

Pipe Product Catalog Table of Contents

Section 1A: Reinforced Concrete Pipe

| Drawing #: | Page Description | Page No. |
|------------|---|----------|
| P-1: | RCP Gasket Joint Details 12" to 36" - "C" Wall and "B" Wall | 3 |
| P-3: | RCP Gasket Joint Details 84" to 144" | 5 |
| P-4: | ASTM C-507 Equivalent Elliptical Pipe | 6 |
| P-5: | Pre-Lubricated Gasket Profile for RCP, Elliptical Pipe and Manholes | 7 |

Section 1B: Reinforced Concrete Pipe Specialty Pieces

| Drawing #: | Page Description | Page No. |
|------------|--------------------------------|----------|
| P-6: | RCP Mitered 7-1/2° Bend | 8 |
| P-7: | RC Perforated Pipe 12" to 144" | 9 |
| P-8: | RC Jacking Pipe 36" to 96" | 10 |
| P-9: | RCP Increases and Reducers | 11 |
| P-10: | RCP Bell and Spigot Plugs | 12 |
| P-11: | RCP Joint Ties | 13 |

Section 1C: Reinforced Concrete Aprons

| Drawing #: | Page Description | Page No. |
|------------|---|----------|
| P-12: | RC Apron 12" to 84" | 14 |
| P-13: | RC Elliptical Aprons 18" to 60" | 15 |
| P-14: | RC Safety Aprons 15" to 24" | 16 |
| P-15: | RC Safety Aprons 12" to 24" | 17 |
| P-16: | RC Safety Aprons 30" to 72" | 18 |
| P-17: | Galvanized Trash Guards 12" to 84" RCP and 18" to 60" Equivalent Elliptical | 19 |

Section 1D: Reinforced Concrete Arch Pipe

| Drawing #: | Page Description | Page No. |
|------------|-------------------------|----------|
| P-18: | ASTM C-506 RC Arch Pipe | 20 |
| P-19: | RC Arch Pipe Apron | 21 |

Manhole Product Catalog Table of Contents

Section 2A: Reinforced Concrete Manholes and Catch Basins

| Drawing #: | Page Description | Page No. |
|------------|--|----------|
| M-1: | RC Structure Sizing Chart 48" to 72" | 22 |
| M-2: | RC Structure Sizing Chart 84" to 120" | 23 |
| M-3: | RC Manhole Gasket Joint Details 48" to 72" - "B" Wall | 24 |
| M-4: | RC Manhole Gasket Joint Details 84" to 144" - "B" Wall | 25 |
| M-5: | Rubber Watertight Pipe to Structure Boot | 26 |
| M-6: | Polypropylene Manhole Steps | 27 |
| M-7: | RC Tongue and Groove Manhole Risers | 28 |
| M-8: | Reduction Manholes Sanitary or Storm | 29 |

Section 2B: Reinforced Concrete Sanitary Manholes

| Drawing #: | Page Description | Page No. |
|------------|--|----------|
| M-9: | Typical Sanitary Manhole with Poured Invert | 30 |
| M-10: | Sanitary Outside Drop Manhole with Poured Invert | 31 |

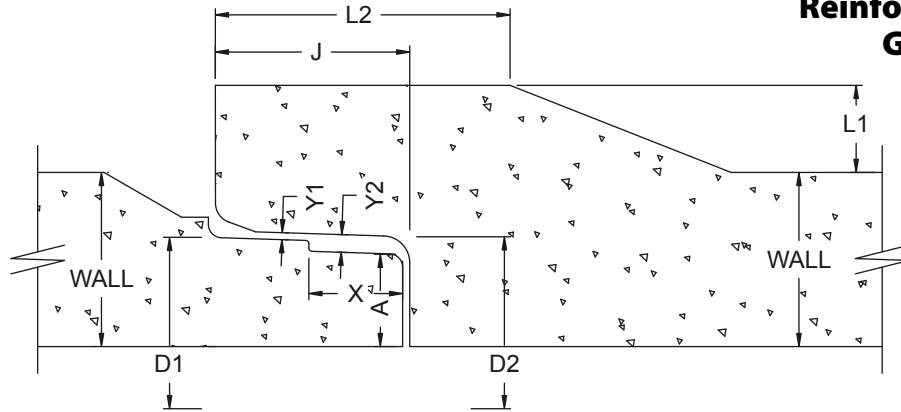
Section 2C: Reinforced Concrete Storm Manholes

| Drawing #: | Page Description | Page No. |
|------------|--|----------|
| M-11: | RC Storm Base Sections with Flat Top and Cutouts | 32 |
| M-12: | Catch Basins 27", 30", 48" Type "G" and "F" Cones and 2 x 3 Boxes | 33 |
| M-13: | St. Paul, MN Type 7A Sump Catch Basin | 34 |
| M-14: | St. Paul, MN Type 4 Manhole | 35 |
| M-15: | St. Paul, MN Type 4A Manhole | 36 |
| M-16: | State of MN LP Catch Basin Standard Plate #4021 | 37 |
| M-17: | Typical RC "T" Manhole | 38 |
| M-18: | Lift Stations and Valve Manholes | 39 |
| M-19: | Sloped Top Pond Skimmer Structures 48" to 144" | 40 |
| M-20: | Sloped Top Pond Skimmer Structures 48" to 144" with Slide In Weir Wall | 41 |
| M-21: | Hydroguard Stormwater Treatment Structures | 42 |

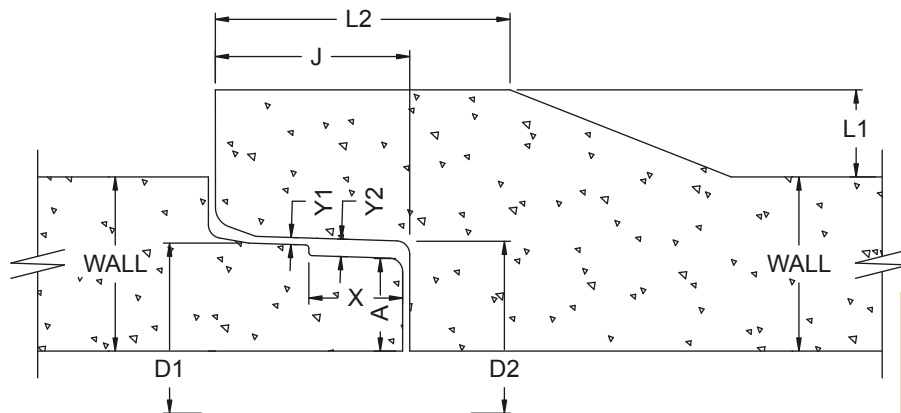
Section 2D: Reinforced Concrete Covers and Base Slabs

| Drawing #: | Page Description | Page No. |
|------------|--|----------|
| M-22: | Manhole or Catch Basin Top Slab with 27" Opening 58" to 168" Outer Diameter | 43 |
| M-23: | Manhole or Catch Basin Top Slab with 2' x 3' Opening 58" to 168" Outer Diameter | 44 |
| M-24: | Manhole or Catch Basin Keyed Top Slab 58" to 168" Outer Diameter | 45 |
| M-25: | Manhole or Catch Basin Base Slab 44" to 180" Outer Diameter | 46 |
| M-26: | Stool Grate RC Frame | 47 |
| M-27: | RC Cap Skimmer 93" Outer Diameter | 48 |
| M-28: | Transmittal Record Sheet for Additions and/or Revisions to County Materials' Pipe Product Catalog | 49 |

**Reinforced Concrete Pipe
 Gasket Joint Details
 12" to 36"
 - "C" and "B" Wall**



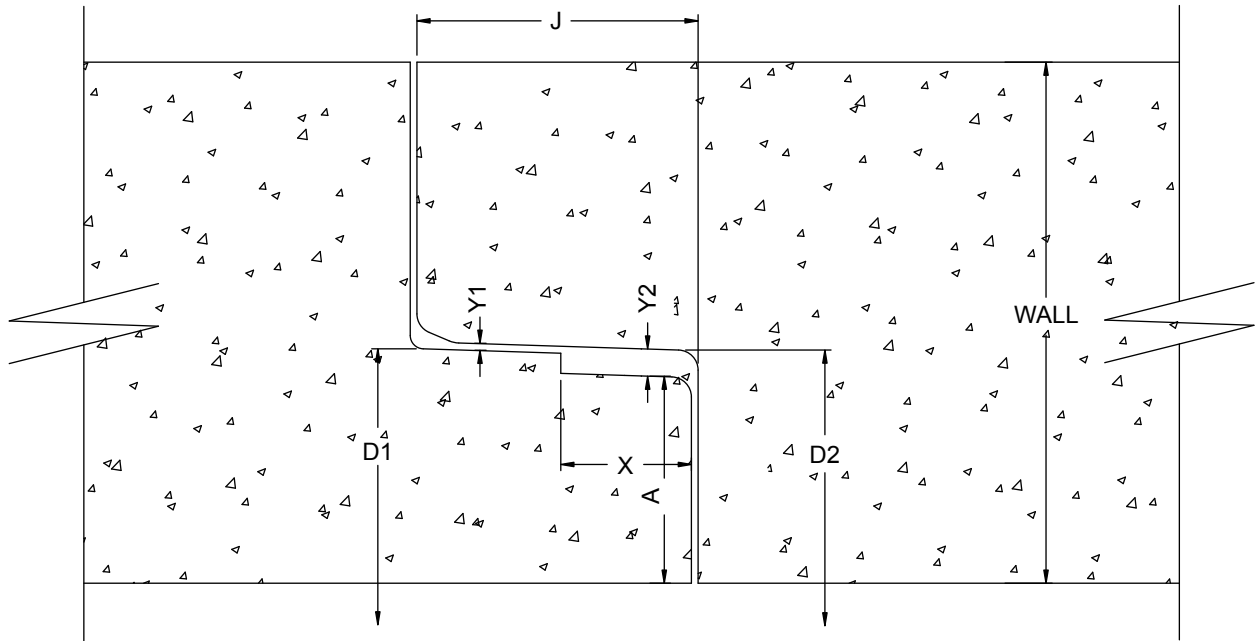
SECTION VIEW - 27" PIPE AND SMALLER



SECTION VIEW - 30" TO 36" PIPE

NOTES:
 MEETS OR EXCEEDS
 THE REQUIREMENTS
 OF ASTM C-76 AND
 ASTM C-443

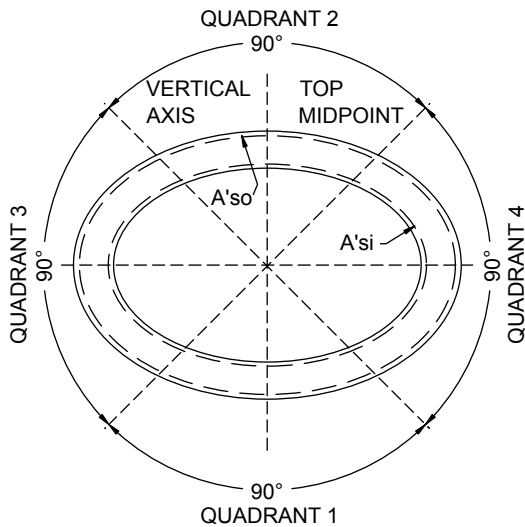
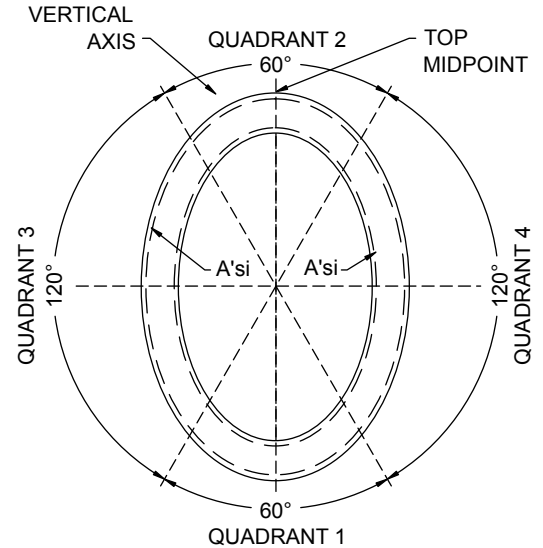
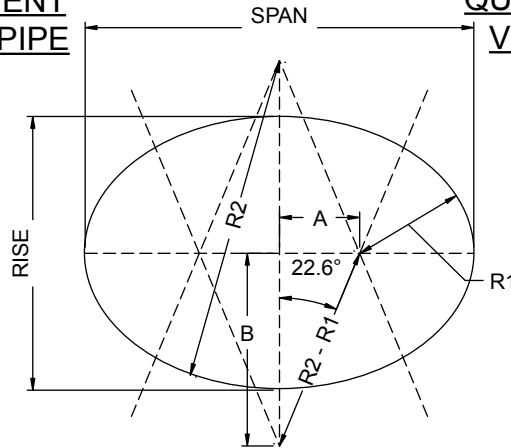
| SINGLE OFFSET JOINT FOR RC PIPE | | | | | | | | C WALL | | | |
|---------------------------------|-------|---------|---------|---------------------------------|--------|--------|--------|---------------------------------|-----------------------------------|---------------------------------|----------|
| ID | A | D1 | D2 | J | X | Y1 | Y2 | WALL | L1 | L2 | WT./FT. |
| 12" | 1.40" | 15.155" | 15.223" | 3 ⁵ / ₈ " | 1.750" | 0.126" | 0.326" | 2 ³ / ₄ " | 1 ¹ / ₄ " | 5 ¹ / ₂ " | 140 lbs. |
| 15" | 1.65" | 18.655" | 18.723" | 3 ⁵ / ₈ " | 1.750" | 0.126" | 0.326" | 3" | 1 ⁷ / ₁₆ " | 5 ¹ / ₄ " | 180 lbs. |
| 18" | 1.84" | 22.030" | 22.098" | 3 ⁵ / ₈ " | 1.750" | 0.126" | 0.326" | 3 ¹ / ₄ " | 1 ⁵ / ₈ " | 5 ¹ / ₂ " | 230 lbs. |
| 21" | 2.16" | 25.672" | 25.724" | 3 ⁷ / ₈ " | 1.750" | 0.126" | 0.326" | 3 ¹ / ₂ " | 1 ¹³ / ₁₆ " | 5 ³ / ₄ " | 280 lbs. |
| 24" | 2.35" | 29.047" | 29.099" | 3 ⁷ / ₈ " | 1.750" | 0.126" | 0.326" | 3 ³ / ₄ " | 2" | 6" | 340 lbs. |
| 27" | 2.61" | 32.564" | 32.608" | 4" | 1.750" | 0.126" | 0.326" | 4" | 2" | 6" | 410 lbs. |
| 30" | 2.66" | 35.892" | 35.976" | 4" | 1.750" | 0.126" | 0.326" | 4 ¹ / ₄ " | 2" | 5 ¹ / ₂ " | 480 lbs. |
| 33" | 2.91" | 39.400" | 39.476" | 4 ¹ / ₈ " | 1.750" | 0.126" | 0.326" | 4 ¹ / ₂ " | 2 ¹ / ₈ " | 6" | 510 lbs. |
| 36" | 3.16" | 42.900" | 42.976" | 4 ¹ / ₈ " | 1.750" | 0.126" | 0.326" | 4 ³ / ₄ " | 2 ³ / ₈ " | 7" | 630 lbs. |
| SINGLE OFFSET JOINT FOR RC PIPE | | | | | | | | B WALL | | | |
| ID | A | D1 | D2 | J | X | Y1 | Y2 | WALL | L1 | L2 | WT./FT. |
| 12" | 1.40" | 15.155" | 15.223" | 3 ⁵ / ₈ " | 1.750" | 0.126" | 0.326" | 2" | 2" | 5 ¹ / ₂ " | 110 lbs. |
| 15" | 1.65" | 18.655" | 18.723" | 3 ⁵ / ₈ " | 1.750" | 0.126" | 0.326" | 2 ¹ / ₄ " | 2 ³ / ₁₆ " | 5 ¹ / ₄ " | 150 lbs. |
| 18" | 1.84" | 22.030" | 22.098" | 3 ⁵ / ₈ " | 1.750" | 0.126" | 0.326" | 2 ¹ / ₂ " | 2 ³ / ₈ " | 5 ¹ / ₂ " | 190 lbs. |
| 21" | 2.16" | 25.672" | 25.724" | 3 ⁷ / ₈ " | 1.750" | 0.126" | 0.326" | 2 ³ / ₄ " | 2 ⁹ / ₁₆ " | 5 ³ / ₄ " | 240 lbs. |
| 24" | 2.35" | 29.047" | 29.099" | 3 ⁷ / ₈ " | 1.750" | 0.126" | 0.326" | 3" | 2 ³ / ₄ " | 6" | 315 lbs. |
| 27" | 2.61" | 32.564" | 32.608" | 4" | 1.750" | 0.126" | 0.326" | 3 ¹ / ₄ " | 2 ³ / ₄ " | 6" | 380 lbs. |
| 30" | 2.66" | 35.892" | 35.976" | 4" | 1.750" | 0.126" | 0.326" | 3 ¹ / ₂ " | 2 ³ / ₄ " | 5 ¹ / ₂ " | 384 lbs. |
| 36" | 3.16" | 42.900" | 42.976" | 4 ¹ / ₈ " | 1.750" | 0.126" | 0.326" | 4" | 3 ¹ / ₈ " | 7" | 524 lbs. |

**Reinforced Concrete Pipe
 Gasket Joint Details
 84" to 144"**


84" TO 144" PIPE - SINGLE OFFSET JOINT

| B WALL JOINT PROPERTIES - SINGLE OFFSET | | | | | | | | | | | |
|---|-------|----------|----------|---------------------------------|---------------------------------|--------|--------|------|---------------|----|-----------|
| ID | A | D1 | D2 | J | X | Y1 | Y2 | WALL | L1 | L2 | WEIGHT/FT |
| 84" | 3.25" | 91.504" | 91.500" | 5 ¹ / ₄ " | 2 ³ / ₄ " | 0.146" | 0.500" | 8" | STRAIGHT WALL | | 2480 |
| 96" | 3.63" | 104.254" | 104.250" | 5 ¹ / ₄ " | 2 ³ / ₄ " | 0.146" | 0.500" | 9" | STRAIGHT WALL | | 3080 |
| 108" | 3.93" | 116.922" | 116.864" | 5 ⁷ / ₈ " | 2 ³ / ₄ " | 0.146" | 0.500" | 10" | STRAIGHT WALL | | 3955 |
| 120" | 4.21" | 128.753" | 128.721" | 6" | 2 ⁵ / ₈ " | 0.150" | 0.500" | 11" | STRAIGHT WALL | | 4875 |
| 144" | 4.96" | 154.253" | 154.221" | 6" | 2 ⁵ / ₈ " | 0.150" | 0.500" | 12" | STRAIGHT WALL | | 6680 |

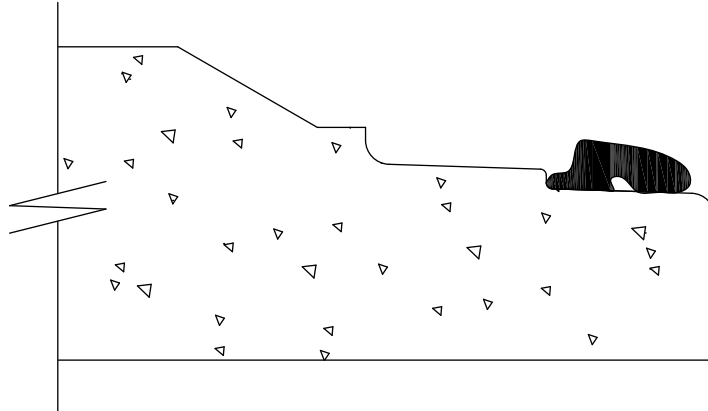
NOTES:
 MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443

ASTM C-507
Equivalent Elliptical Pipe

QUADRANT REINFORCEMENT
HORIZONTAL ELLIPTICAL PIPE

QUADRANT REINFORCEMENT
VERTICAL ELLIPTICAL PIPE

SYMETRICAL ABOUT AXES

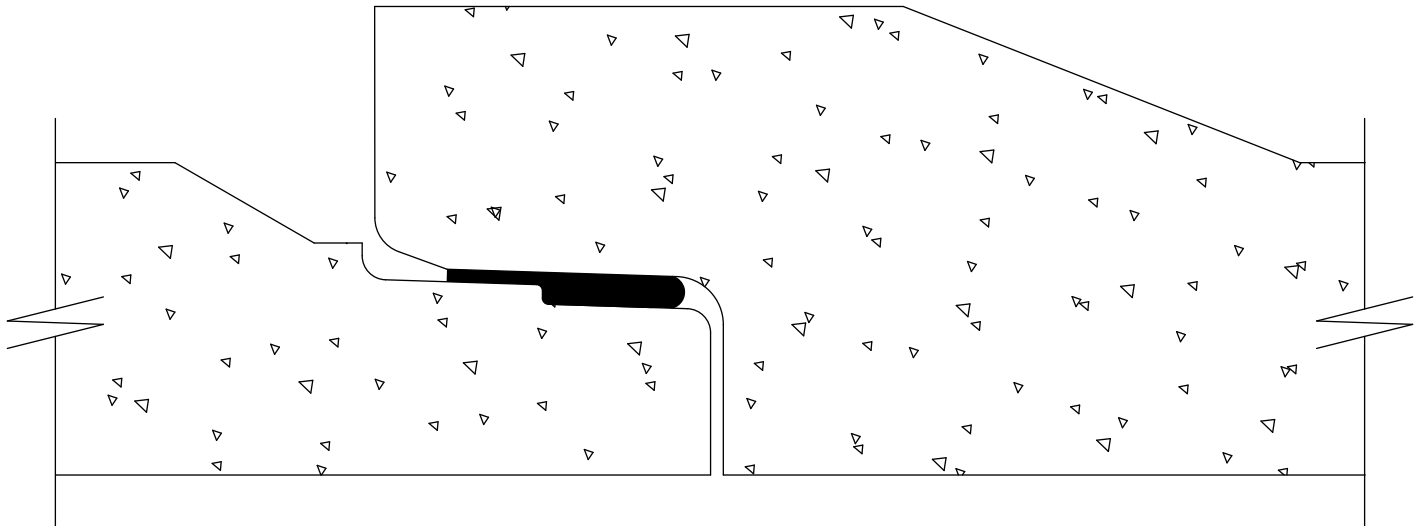
ASTM C-507 EQUIVALENT ELLIPTICAL PIPE - WITH GASKET JOINT

| EQUIVALENT ROUND ID | RISE X SPAN, INCHES | FULL FLOW WATER AREA, FT | RISE, INCHES | SPAN, INCHES | A, INCHES | B, INCHES | R1, INCHES | R2, INCHES | ° DEGREES | WALL THICKNESS INCHES | WEIGHT PER FOOT |
|---------------------|---------------------|--------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------|-------------------------------|-----------------|
| 18" | 14 X 23 | 1.83 | 14 ¹ / ₄ | 22 ³ / ₄ | 5 ³ / ₈ | 12 ⁷ / ₈ | 6 | 20 | 22.6 | 2 ³ / ₄ | 195 |
| 24" | 19 X 30 | 3.28 | 19 ¹ / ₄ | 30 ¹ / ₄ | 6 ⁷ / ₈ | 16 ⁵ / ₈ | 8 ¹ / ₄ | 26 ¹ / ₄ | 22.6 | 3 ³ / ₄ | 300 |
| 30" | 24 X 38 | 5.10 | 24 | 37 ³ / ₄ | 8 ⁵ / ₈ | 20 ³ / ₄ | 10 ¹ / ₄ | 32 ³ / ₄ | 22.6 | 3 ³ / ₄ | 430 |
| 36" | 29 X 45 | 7.36 | 28 ³ / ₄ | 45 ¹ / ₂ | 10 ¹ / ₂ | 24 ⁷ / ₈ | 12 ¹ / ₄ | 39 ¹ / ₄ | 22.6 | 4 ¹ / ₂ | 625 |
| 42" | 34 X 53 | 10.2 | 34 | 53 ¹ / ₄ | 12 ¹ / ₈ | 29 | 14 ¹ / ₂ | 46 | 22.6 | 5 | 850 |
| 48" | 38 X 60 | 12.9 | 38 ³ / ₄ | 60 | 18 ¹ / ₂ | 32 ³ / ₈ | 16 ¹ / ₂ | 51 ¹ / ₂ | 22.6 | 5 ¹ / ₂ | 1090 |
| 54" | 43 X 68 | 16.7 | 43 ¹ / ₂ | 68 | 15 ¹ / ₄ | 36 ³ / ₄ | 18 ³ / ₄ | 58 ¹ / ₂ | 22.6 | 6 | 1350 |
| 60" | 48 X 76 | 20.5 | 48 ¹ / ₄ | 75 ¹ / ₂ | 17 | 40 ⁷ / ₈ | 20 ³ / ₄ | 65 | 22.6 | 6 ¹ / ₂ | 1475 |
| 72" | 58 X 91 | 29.4 | 57 ³ / ₄ | 90 ¹ / ₂ | 20 ¹ / ₂ | 49 ⁹ / ₈ | 24 ³ / ₄ | 78 | 22.6 | 7 ¹ / ₂ | 2040 |
| 90" | 72 X 113 | 46.1 | 72 ¹ / ₂ | 113 | 25 ¹ / ₂ | 61 | 31 | 97 ¹ / ₄ | 22.6 | 9 | 3050 |

