

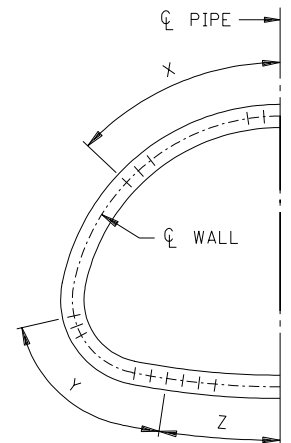
TABLE OF DIMENSIONS

| NOMINAL SPAN | EQUIVALENT DIAMETER(A) | WATER AREA | RISE    | SPAN    | DIMENSION REQUIREMENTS IN INCHES |         |     |         |       |        |     |         |          |        |         | APPROX. WT./FT. |
|--------------|------------------------|------------|---------|---------|----------------------------------|---------|-----|---------|-------|--------|-----|---------|----------|--------|---------|-----------------|
|              |                        |            |         |         | +                                | a       | b   | c       | j     | e      | f   | g       | R1       | R2     | R3      |                 |
| 22           | 18                     | 1.7        | 13-1/2  | 22      | 2-1/2                            | 1-3/8   | 3/8 | 3/4     | 2     | 1-1/8  | 3/8 | 1       | 27-1/2   | 13-3/4 | 5-1/4   | 175             |
| 28           | 24                     | 2.8        | 18      | 28-1/2  | 3-1/2                            | 1-5/8   | 1/2 | 1-3/8   | 3     | 1-3/8  | 1/2 | 1-5/8   | 40-11/16 | 14-3/4 | 4-5/8   | 320             |
| 36           | 30                     | 4.4        | 22-1/2  | 36-1/4  | 4                                | 1-13/16 | 5/8 | 1-9/16  | 3-1/2 | 1-9/16 | 5/8 | 1-13/16 | 51       | 18-3/4 | 6-1/8   | 455             |
| 44           | 36                     | 6.4        | 26-5/8  | 43-3/4  | 4-1/2                            | 2       | 3/4 | 1-3/4   | 4     | 1-3/4  | 3/4 | 2       | 62       | 22-1/2 | 6-1/2   | 610             |
| 51           | 42                     | 8.8        | 31-5/16 | 51-1/8  | 4-1/2                            | 2       | 3/4 | 1-3/4   | 4     | 1-3/4  | 3/4 | 2       | 73       | 26-1/4 | 7-3/4   | 740             |
| 58           | 48                     | 11.4       | 36      | 58-1/2  | 5                                | 2-1/4   | 3/4 | 2       | 5     | 2      | 3/4 | 2-1/4   | 84       | 30     | 8-7/8   | 895             |
| 65           | 54                     | 14.0       | 40      | 65      | 5-1/2                            | 2-1/2   | 3/4 | 2-1/4   | 5     | 2-1/4  | 3/4 | 2-1/2   | 92-1/2   | 33-3/8 | 10      | 1095            |
| 73           | 60                     | 17.7       | 45      | 73      | 6                                | 3-5/16  | 3/4 | 1-15/16 | 5     | 2-3/4  | 3/4 | 2-1/2   | 105      | 37-1/2 | 11      | 1345            |
| 88           | 72                     | 25.6       | 54      | 88      | 7                                | 3-13/16 | 1   | 2-3/16  | 6     | 3-1/4  | 1   | 2-3/4   | 126      | 45     | 13-5/16 | 1885            |
| 102          | 84                     | 34.6       | 62      | 102     | 8                                | 4-1/8   | 1   | 2-7/8   | 6     | 3-1/2  | 1   | 3-1/2   | 162-1/2  | 52     | 14-1/2  | 2490            |
| 115          | 90                     | 44.5       | 72      | 115-1/2 | 8-1/2                            | 4-1/4   | 1   | 3-1/4   | 7     | 3-3/4  | 1   | 3-3/4   | 183      | 59     | 18      | 2900            |
| 122          | 96                     | 51.7       | 77-1/2  | 122-3/8 | 9                                | 4-1/2   | 1   | 3-1/2   | 7     | 4      | 1   | 4       | 218      | 62     | 20      | 3510            |
| 138          | 108                    | 66.0       | 87-1/8  | 138-1/2 | 10                               | 5       | 1   | 4       | 7     | 4-1/2  | 1   | 4-1/2   | 269      | 70     | 22      | 4400            |
| 154          | 120                    | 81.8       | 96-7/8  | 154     | 11                               | 5-1/2   | 1   | 4-1/2   | 7     | 5      | 1   | 5       | 301-3/8  | 78     | 24      | 5400            |
| 169          | 132                    | 99.1       | 106-1/2 | 168-3/4 | 10                               | 5       | 1   | 4       | 7     | 4-1/2  | 1   | 4-1/2   | 329      | 85-5/8 | 26-7/8  | 5390            |

(A) EQUIVALENT DIAMETER EQUALS DIAMETER OF CIRCULAR PIPE WITH APPROXIMATELY EQUIVALENT CROSS-SECTION AREA.

