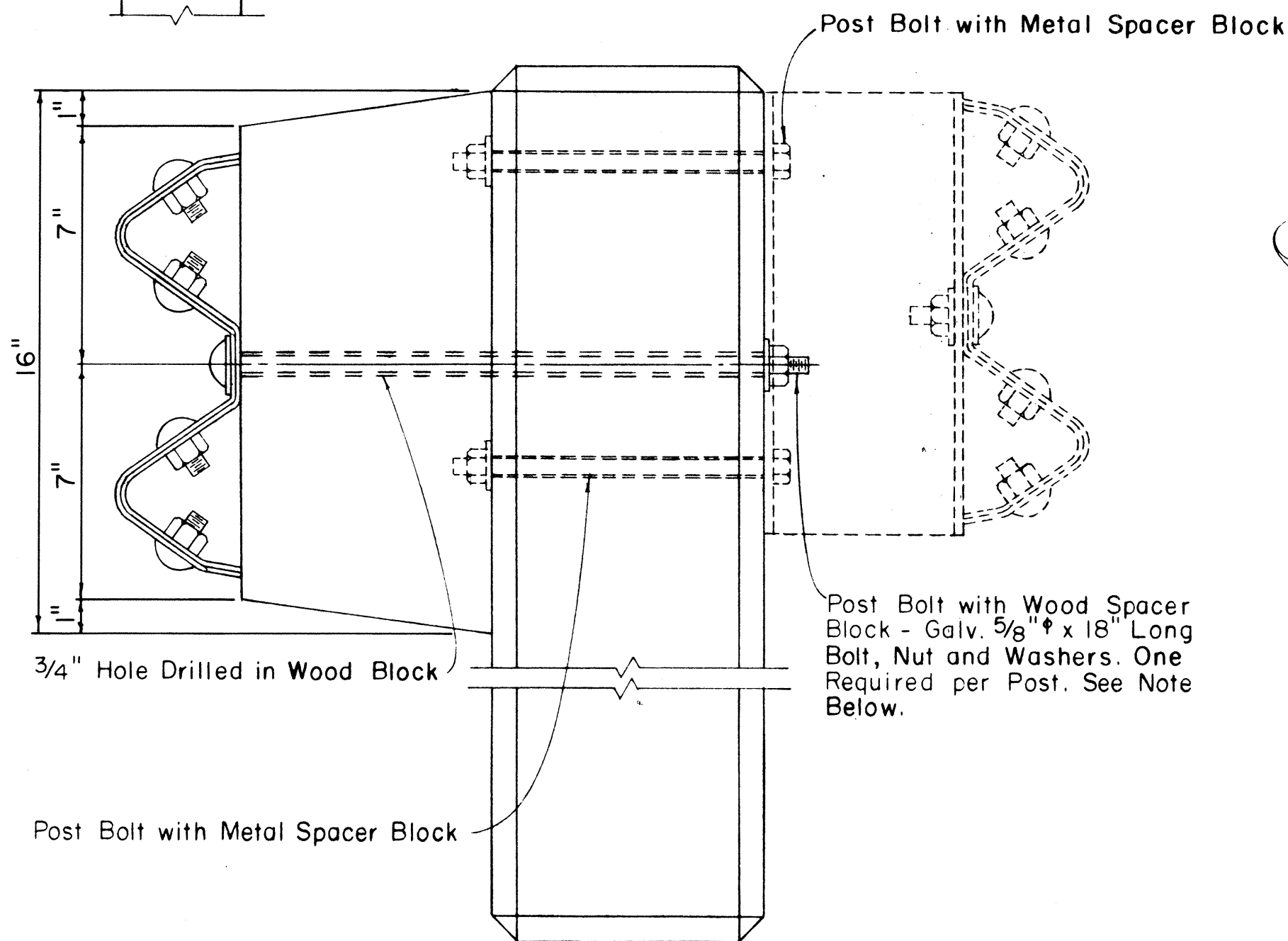
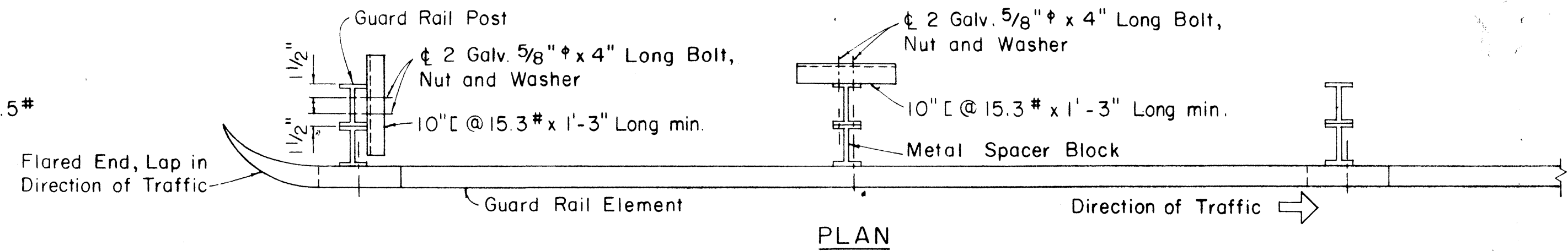
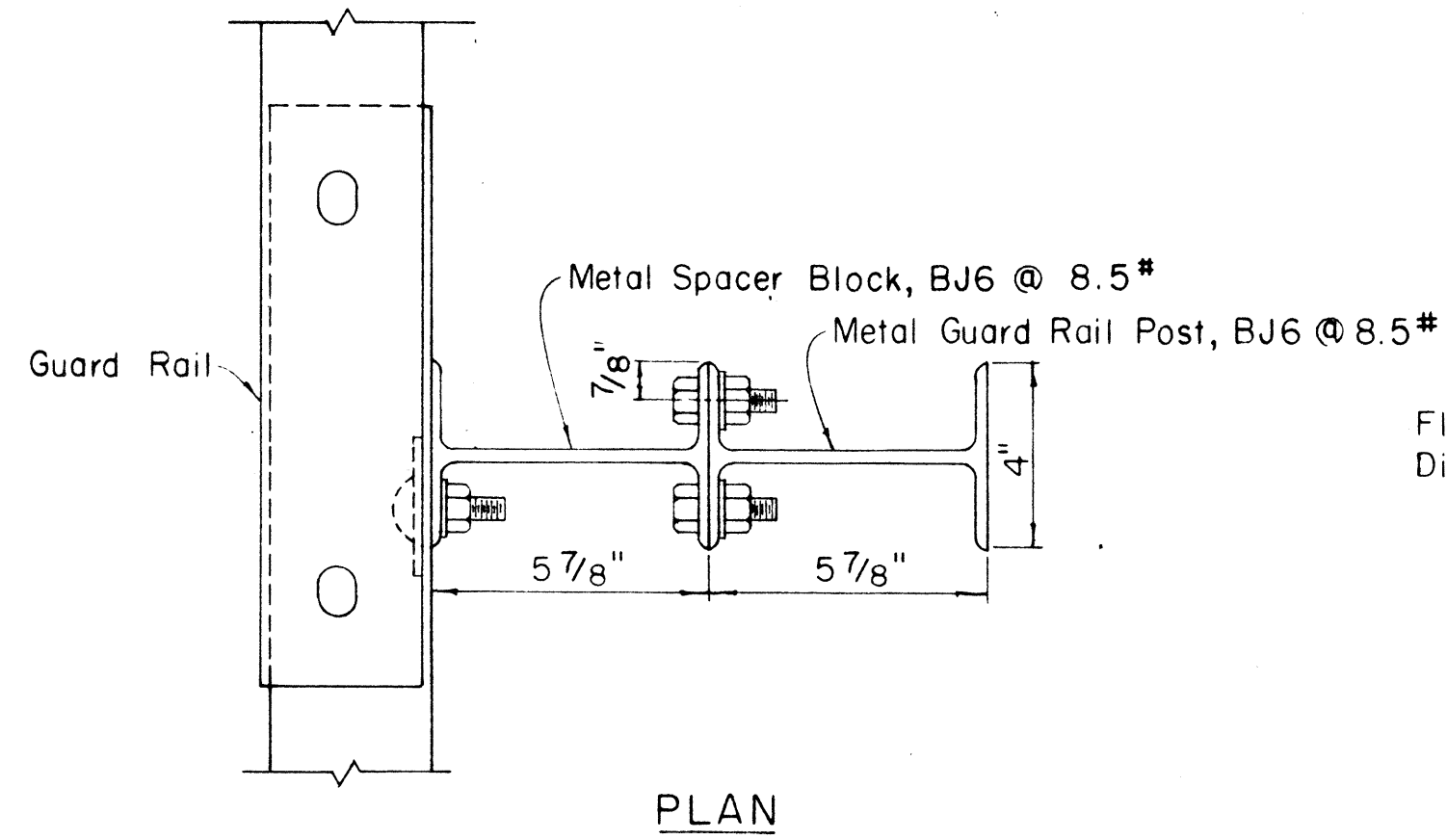
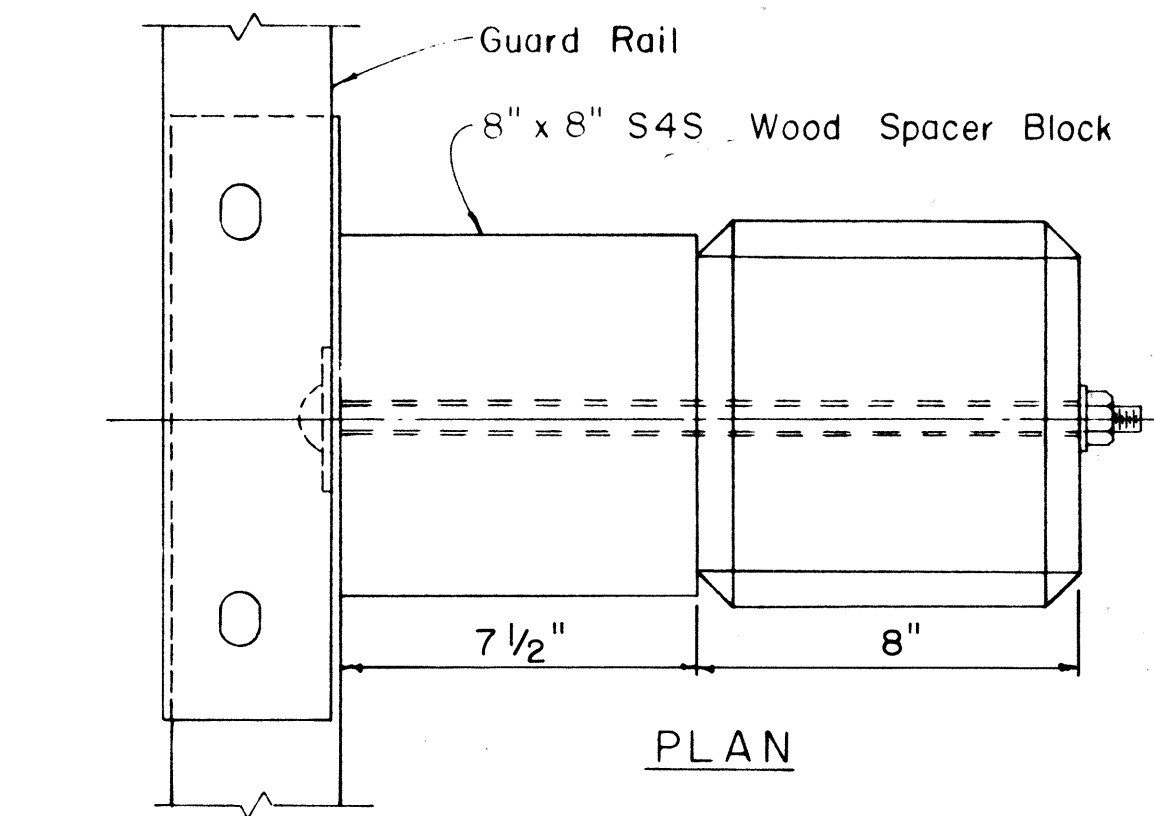


SECTION "A-A"

DETAIL OF CONCRETE DROP INTAKE

Scale: 1/2" = 1'-0"

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  |                    |             |           |              |



**SINGLE METAL GUARD RAIL ON METAL POST WITH METAL SPACER BLOCK**  
Scale: 3" = 1' - 0"

**SINGLE METAL GUARD RAIL ON PRECAST CONCRETE POST WITH WOOD OR METAL SPACER BLOCK**  
Scale: 3" = 1' - 0"

NOTE:  
Single Guard Rails Shown. For Double Guard Rails Additional Spacer Blocks and Rail Elements Required on Opposite Side of Posts. See Bolt Schedule for Required Bolt Lengths.