**Pre-Lubricated Gasket Profile
for RCP, Elliptical Pipe,
and Manholes**



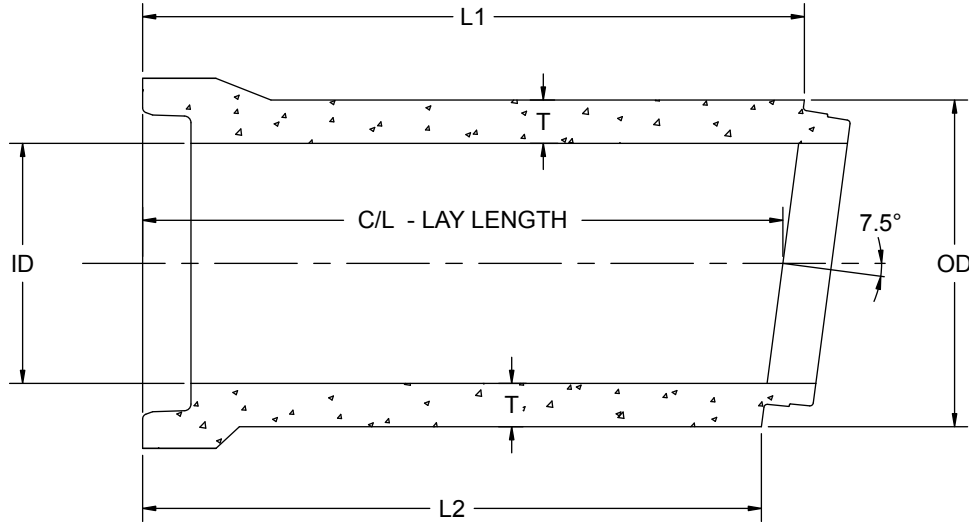
TYPICAL PRE-LUBRICATED GASKET PROFILE



TYPICAL PRE-LUBRICATED GASKET PROFILE

NOTE:
ALL GASKETS MEET OR EXCEED THE PHYSICAL
PROPERTY REQUIREMENTS OF ASTM C-443,
ASTM C-425 AND ASTM C-361

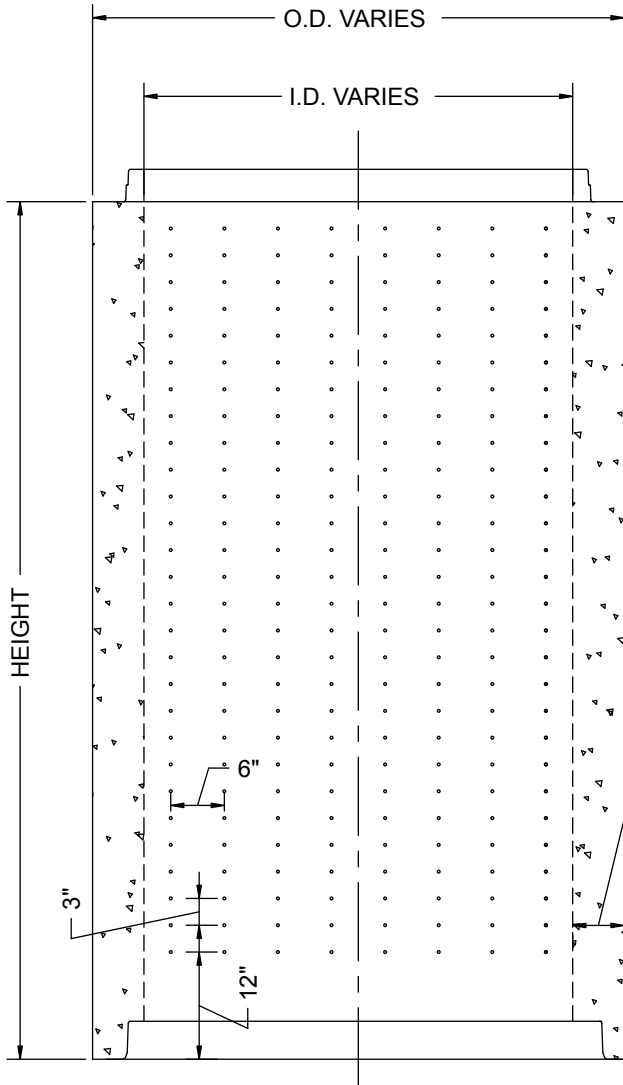
**Reinforced Concrete Pipe
 Mitered – 7-1/2° Bend**



| MITERED LONG BEND SINGLE OFFSET JOINT PROPERTIES | | | | | | | | | |
|--|--------------------|-----|------|--------|---------|----------------|--------------|------------|-----------|
| ID | WEIGHT PER SECTION | T | OD | L1 | L2 | C/L LAY LENGTH | CURVE RADIUS | BEND ANGLE | WALL TYPE |
| 12" | 560 lbs | 2½" | 17" | 4'-1⅛" | 3'-10⅞" | 4'-0" | 30'-6" | 7.5° | C |
| 15" | 720 lbs | 3" | 21" | 4'-1⅜" | 3'-10⅝" | 4'-0" | 30'-6" | 7.5° | C |
| 18" | 920 lbs | 3¼" | 24½" | 4'-1⅝" | 3'-10⅜" | 4'-0" | 30'-6" | 7.5° | C |
| 21" | 1120 lbs | 3½" | 28" | 4'-1⅜" | 3'-10⅜" | 4'-0" | 30'-6" | 7.5° | C |
| 24" | 1360 lbs | 3¾" | 31½" | 4'-2⅛" | 3'-9⅛" | 4'-0" | 30'-6" | 7.5° | C |
| 27" | 1640 lbs | 4" | 35" | 4'-2⅝" | 3'-9⅛" | 4'-0" | 30'-6" | 7.5° | C |
| 30" | 1920 lbs | 4¼" | 38½" | 4'-2⅞" | 3'-9⅛" | 4'-0" | 30'-6" | 7.5° | C |
| 33" | 2040 lbs | 4½" | 42" | 4'-2⅞" | 3'-9⅜" | 4'-0" | 30'-6" | 7.5° | C |
| 36" | 2520 lbs | 4¾" | 45½" | 4'-3" | 3'-9" | 4'-0" | 30'-6" | 7.5° | C |
| 42" | 3240 lbs | 5¼" | 52½" | 4'-3½" | 3'-8⅞" | 4'-0" | 30'-6" | 7.5° | C |
| 48" | 4040 lbs | 5¾" | 59½" | 4'-3⅝" | 3'-8⅞" | 4'-0" | 30'-6" | 7.5° | C |
| 54" | 4920 lbs | 6" | 66" | 4'-4⅜" | 3'-7⅝" | 4'-0" | 30'-6" | 7.5° | C |
| 60" | 5880 lbs | 6¾" | 73½" | 4'-4⅞" | 3'-7⅝" | 4'-0" | 30'-6" | 7.5° | C |
| 66" | 7500 lbs | 7¼" | 79½" | 4'-4⅝" | 3'-7⅝" | 4'-0" | 30'-6" | 7.5° | C |
| 72" | 8040 lbs | 7¾" | 87½" | 4'-5" | 3'-7" | 4'-0" | 30'-6" | 7.5° | C |
| 84" | 9920 lbs | 8" | 100" | 4'-6⅞" | 3'-5⅞" | 4'-0" | 30'-6" | 7.5° | C |
| 96" | 12,320 lbs | 9" | 114" | 4'-7" | 3'-5" | 4'-0" | 30'-6" | 7.5° | C |

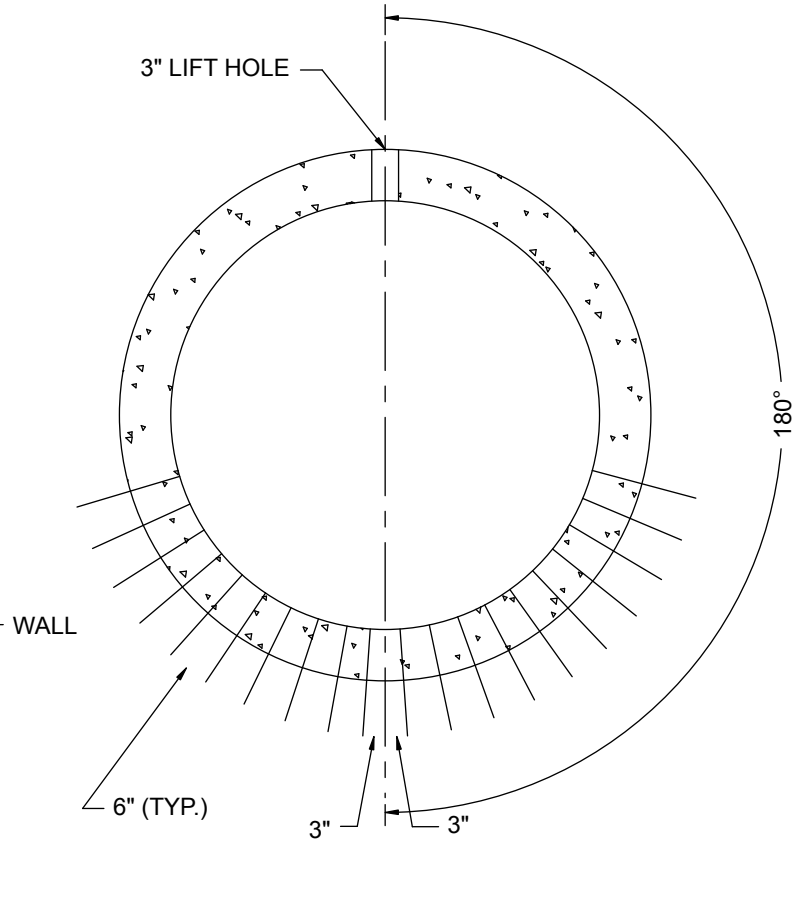
NOTES:
 MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443

ASTM C-444
Reinforced Concrete
Perforated Pipe
12" to 144"



SECTION VIEW

5/16" HOLES: 3" O.C. VERTICAL
6" O.C. HORIZONTAL - 20 ROWS WIDE.



TOP VIEW

NOTES:

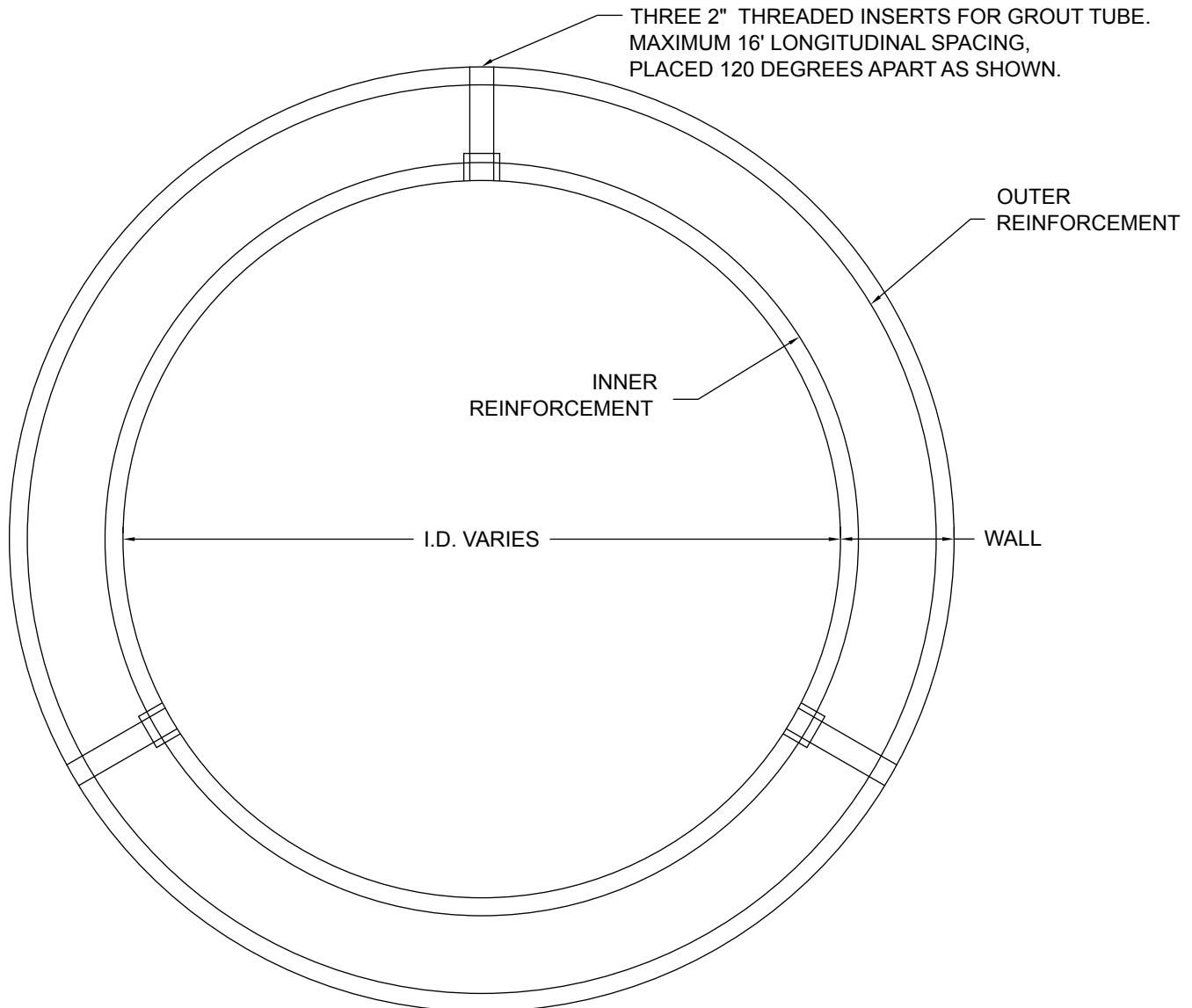
SEE JOINT DETAILS FOR SPECIFICATIONS.

AVAILABLE IN 12" TO 144" I.D. SIZES.

HOLE SIZE AND SPACING VARIABLE BY PROJECT SPECIFICATIONS.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76, ASTM C-443 AND ASTM C-444.

**Reinforced Concrete
Jacking Pipe
36" to 96"**



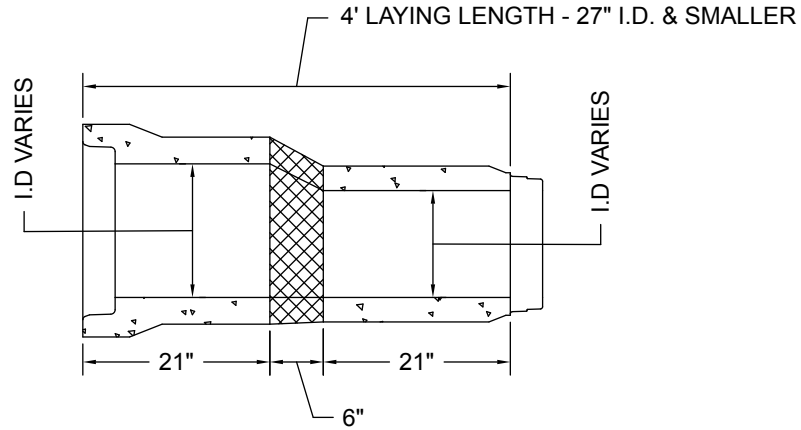
TOP VIEW

JACKING PIPE I.D. & O.D.

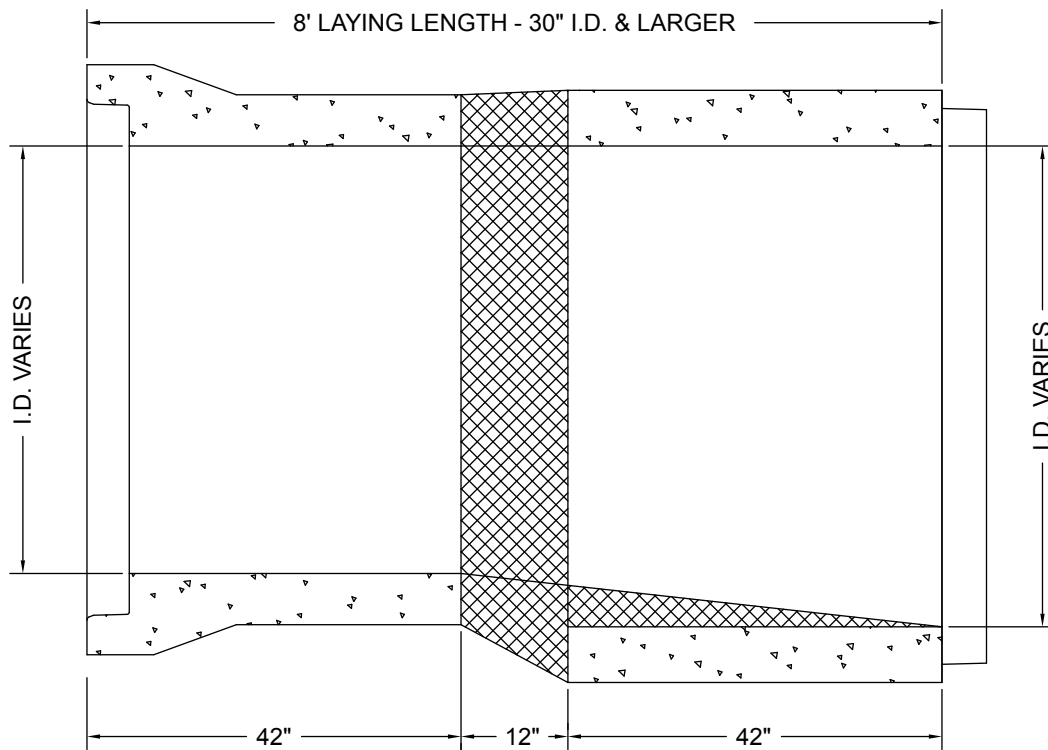
| SIZE | INSIDE DIAMETER | WALL THICKNESS | OUTSIDE DIAMETER |
|------------------|-----------------|----------------|------------------|
| 36" JACKING PIPE | 36" | 7 1/2" | 51" |
| 42" JACKING PIPE | 42" | 8" | 58" |
| 48" JACKING PIPE | 48" | 8 1/2" | 65" |
| 54" JACKING PIPE | 54" | 9" | 72" |
| 60" JACKING PIPE | 60" | 9 1/2" | 79" |
| 66" JACKING PIPE | 66" | 10" | 86" |
| 72" B- WALL | 72" | 7" | 86" |
| 72" C- WALL | 72" | 7 3/4" | 87 1/2" |
| 84" B- WALL | 84" | 8" | 100" |
| 96" B- WALL | 96" | 9" | 114" |

NOTES:
JOINT WILL COMPLY
FOR RUBBER GASKETS
PER: ASTM C-443.

**Reinforced Concrete Pipe
Increases and Reducers**



SECTION VIEW - 27" AND SMALLER



SECTION VIEW - 30" AND LARGER

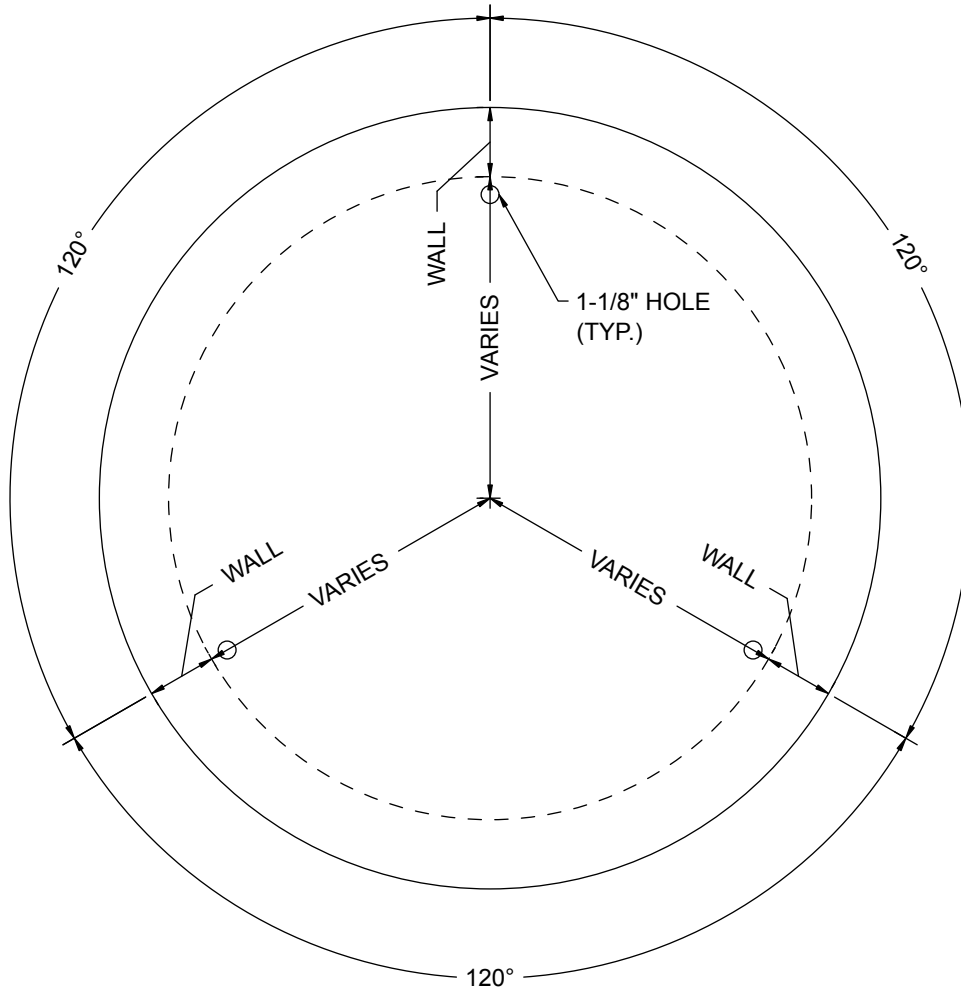
NOTES:

SEE PIPE JOINT DETAILS FOR SPECIFICATIONS.

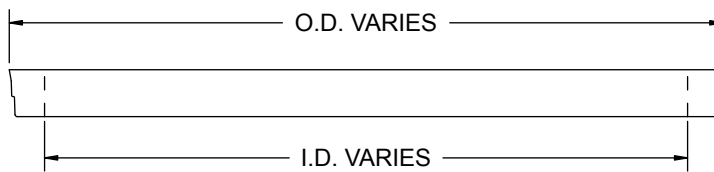
SPECIALLY FABRICATED FOR REQUIRED REDUCTIONS OR INCREASE.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443.

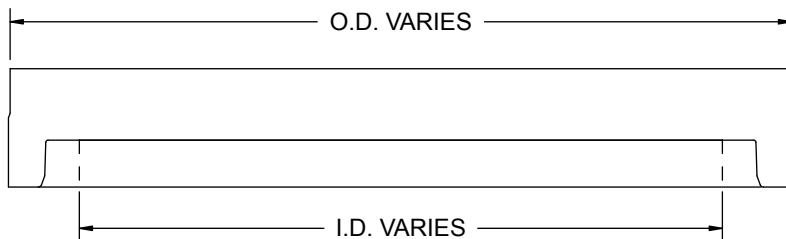
**Reinforced Concrete Pipe
Bell and Spigot Plugs**



TOP VIEW



BELL PLUG SECTION VIEW



SPIGOT PLUG SECTION VIEW

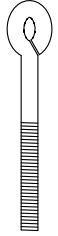
NOTES:

SEE JOINT DETAILS FOR SPECIFICATIONS.

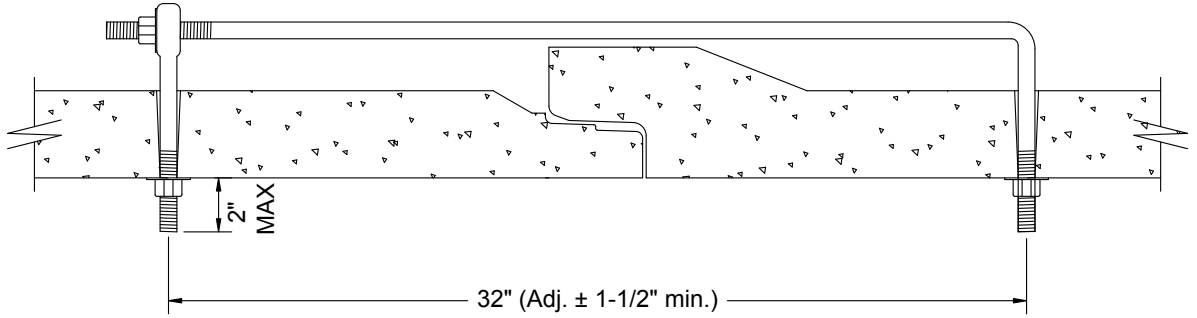
BELL & SPIGOT DIMENSIONS VARY BY PIPE SIZE.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443

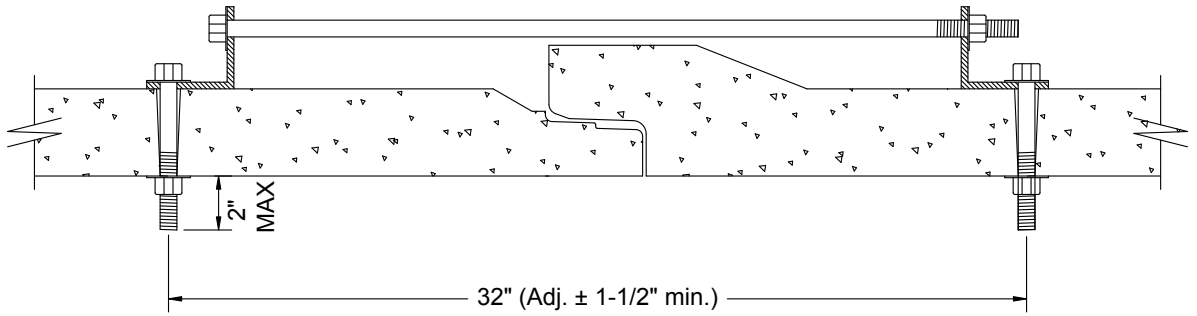
**Reinforced Concrete Pipe
Joint Ties**



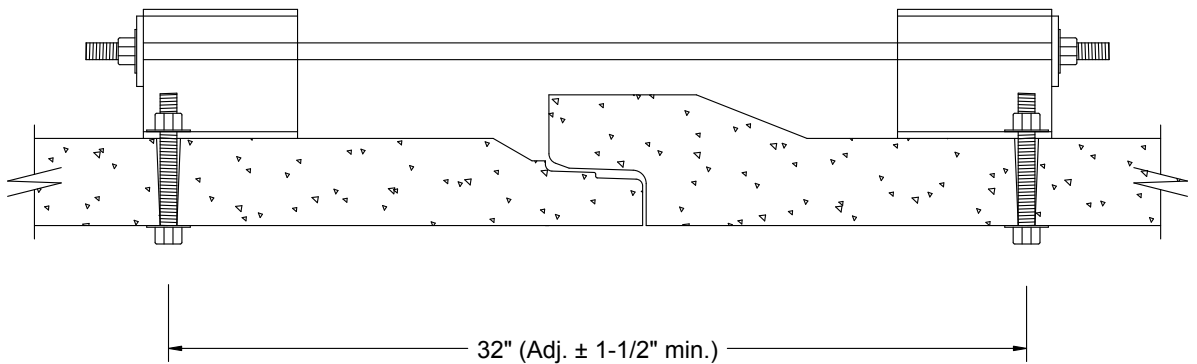
1 PIECE
FORMED
EYE BOLT



PIPE TIE - ADJUSTABLE/ GALVANIZED OR PAINTED

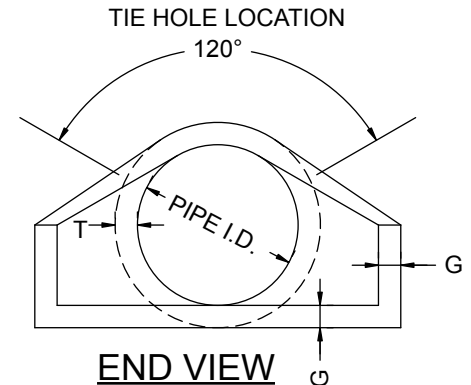
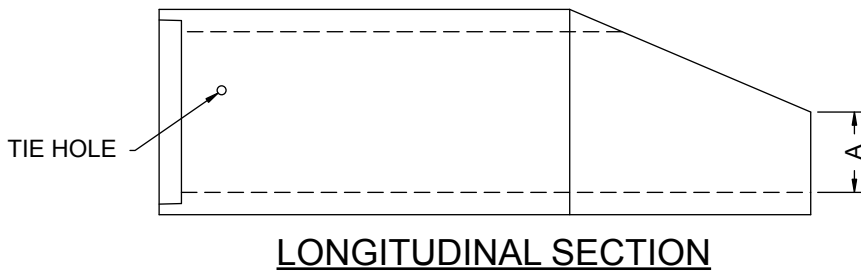
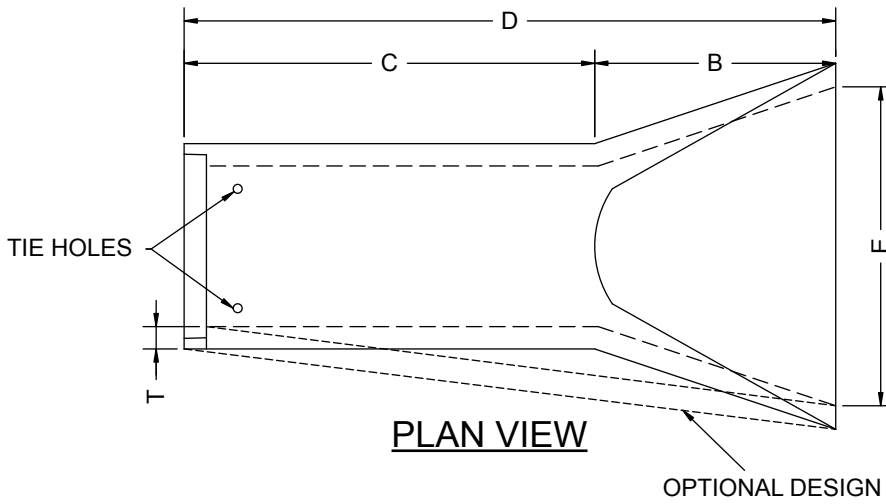


