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| MD 386.01 | STANDARD SPRING BOX  
SPRING OR WELL PROTECTION | 10/01/01 03/23/56 |
| MD 386.02 | CAPPING EXISTING DUG WELLS | 10/01/01 12/06/82 |
| MD 386.03 | SPRING CONTROL METHOD & DETAIL | 03/15/06 04/05/06 |
| MD 386.11 | STANDARD JUNCTION BOX | 10/01/01 03/23/56 |
| MD 386.21 | PRE-CAST REINFORCED CONCRETE SLAB | 10/07/14 09/29/14 |
| MD 387.01 | STANDARD UNDERDRAINS | 12/21/17 11/28/17 |
| MD 387.11 | LONGITUDINAL UNDERDRAIN LOCATED AT  
SHOULDER EDGE FOR FLEXIBLE PAVEMENT | 06/30/16 06/28/16 |
| MD 387.11-01 | LONGITUDINAL UNDERDRAIN LOCATED AT CURB AND GUTTER EDGE FOR FLEXIBLE PAVEMENT | 06/30/16 06/28/16 |
| MD 387.21 | LONGITUDINAL UNDERDRAIN LOCATED AT  
SHOULDER EDGE FOR RIGID PAVEMENT | 06/30/16 06/28/16 |
| MD 387.21-01 | LONGITUDINAL UNDERDRAIN LOCATED AT CURB AND GUTTER EDGE FOR RIGID PAVEMENT | 06/30/16 06/28/16 |
| MD 387.51 | STANDARD SUBGRADE DRAINS  
FLEXIBLE PAVING | 06/30/16 06/28/16 |
| MD 387.61 | STANDARD SUBGRADE DRAINS  
RIGID PAVEMENT | 06/30/16 06/28/16 |
| MD 389.01 | STANDARD CONCRETE VALLEY GUTTER, FLUMES,  
CONCRETE SHOULDER & REBUT | 10/01/01 |
| MD 389.02 | TOE WALL DETAIL-5" CONCRETE GUTTER | 10/01/01 01/27/69 |
| MD 389.06 | SOIL STABILIZATION MATTING  
DRAINAGE DITCHES | 10/01/01 06/27/85 |
| MD 389.07 | SOIL STABILIZATION MATTING  
DRAINAGE DITCHES | 10/01/01 04/25/88 |
Plan

Elevation

Quantities for Estimating Purposes Only

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'S' Distance

4" for 12" Dia. to 21" Dia. Pipes Inclusive.
6" for 24" Dia. to 36" Dia. Pipes Inclusive.
8" for 42" Dia. to 60" Dia. Pipes Inclusive.

General Notes

Specifications: Latest S.H.A.
Concrete shall be mix No. 2
Reinforcing: Deformed Steel Bars No. 4
Chamfer: All Exposed Edges 1"x1" or as directed.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

Standard End Support Wall
Metal or Concrete Round Pipe

Standard No. MD 350.01
**Disposition of Bars Detail**

- No. 4 straight bars horizontal @ 1"-7" max C/C both sides of opening for 49"x33" to 71"x47" pipe endwalls inclusive.
- No. 4 straight bars horizontal @ 1'-0" C/C all endwalls.
- No. 4 bent bars @ 1'-0" all endwalls.
- 2-No. 4 straight bars horizontal for 49"x33" to 71"x47" pipe endwalls inclusive.

**Section A-A**

'S' Distances:
- 6" for 28"x20" to 42"x29" inclusive.
- 8" for 49"x33" to 71"x47" inclusive.

**Quantities for Estimating Purposes Only**

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<tr>
<th>OPENING</th>
<th>QUANTITIES</th>
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<td>42x29</td>
<td>132 lbs</td>
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<td>49x33</td>
<td>159 lbs</td>
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<td>57x38</td>
<td>192 lbs</td>
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<td>64x43</td>
<td>251 lbs</td>
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<tr>
<td>71x47</td>
<td>286 lbs</td>
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**General Notes**

Specifications latest S.H.A.
Concrete shall be Mix No. 2.
Reinforcing: Deformed steel bars No. 4.
Chamfer: All exposed edges 1"x1" or as directed.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD END SUPPORT WALL
METAL PIPE ARCH

STANDARD NO. MD 351.01
ELEVATION

STRAIGHT BARS VERTICAL @ 1"-6" MIN. TO 2"-0" MAX.
FRONT FACE

PLAN

ISOMETRIC VIEW

SECTION A-A

#4 BARS HORIZONTAL @ 1"-0" C/C BELOW OPENING

SECTION B-B

#4 BARS HORIZONTAL @ 1"-7" MAX. C/C BOTH WINDWALLS - ALL ENDMALLS

NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO. 2
REINFORCING: DEFORMED STEEL BARS #4 & #6
CHAMFER: ALL EXPOSED EDGES 1" X 1" OR AS DIRECTED

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QUANTITIES IN TABLE TO BE USED FOR ESTIMATING ONLY

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD HEADWALLS
B-48 B-54 B-60

STANDARD NO. MD 352.01
#6 Bent bars horizontal
2 each face

#4 Straight bars vertical
# 1'-6" min. to 2'-0" max.
In front face

Elevation

#4 Bent bars @ 1'-0" C/C below opening

Section A-A

1"
3/4" ø hook bolts @ 1'-6"
C/C around pipe arch when metal pipe is used.