STIRRUP REQUIREMENTS (B)

| NOMINAL SPAN | EQUIVALENT DIAMETER(A) | TOP |       |      |     |       |      |       |     |     |      |      |       |     |      | BOTTOM |      |     |  |  |  |  |  |  |  |
|--------------|------------------------|-----|-------|------|-----|-------|------|-------|-----|-----|------|------|-------|-----|------|--------|------|-----|--|--|--|--|--|--|--|
|              |                        | TOP |       |      |     |       |      | SIDES |     |     |      |      |       |     |      | CENTER |      |     |  |  |  |  |  |  |  |
|              |                        | S   | X     | As1  |     | S     | Y    |       |     | As1 |      |      | S     | Z   |      |        | As1  |     |  |  |  |  |  |  |  |
|              |                        |     |       | IIIA | IVA |       | IIA  | IIIA  | IVA | IIA | IIIA | IVA  |       | IIA | IIIA | IVA    | IIIA | IVA |  |  |  |  |  |  |  |
| 73           | 60                     | 5   | 2'8"  |      | .20 | 4     | 1'8" | 2'0"  | .37 | .66 | 5    | 1'8" | 1'4"  | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 88           | 72                     | 5   | 3'2"  |      | .20 | 4     | 2'0" | 2'5"  | .39 | .65 | 5    | 2'0" | 1'7"  | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 102          | 84                     | 6   | 3'8"  |      | .20 | 4     | 2'3" | 2'9"  | .37 | .64 | 6    | 2'3" | 1'10" | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 115          | 90                     | 6   | 4'2"  |      | .20 | 4     | 2'6" | 3'1"  | .36 | .69 | 6    | 2'6" | 2'0"  | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 122          | 96                     | 7   | 4'5"  |      | .20 | 4     | 2'9" | 3'3"  | .33 | .67 | 7    | 2'9" | 2'2"  | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 138          | 108                    | 7   | 5'0"  |      | .20 | 4-1/2 | 3'1" | 3'8"  | .33 | .68 | 7    | 3'1" | 2'6"  | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 154          | 120                    | 8   | 5'6"  |      | .20 | 5     | 3'5" | 4'2"  | .30 | .62 | 8    | 3'5" | 2'9"  | .20 | .20  |        |      |     |  |  |  |  |  |  |  |
| 169          | 132                    | 7   | 5'11" | .20  |     | 4-1/2 | 3'9" | 3'9"  | .20 | .42 | 7    | 3'9" | 3'9"  | .20 |      |        |      |     |  |  |  |  |  |  |  |



STIRRUP DETAILS

(B) SEE STANDARD PLATE 3007 FOR STIRRUP OPTIONS.

S = MAXIMUM STIRRUP SPACING IN INCHES MEASURED AT CENTERLINE OF WALL.

As1 = MINIMUM RADIAL REINFORCEMENT IN SQUARE INCHES PER SQUARE FOOT OF WALL MEASURED AT CENTERLINE OF WALL.

X, Y, & Z ARE MEASURED AT CENTERLINE OF WALL.

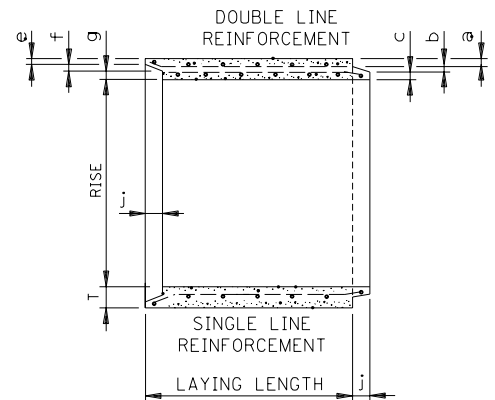
GENERAL NOTES:

- LAYING LENGTHS: 22" TO 122" DIA. ( 6' & 8' ), 138" DIA. ( 4' & 6' ), 154" & 169" DIA. ( 4' & 5' ).
- THREE-EDGE-BEARING-TEST REQUIREMENTS OF SPECIFICATION 3236 ARE NOT APPLICABLE.
- BEDDING: CLASS "B" BEDDING, SPEC. 2451, REQUIRED.

BASIS OF DESIGN:

- ULTIMATE STRENGTH ACCORDING TO 1977 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, USING  $U = 1.5D + 2.5(L+1)$ .
- LIVE LOAD BASED ON HS 20 LOADING WITH IMPACT AND DISTRIBUTION IN ACCORDANCE WITH 1977 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.
- FILL LOADS ON PIPE ARCH DETERMINED BY ACPA DESIGN DATA 17 PROCEDURE FOR POSITIVE PROJECTING CONDUIT, USING  $r_{sd} = 0.5$ ,  $p = 0.7$ ,  $w = 120$  LBS./C.F., AND BEARING ASSUMED TO ACT ON 80% OF THE CULVERT WIDTH.
- MAXIMUM DEPTH OF COVER, "EMBANKMENT CONDITION." \*  
 CLASS IIA 8 FT.  
 CLASS IIIA 16 FT.  
 CLASS IVA 23 FT.

\*MAXIMUM DEPTH OF COVER MAY BE INCREASED 25% OVER THE DEPTH LISTED FOR THE "EMBANKMENT CONDITION" WHEN INSTALLATION IN A "ZERO PROJECTION TRENCH CONDITION."



LONGITUDINAL SECTION

APPROVED Oct. 29, 1981

*R.H. Sullivan*  
 Assistant Division Director  
 Technical Services

STATE OF MINNESOTA  
 DEPARTMENT OF TRANSPORTATION  
 REINFORCED CONCRETE  
 PIPE ARCH  
 GENERAL NOTES, DIMENSIONS & STIRRUP REQUIREMENTS

SPECIFICATION  
 REFERENCE  
 2501  
 2503  
 REVISED  
 5-3-99 A.K.J.

STANDARD  
 PLATE  
 NO.  
 3014J  
 1 OF 2