PIPE TIE - HEAVY DUTY/ GALVANIZED OR PAINTED



WASHINGTON COUNTY, MN STANDOFF CULVERT TIE/ GALVANIZED

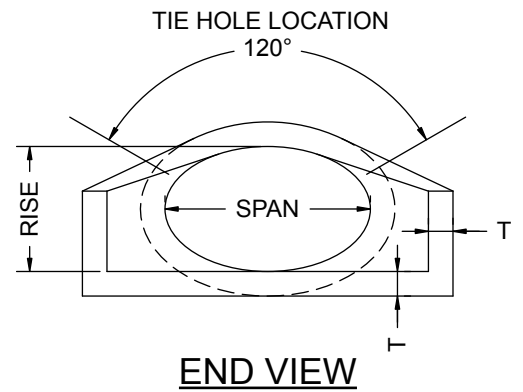
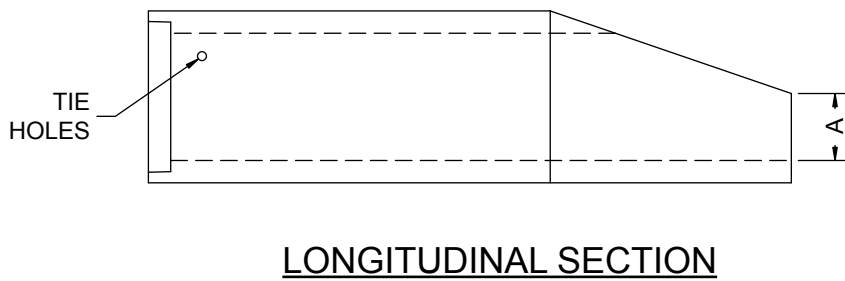
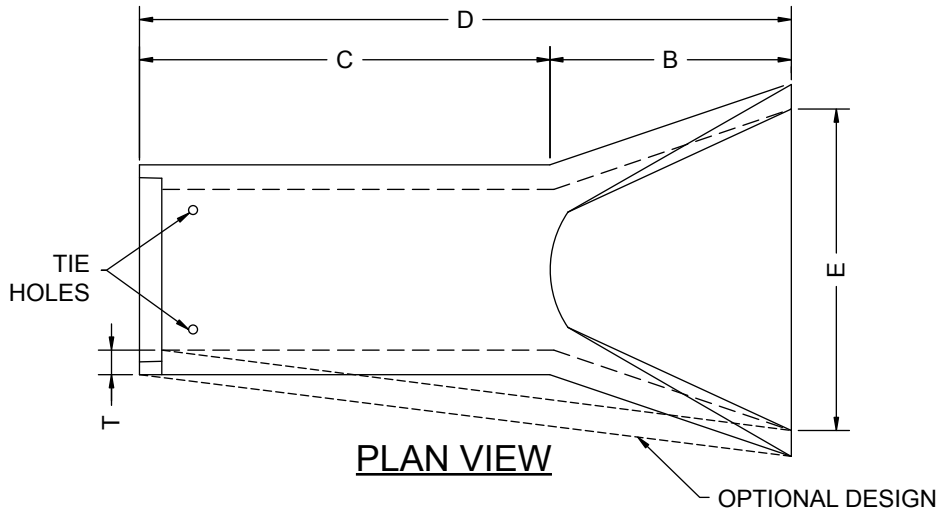
**Reinforced Concrete
 Aprons 12" to 84"**



| DIMENSIONS IN INCHES | | | | | | | |
|----------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-----|-------------------------------|
| ID (in) | T | A | B | C | D | E | G |
| 12 | 2 | 4 | 24 | 48 ⁷ / ₈ | 72 ⁷ / ₈ | 24 | 2 |
| 15 | 2 ¹ / ₄ | 6 | 27 | 46 | 73 | 30 | 2 ¹ / ₄ |
| 18 | 2 ¹ / ₂ | 9 | 27 | 46 | 73 | 36 | 2 ¹ / ₂ |
| 21 | 2 ³ / ₄ | 9 | 36 | 37 ¹ / ₂ | 73 ¹ / ₂ | 42 | 2 ³ / ₄ |
| 24 | 3 | 9 ¹ / ₂ | 43 ¹ / ₂ | 30 | 73 ¹ / ₂ | 48 | 3 |
| 27 | 3 ¹ / ₄ | 10 ¹ / ₂ | 49 ¹ / ₂ | 24 | 73 ¹ / ₂ | 54 | 3 ¹ / ₄ |
| 30 | 3 ¹ / ₂ | 12 | 54 | 19 ³ / ₄ | 73 ¹ / ₂ | 60 | 3 ¹ / ₂ |
| 33 | 3 ³ / ₄ | 13 ¹ / ₂ | 58 ¹ / ₂ | 19 ³ / ₄ | 73 ¹ / ₂ | 66 | 3 ³ / ₄ |
| 36 | 4 | 15 | 63 | 34 ³ / ₄ | 97 ³ / ₄ | 72 | 4 |
| 42 | 4 ¹ / ₂ | 21 | 63 | 35 | 98 | 78 | 4 ¹ / ₂ |
| 48 | 5 | 24 | 72 | 26 | 98 | 84 | 5 |
| 54 | 5 ¹ / ₂ | 27 | 65 | 33 ¹ / ₄ | 98 ¹ / ₄ | 90 | 5 ¹ / ₂ |
| 60 | 6 | 35 | 60 | 39 | 99 | 96 | 5 |
| 66 | 6 ¹ / ₂ | 35 ¹ / ₂ | 69 | 30 | 99 | 102 | 5 |
| 72 | 7 | 36 | 78 | 21 | 99 | 108 | 6 |
| 84 | 8 | 37 | 96 | 39 | 99 | 120 | 6 |

NOTES:
 MEETS OR EXCEEDS
 THE REQUIREMENTS
 OF ASTM C-76 AND
 ASTM C-443

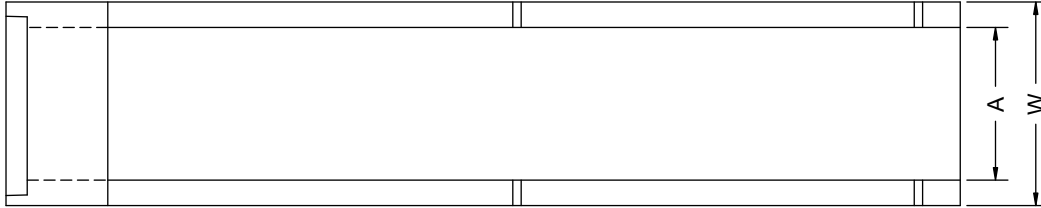
**Reinforced Concrete
 Elliptical Aprons
 18" to 60" Equivalent**



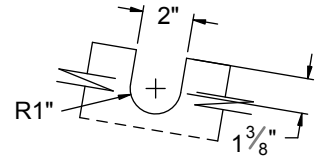
| DIMENSIONS IN INCHES | | | | | | | | |
|----------------------|------|------|-------------------------------|--------------------------------|----|----|----|----|
| EQUIVALENT DIAMETER | SPAN | RISE | T | A | B | C | D | E |
| 18 | 23 | 14 | 2 ³ / ₄ | 7 ¹ / ₂ | 27 | 45 | 72 | 36 |
| 24 | 30 | 19 | 3 ¹ / ₄ | 8 ¹ / ₂ | 39 | 33 | 72 | 48 |
| 30 | 38 | 24 | 3 ³ / ₄ | 9 ¹ / ₂ | 54 | 18 | 72 | 60 |
| 36 | 45 | 29 | 4 ¹ / ₂ | 11 ¹ / ₈ | 60 | 24 | 84 | 72 |
| 42 | 53 | 34 | 5 | 15 ³ / ₄ | 60 | 36 | 96 | 78 |
| 48 | 60 | 38 | 5 ¹ / ₂ | 21 | 60 | 36 | 96 | 84 |
| 54 | 68 | 43 | 6 | 25 ¹ / ₂ | 60 | 36 | 96 | 90 |
| 60 | 76 | 48 | 6 ¹ / ₂ | 30 | 60 | 36 | 96 | 96 |

NOTES:
 MEETS OR EXCEEDS
 THE REQUIREMENTS
 OF ASTM C-443 AND
 ASTM C-507

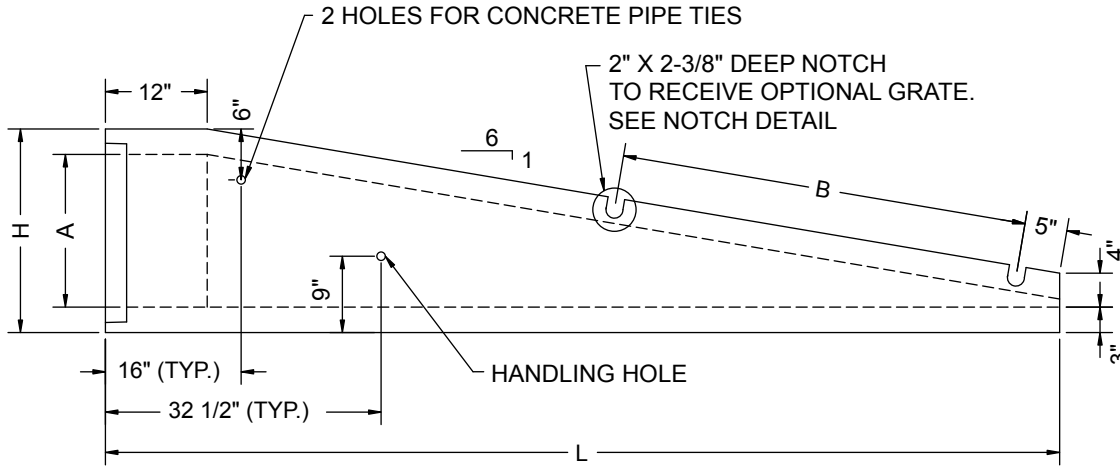
**Reinforced Concrete
 Safety Aprons
 15" to 24"**



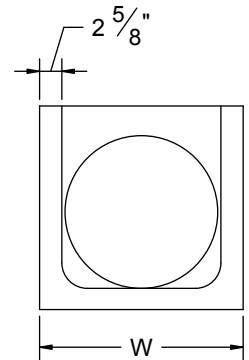
TOP VIEW



NOTCH DETAIL



LONGITUDINAL SECTION



END VIEW

| 1:6 SLOPES | | | | |
|------------|-------------------|-----|-------------|-----|
| I.D. A | B C.L. to C.L. | H | L | W |
| 15" | 4' - 0" | 24" | 9' - 4 1/2" | 24" |
| 18" | 4' - 0" | 24" | 9' - 4 1/2" | 24" |
| 24" | 6' - 0" | 30" | 12' - 4" | 30" |

| 1:4 SLOPES | | | | |
|------------|-------------------|-----|---------|-----|
| I.D. A | B C.L. to C.L. | H | L | W |
| 24" | 4' - 0" | 30" | 8' - 5" | 30" |

SPECIFICATION NOTES:

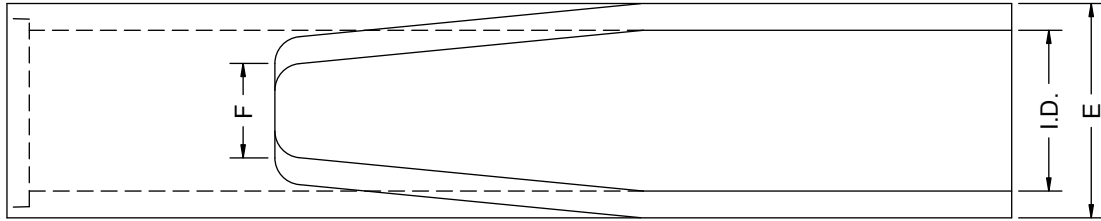
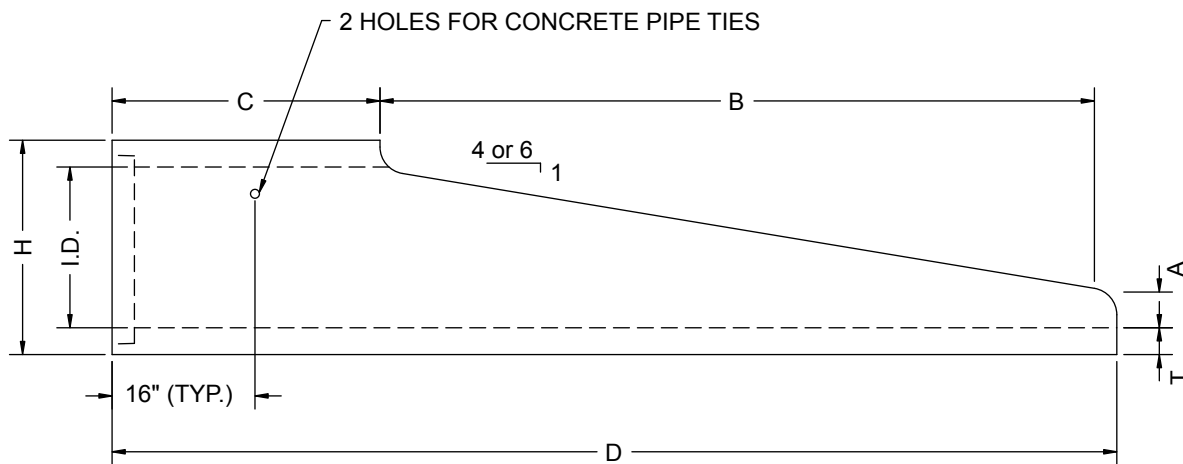
REINFORCING STEEL AND CONCRETE PER ASHTO M170.

OPTIONAL GALVANIZED BARS ALSO AVAILABLE.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443.

STEEL DESIGN IN ACCORDANCE WITH A.S.T.M. C-478 0.12 SQ. IN./FT.

ALL REINFORCING DESIGNED FOR 1" MINIMUM COVER.

**Reinforced Concrete
 Safety Aprons
 12" to 24"**

TOP VIEW

LONGITUDINAL SECTION

| 1:6 SLOPES | | | | | | | | |
|------------|-------------------|----|------|-----|------|--------------------|-----|--------------------|
| I.D. | T | A | B | C | D | E | F | H |
| 12" | 2" | 4" | 42" | 30" | 72" | 16" | 6" | 16" |
| 15" | 2 $\frac{1}{4}$ " | 4" | 60" | 24" | 84" | 19 $\frac{1}{2}$ " | 8" | 19 $\frac{1}{2}$ " |
| 18" | 2 $\frac{1}{2}$ " | 4" | 81" | 15" | 96" | 23" | 10" | 23" |
| 24" | 3" | 4" | 120" | 24" | 144" | 30" | 11" | 30" |

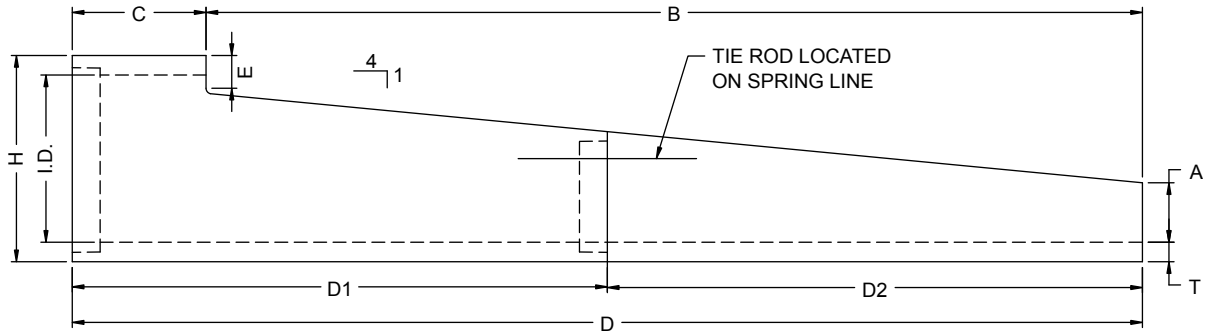
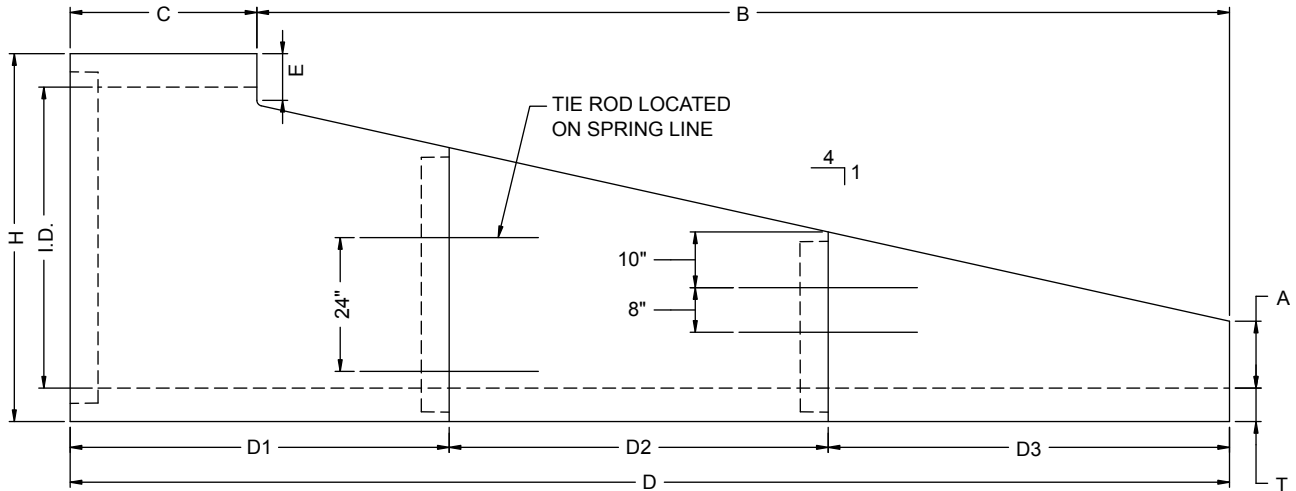
| 1:4 SLOPES | | | | | | | | |
|------------|-------------------|----|-----|-----|-----|-----|-----|-----|
| I.D. | T | A | B | C | D | E | F | H |
| 18" | 2 $\frac{1}{2}$ " | 4" | 46" | 26" | 72" | 23" | 10" | 23" |
| 24" | 3" | 4" | 72" | 24" | 96" | 30" | 11" | 30" |

SPECIFICATION NOTES:

REINFORCEMENT AND CONCRETE CONFORMS TO MN STANDARD RCP CLASS 2.

OPTIONAL GALVANIZED BARS ALSO AVAILABLE.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443.

**Reinforced Concrete
 Safety Aprons
 30" to 72"**

LONGITUDINAL SECTION 30" TO 54"

LONGITUDINAL SECTION 60" & 72"

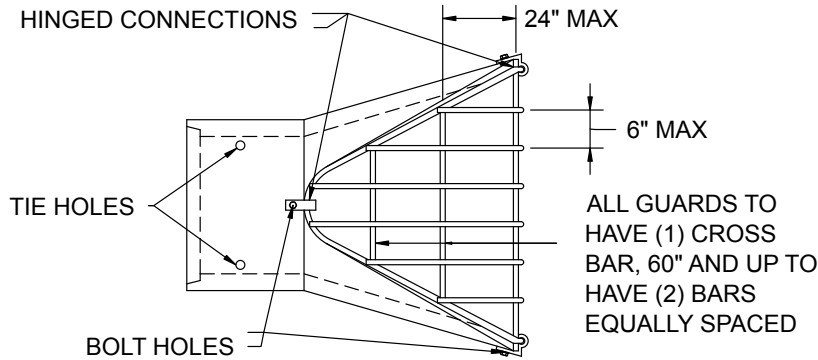
| 2 PIECE SLOPED SAFETY APRONS | | | | | | | | | |
|------------------------------|-----|-----|-------|------|------|------|------|-----|-----|
| I.D. | T | A | B | C | D | D1 | D2 | E | H |
| 30" | 3½" | 9⅝" | 72" | 24" | 102" | 102" | None | 5⅞" | 37" |
| 36" | 4" | 12" | 87" | 15" | 102" | 102" | None | 6¼" | 44" |
| 42" | 4½" | 12" | 110½" | 33½" | 144" | 72" | 72" | 6⅞" | 51" |
| 48" | 5" | 12" | 134½" | 33½" | 168" | 96" | 72" | 7⅞" | 58" |
| 54" | 5½" | 12" | 136½" | 33½" | 192" | 96" | 96" | 7⅞" | 65" |

| 3 PIECE SLOPED SAFETY APRONS | | | | | | | | | | |
|------------------------------|----|-----|-------|------|------|-----|-----|-----|-----|-----|
| I.D. | T | A | B | C | D | D1 | D2 | D3 | E | H |
| 60" | 6" | 12" | 182½" | 33½" | 216" | 72" | 72" | 72" | 8⅜" | 72" |
| 72" | 7" | 12" | 230½" | 33½" | 264" | 96" | 96" | 72" | 9⅜" | 86" |

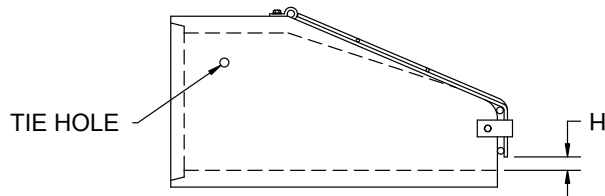
SPECIFICATION NOTES:

REINFORCEMENT AND CONCRETE CONFORMS TO MN STANDARD RCP CLASS 2.
 OPTIONAL GALVANIZED BARS ALSO AVAILABLE.
 MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-443.