### DETAILS FOR SINGLE GUARD RAIL

**METAL GUARD RAIL ON CONCRETE POST WITH WOOD OR METAL SPACER BLOCK**  
Scale: 3/4" = 1' - 0"

REVISED: August 10, 1967

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

### STANDARD DETAILS

METAL GUARD RAIL

PROJ. NO. 330C-02-67

Scale: as noted Date: Sept. 8, 1967

SHEET No. OF SHEETS

| DATE        | BY |
|-------------|----|
| DESIGNED BY |    |
| CHECKED BY  |    |
| NOTED BY    |    |
| ORIGINAL    |    |

| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  |                    |             |           |              |

**BOLT DIMENSIONS**

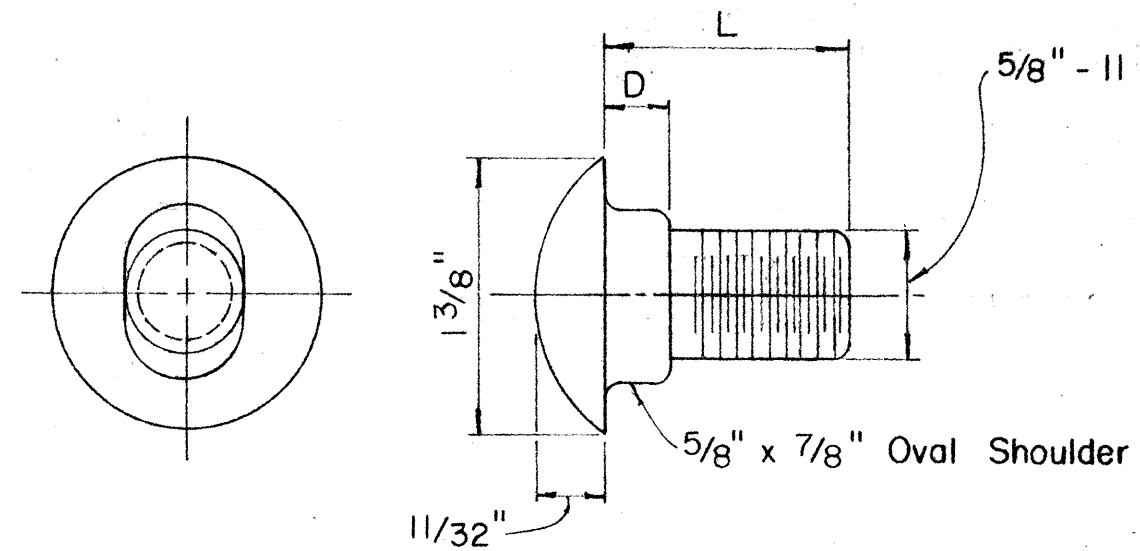
**TYPE A BOLT**

|                                                | D     | L      |
|------------------------------------------------|-------|--------|
| Splice Bolt                                    | 5/16" | 1 1/4" |
| Post Bolt for Conc. Post w/ Double Wood Blocks | 3/32" | 2 5/8" |
| Post Bolt for Conc. Post w/ Single Wood Block  | 3/32" | 1 8/8" |
| Rail Bolt for Metal Block                      | 3/32" | 2"     |

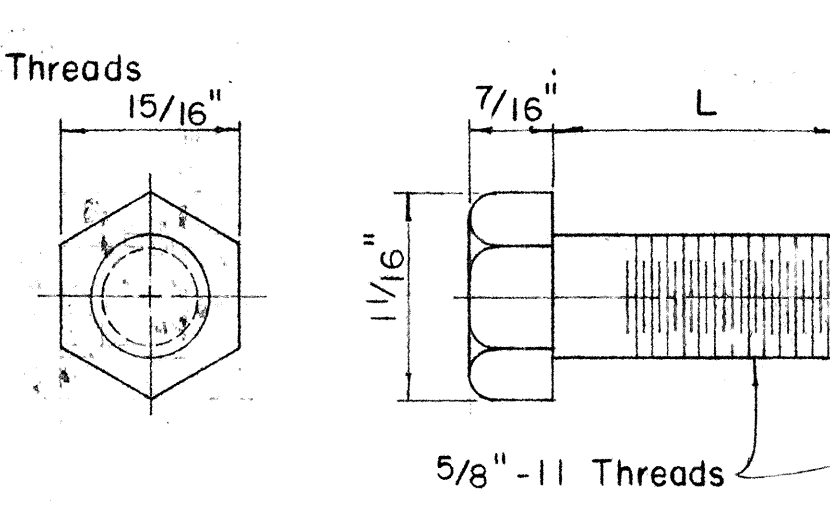
**BOLT DIMENSIONS**

**TYPE B BOLT**

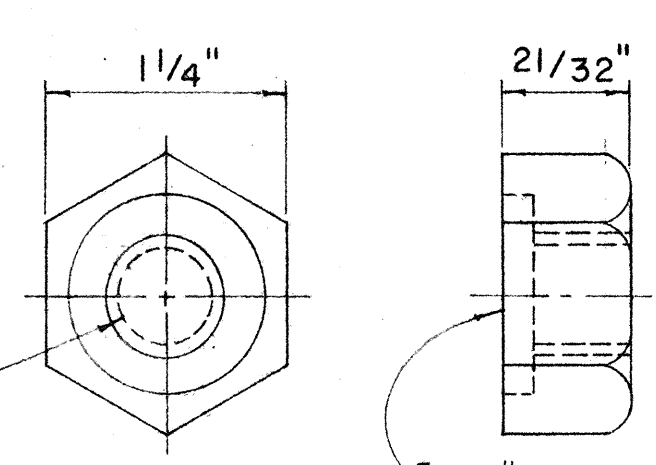
|                                          | L      |
|------------------------------------------|--------|
| Post Bolt for Conc. Post w/ Metal Blocks | 9 1/2" |
| Post Bolt for Metal Post w/ Metal Block  | 1 3/4" |



**TYPE A BOLT**



**TYPE B BOLT**



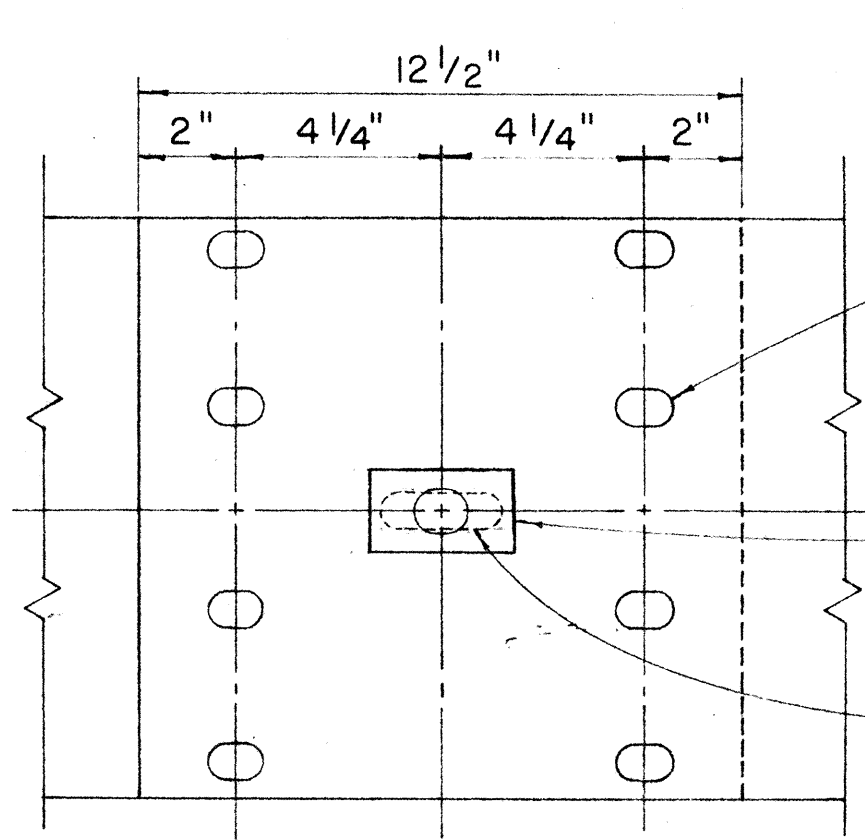
**HEXAGON NUT**

5/32" Deep x 15/16" Dia. C' Bore for Type A Bolt only. Plain nut for Type B Bolt.

Scale: Full Size

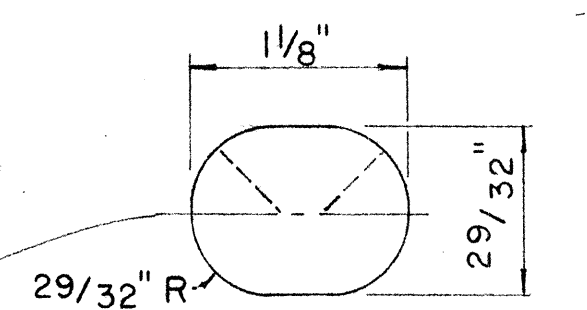
**SPLICE RAIL AND POST BOLTS**

Scale: Full Size

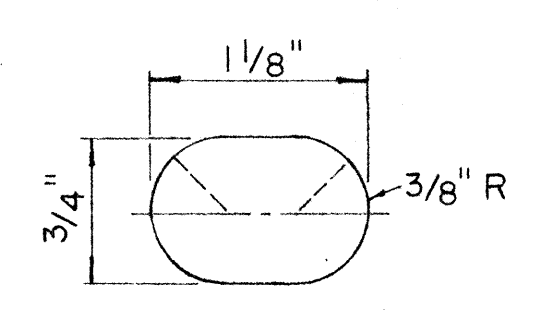


**RAIL SPLICE**

Scale: 3" = 1'-0"