Galvanized Trash Guards
12" to 84" RCP and
18" to 60" Equivalent Elliptical

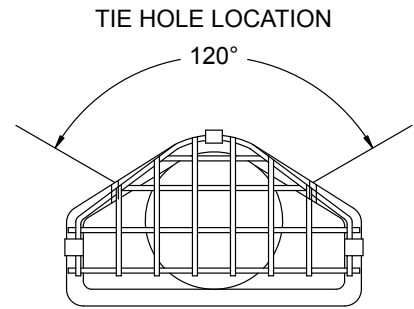


TOP VIEW



HOT DIP GALVANIZED PER
 MNDOT 3392 OR ASTM-A153

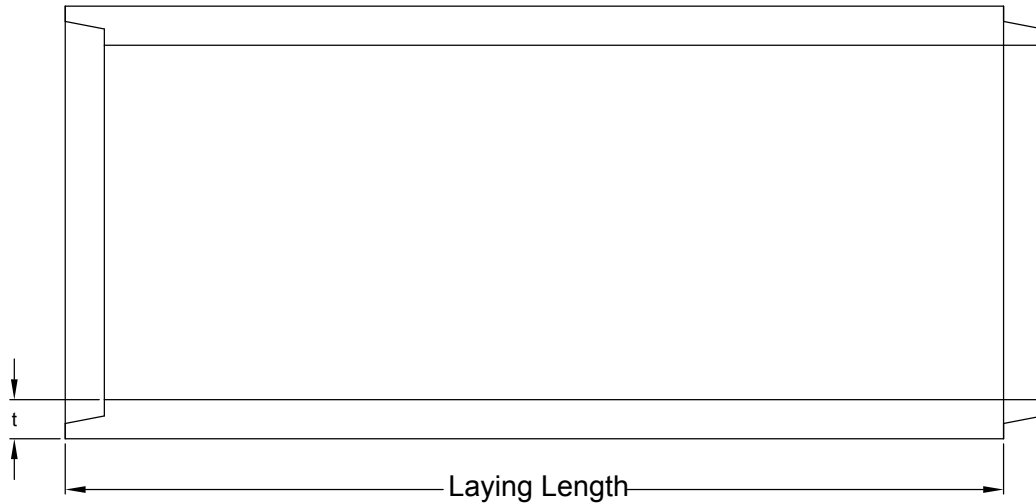
LONGITUDINAL SECTION



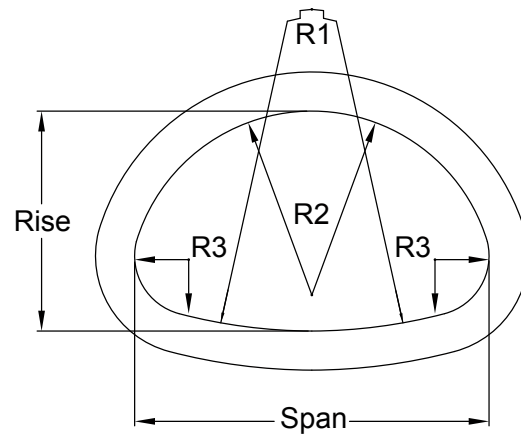
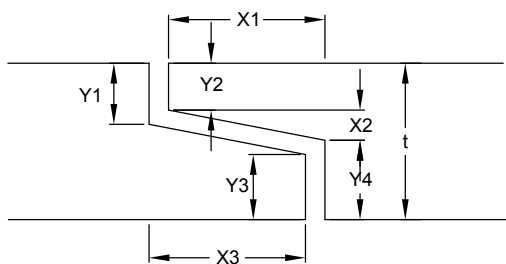
END VIEW

| PIPE SIZE | HOLE ID | BOLT ID | BAR SIZE | H | PIPE SIZE | EQUIVALENT ID | HOLE ID | BOLT ID | BAR SIZE | H |
|-----------|---------|---------|----------|--------|-----------|---------------|---------|---------|----------|----|
| 12" | 3/4" | 5/8" | 3/4" | 2 1/2" | 14" x 23" | 18" | 3/4" | 5/8" | 3/4" | 3" |
| 15" | 3/4" | 5/8" | 3/4" | 3" | 19" x 30" | 24" | 3/4" | 5/8" | 3/4" | 4" |
| 18" | 3/4" | 5/8" | 3/4" | 4" | 24" x 38" | 30" | 7/8" | 3/4" | 1" | 5" |
| 21" | 7/8" | 3/4" | 1" | 4" | 29" x 45" | 36" | 7/8" | 3/4" | 1" | 5" |
| 24" | 7/8" | 3/4" | 1" | 4" | 34" x 53" | 42" | 7/8" | 3/4" | 1" | 6" |
| 27" | 7/8" | 3/4" | 1" | 5" | 38" x 60" | 48" | 7/8" | 3/4" | 1" | 6" |
| 30" | 7/8" | 3/4" | 1" | 5" | 43" x 68" | 54" | 7/8" | 3/4" | 1" | 6" |
| 33" | 7/8" | 3/4" | 1" | 5" | 48" x 76" | 60" | 7/8" | 3/4" | 1" | 7" |
| 36" | 7/8" | 3/4" | 1" | 5" | | | | | | |
| 42" | 7/8" | 1" | 1" | 6" | | | | | | |
| 48" | 7/8" | 1" | 1 1/4" | 6" | | | | | | |
| 54" | 1 1/8" | 1" | 1 1/4" | 6" | | | | | | |
| 60" | 1 1/8" | 1" | 1 1/4" | 7" | | | | | | |
| 66" | 1 1/8" | 1" | 1 1/4" | 7" | | | | | | |
| 72" | 1 1/8" | 1" | 1 1/4" | 7" | | | | | | |
| 84" | 1 1/8" | 1" | 1 1/4" | 7" | | | | | | |

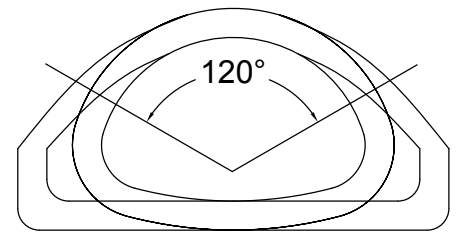
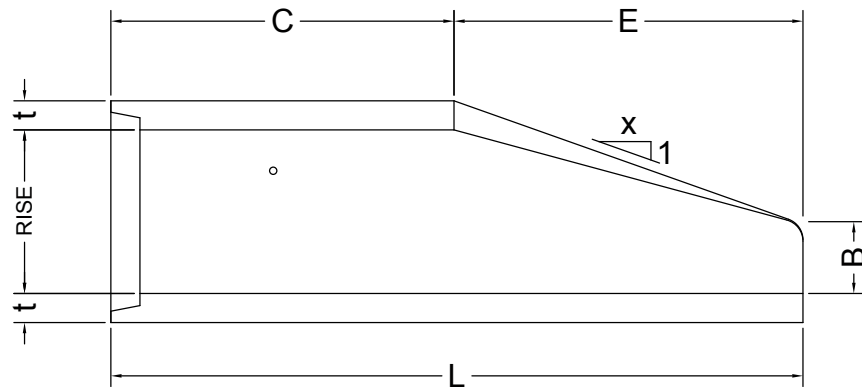
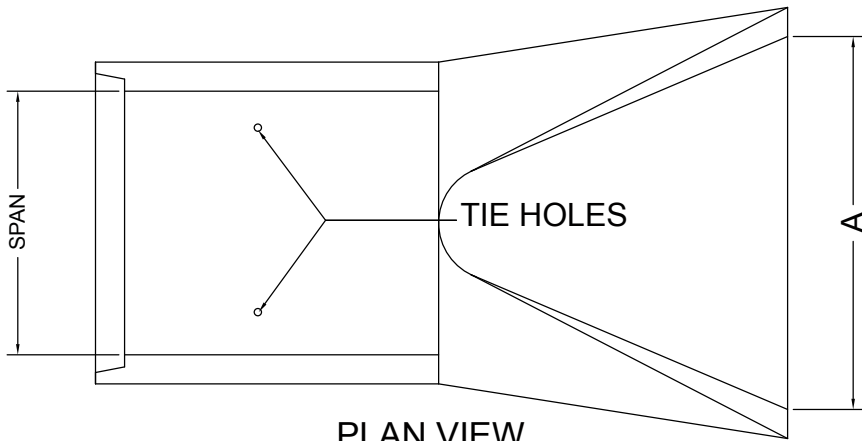
ASTM C-506
Reinforced Concrete
Arch Pipe



TONGUE & GROOVE JOINT DETAIL

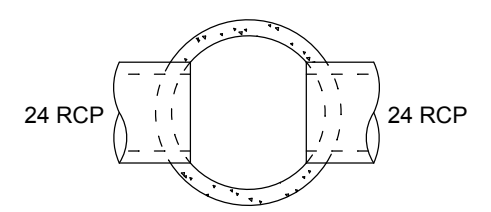
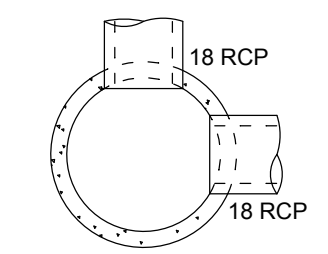
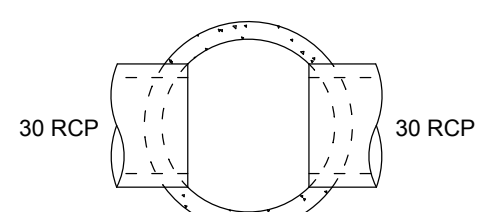
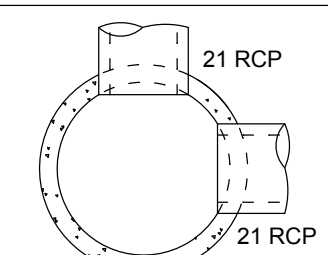
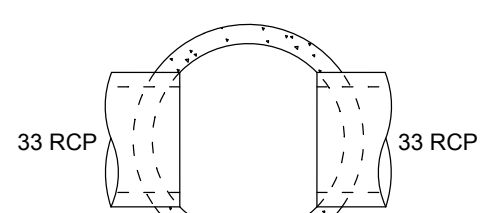
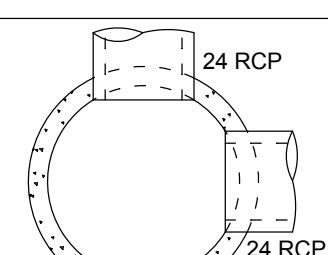
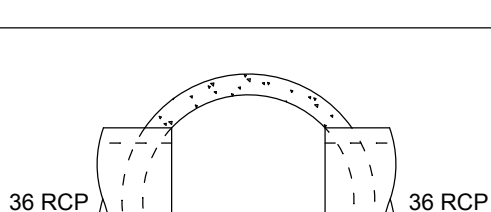
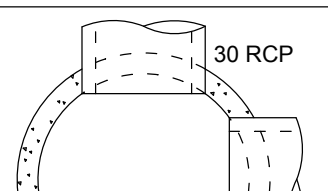
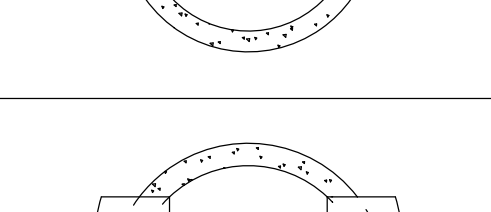
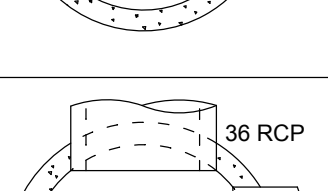


| ASTM C-506 REINFORCED CONCRETE ARCH PIPE | | | | | | | | | | | | | | | |
|--|------------------|----------------------|-----------|-----------|----------|-------------|---------|---------|---------|---------|---------|---------|---------|---------|-----------------|
| NOMINAL SPAN (IN) | EQUIV. DIA. (IN) | WATER AREA (SQ. FT.) | RISE (IN) | SPAN (IN) | "t" (IN) | X1, X3 (IN) | X2 (IN) | Y1 (IN) | Y2 (IN) | Y3 (IN) | Y4 (IN) | R1 (IN) | R2 (IN) | R3 (IN) | WEIGHT (LBS/FT) |
| 22 | 18 | 1.7 | 13.5 | 22.0 | 2.5 | 2 | .375 | 1.375 | 1.125 | 0.75 | 1.00 | 27.5 | 13.75 | 5.25 | 194 |
| 29 | 24 | 2.8 | 18.0 | 28.5 | 3.5 | 3 | .500 | 1.625 | 1.375 | 1.38 | 1.63 | 40.7 | 14.75 | 4.63 | 329 |
| 36 | 30 | 4.4 | 22.5 | 36.3 | 4.0 | 4 | .625 | 1.813 | 1.563 | 1.56 | 1.81 | 51.0 | 18.75 | 6.13 | 485 |
| 44 | 36 | 6.4 | 26.6 | 43.8 | 4.5 | 4 | .750 | 2.000 | 1.750 | 1.75 | 2.00 | 62.0 | 22.50 | 6.50 | 643 |
| 51 | 42 | 8.8 | 31.3 | 51.1 | 4.5 | 4 | .750 | 2.000 | 1.750 | 1.75 | 2.00 | 73.0 | 26.25 | 7.75 | 740 |
| 58 | 48 | 11.4 | 36.0 | 58.5 | 5.0 | 5 | .750 | 2.250 | 2.000 | 2.00 | 2.25 | 84.0 | 30.00 | 8.88 | 973 |
| 65 | 54 | 14.0 | 40.0 | 65.0 | 5.5 | 5 | .750 | 2.500 | 2.250 | 2.25 | 2.50 | 92.5 | 33.38 | 10.00 | 1184 |
| 73 | 60 | 17.7 | 45.0 | 73.0 | 6.0 | 5 | .750 | 3.313 | 2.750 | 1.94 | 2.50 | 105.0 | 37.50 | 11.00 | 1440 |
| 88 | 72 | 25.6 | 54.0 | 88.0 | 7.0 | 6 | 1.00 | 3.813 | 3.250 | 2.81 | 2.75 | 126.0 | 45.00 | 13.31 | 1988 |
| 102 | 84 | 34.6 | 62.0 | 102.0 | 8.0 | 6 | 1.00 | 4.125 | 3.500 | 2.88 | 3.50 | 162.5 | 52.00 | 14.50 | 2490 |

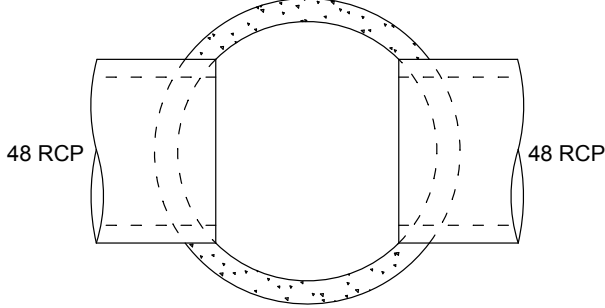
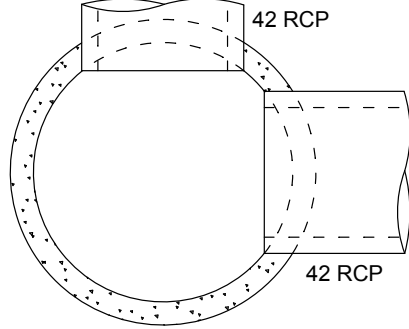
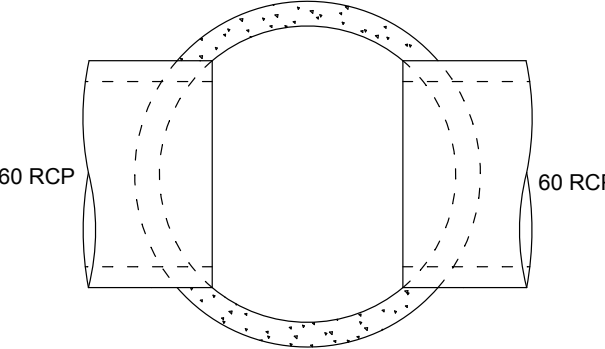
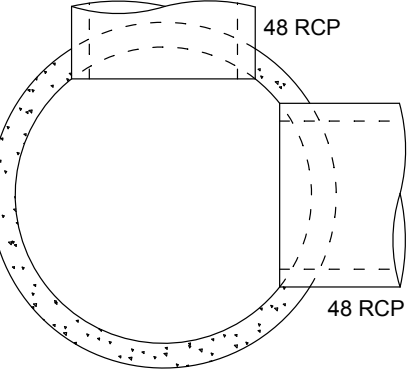
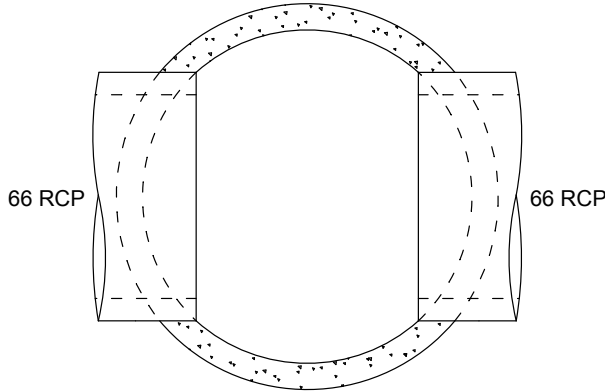
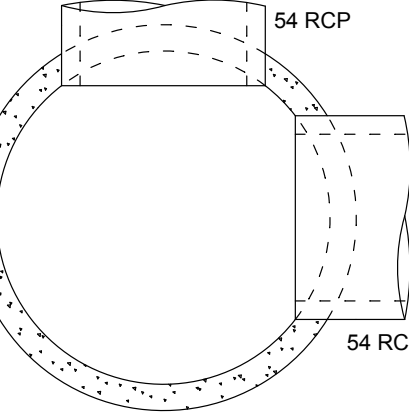
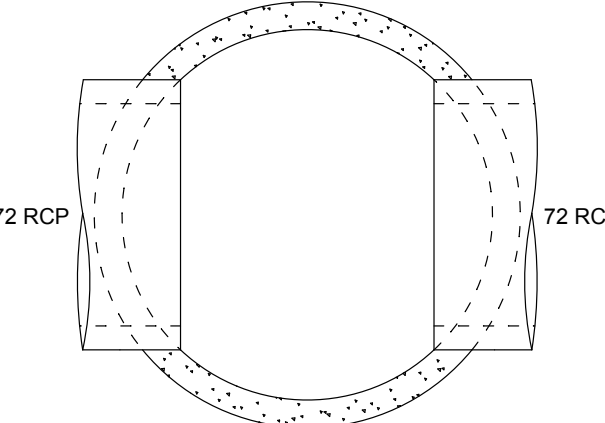
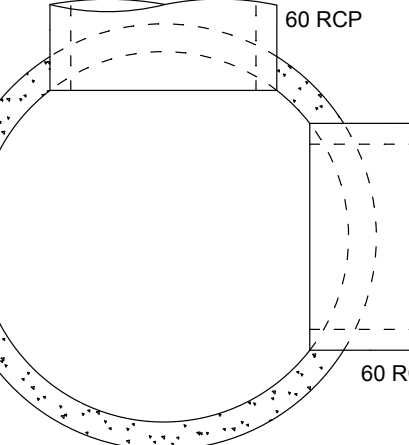
**Reinforced Concrete
 Arch Pipe Apron**


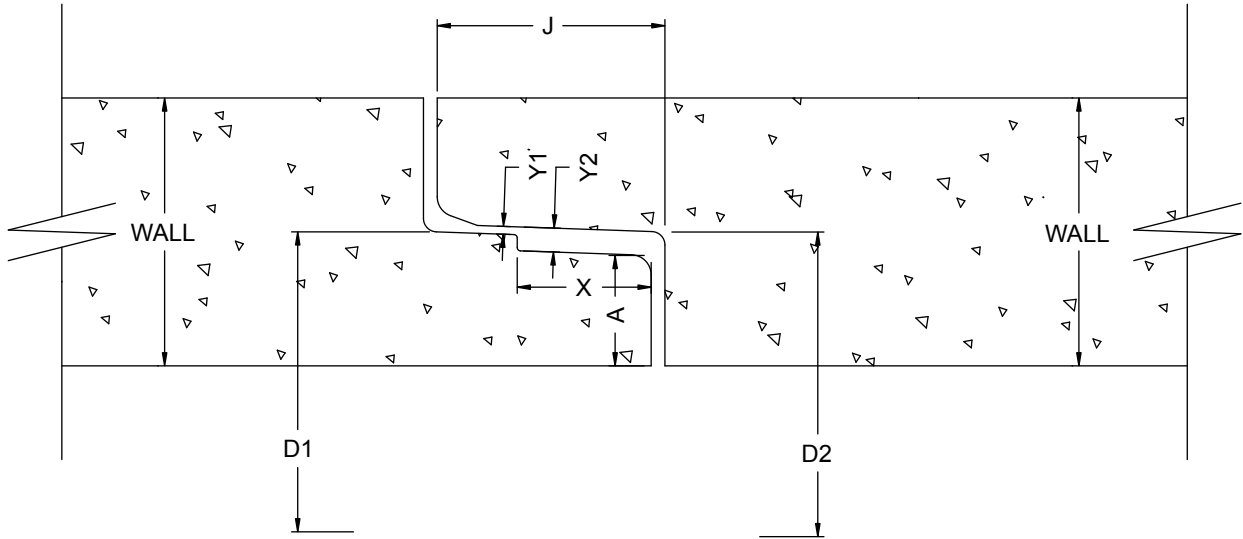
| ARCH PIPE APRON | | | | | | | | | | | |
|-------------------|------------------|-----------|-----------|-----------|----------|--------|--------|--------|--------|--------|--------------------------|
| NOMINAL SPAN (IN) | EQUIV. DIA. (IN) | RISE (IN) | SPAN (IN) | SLOPE (X) | "t" (IN) | A (IN) | B (IN) | C (FT) | E (FT) | L (FT) | WEIGHT PER SECTION (LBS) |
| 22 | 18 | 13.5 | 22.0 | 3 | 2.5 | 35.5 | 8.50 | 3.7 | 2.2 | 0.75 | 1140 |
| 29 | 24 | 18.0 | 28.5 | 3 | 3.5 | 48.0 | 8.25 | 2.6 | 3.1 | 1.38 | 1630 |
| 36 | 30 | 22.5 | 36.3 | 3 | 4.0 | 59.3 | 9.50 | 3.6 | 4.0 | 1.56 | 3270 |
| 44 | 36 | 26.6 | 43.8 | 3 | 4.5 | 72.0 | 12.0 | 2.8 | 4.8 | 1.75 | 4310 |
| 51 | 42 | 31.3 | 51.1 | 3 | 4.5 | 76.5 | 18.5 | 2.7 | 4.9 | 1.75 | 5060 |
| 58 | 48 | 36.0 | 58.5 | 3 | 5.0 | 83.3 | 22.3 | 2.6 | 4.9 | 2.00 | 6260 |
| 65 | 54 | 40.0 | 65.0 | 3 | 5.5 | 102.0 | 25.5 | 3.2 | 4.8 | 2.25 | 7780 |
| 73 | 60 | 45.0 | 73.0 | 3 | 6.0 | 94.0 | 30.5 | 2.7 | 4.8 | 1.94 | 10400 |
| 88 | 72 | 54.0 | 88.0 | 2 | 7.0 | 120.0 | 30.0 | 3.3 | 5.0 | 2.81 | 13600 |
| 102 | 84 | 62.0 | 102.0 | 2 | 8.0 | 144.0 | 28.5 | 1.6 | 6.9 | 2.88 | 18000 |

**Reinforced Concrete Structure
 Sizing Chart 48" to 72"**

| MANHOLE DIAMETER | MAXIMUM PIPE SIZE FOR PRECAST STRUCTURES | |
|---------------------|---|--|
| | STRAIGHT | RIGHT ANGLE |
| 48" |  <p>24 RCP 24 RCP</p> |  <p>18 RCP 18 RCP</p> |
| 54" |  <p>30 RCP 30 RCP</p> |  <p>21 RCP 21 RCP</p> |
| 60" |  <p>33 RCP 33 RCP</p> |  <p>24 RCP 24 RCP</p> |
| 66" |  <p>36 RCP 36 RCP</p> |  <p>30 RCP 30 RCP</p> |
| 72" |  <p>42 RCP 42 RCP</p> |  <p>36 RCP 36 RCP</p> |

Reinforced Concrete Structure Sizing Chart 84" to 120"

| MANHOLE DIAMETER | MAXIMUM PIPE SIZE FOR PRECAST STRUCTURES | |
|------------------|---|---|
| | STRAIGHT | RIGHT ANGLE |
| 84" |  <p>48 RCP</p> |  <p>42 RCP</p> <p>42 RCP</p> |
| 96" |  <p>60 RCP</p> |  <p>48 RCP</p> <p>48 RCP</p> |
| 108" |  <p>66 RCP</p> |  <p>54 RCP</p> <p>54 RCP</p> |
| 120" |  <p>72 RCP</p> |  <p>60 RCP</p> <p>60 RCP</p> |

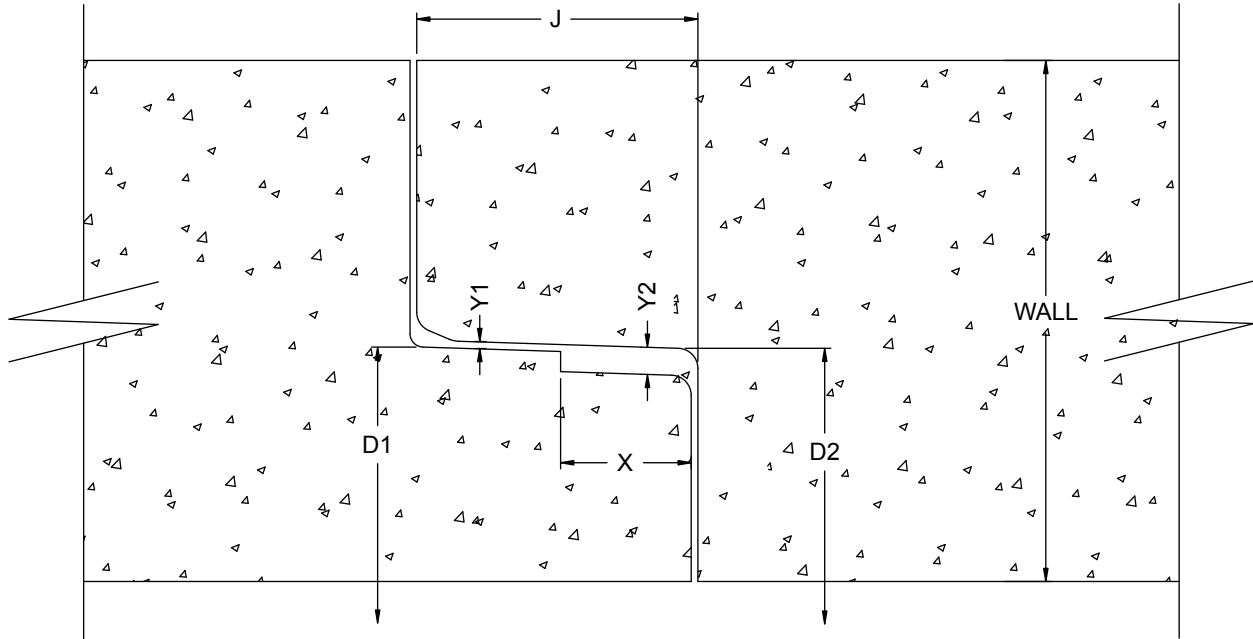
**Reinforced Concrete Manhole
 Gasket Joint Details
 48" to 72" - "B" Wall**


SECTION VIEW - 48" TO 72" MANHOLE

| SINGLE OFFSET JOINT FOR MANHOLES - B WALL | | | | | | | | | |
|---|-------|---------|---------|---------------------------------|-------|--------|--------|---------------------------------|---------|
| ID | A | D1 | D2 | J | X | Y1 | Y2 | WALL | WT./FT. |
| 48" | 2.04" | 52.918" | 52.966" | 4 ¹ / ₄ " | 2.50" | 0.146" | 0.446" | 5" | 880 |
| 54" | 2.07" | 58.972" | 57.028" | 4 ¹ / ₄ " | 2.50" | 0.146" | 0.446" | 5 ¹ / ₂ " | 1088 |
| 60" | 2.14" | 65.154" | 65.175" | 4 ³ / ₄ " | 2.50" | 0.146" | 0.446" | 6" | 1300 |
| 66" | 2.39" | 71.671" | 71.675" | 5" | 2.50" | 0.146" | 0.446" | 6 ¹ / ₂ " | 1570 |
| 72" | 2.53" | 77.949" | 77.953" | 5" | 2.50" | 0.146" | 0.446" | 7" | 1840 |

NOTES:
 MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND ASTM C-478

**Reinforced Concrete Manhole
 Gasket Joint Details
 84" to 144" – "B" Wall**

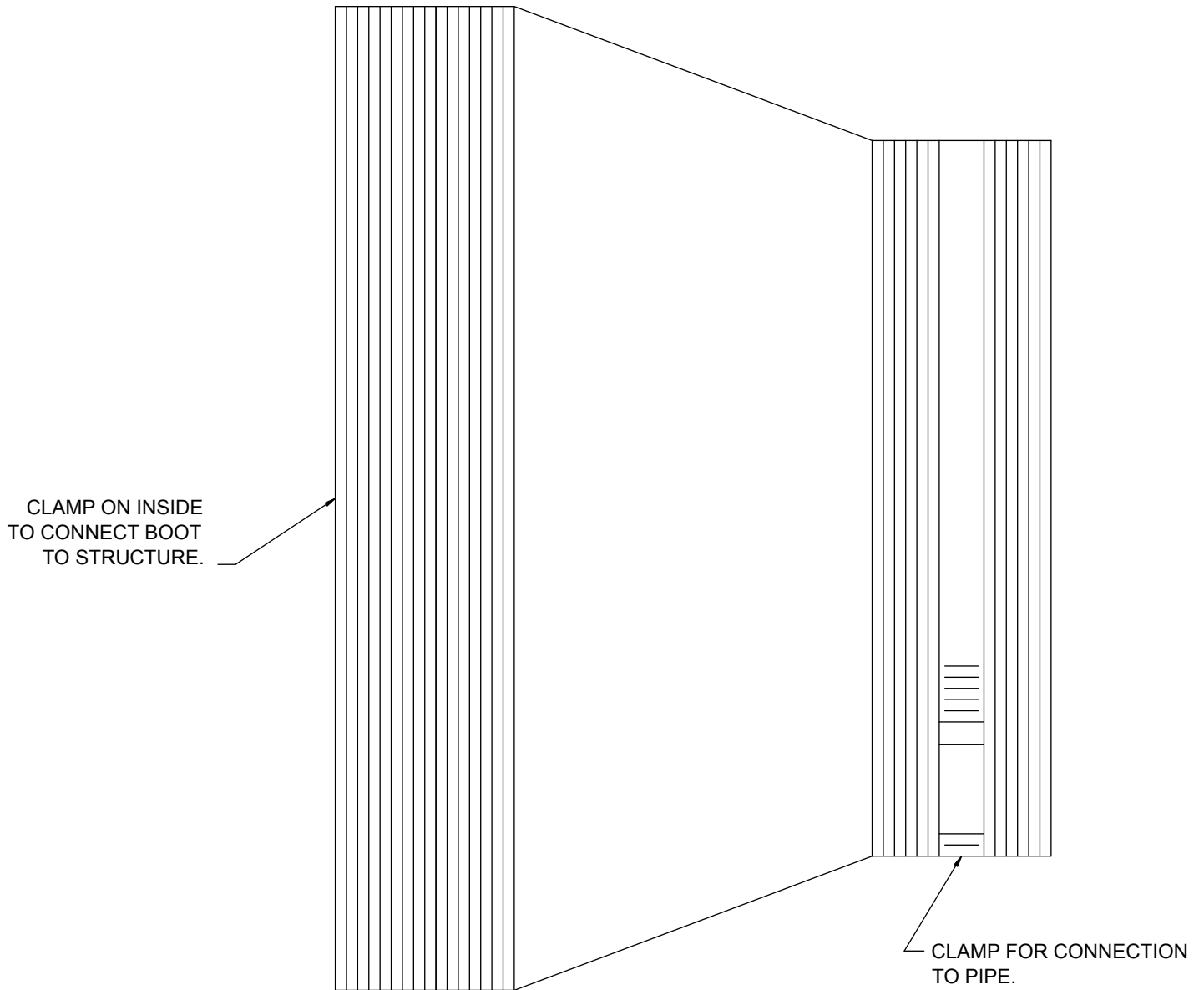


84" TO 144" MANHOLES - SINGLE OFFSET JOINT

| B WALL JOINT PROPERTIES - SINGLE OFFSET | | | | | | | | | | | |
|---|-------|----------|----------|---------------------------------|---------------------------------|--------|--------|------|---------------|----|-----------|
| ID | A | D1 | D2 | J | X | Y1 | Y2 | WALL | L1 | L2 | WEIGHT/FT |
| 84" | 3.25" | 91.504" | 91.500" | 5 ¹ / ₄ " | 2 ³ / ₄ " | 0.146" | 0.500" | 8" | STRAIGHT WALL | | 2480 |
| 96" | 3.63" | 104.254" | 104.250" | 5 ¹ / ₄ " | 2 ³ / ₄ " | 0.146" | 0.500" | 9" | STRAIGHT WALL | | 3080 |
| 108" | 3.93" | 116.922" | 116.864" | 5 ⁷ / ₈ " | 2 ³ / ₄ " | 0.146" | 0.500" | 10" | STRAIGHT WALL | | 3955 |
| 120" | 4.21" | 128.753" | 128.721" | 6" | 2 ⁵ / ₈ " | 0.150" | 0.500" | 11" | STRAIGHT WALL | | 4875 |
| 144" | 4.96" | 154.253" | 154.221" | 6" | 2 ⁵ / ₈ " | 0.150" | 0.500" | 12" | STRAIGHT WALL | | 6680 |

NOTES:
 MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND ASTM C-478

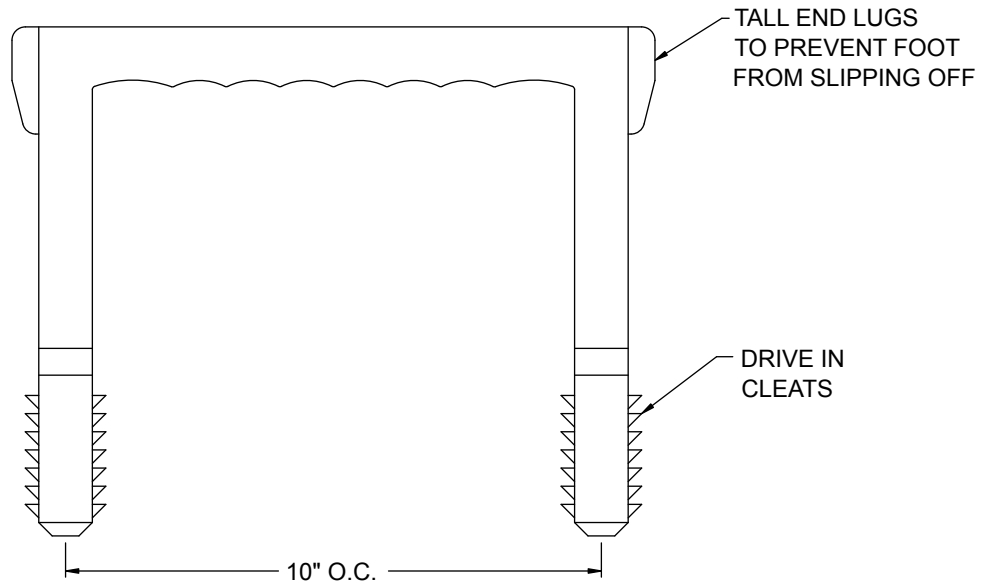
Rubber Watertight Pipe to Structure Boot



NOTE:

ALL BOOTS ARE MADE OF CORROSION RESISTANT RUBBER WITH ALL STAINLESS STEEL COMPONENTS WHICH MEET OR EXCEED ALL REQUIREMENTS OF ASTM C-923, ASTM C-1478 AND ASTM C-1244.

**Polypropylene
Manhole Steps**



POLYPROPYLENE STEP - TOP VIEW



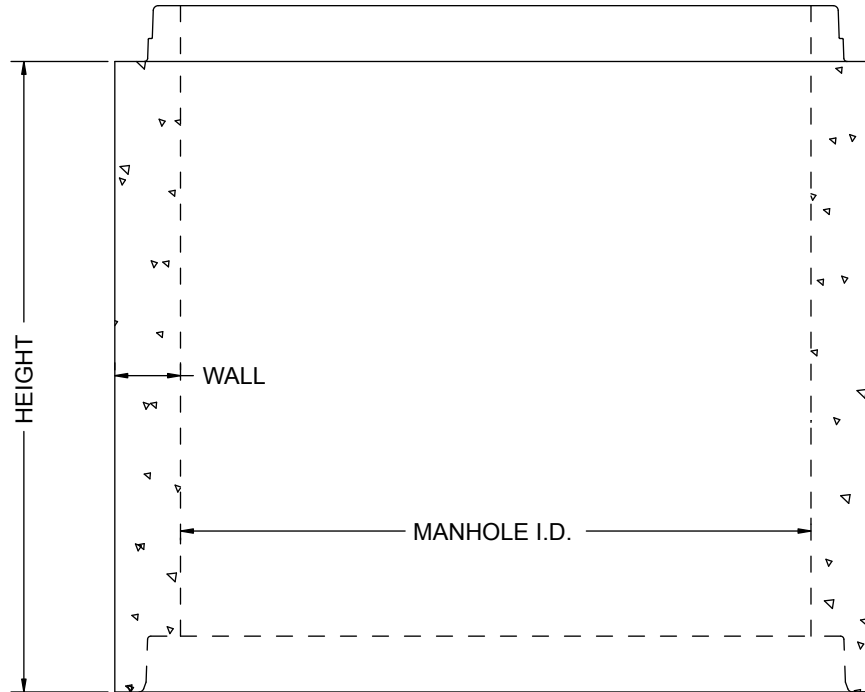
POLYPROPYLENE STEP - FRONT VIEW

NOTES:

ALL POLYPROPYLENE STEPS MEET THE REQUIREMENTS OF ASTM C-478 AND AASHTO M-199.

STEPS CAN BE DRIVEN INTO TWO PARALLEL 1" ID DRILLED HOLES - 3- 1/2" DEEP.

Reinforced Concrete Tongue and Groove Manhole Risers



SECTION VIEW

| STOCK TONGUE & GROOVE RISERS FOR MANHOLES | |
|---|--------|
| MANHOLE I.D. | HEIGHT |
| 48" to 96" | 12" |
| 48" to 96" | 16" |
| 48" to 144" | 24" |
| 48" | 32" |
| 48" to 144" | 36" |
| 48" to 144" | 48" |
| 48" to 144" | 60" |
| 48" to 144" | 72" |
| 54" to 120" | 84" |
| 54" to 120" | 96" |

NOTES:

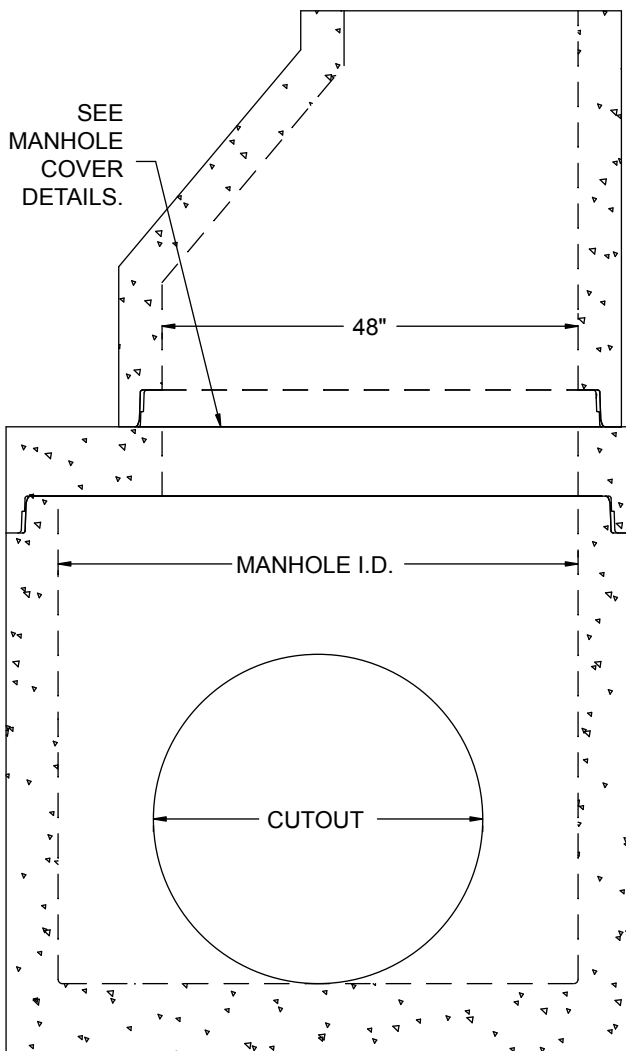
SEE MANHOLE JOINT DETAIL FOR SPECIFICATIONS.

12" AND 16" HEIGHTS WITH FLAT TOP ARE ALSO STOCK ITEMS.

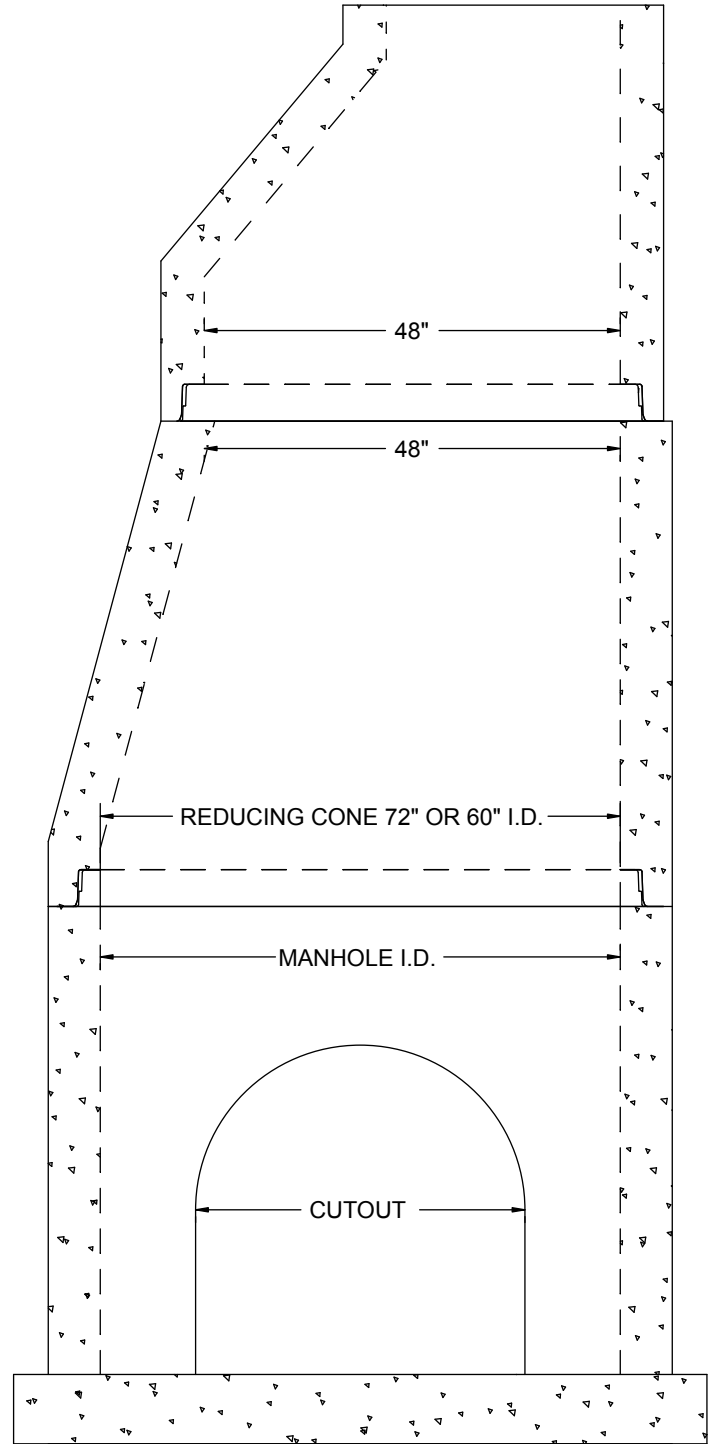
SPECIAL FLAT TOP HEIGHTS AVAILABLE IN 2" INCREMENTS.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND ASTM C-478

**Reduction Manholes
Sanitary or Storm**



SECTION VIEW



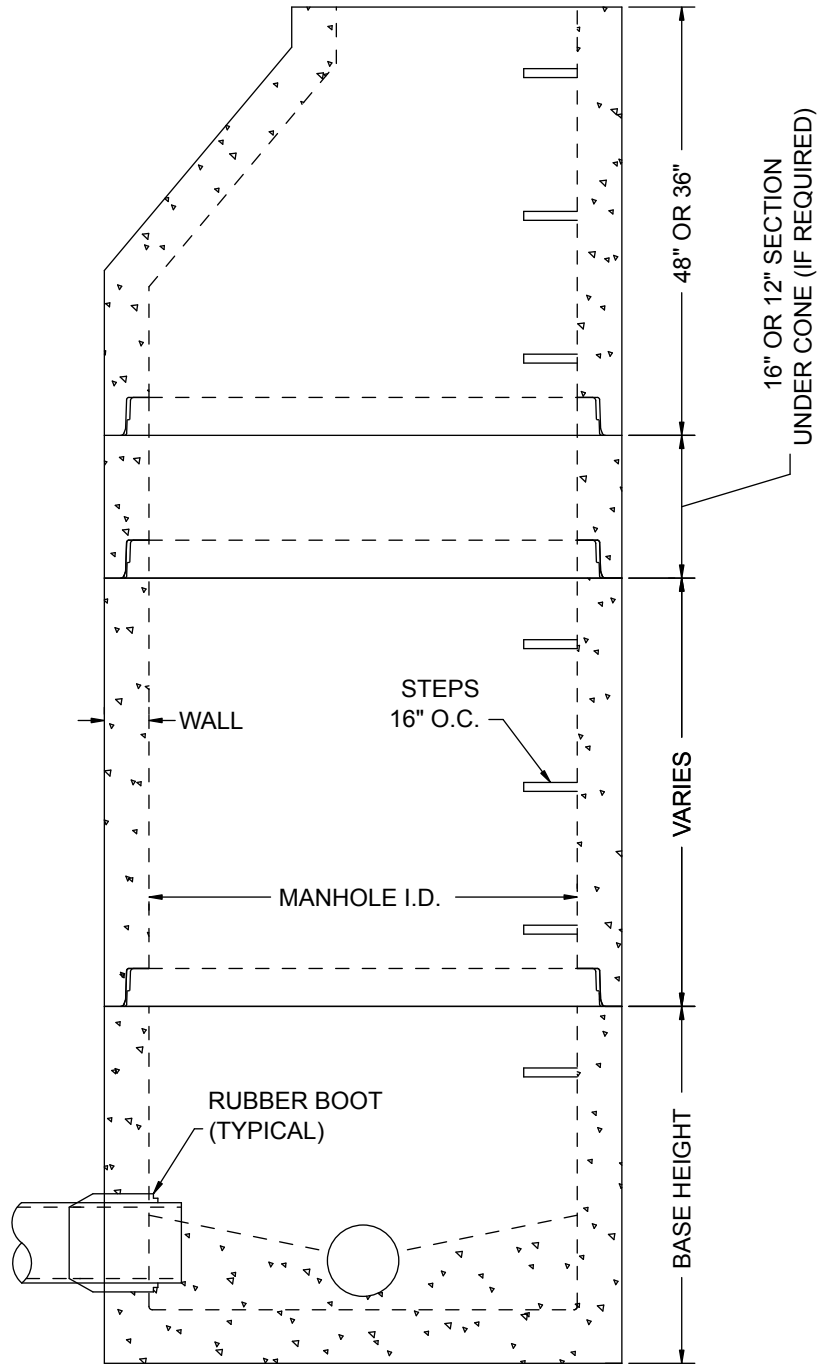
SECTION VIEW

NOTES:

PRECAST REINFORCED CONES AND RISER SECTIONS CONFORM TO ASTM C-478 AND ASTM C-443.

SEE DETAILS FOR JOINT AND SLAB INFORMATION.

**Typical Sanitary Manhole
with Poured Invert**



SECTION VIEW

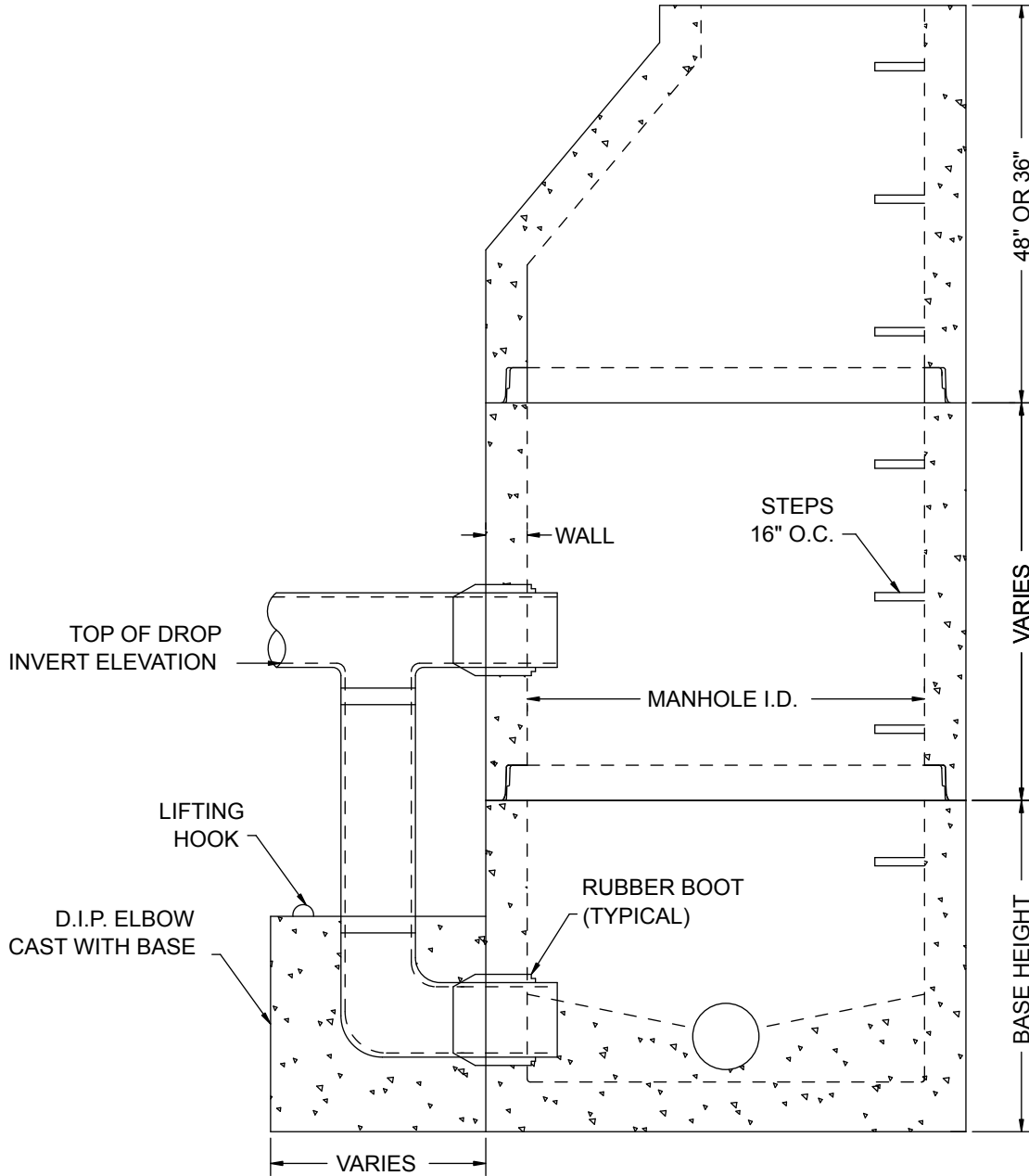
NOTES:

PRECAST REINFORCED CONES AND RISER SECTIONS CONFORM TO ASTM C-478 AND ASTM C-443.

SEE DETAILS FOR JOINT INFORMATION.

POURED INVERT AVAILABLE IN VARYING SIZES AND CONFIGURATIONS.

Sanitary Outside Drop Manhole with Poured Invert



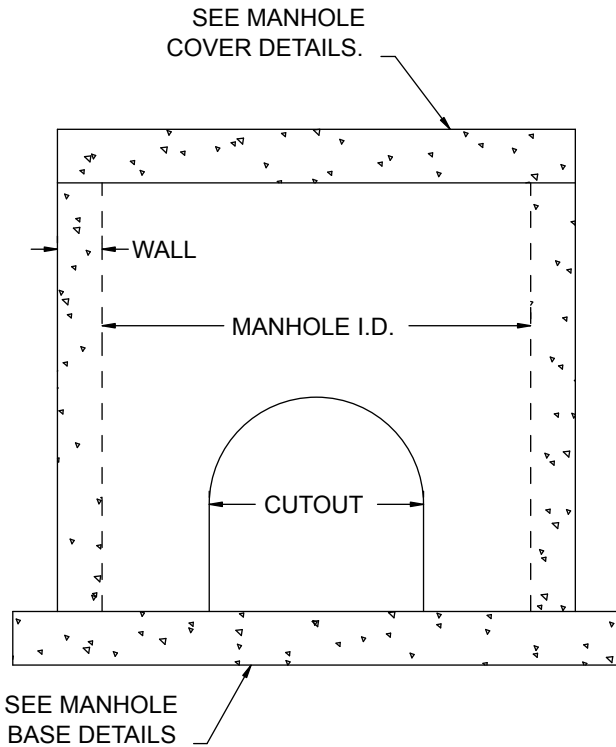
SECTION VIEW

NOTES:

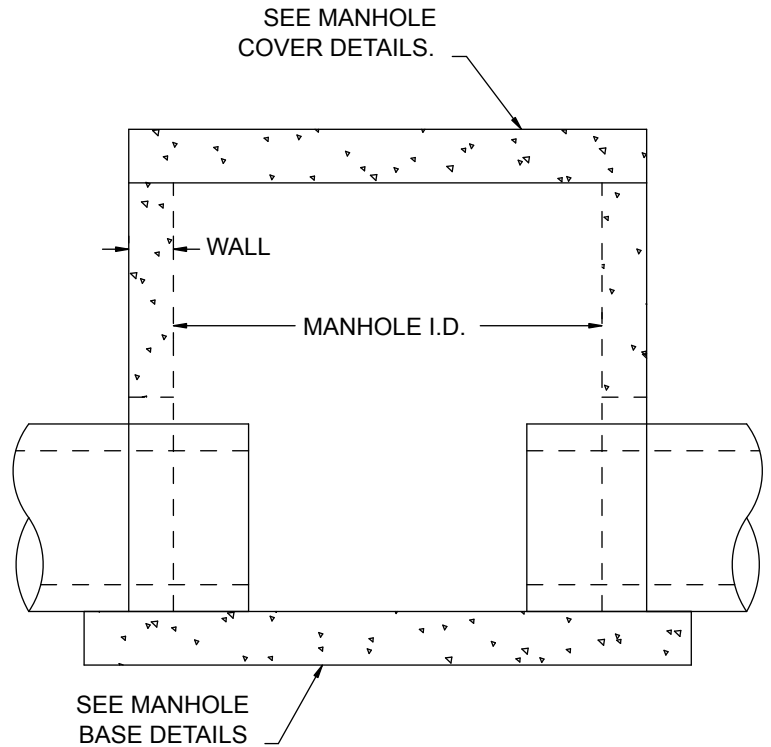
PRECAST REINFORCED CONES AND RISER SECTIONS CONFORM TO ASTM C-478 AND ASTM C-443.