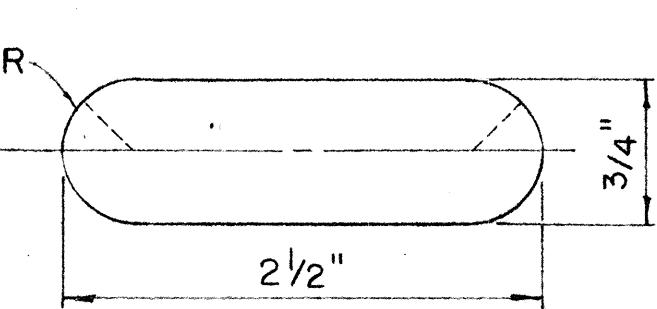


**SPLICE BOLT SLOT**

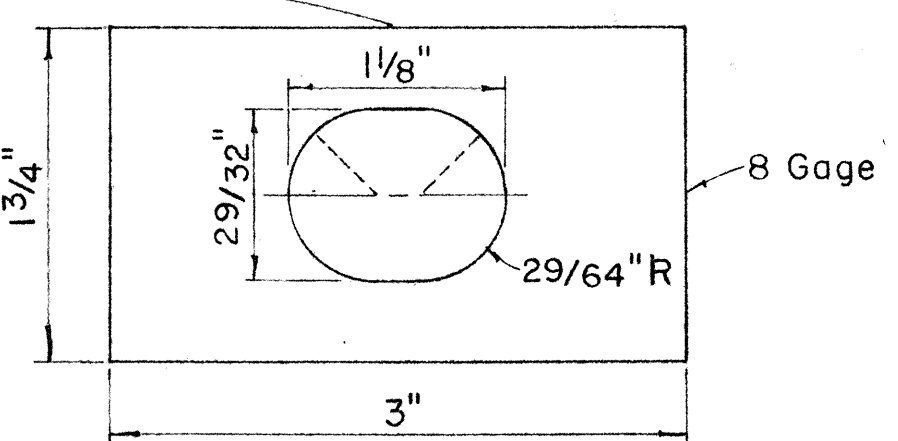


**SPLICE BOLT SLOT FOR ALL ENDS**

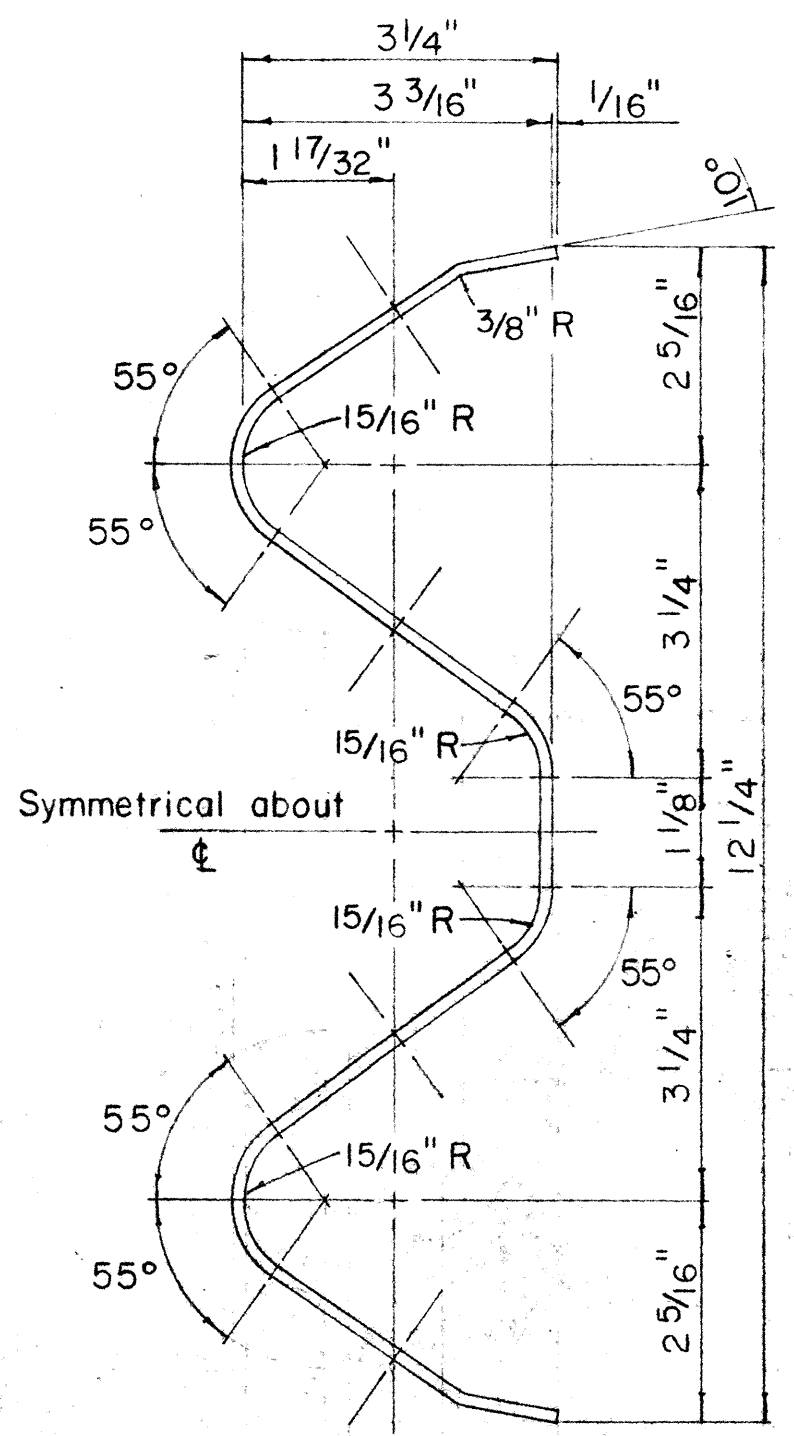
Scale: Full Size



**POST BOLT SLOT**

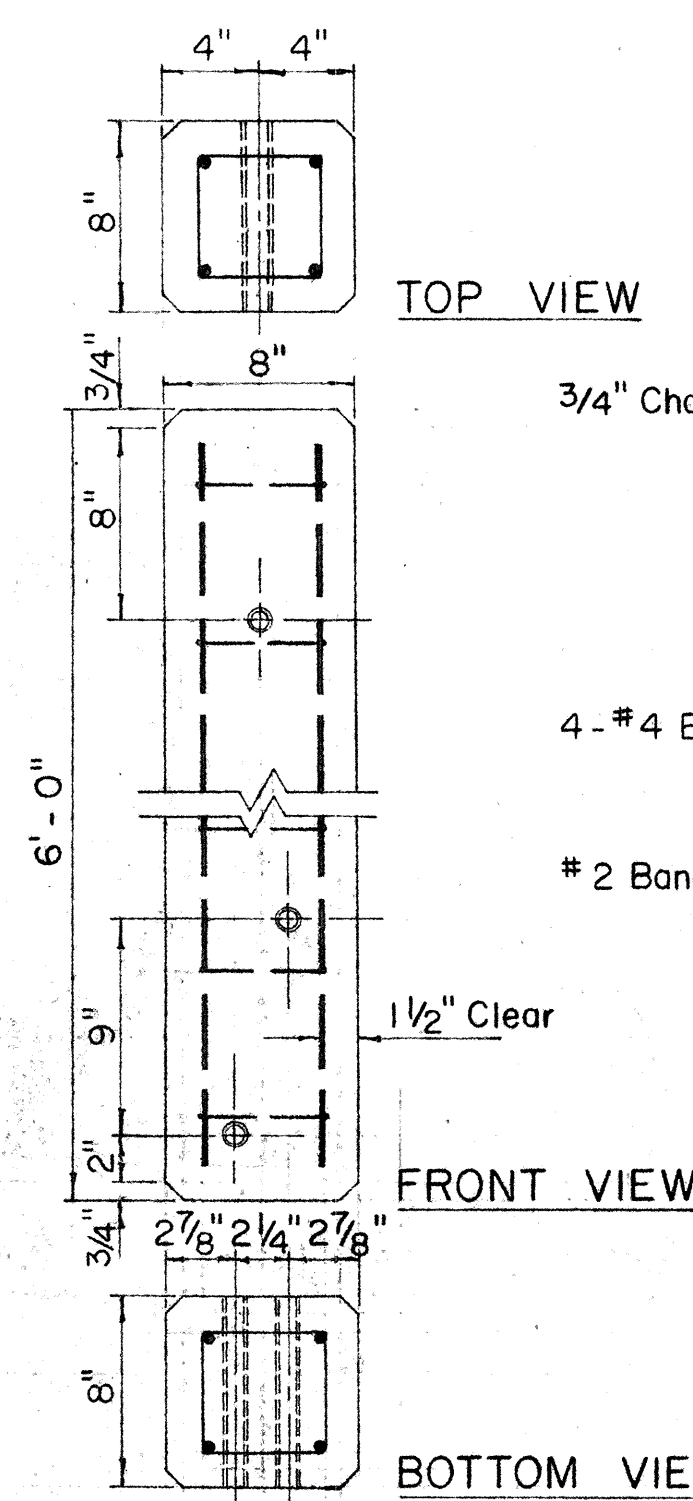


**RAIL WASHER**



**RAIL ELEMENT SECTION**

Scale: 6" = 1'-0"