SEE DETAILS FOR JOINT INFORMATION.

Reinforced Concrete Storm Base Sections with Flat Top and Cutouts



FRONT SECTION VIEW



SIDE SECTION VIEW

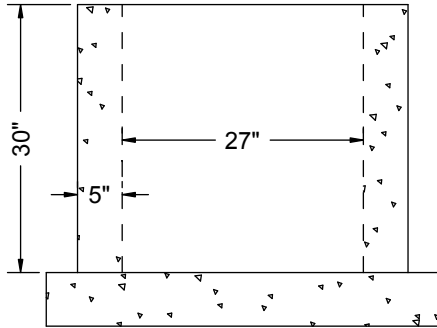
| WALL THICKNESS FOR STORM MANHOLES | | |
|-----------------------------------|------|---------|
| MANHOLE I.D. | WALL | WT./FT. |
| 48" | 5" | 880 |
| 54" | 5½" | 1088 |
| 60" | 6" | 1300 |
| 66" | 6½" | 1570 |
| 72" | 7" | 1840 |
| 84" | 8" | 2480 |
| 96" | 9" | 3080 |
| 108" | 10" | 3955 |
| 120" | 11" | 4875 |
| 144" | 12" | 5900 |

| CUTOUT SIZES FOR RC PIPE | |
|--------------------------|-------------|
| RCP PIPE I.D. | CUTOUT SIZE |
| 12" | 20" |
| 15" | 24" |
| 21" | 28" |
| 24" | 32" |
| 27" | 36" |
| 30" | 43" |
| 33" | 46" |
| 36" | 48" |
| 42" | 57" |
| 48" | 64" |
| 54" | 72" |
| 60" | 78" |
| 66" | 84" |
| 72" | 90" |

NOTES:
 SEE MANHOLE JOINT DETAIL FOR SPECIFICATIONS.
 SPECIAL FLAT TOP HEIGHTS AVAILABLE IN 2"
 INCREMENTS. ALSO AVAILABLE WITH TONGUE & GROOVE
 BOTTOM SECTIONS FOR TALLER STRUCTURES. MEETS
 OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND
 ASTM C-478.

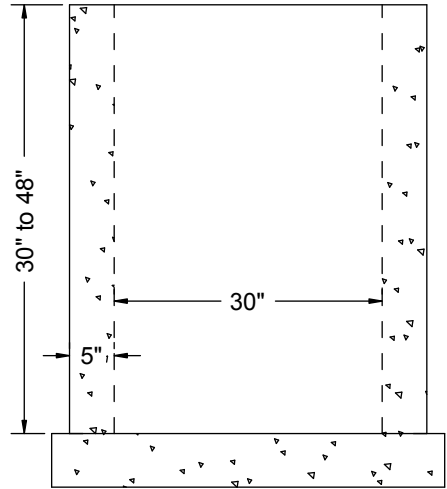
Catch Basins 27", 30", 48" Type "G" and Type "F" Cones and 2x3 Boxes

NOTE:
 SEE BASE SLAB DETAILS FOR SPECIFICATIONS.
 ALL STRUCTURES MEET OR EXCEED THE REQUIREMENTS OF ASTM C-478.



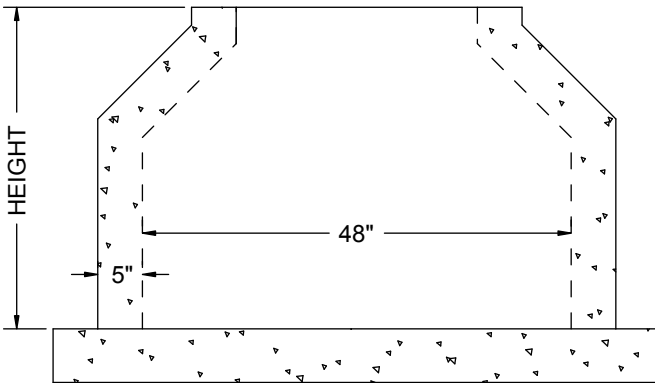
27" I.D. CATCH BASIN

AVAILABLE ONLY
 IN 30" HEIGHT.



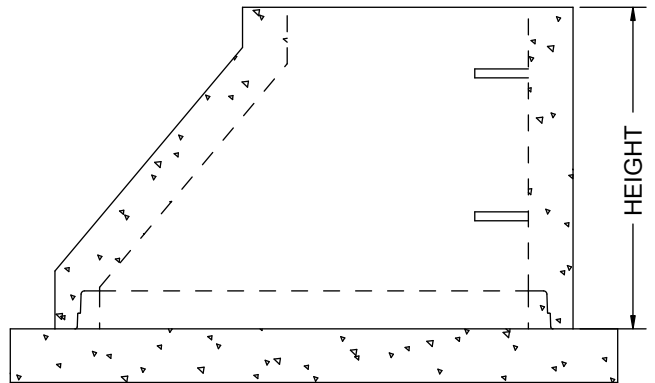
30" I.D. CATCH BASIN

AVAILABLE IN 2" INCREMENTS
 FROM 30" TO 48" IN HEIGHT.



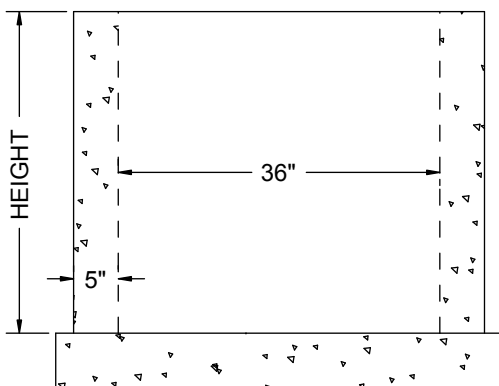
48" I.D. TYPE "G" CONE

AVAILABLE IN 36", 42"
 AND 48" IN HEIGHT.



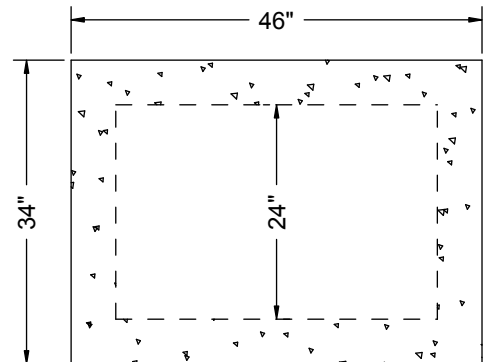
48" I.D. TYPE "F" CONE

AVAILABLE IN 36", 42", 48", 54", 60",
 66" AND 72" IN HEIGHT.



2x3 BOX - FRONT SECTION VIEW

38" x 50" x 6"
 BASE SLAB

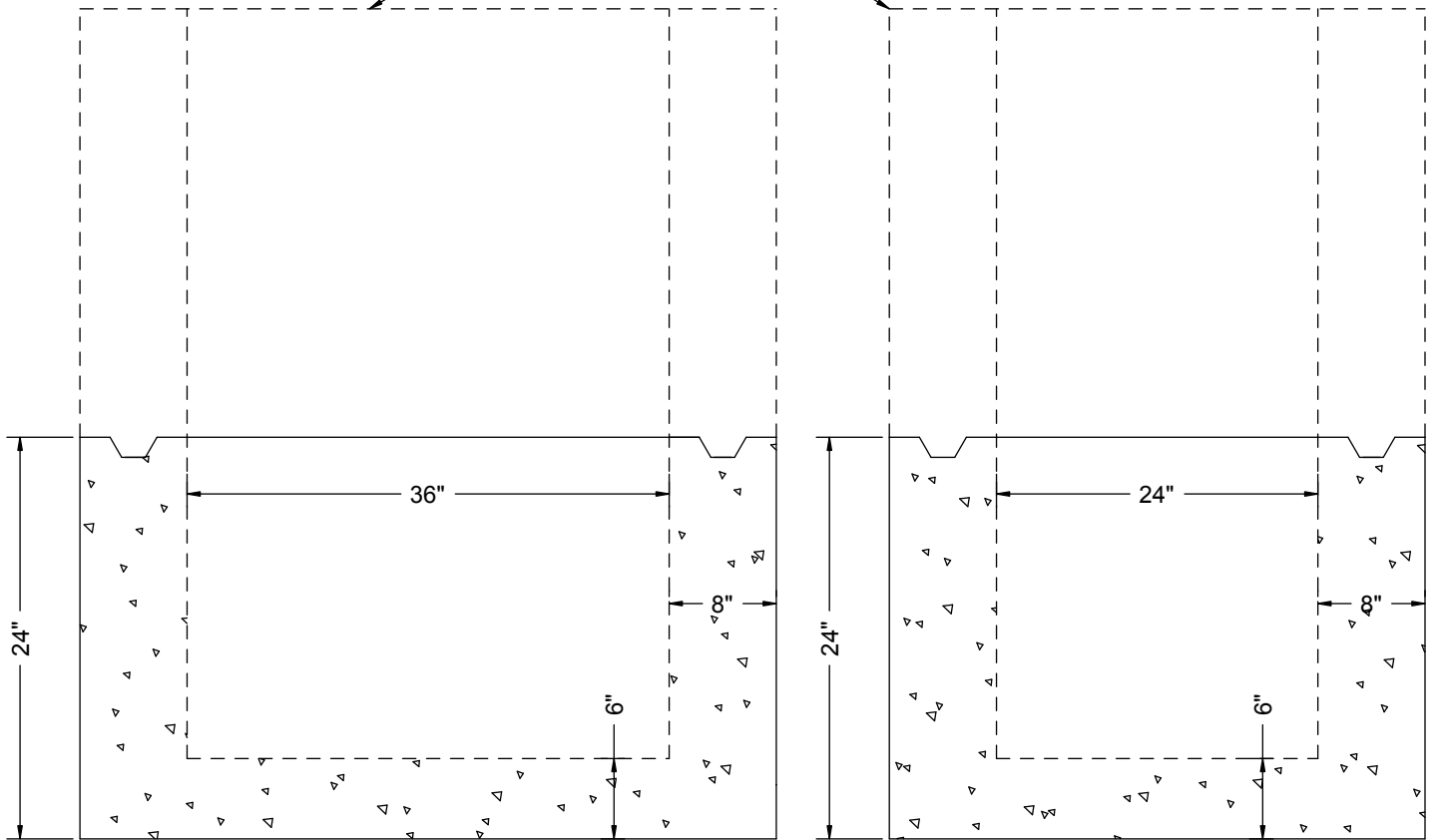


2x3 BOX - TOP VIEW

IN STOCK SIZES AVAILABLE IN 24", 30", 36", 42" AND 48" IN HEIGHT, WITH 24" END OR SIDE CUTOUT.
 SPECIAL SIZES AVAILABLE IN 27", 33", 39", AND 45" IN HEIGHT, WITH VARIABLE END AND/OR SIDE CUTOUT.

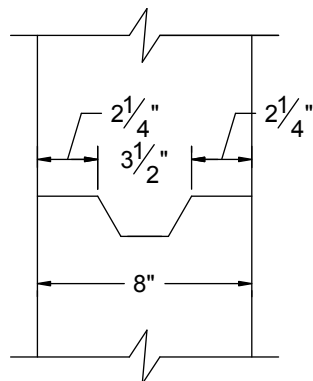
St. Paul, MN
Type 7A Sump
Catch Basin

TOP SECTION
POURED BY CONTRACTOR
IN THE FIELD.



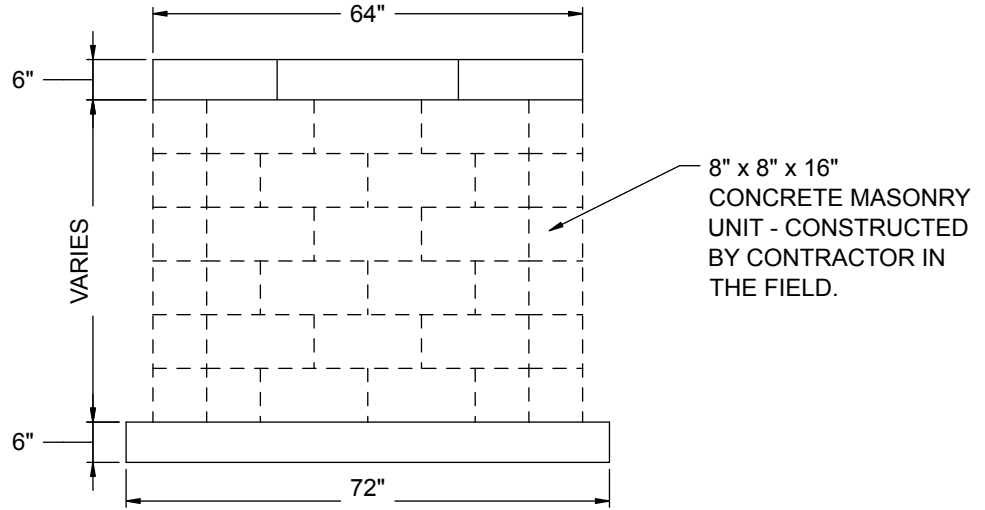
FRONT SECTION VIEW

SIDE SECTION VIEW

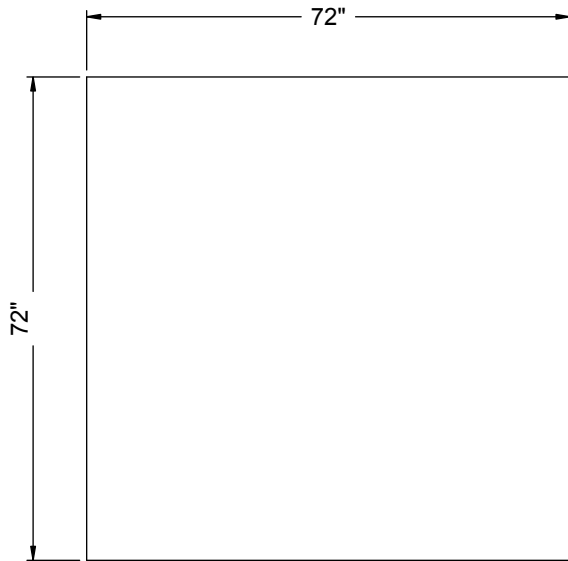


JOINT DETAIL

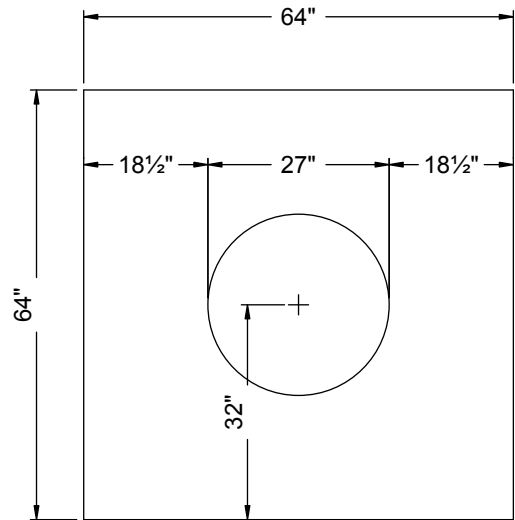
NOTE:
MEETS OR EXCEEDS THE
REQUIREMENTS OF
ASTM C-478.



FRONT SECTION VIEW

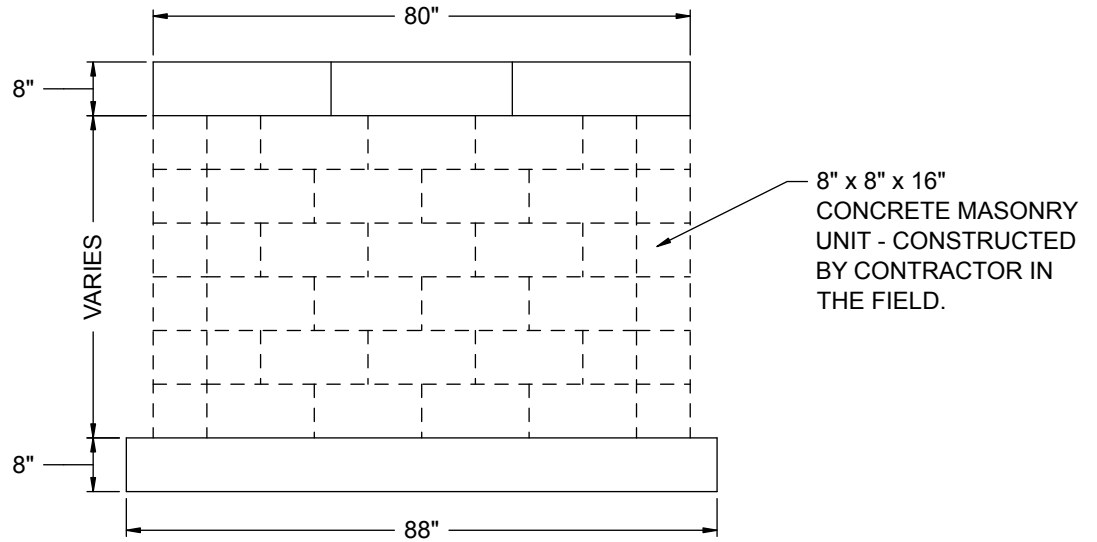


PLAN VIEW - BASE SLAB

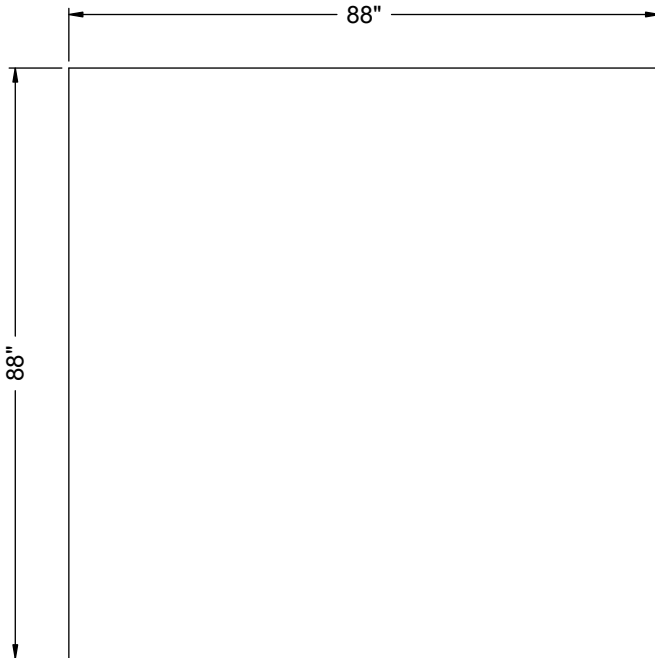


PLAN VIEW - TOP SLAB

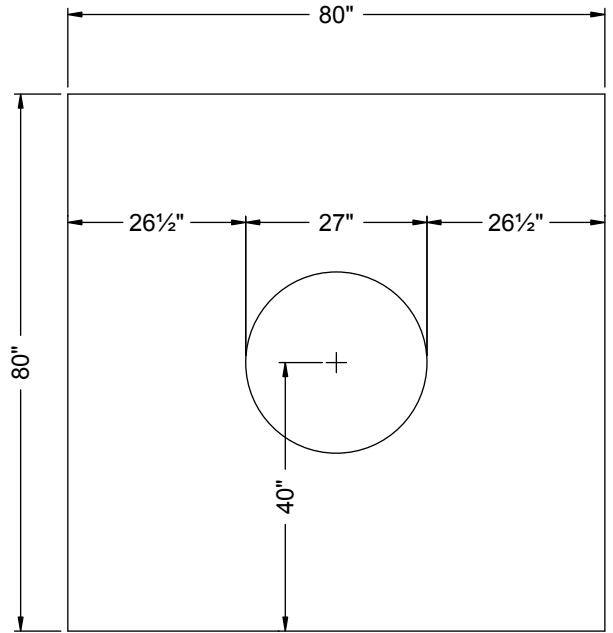
St. Paul, MN
Type 4A Manhole



FRONT SECTION VIEW

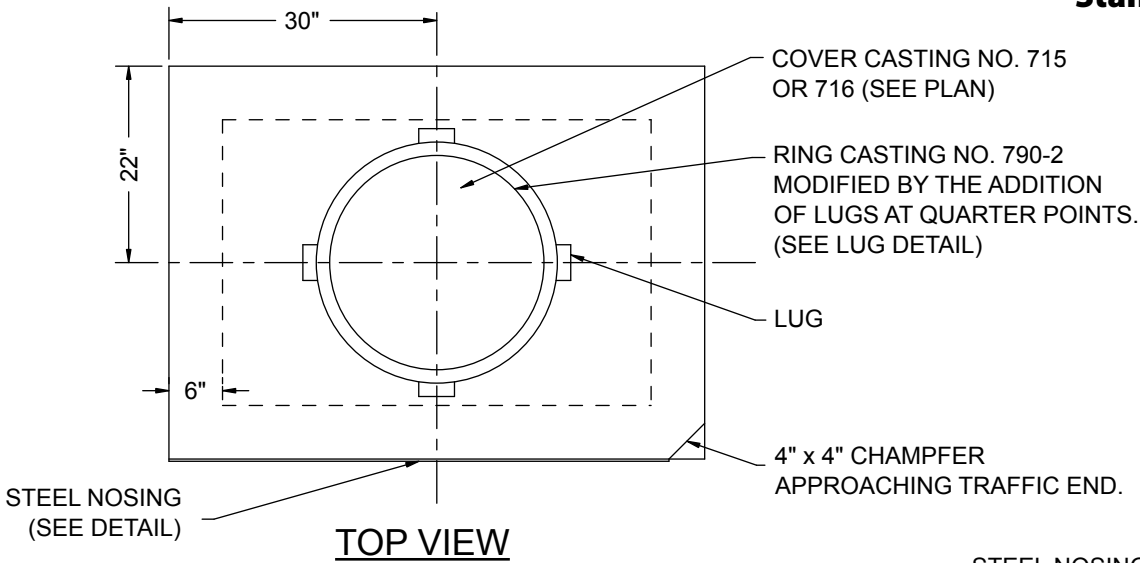


PLAN VIEW - BASE SLAB

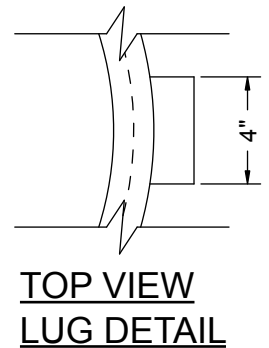
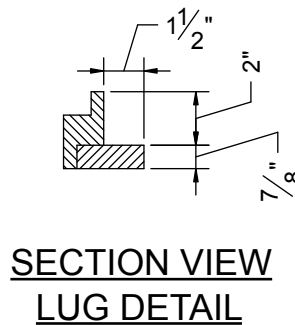
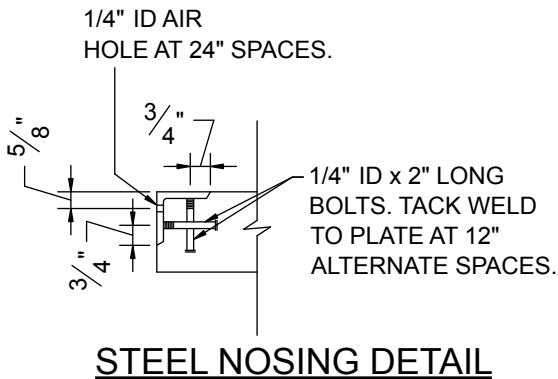
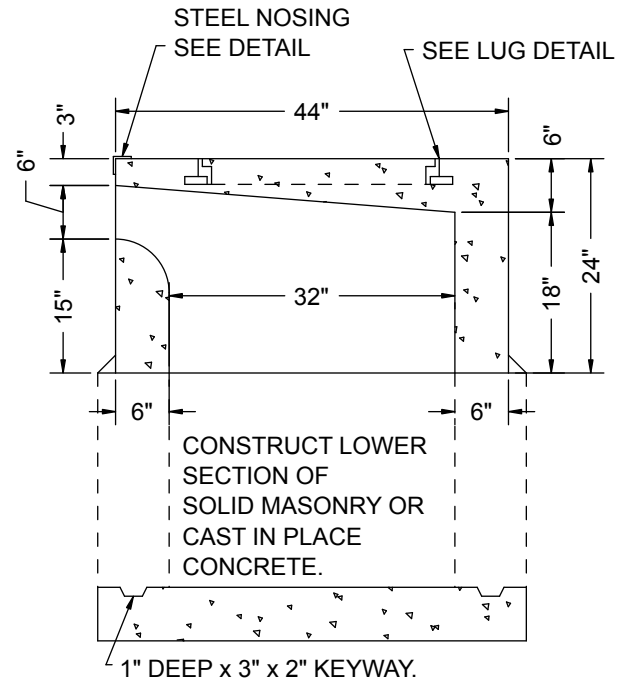
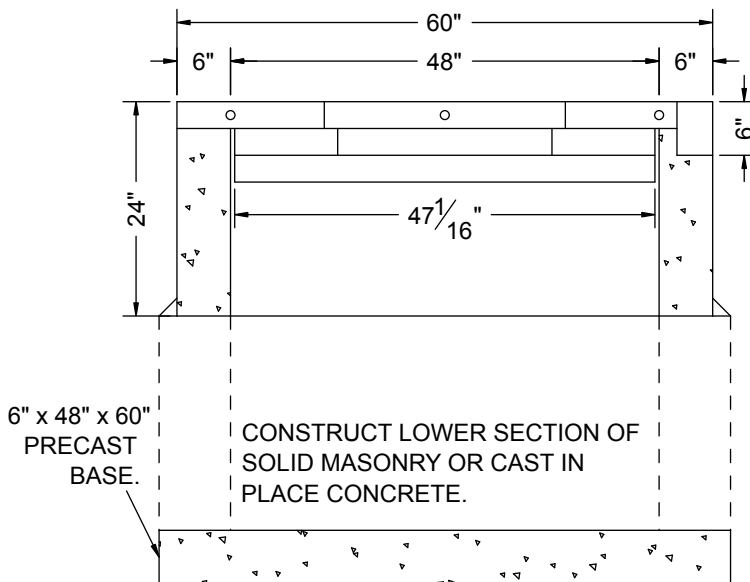


PLAN VIEW - TOP SLAB

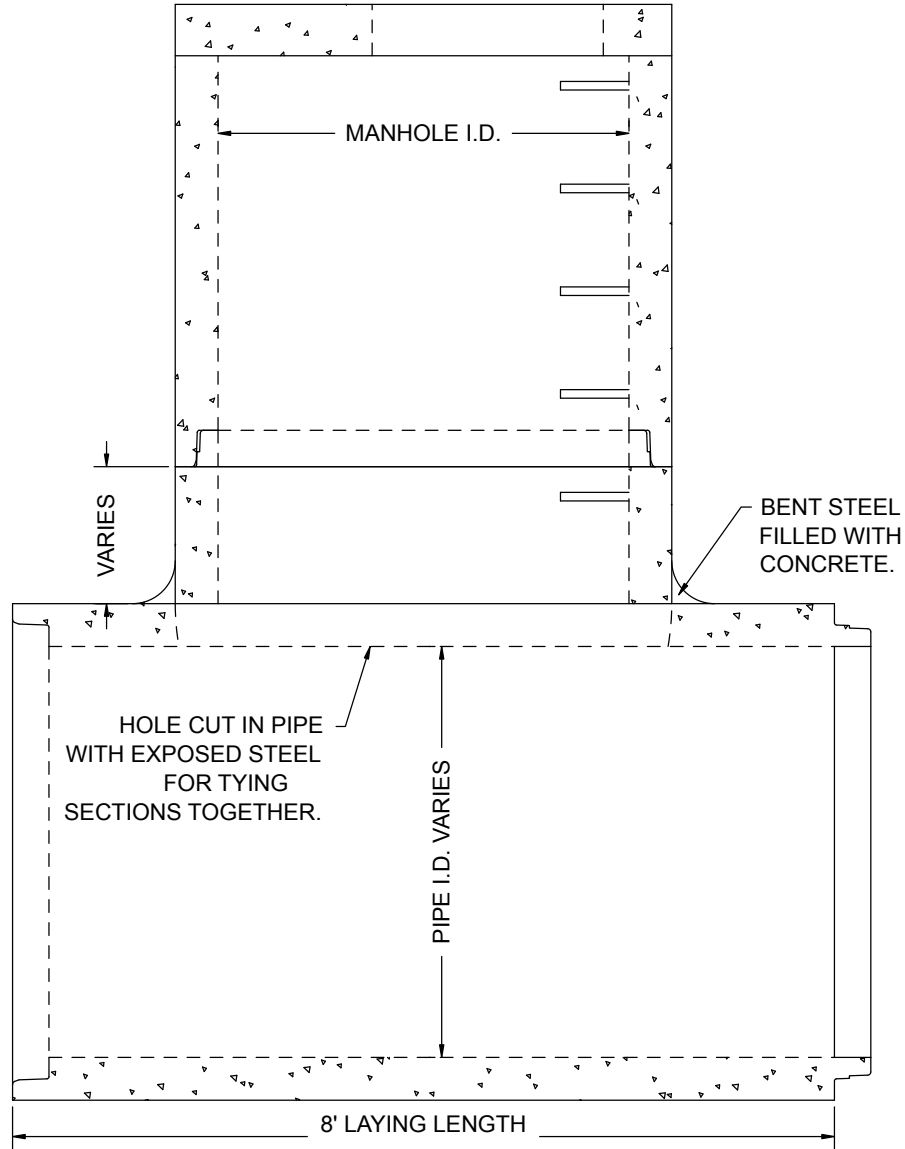
State of MN LP Catch Basin
Standard Plate #4021



MEETS OR
EXCEEDS THE
REQUIREMENTS
OF ASTM C-478.



**Typical Reinforced Concrete
"T" Manhole**



SECTION VIEW

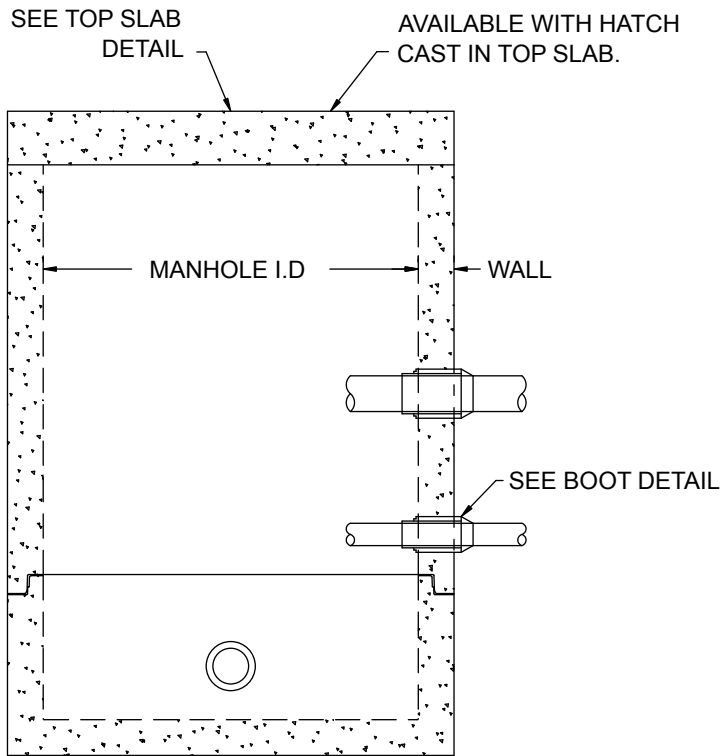
NOTES:

SEE JOINT DETAILS FOR SPECIFICATIONS.

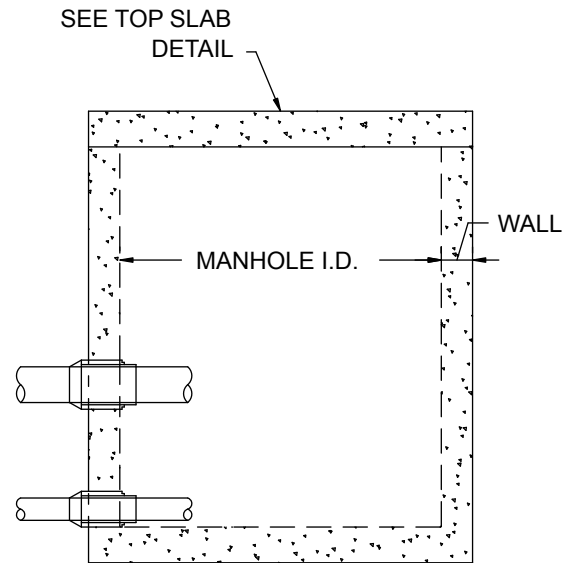
AVAILABLE WITH VARYING PIPE & MANHOLE SIZE COMBINATIONS.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76, ASTM C-443 AND ASTM C-478.

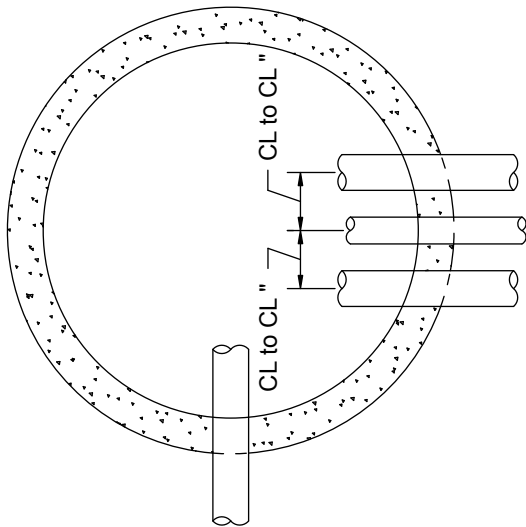
**Lift Stations and
 Valve Manholes**



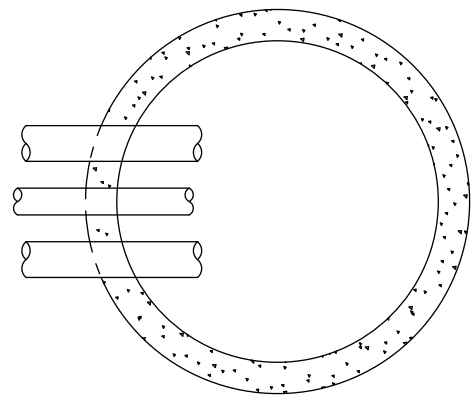
LIFT STATION - SECTION VIEW



VALVE MH - SECTION VIEW



LIFT STATION - TOP VIEW

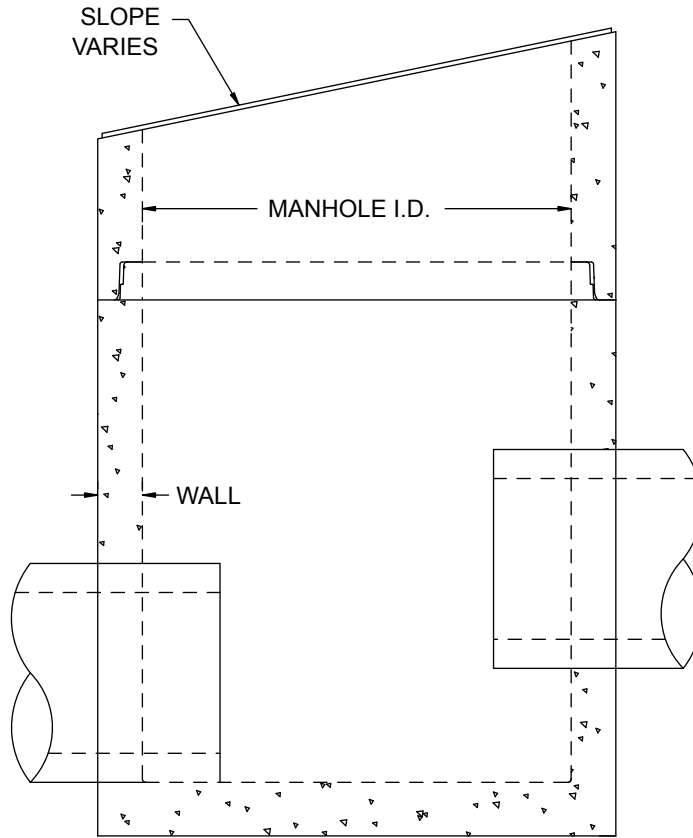


VALVE MH - TOP VIEW

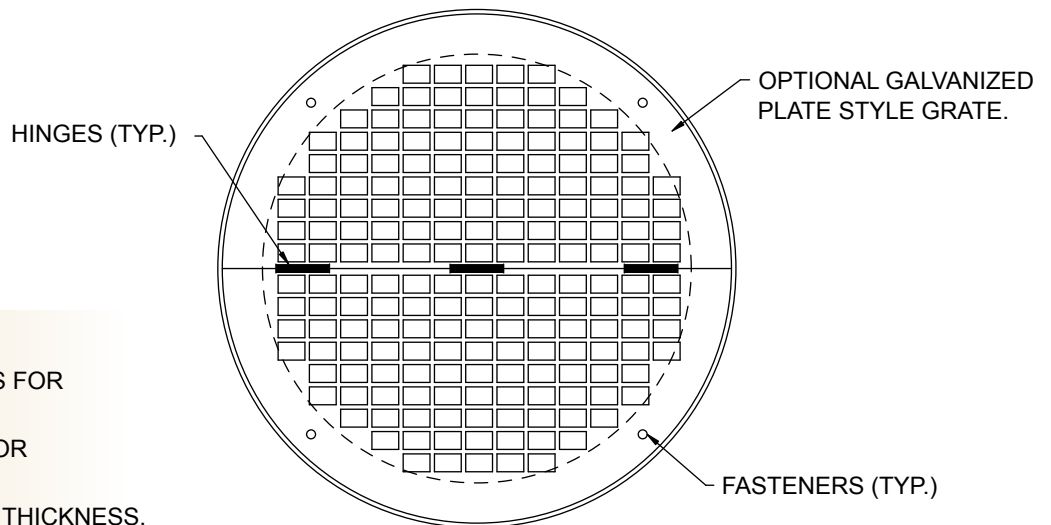
NOTES:

- SEE MANHOLE JOINT DETAILS FOR SPECIFICATIONS.
- AVAILABLE WITH VARYING THICKNESS TOP SLABS AND POURED BOTTOMS.
- MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND ASTM C-478.

**Sloped Top Pond Skimmer
Structures 48" to 144"**



FRONT SECTION VIEW



TOP VIEW

NOTES:

SEE MANHOLE JOINT DETAILS FOR SPECIFICATIONS.

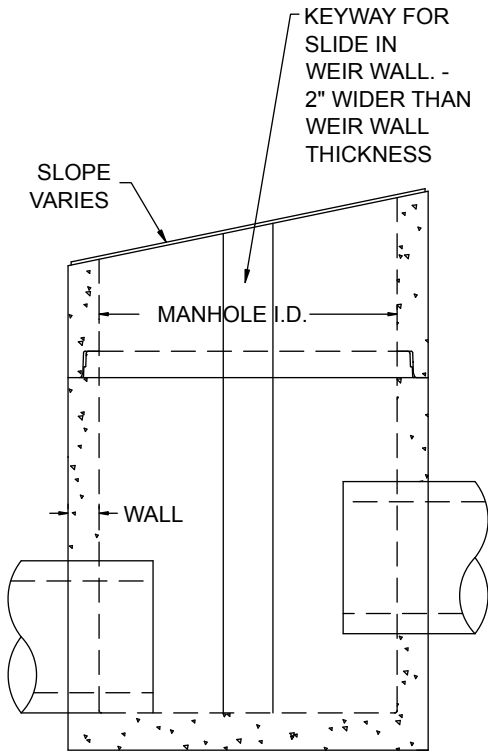
AVAILABLE WITH BASE SLAB OR POURED BOTTOM.

SEE RISER DETAIL FOR WALL THICKNESS.

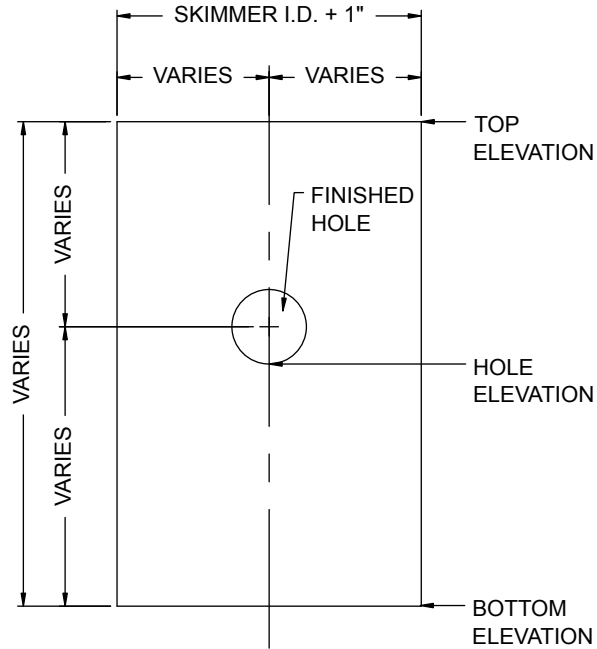
AVAILABLE WITH OPTIONAL SKIMMER GRATE.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND ASTM C-478.

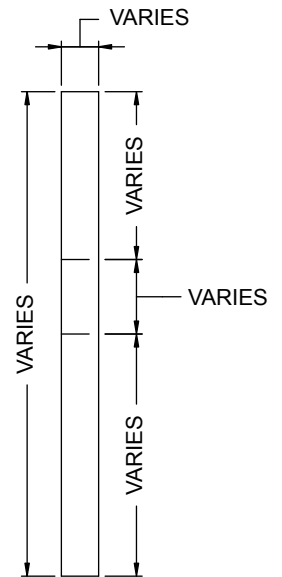
**Sloped Top Pond Skimmer
Structures 48" to 144"
with Slide in Weir Wall**



FRONT SECTION VIEW
POND SKIMMER



FRONT ELEVATION
WEIR WALL



SIDE ELEVATION
WEIR WALL

NOTES:

SLIDE IN WEIR WALLS AVAILABLE IN VARYING SIZES AND CONFIGURATIONS TO MEET PROJECT SPECIFICATIONS.

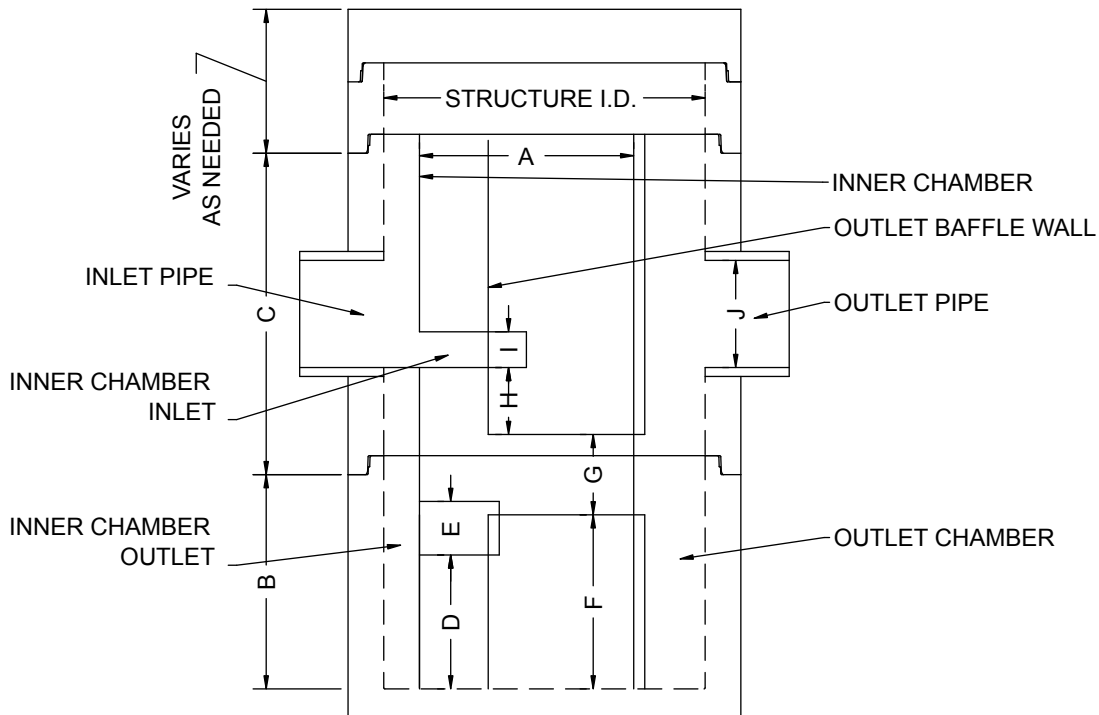
SEE MANHOLE JOINT AND RISER DETAILS.

AVAILABLE WITH BASE SLAB OR POURED BOTTOM.

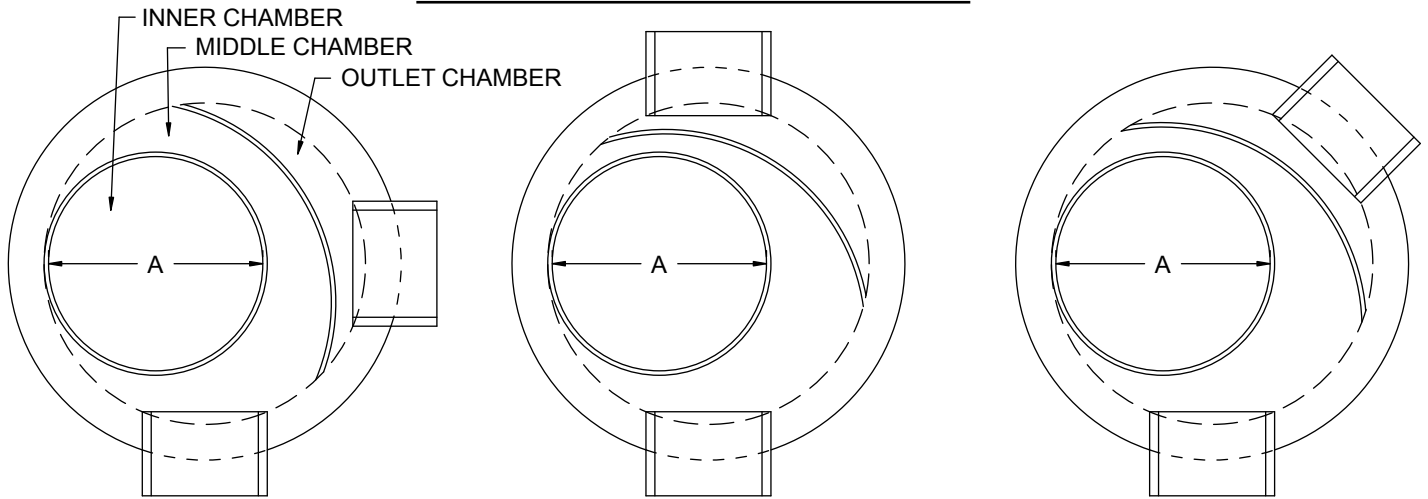
AVAILABLE WITH OPTIONAL SKIMMER GRATE.

MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-443 AND ASTM C-478.

Hydroguard Stormwater Treatment Structure



HYDROGUARD - SECTION VIEW



RIGHT 90° BEND

TOP VIEW

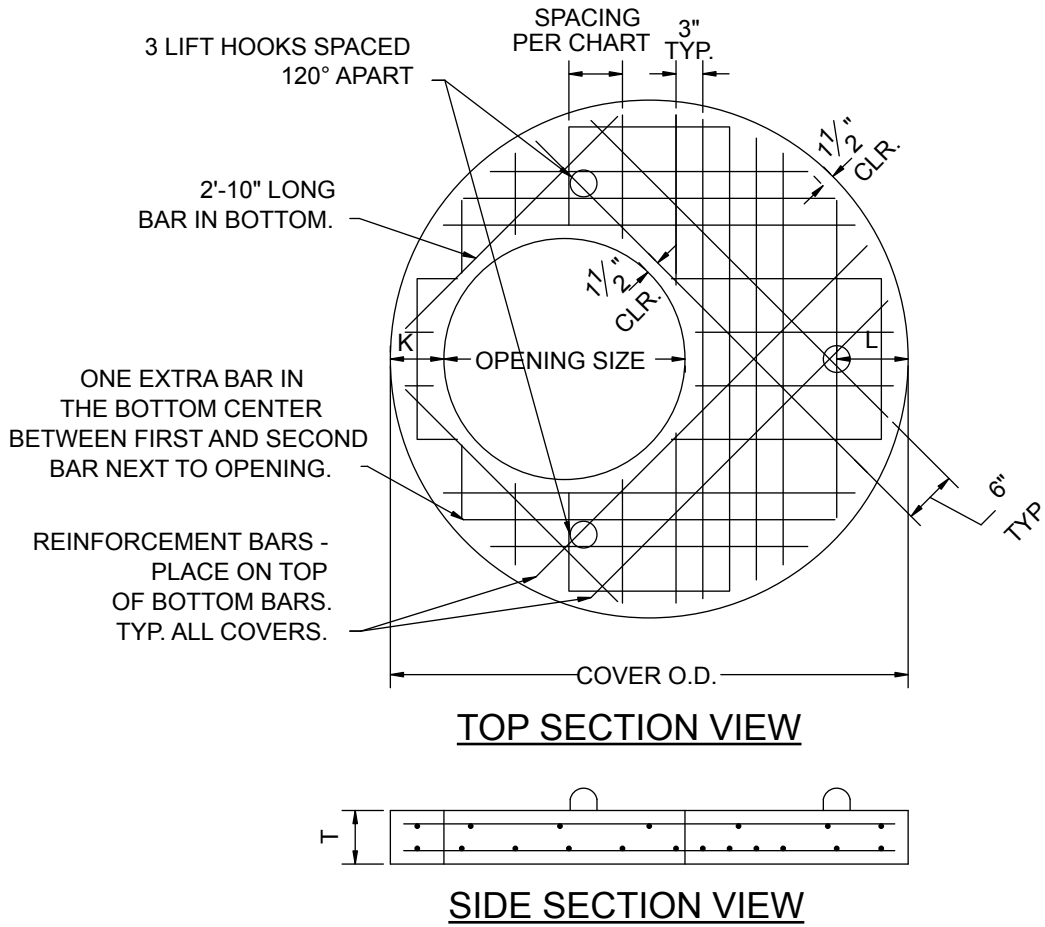
RIGHT < 45° BEND

| STRUCTURE I.D. | A - I.D. | B | C | D | E | F | G | H | I | J | PERMANENT POOL VOLUME |
|----------------|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------|
| 48" | 30" | 36" | 60" | 30" | 6" | 36" | 12" | 12" | 5" | 15" | 450 US GALLONS |
| 72" | 48" | 48" | 72" | 30" | 12" | 39" | 18" | 15" | 8" | 24" | 1200 US GALLONS |
| 96" | 60" | 48" | 84" | 30" | 16" | 43" | 22" | 15" | 11" | 30" | 2400 US GALLONS |
| 120" | 78" | 60" | 84" | 30" | 20" | 47" | 26" | 18" | 14" | 36" | 4300 US GALLONS |
| 144" | 96" | 48" | 84" | 30" | 24" | 48" | 36" | 18" | 16" | 48" | 7000 US GALLONS |

NOTES:

STRUCTURE EFFICIENTLY REMOVES SUSPENDED SOLIDS (AND ASSOCIATED METALS, NUTRIENTS AND BACTERIA), OIL, AND TRASH FROM STORMWATER RUNOFF FULFILLING THE REQUIREMENTS OF MOST NPDES PERMITS AND CLEAN WATER ACT REQUIREMENTS. TECHNICAL INFORMATION AND SIZING AVAILABLE ON REQUEST. MEETS OR EXCEEDS THE REQUIREMENTS OF ASTM C-76 AND ASTM C-478.