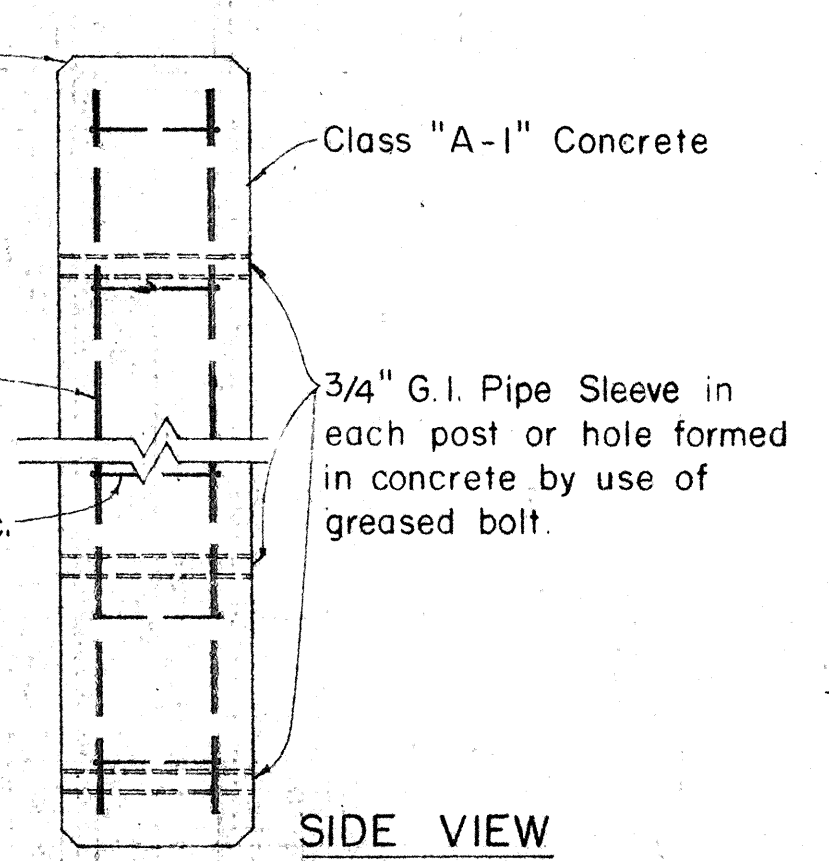


**TOP VIEW**

**FRONT VIEW**

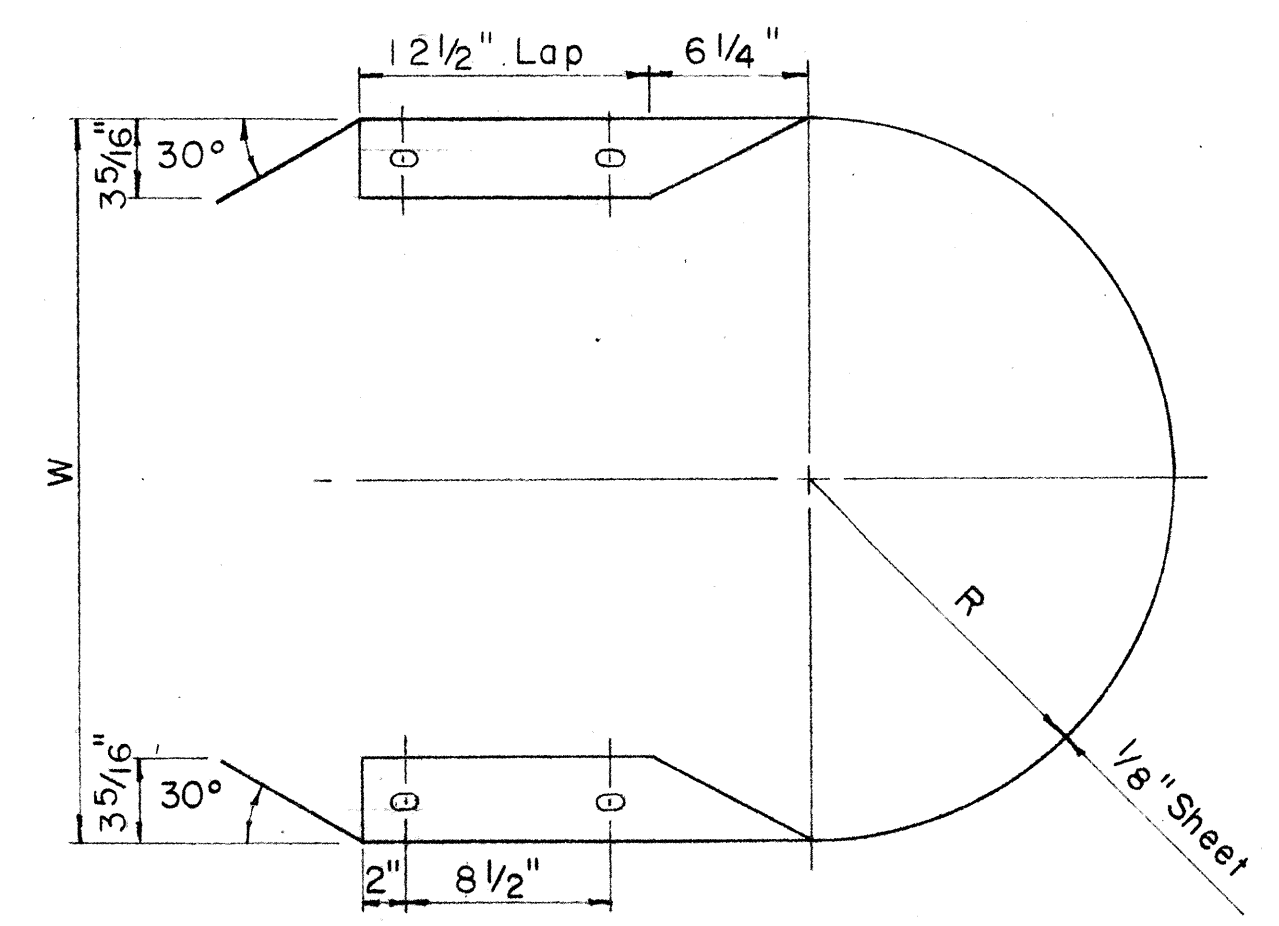
**BOTTOM VIEW**

**NOTE:**  
Concrete post shall be precast



**DETAIL OF CONCRETE POST**

Scale: 1 1/2" = 1'-0"

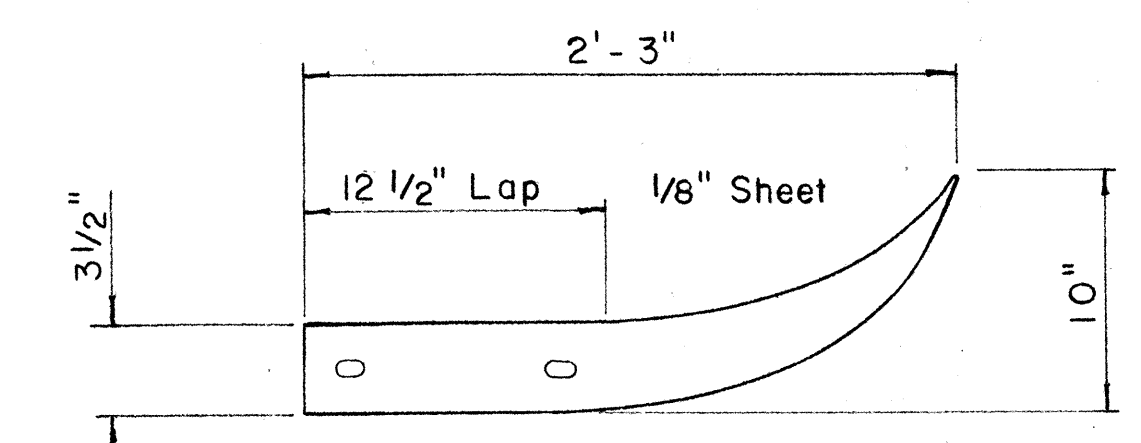


**MEDIAN END**

Scale: 1 1/2" = 1'-0"

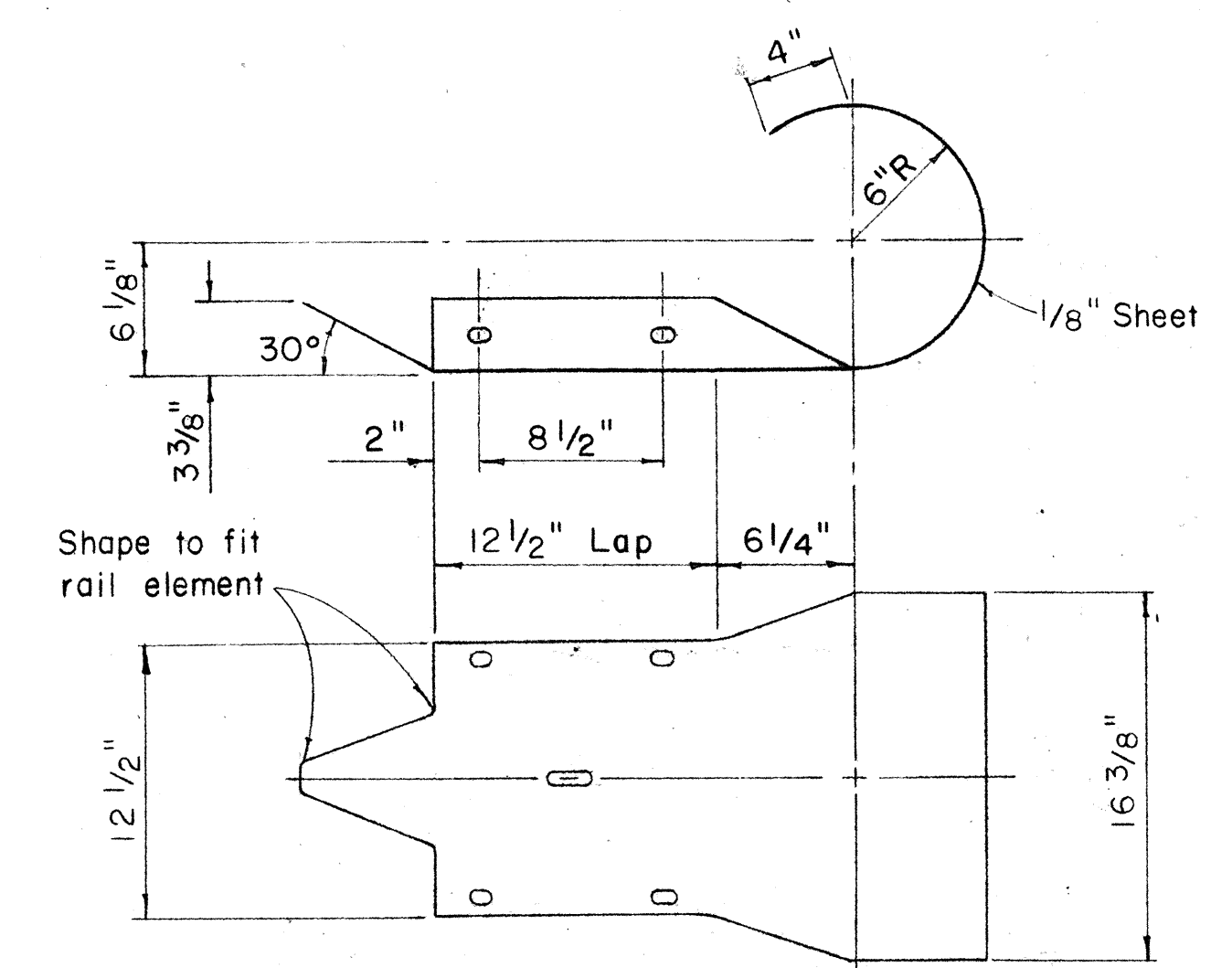
**MEDIAN END DIMENSIONS**

| TYPE OF POST AND BLOCK                                           | W       | R        |
|------------------------------------------------------------------|---------|----------|
| Double Metal Guard Rail on Concrete Post with Wood Blocks        | 29 3/4" | 14 7/8"  |
| Double Metal Guard Rail on Concrete Post with Metal Blocks (BJ6) | 26 1/2" | 13 1/4"  |
| Double Metal Guard Rail on Metal Post with Metal Blocks (BJ6)    | 24 3/8" | 12 3/16" |



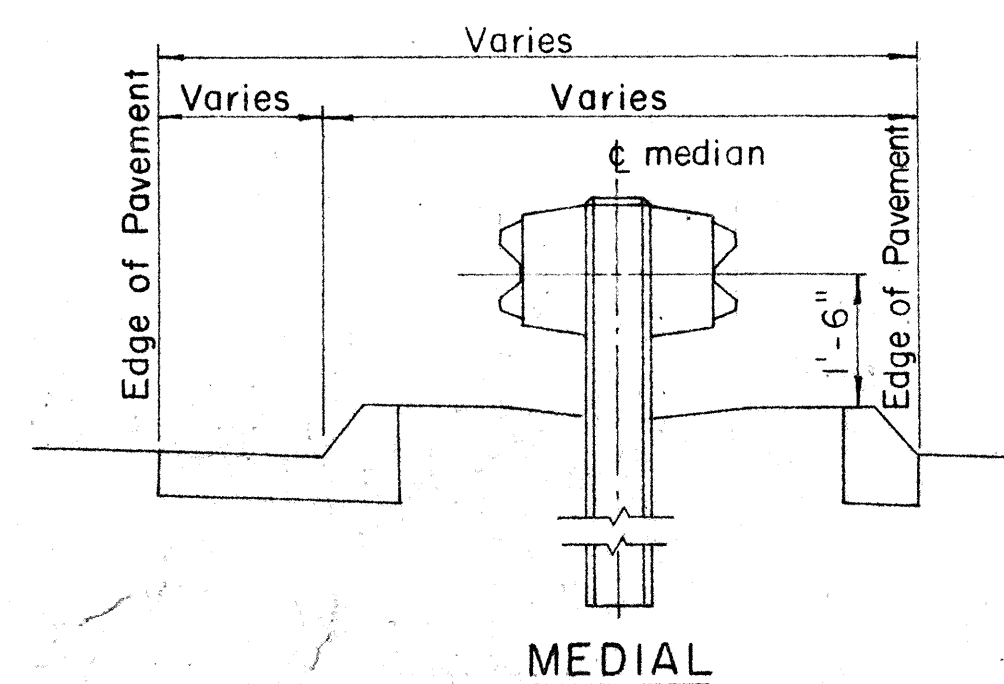
**FLARED END**

Scale: 1 1/2" = 1'-0"

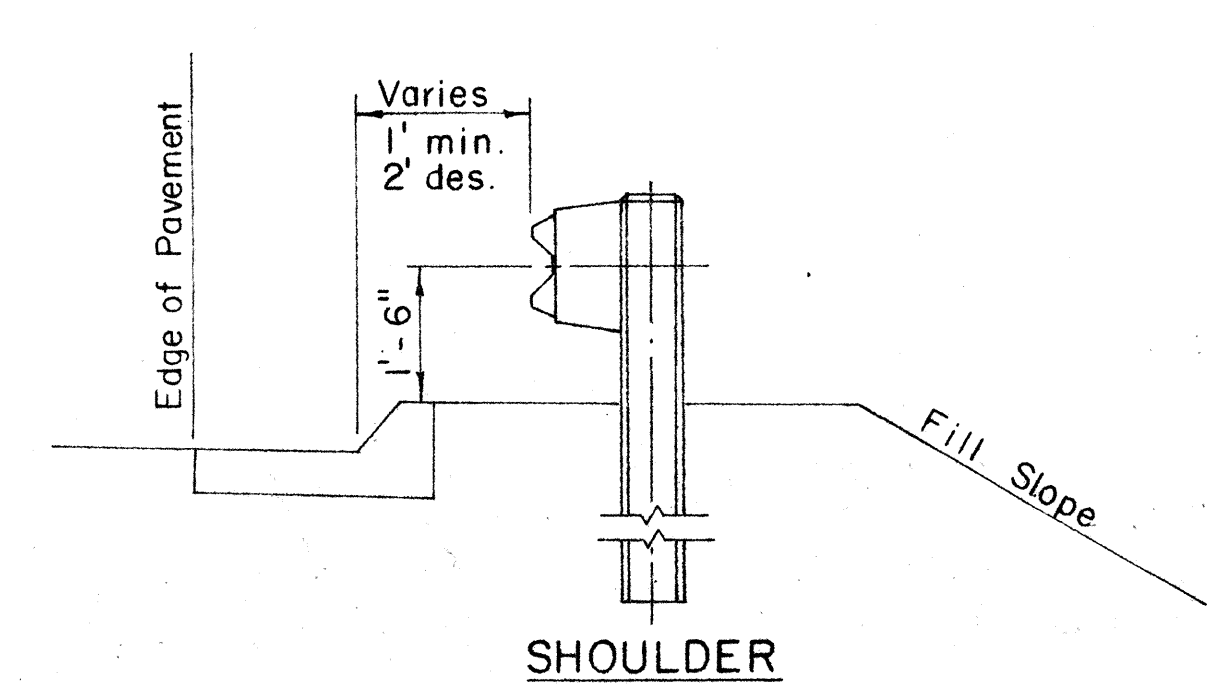


**CURVED END**

Scale: 1 1/2" = 1'-0"



**MEDIAL**



**SHOULDER**

**TYPICAL GUARD RAIL DETAIL**

Scale: 1/2" = 1'-0"

REVISED: June 2, 1967

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION

**STANDARD DETAILS**

METAL GUARD RAIL

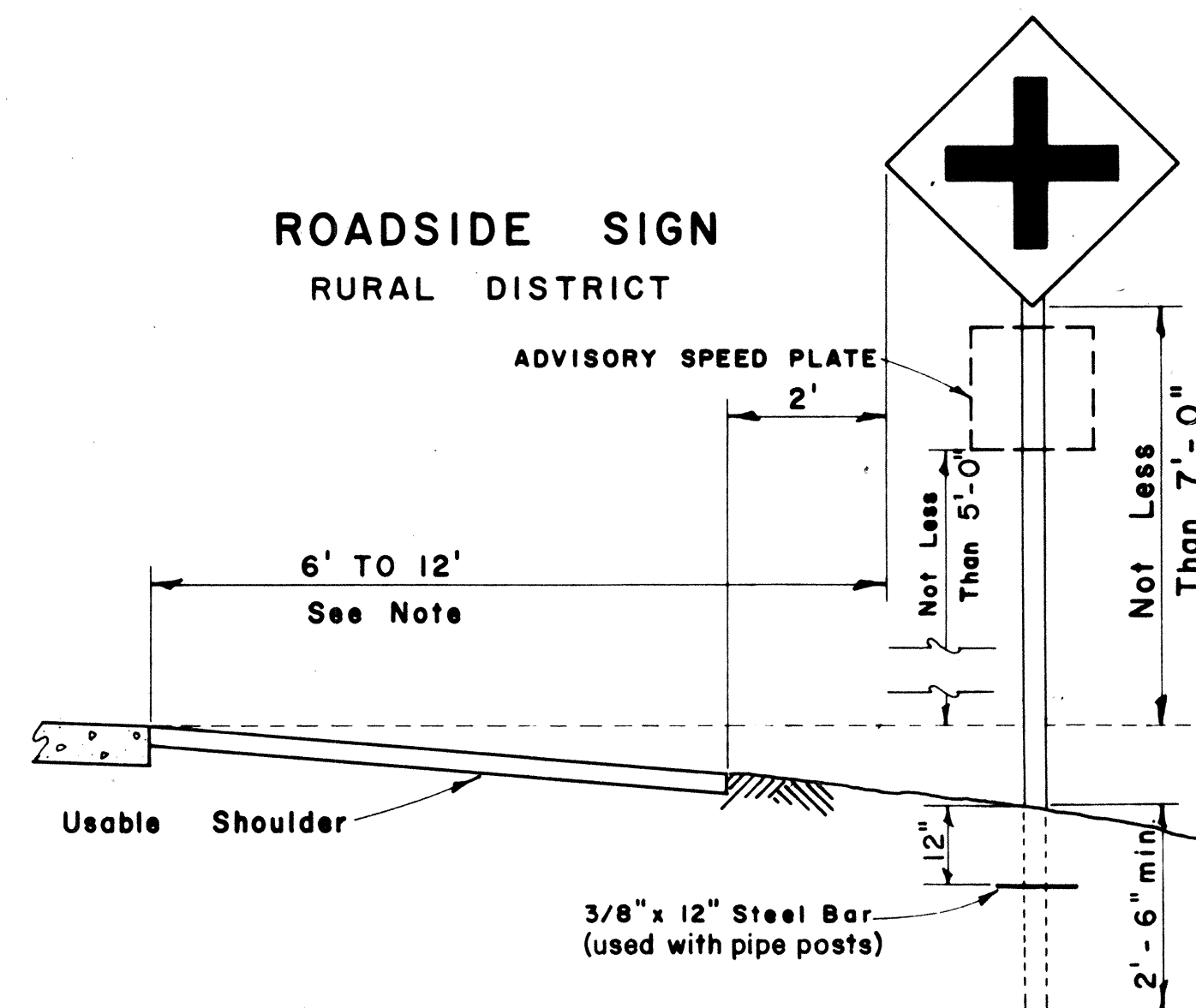
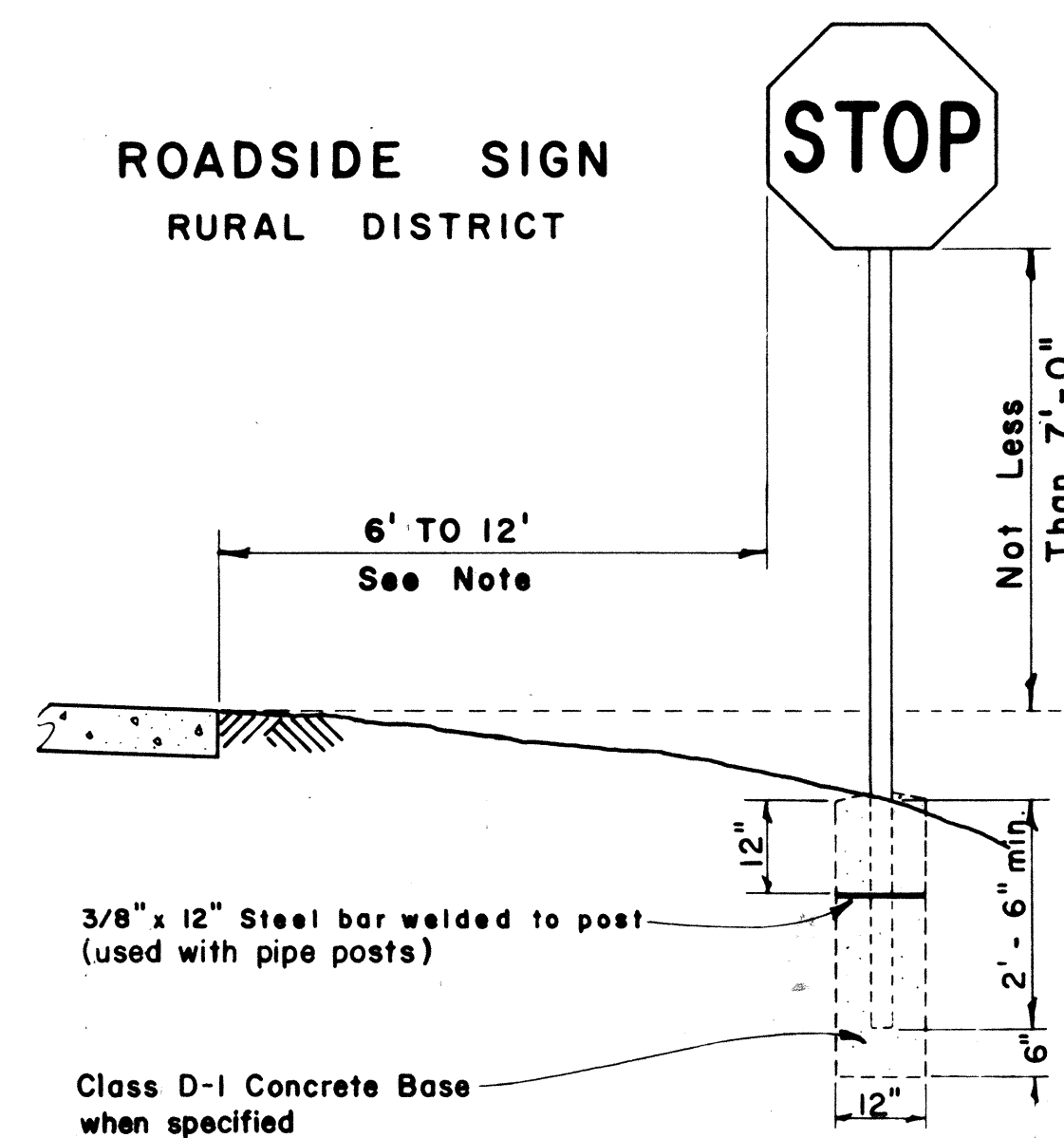
PROJ. NO. 330C-02-67