**Manhole or Catch Basin
 Top Slab with 27" Opening
 58" to 168" Outer Diameter**

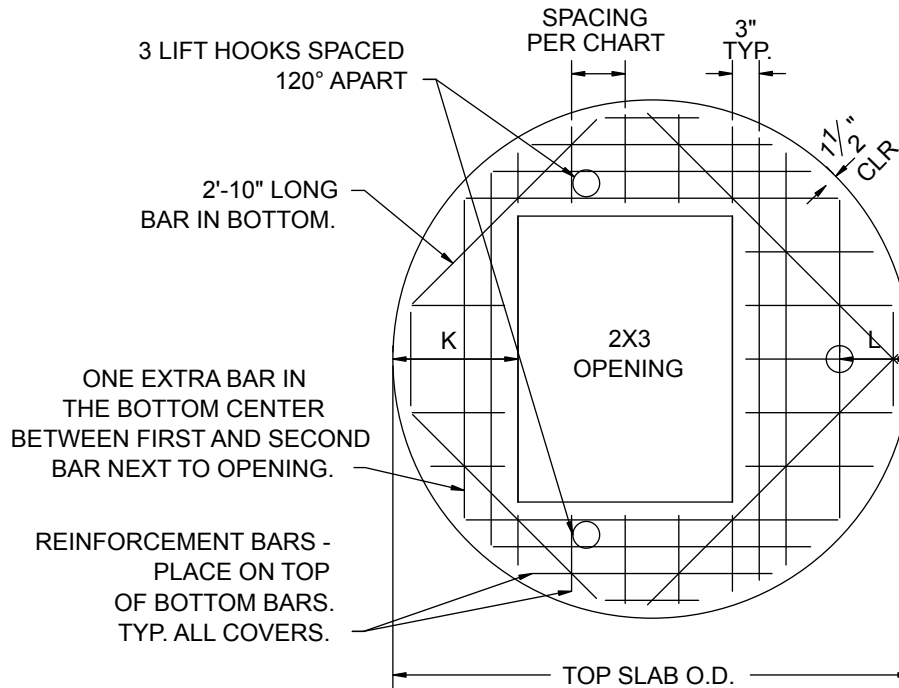


| CB or MH I.D. | TOP SLAB O.D. | OPENING SIZE | T | K | L | TOP BARS EACH WAY | BOTTOM BARS EACH WAY | WEIGHT |
|---------------|---------------|--------------|-----|-----|-----|-------------------|----------------------|--------|
| 48" | 58" | 27" | 6" | 6" | 8" | NONE | # 5 @ 6" | 1095 |
| 54" | 65" | 27" | 8" | 6" | 8" | # 4 @ 10" | # 5 @ 8" | 1940 |
| 60" | 72" | 27" | 8" | 7" | 9" | # 4 @ 10" | # 5 @ 7" | 2470 |
| 66" | 79" | 27" | 8" | 7" | 9" | # 4 @ 10" | # 5 @ 7" | 3055 |
| 72" | 86" | 27" | 8" | 8" | 10" | # 4 @ 10" | # 5 @ 6" | 3695 |
| 84" | 100" | 27" | 8" | 9" | 11" | # 4 @ 10" | # 5 @ 5" | 5140 |
| 96" | 114" | 27" | 8" | 9" | 11" | # 4 @ 10" | # 6 @ 6" | 6800 |
| 108" | 128" | 27" | 12" | 10" | 12" | # 4 @ 10" | # 5 @ 6" | 13,010 |
| 120" | 142" | 27" | 12" | 11" | 13" | # 4 @ 10" | # 5 @ 6" | 16,155 |
| 144" | 168" | 27" | 12" | 12" | 14" | # 4 @ 10" | # 5 @ 6" | 23,320 |

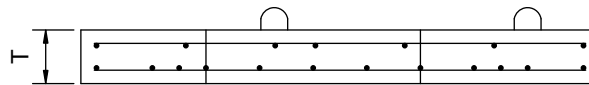
NOTES:

- AASHTO HS 25 LOADING.
- REINFORCEMENT PER MN SPEC. 3301 GRADE 60.
- ANY STEEL REINFORCEMENT THAT IS WELDED DURING FABRICATION MEETS THE REQUIREMENTS OF ASTM A706.
- TOP LAYER OF STEEL NOT REQUIRED FOR 58" O.D. COVERS.
- COVERS AVAILABLE WITH CONCENTRIC CUTOUTS AS WELL AS SPECIALTY SIZES AND THICKNESS NOT LISTED.

**Manhole or Catch Basin
 Top Slab with 2x3 Opening
 58" to 168" Outer Diameter**



TOP SECTION VIEW



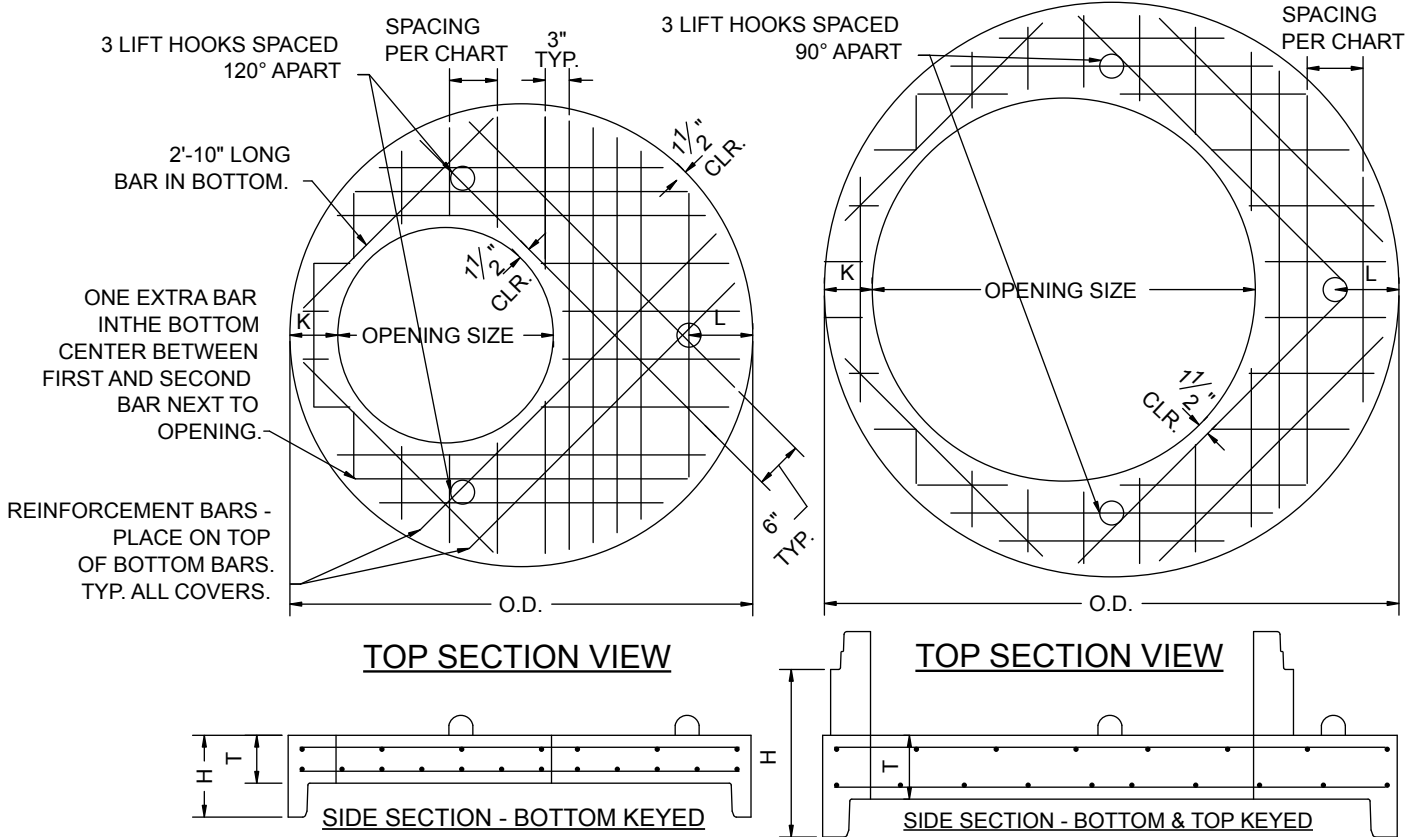
SIDE SECTION VIEW

| CB or MH I.D. | TOP SLAB O.D. | OPENING SIZE | T | K | L | TOP BARS EACH WAY | BOTTOM BARS EACH WAY | WEIGHT |
|---------------|---------------|--------------|-----|------|-----|-------------------|----------------------|--------|
| 48" | 58" | 2 X 3 | 6" | 14" | 8" | NONE | # 5 @ 6" | 945 |
| 54" | 65" | 2 X 3 | 8" | 14½" | 8" | # 4 @ 10" | # 5 @ 8" | 1735 |
| 60" | 72" | 2 X 3 | 8" | 15" | 9" | # 4 @ 10" | # 5 @ 7" | 2265 |
| 66" | 79" | 2 X 3 | 8" | 15½" | 9" | # 4 @ 10" | # 5 @ 7" | 2850 |
| 72" | 86" | 2 X 3 | 8" | 16" | 10" | # 4 @ 10" | # 5 @ 6" | 3490 |
| 84" | 100" | 2 X 3 | 8" | 17" | 11" | # 4 @ 10" | # 5 @ 5" | 4935 |
| 96" | 114" | 2 X 3 | 8" | 18" | 11" | # 4 @ 10" | # 6 @ 6" | 6595 |
| 108" | 128" | 2 X 3 | 12" | 19" | 12" | # 4 @ 10" | # 5 @ 6" | 12,705 |
| 120" | 142" | 2 X 3 | 12" | 20" | 13" | # 4 @ 10" | # 5 @ 6" | 15,850 |
| 144" | 168" | 2 X 3 | 12" | 21" | 14" | # 4 @ 10" | # 5 @ 6" | 23,040 |

NOTES:

AASHTO HS 25 LOADING.
 REINFORCEMENT PER MN SPEC. 3301 GRADE 60. ANY STEEL REINFORCEMENT THAT IS WELDED DURING FABRICATION MEETS THE REQUIREMENTS OF ASTM A706.
 TOP LAYER OF STEEL NOT REQUIRED FOR 58" O.D. COVERS.
 COVERS AVAILABLE WITH CONCENTRIC CUTOUTS AS WELL AS SPECIALTY SIZES AND THICKNESS NOT LISTED.

Manhole or Catch Basin Keyed Top Slab
58" to 168" Outer Diameter



| CB or MH I.D. | TOP SLAB O.D. | OPENING SIZE | T | H | K | L | TOP BARS EACH WAY | BOTTOM BARS EACH WAY | WEIGHT |
|---------------|---------------|--------------|-----|-----|-----|-----|-------------------|----------------------|--------|
| 48" | 58" | 27" | 6" | 13" | 6" | 8" | NONE | # 5 @ 6" | 1655 |
| 54" | 65" | 27" | 8" | 13" | 6" | 8" | # 4 @ 10" | # 5 @ 8" | 2175 |
| 60" | 72" | 27" | 8" | 13" | 7" | 9" | # 4 @ 10" | # 5 @ 7" | 2755 |
| 66" | 79" | 27" | 8" | 13" | 8" | 10" | # 4 @ 10" | # 5 @ 7" | 3395 |
| 72" | 86" | 27" | 8" | 13" | 8" | 10" | # 4 @ 10" | # 5 @ 6" | 4095 |
| 84" | 100" | 27" | 8" | 13" | 9" | 11" | # 4 @ 10" | # 5 @ 5" | 5670 |
| 96" | 114" | 27" | 8" | 13" | 9" | 11" | # 4 @ 10" | # 6 @ 6" | 7480 |
| 108" | 128" | 27" | 12" | 17" | 10" | 12" | # 4 @ 10" | # 5 @ 6" | 13,865 |
| 120" | 142" | 27" | 12" | 17" | 11" | 13" | # 4 @ 10" | # 5 @ 6" | 17,195 |
| 144" | 168" | 27" | 12" | 17" | 12" | 14" | # 4 @ 10" | # 5 @ 6" | 26,000 |
| 54" | 65" | 48" | 8" | 21" | 6" | 7" | # 4 @ 10" | # 5 @ 8" | 2065 |
| 60" | 72" | 48" | 8" | 21" | 7" | 8" | # 4 @ 10" | # 5 @ 7" | 2645 |
| 66" | 79" | 48" | 8" | 21" | 8" | 9" | # 4 @ 10" | # 5 @ 7" | 3285 |
| 72" | 86" | 48" | 8" | 21" | 8" | 9" | # 4 @ 10" | # 5 @ 6" | 3985 |
| 84" | 100" | 48" | 8" | 21" | 9" | 10" | # 4 @ 10" | # 5 @ 5" | 5560 |
| 96" | 114" | 48" | 8" | 21" | 9" | 11" | # 4 @ 10" | # 6 @ 6" | 7370 |
| 108" | 128" | 48" | 12" | 21" | 10" | 11" | # 4 @ 10" | # 5 @ 6" | 13,025 |
| 120" | 142" | 48" | 12" | 21" | 11" | 12" | # 4 @ 10" | # 5 @ 6" | 16,355 |
| 144" | 168" | 48" | 12" | 21" | 12" | 13" | # 4 @ 10" | # 5 @ 6" | 26,000 |

NOTES:

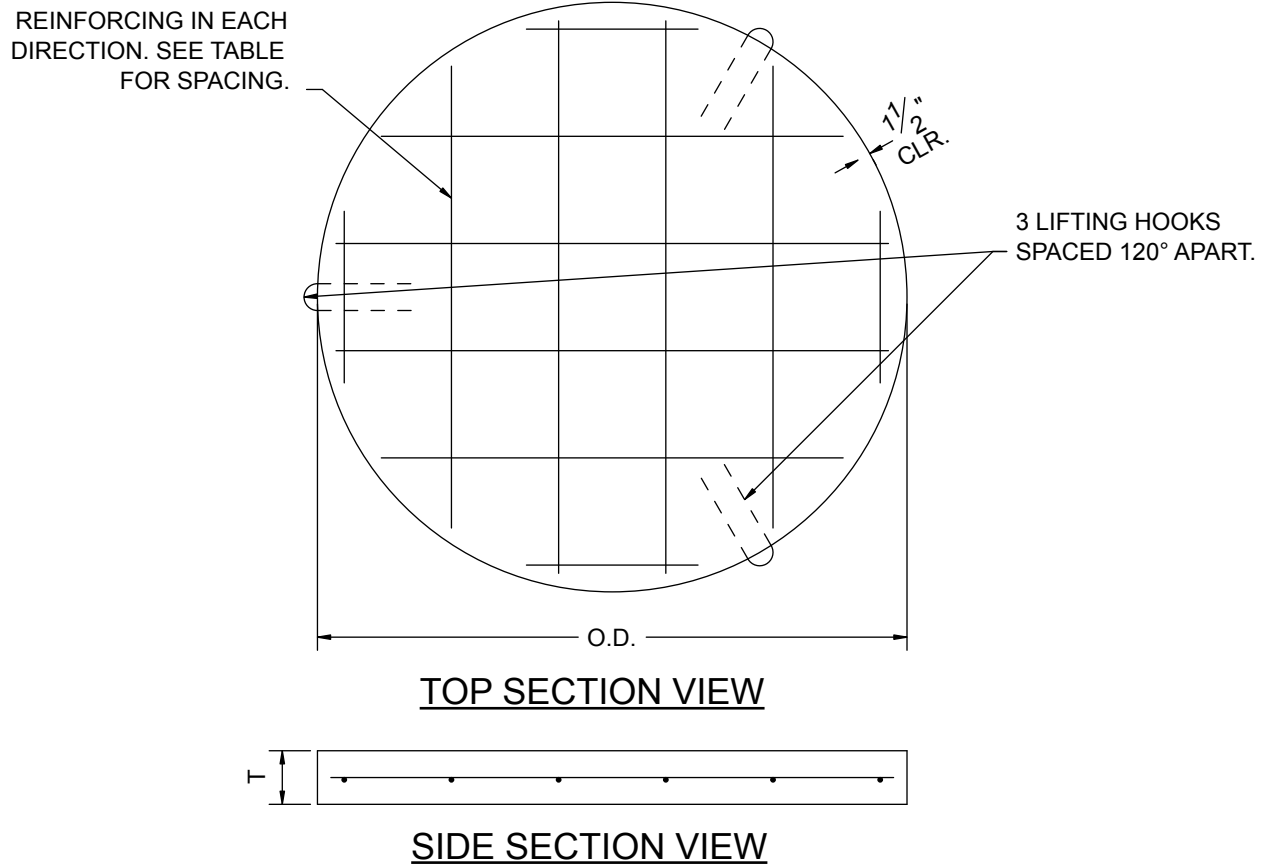
AASHTO HS 25 LOADING.

REINFORCEMENT PER MN SPEC. 3301 GRADE 60. ANY STEEL REINFORCEMENT THAT IS WELDED DURING FABRICATION MEETS THE REQUIREMENTS OF ASTM A706.

TOP LAYER OF STEEL NOT REQUIRED FOR 58" O.D. COVERS.

COVERS AVAILABLE WITH CONCENTRIC CUTOUTS AS WELL AS SPECIALTY SIZES AND THICKNESS NOT LISTED.

**Manhole or Catch Basin
 Base Slab
 44" to 180" Outer Diameter**



| CB or MH I.D. | BASE O.D. | T | BAR # | SPACING | WEIGHT |
|---------------|-----------|-----|-------|---------|--------|
| 27" | 39" | 5" | 4 | 12" | 520 |
| 30" | 44" | 6" | 4 | 12" | 805 |
| 24" x 36" | 38" x 50" | 6" | 4 | 12" | 1005 |
| 48" | 66" | 6" | 4 | 12" | 1810 |
| 54" | 72" | 8" | 4 | 12" | 2875 |
| 60" | 80" | 8" | 4 | 12" | 3550 |
| 66" | 86" | 8" | 4 | 12" | 4295 |
| 72" | 94" | 8" | 4 | 12" | 4900 |
| 84" | 108" | 8" | 4 | 8" | 6465 |
| 96" | 120" | 8" | 4 | 8" | 7980 |
| 108" | 132" | 12" | 4 | 8" | 14,485 |
| 120" | 146" | 12" | 4 | 8" | 17,715 |
| 144" | 180" | 12" | 4 | 6" | 27,480 |

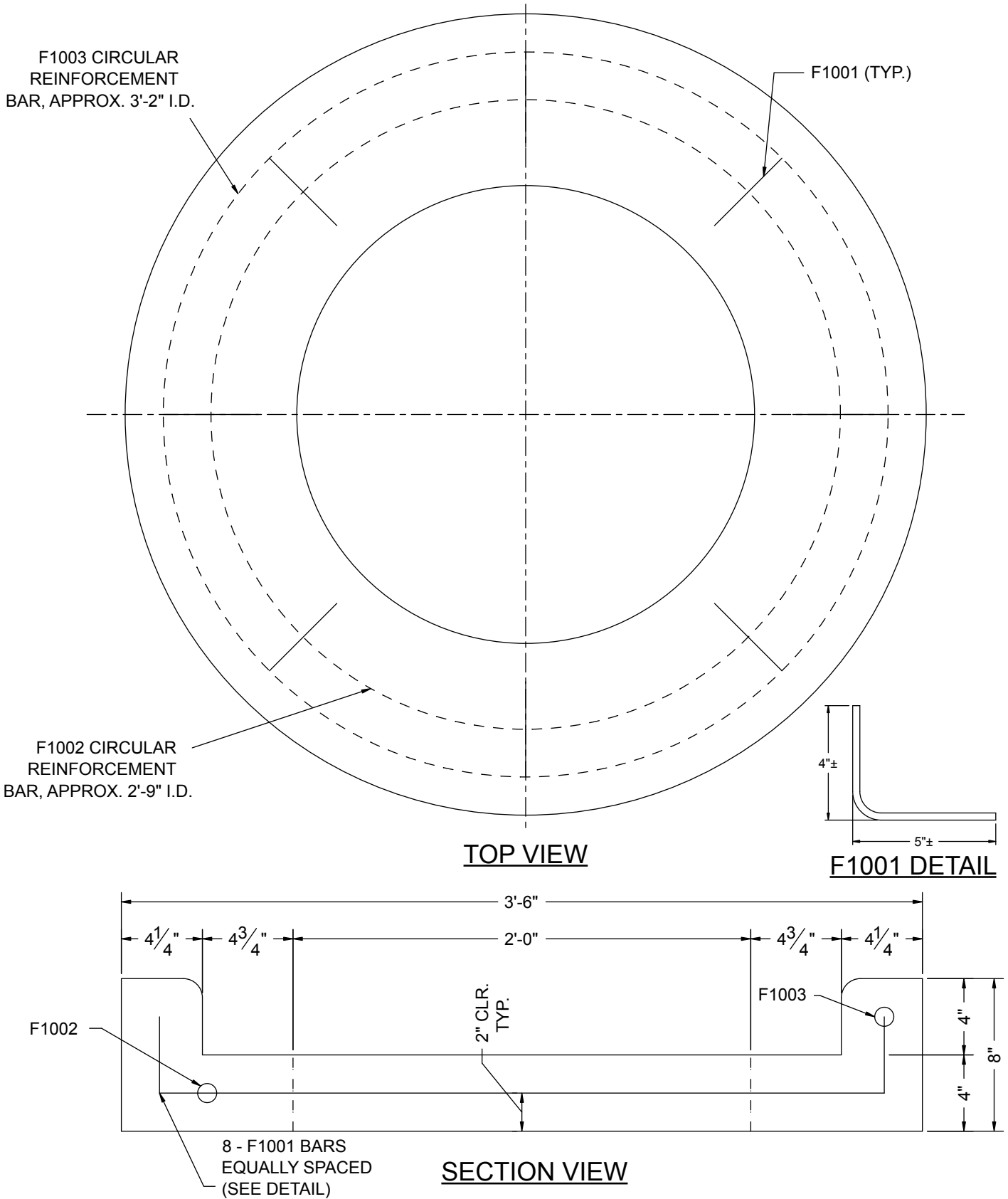
NOTES:

AASHTO HS 25 LOADING.

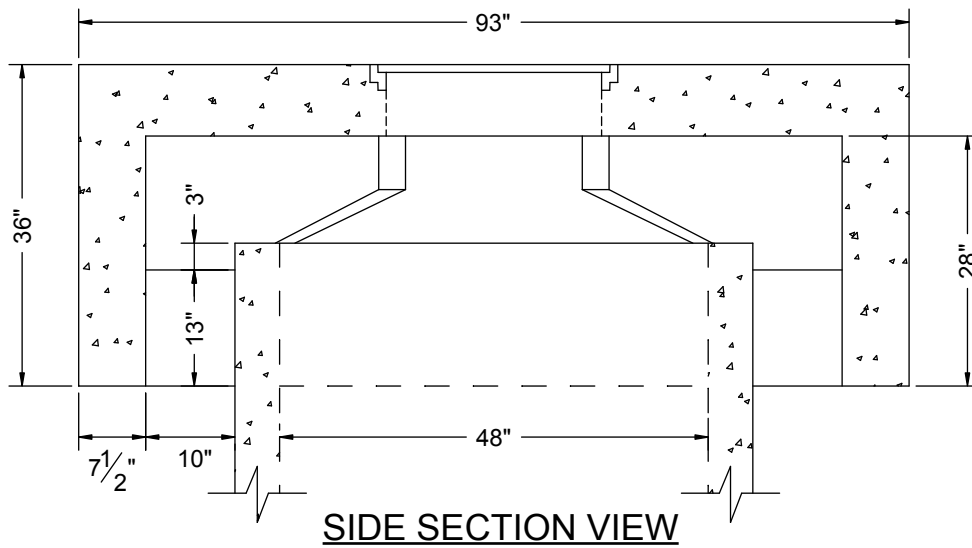
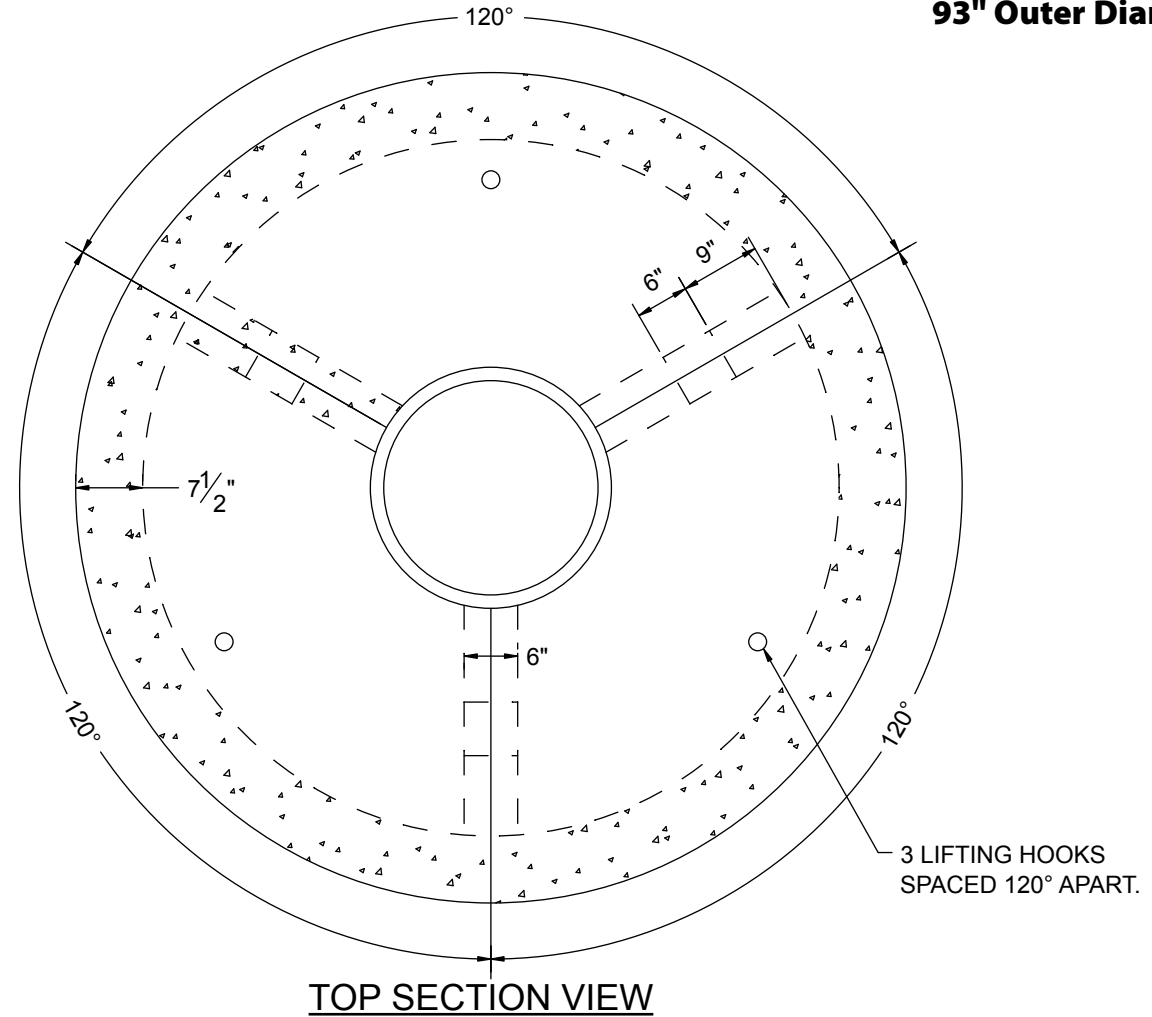
REINFORCEMENT PER MN SPEC. 3301 GRADE 60. ANY STEEL REINFORCEMENT THAT IS WELDED DURING FABRICATION MEETS THE REQUIREMENTS OF ASTM A706.

BASE SLABS AVAILABLE WITH SPECIALTY SIZES AND THICKNESS NOT LISTED.

**Stool Grate Reinforced
Concrete Frame**



**Reinforced Concrete
Cap Skimmer
93" Outer Diameter**



NOTE:

SEE MNDOT STANDARD PLATE NO. 4108F FOR DETAILS FOR FRAME 790-2
CAST IN SLAB.