Scale: as noted Date: Sept. 8, 1967

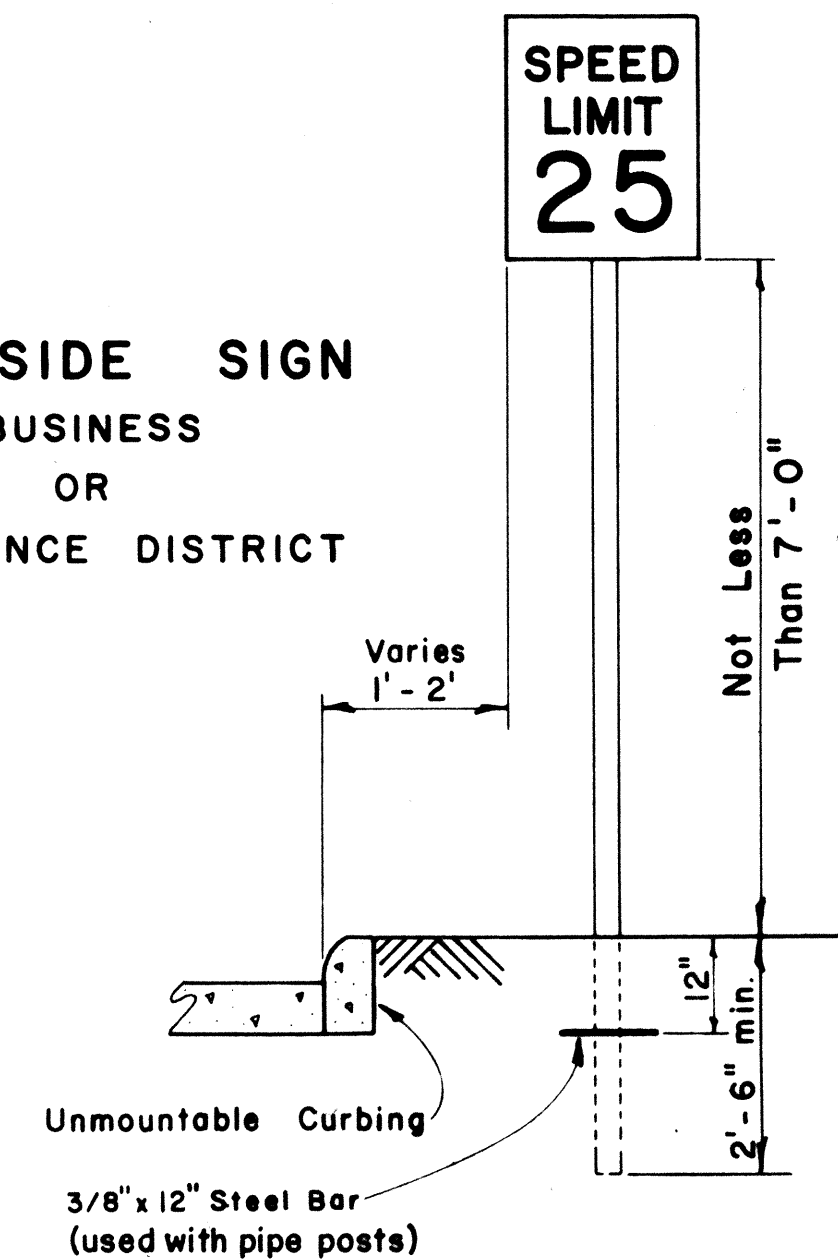
SHEET No. OF SHEETS

|               |      |
|---------------|------|
| ORIGINAL PLAN | DATE |
| DESIGNED BY   |      |
| QUANTITIES BY |      |
| CHECKED BY    |      |

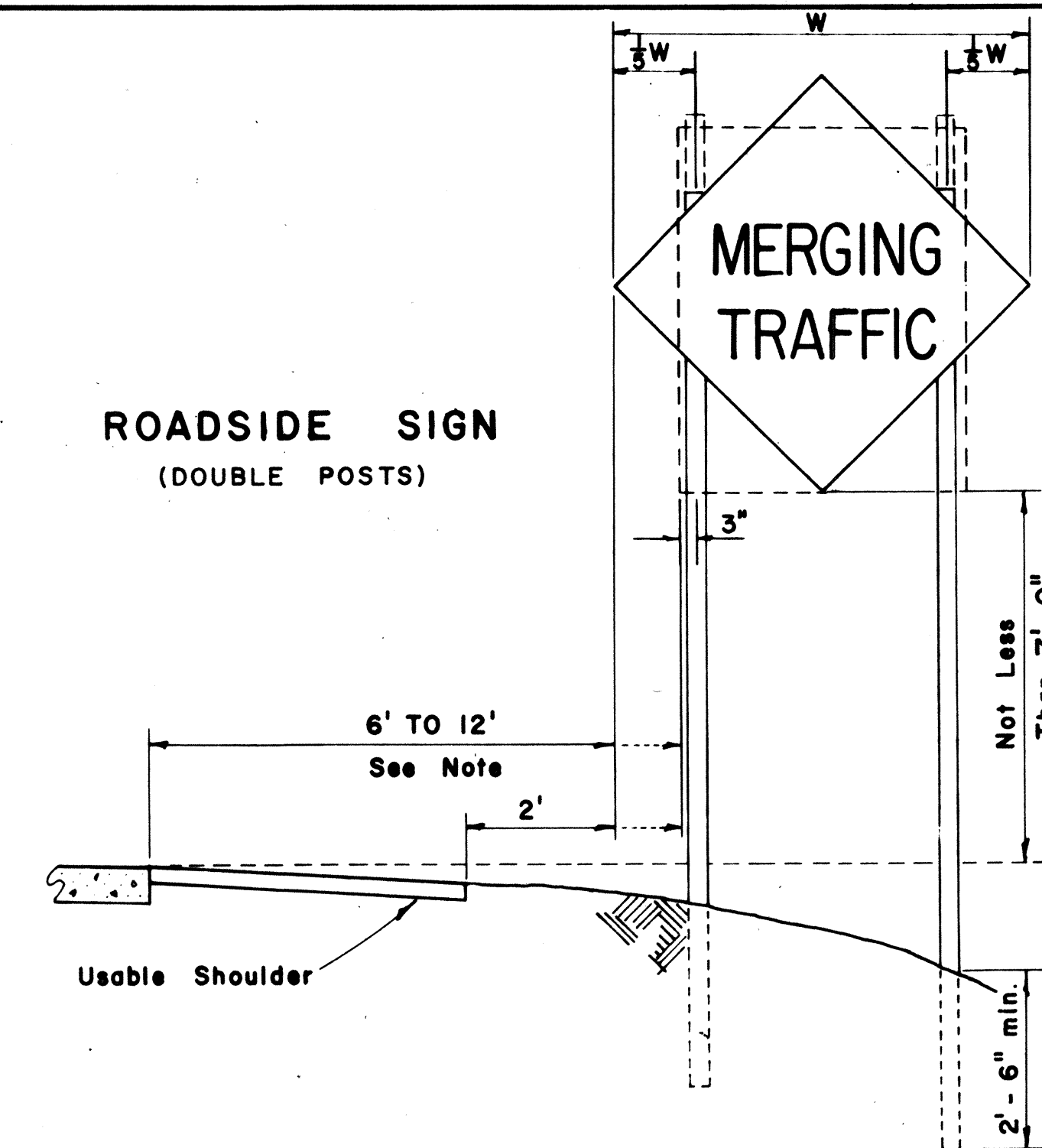
- NOTE:
- All signs and road delineators shall be placed 2' outside the usable roadway shoulder or 1' outside unmountable curbing present and within the limits shown below.
  - Except as noted below, sign posts shall be either 3" galv. std. pipe or 2 1/2" x 2 1/2" galv. square tube posts for signs larger than 24" in any dimension; 2" galv. std. pipe or 2" x 2" galv. square tube posts for signs 24" or less in any dimension.
  - Sign shall be attached to post with 5/16" galvanized bolts with nuts and 7/8" x 7/8" x .120" stainless-steel washers with neoprene rubber gasket.
  - Clearance Markers (RM-3, RM-4) shall be installed with the inside edge of the marker in line with the inner edge of the obstruction.
  - Signs 48" and wider or larger than 10 sq. ft. in area shall be mounted on two 3" galv. std. pipe or two 2 1/2" x 2 1/2" galv. square tube posts.



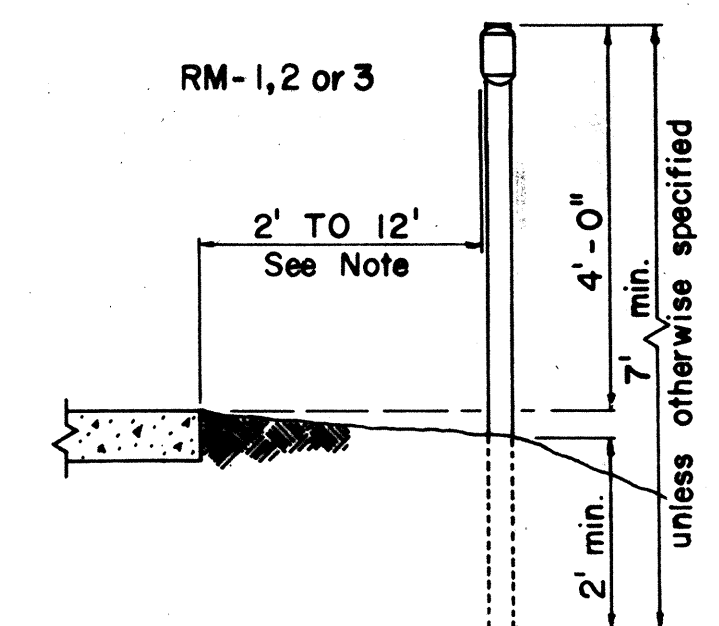
**ROADSIDE SIGN**  
BUSINESS  
OR  
RESIDENCE DISTRICT



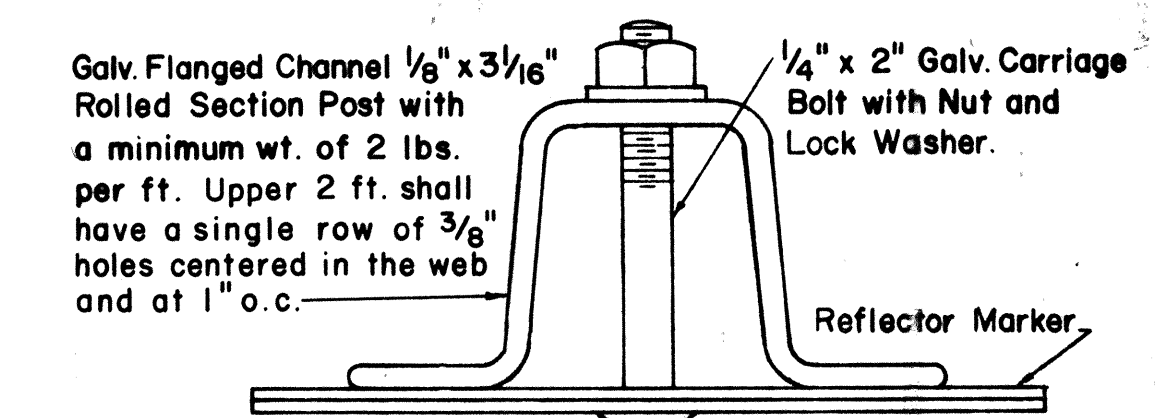
**ROADSIDE SIGN**  
(DOUBLE POSTS)



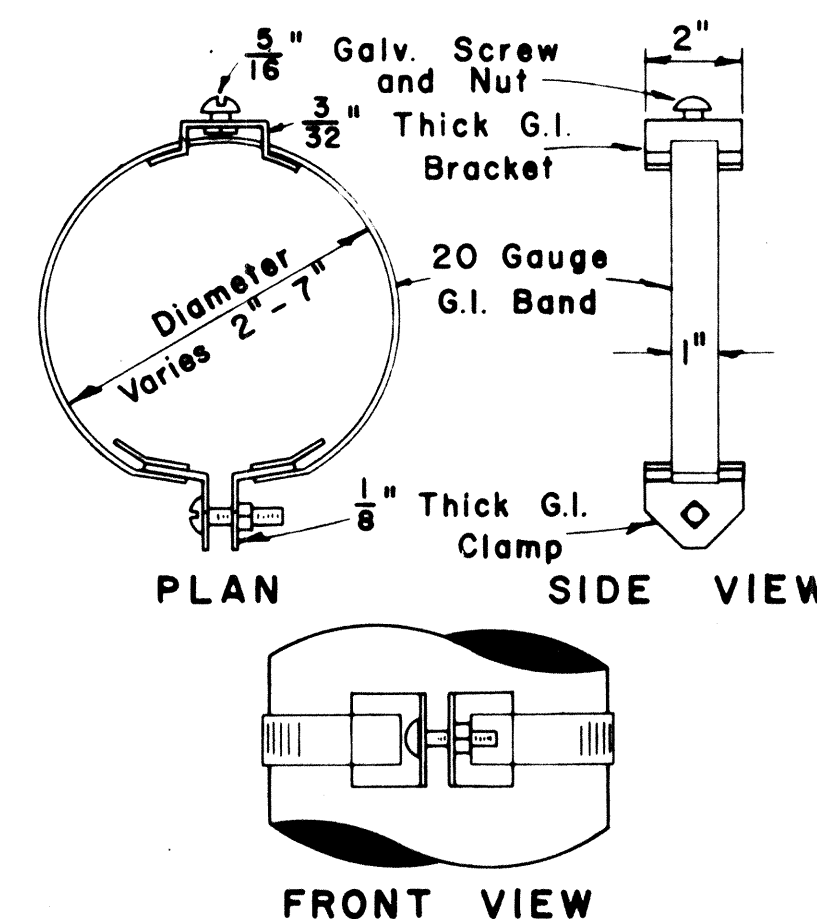
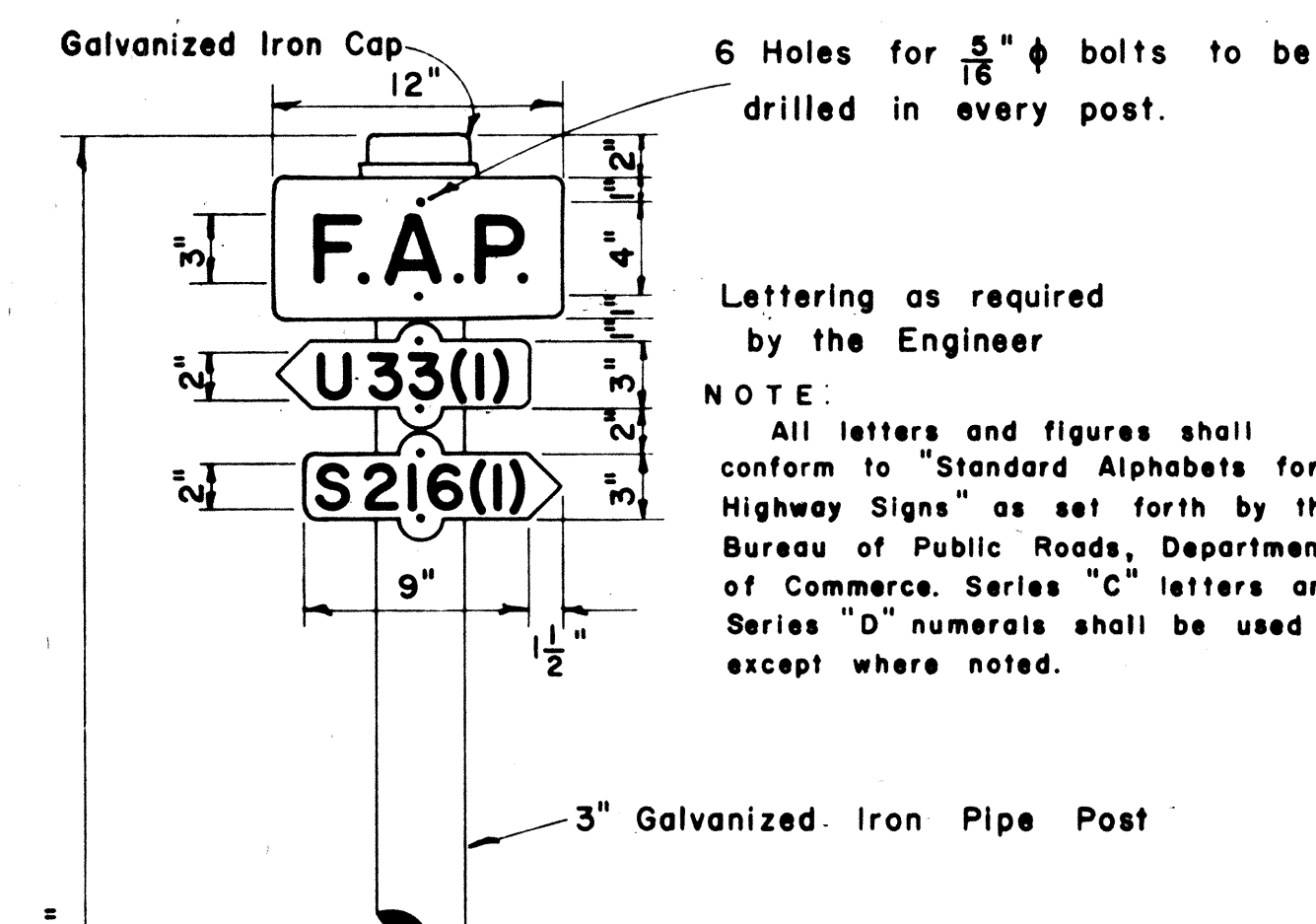
| FED. ROAD DIST. NO. | STATE | FED. AID PROJ. NO. | FISCAL YEAR | SHEET NO. | TOTAL SHEETS |
|---------------------|-------|--------------------|-------------|-----------|--------------|
| HAWAII              | HAW.  |                    |             |           |              |



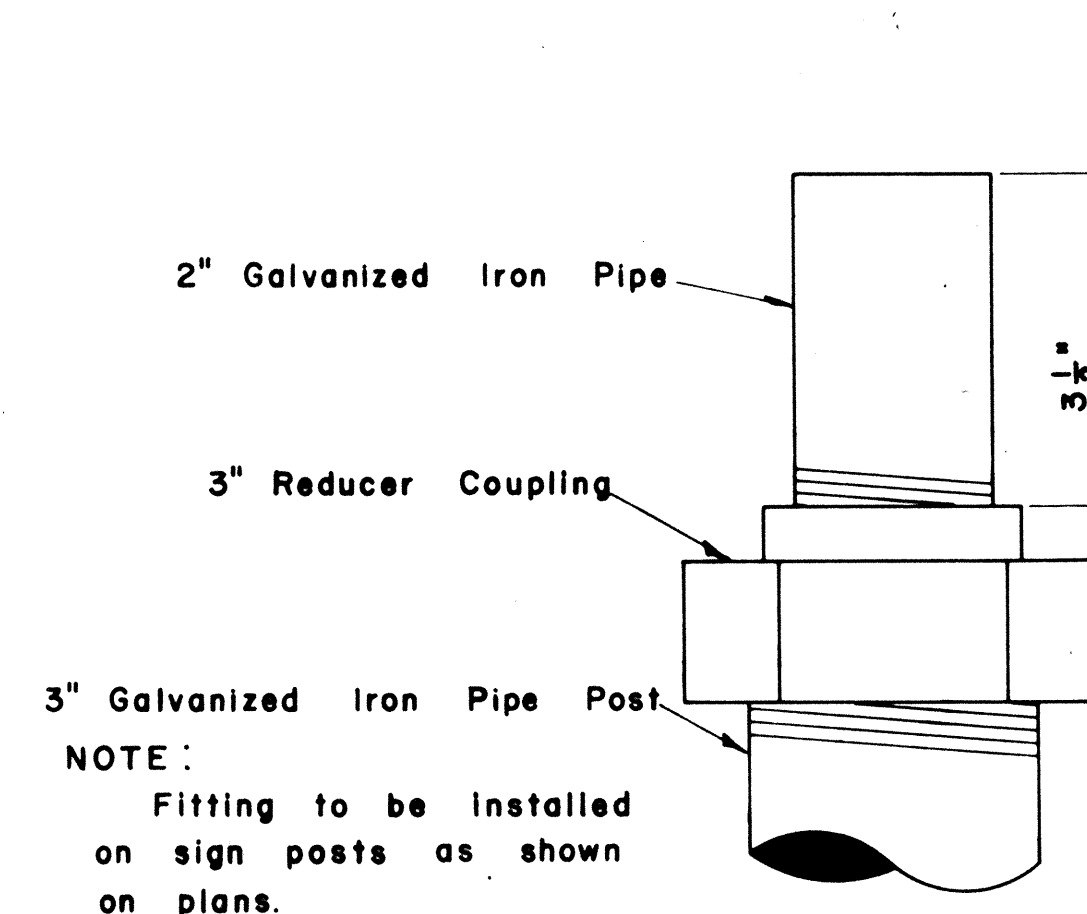
**ROAD DELINEATOR**  
Scale: 1/2" = 1' - 0"



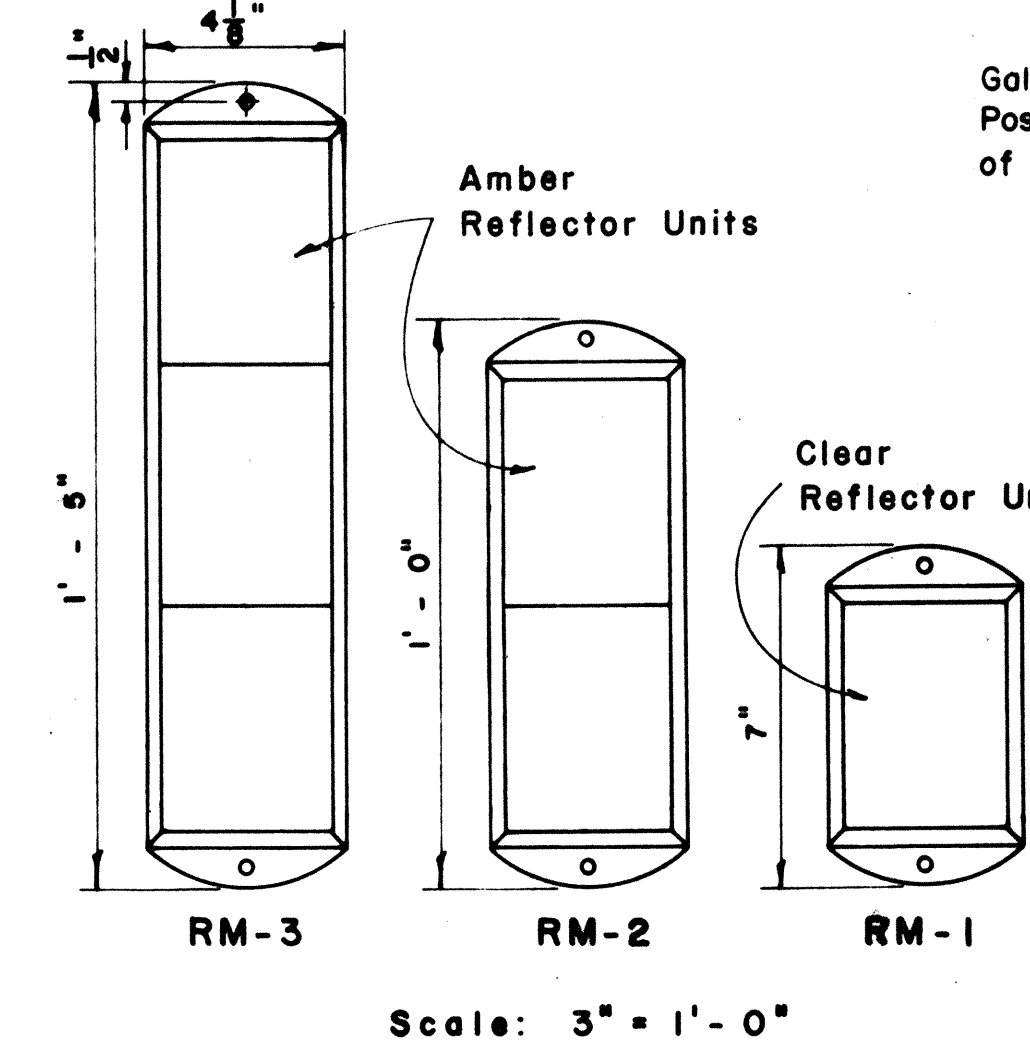
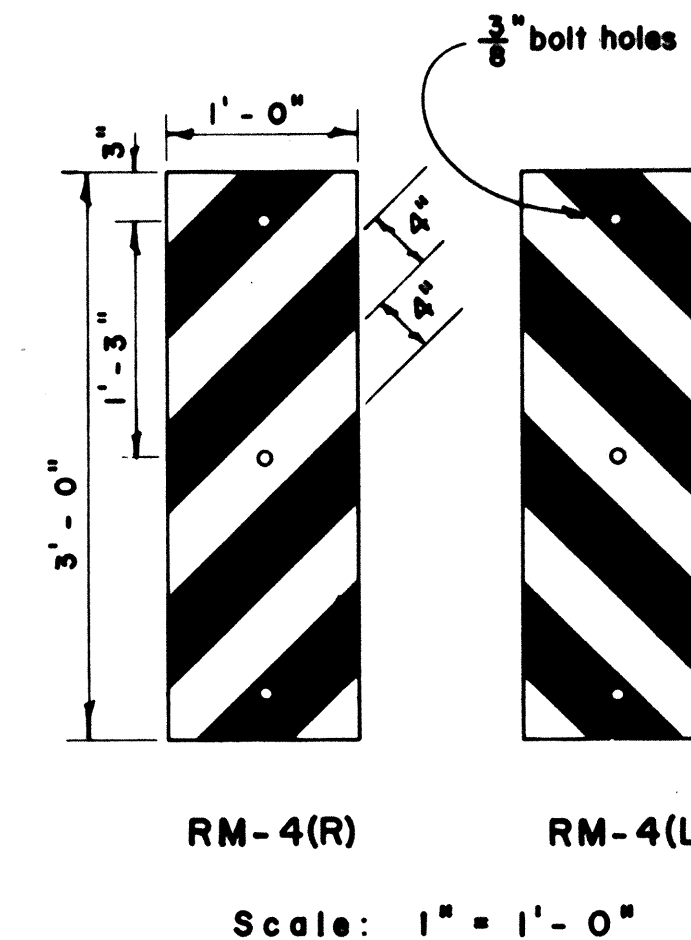
## HEIGHT AND LATERAL LOCATION OF SIGNS - TYPICAL INSTALLATIONS



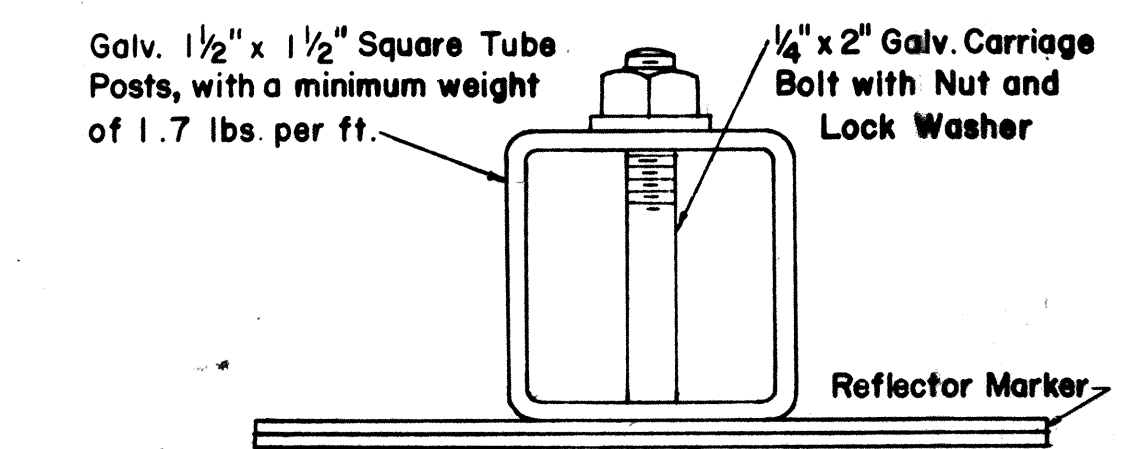
**TYPICAL BAND BRACKET FOR MOUNTING TRAFFIC SIGNS**  
Scale: 3" = 1' - 0"



**DETAIL OF SIGN POST FITTING FOR CITY & COUNTY STREET NAME SIGNS**  
Scale: 1/2" = 1'

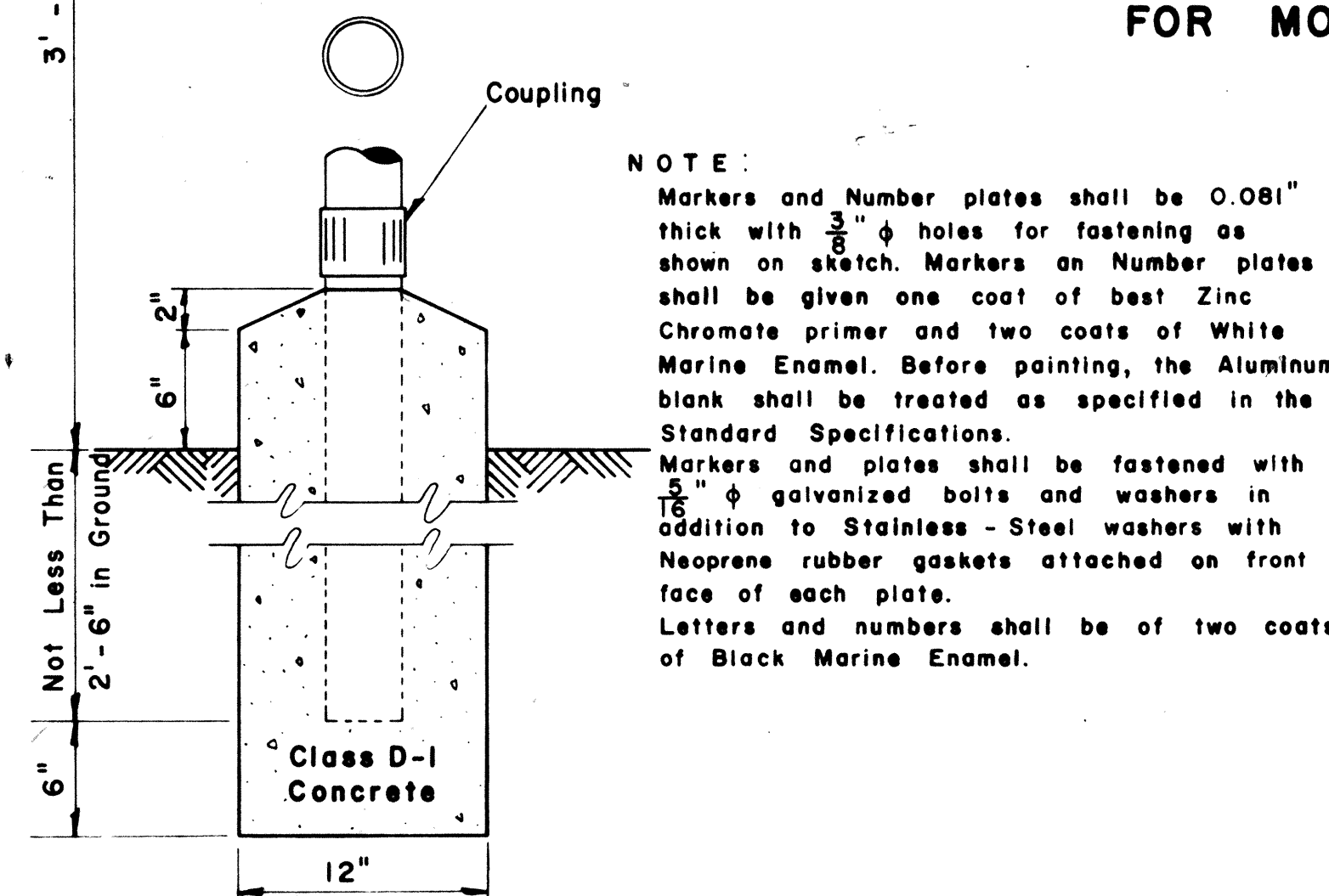


**REFLECTOR MARKERS**  
Scale: As Shown

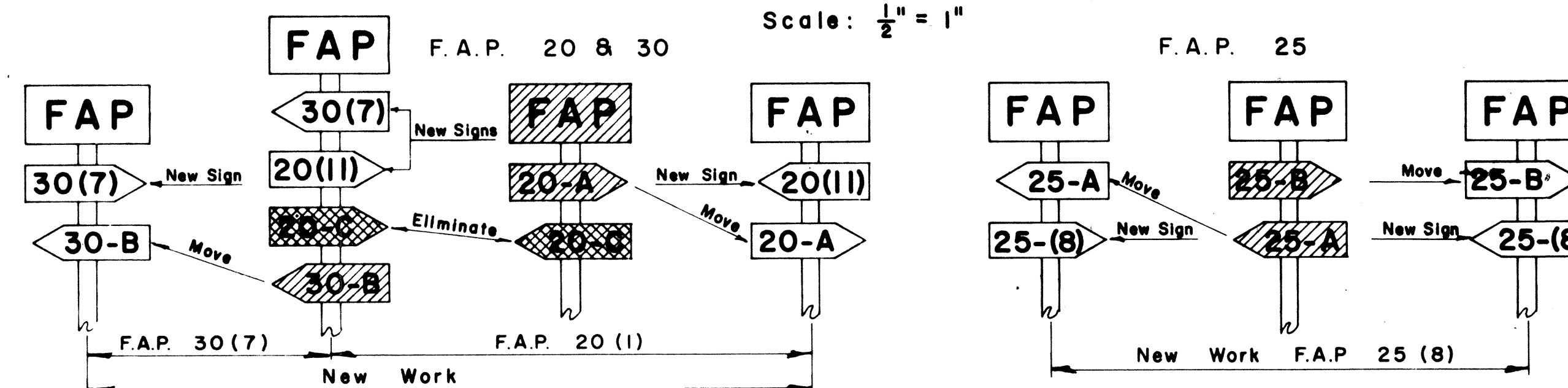


**TYPICAL SECTION OF ROAD DELINEATOR**  
Full Size

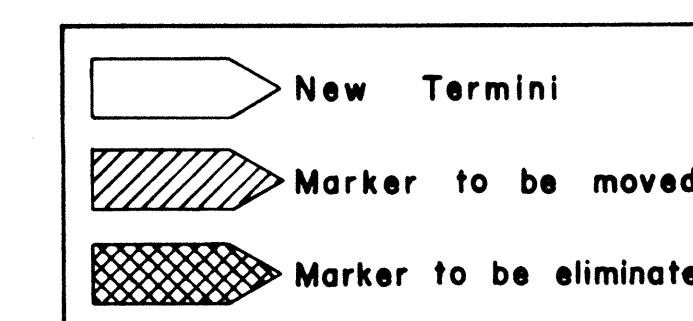
NOTE: Reflector Markers RM-1,2,3 shall be glass sphere reflector markers with 4" x 5" reflector units (as shown) or plastic prismatic reflector markers with 3" diameter reflector units.



**FEDERAL AID MARKER**  
Scale: 1/2" = 1' - 0"



**METHOD OF MARKING F.A. PROJECTS AT OVERLAPS**  
(USING NUMBER SUFFIX ON NEW WORK)



APPROVED: \_\_\_\_\_ DATE: 1/2/67

DIRECTOR OF TRANSPORTATION

PROJ. NO. 330C-02-67

JANUARY 27, 1967  
DECEMBER 8, 1964  
REVISED: FEBRUARY 25, 1964

STATE OF HAWAII  
DEPARTMENT OF TRANSPORTATION  
HIGHWAYS DIVISION  
**STANDARD DETAILS**  
F.A. MARKER  
AND  
MISCELLANEOUS SIGN  
DETAILS  
Scale: As Shown Date: Sept. 8, 1967

**SHEET No. OF SHEETS**