#4 Bent bars

Section B-B

#4 Bent bars both wingwalls all endwalls

#4 Bent bars @ 1'-0" C/C both sides of opening

2 #4 Bent bars horizontal
1 each wingwall

Notes

Specifications: Latest S.H.A.
Concrete shall be mix #2.
Reinforcing: Deformed steel bars #4 & #6.
Chamfer: All exposed edges 1"x1" or as directed

Disposition of bars detail

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Quantities in table to be used for estimating only

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD HEADWALLS
B-66 B-72 B-78 B-84

STANDARD NO. MD 352.02
PLAN

4-NO.4 STRAIGHT BARS VERTICAL IN FRONT FACE FOR 12" DIA. TO 21" DIA. PIPE ENDWALLS INCLUSIVE.

2 NO.4 STRAIGHT BARS HORIZONTAL 1 EACH FACE FOR 36" DIA. TO 72" DIA. PIPE ENDWALLS INCLUSIVE.

NO.4 STRAIGHT BARS VERTICAL # 1-5" MIN. TO 2"-0" MAX. FRONT FACE FOR 24" DIA. TO 72" DIA. PIPE ENDWALLS INCLUSIVE.

SECTION A-A

ELEVATION

QUANTITIES FOR ESTIMATING PURPOSES ONLY

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'S' DISTANCE

4" FOR 12" DIA. TO 21" DIA. PIPES INCLUSIVE.
6" FOR 24" DIA. TO 36" DIA. PIPES INCLUSIVE.
8" FOR 42" DIA. TO 72" DIA. PIPES INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO. 2
REINFORCING: DEFORMED STEEL BARS-No. 4
CHAMFER: ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE C ENDWALL
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 354.01
PLAN

4-NO.4 STRAIGHT BARS VERTICAL
IN FRONT FACE FOR 17"x13" TO
28"x20" PIPE ENDWALLS INCLUSIVE.

2-NO.4 STRAIGHT BARS HORIZONTAL
1 EACH FACE FOR 49"x33" TO 71"x47"
PIPE ENDWALLS INCLUSIVE.

ELEVATION

QUANTITIES FOR ESTIMATING PURPOSES ONLY

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DISPOSITION OF BARS DETAIL

NO.4 STRAIGHT BARS HORIZONTAL
@ 1'-6" MAX. C/C BOTH SIDES OF OPENING FOR
49"x33" TO 71"x47" PIPE ENDWALLS INCLUSIVE.

SECTION A-A

5' DISTANCES
4" FOR 17" x 13" TO 24" x 18" INCLUSIVE.
6" FOR 28" x 20" TO 42" x 29" INCLUSIVE.
8" FOR 49" x 33" TO 71" x 47" INCLUSIVE.

GENERAL NOTES
SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO.2
REINFORCING: DEFORMED STEEL BARS NO.4
CHAMFER: ALL EXPOSED EDGES 1"X1" OR AS DIRECTED.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE C ENDWALL METAL PIPE ARCH

STANDARD NO. MD 355.01
**PLAN**

4-No. 4 Straight bars vertical in front face for 14" x 23" to 19" x 30" pipe endwalls.

2-No. 4 Straight bars horizontal in each face for 32" x 49" to 43" x 68" pipe endwalls inclusive.

**ELEVATION**

Quantities for estimating purposes only

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<th>QUANTITIES</th>
<th>DIMENSIONS</th>
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**GENERAL NOTES**

6" for 14" x 23" to 27" x 42" inclusive.
8" for 28" x 45" to 43" x 68" inclusive.

**5' DISTANCES**

6' for 14" x 23" to 27" x 42" inclusive.
8' for 28" x 45" to 43" x 68" inclusive.

**SPECIFICATIONS**

Specifications: Latest S.H.A. Concrete: See S.H.A. Specifications Reinforcement: Deformed Steel Bars No. 4 Chamfer: All exposed edges 1" x 1" or as directed.

**STATE HIGHWAY ADMINISTRATION**

Standards for Highways and Incidental Structures

**STANDARD TYPE C ENDWALL**

**HORIZONTAL ELLIPTICAL CONCRETE PIPE**

**STANDARD NO.**

MD 355.02
PLAN

ELEVATION

QUANTITIES FOR ESTIMATING PURPOSES ONLY

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'S' DISTANCES

6" FOR 14"X23" TO 27"X42" PIPES INCLUSIVE.
8" FOR 29"X45" TO 43"X68" PIPES INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A. CONCRETE: SEE S.H.A. SPECIFICATIONS. REINFORCEMENT: DEFORMED STEEL BARS NO.4 CHAMFER: ALL EXPOSED EDGES 1"X1" OR AS DIRECTED.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD END SUPPORT WALL
HORIZONTAL ELLIPTICAL CONCRETE PIPE

STANDARD NO. MD 355.03
PLAN

SECTION A-A

'S' DISTANCES

4" FOR 12" DIA. TO 21" DIA. PIPES INCLUSIVE.
6" FOR 24" DIA. TO 36" DIA. PIPES INCLUSIVE.
8" FOR 42" DIA. TO 72" DIA. PIPES INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A
CONCRETE SHALL BE MIX NO.2
REINFORCING: DEFORMED STEEL BARS - NO.4
CHAMFER: ALL EXPOSED EDGES 1" X 1" OR AS DIRECTED.

DISPOSITION OF BARS DETAIL

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E ENDWALL
METAL OR CONCRETE ROUND PIPE

STANDARD NO. MD 356.01
QUANTITIES FOR ESTIMATING PURPOSES ONLY

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PLAN

2 NO. 4 STRAIGHT BARS VERTICAL IN FRONT FACE FOR 17\times 13" TO 28\times 20" ENDWALLS INCLUSIVE.

2 NO. 4 BENT BARS HORIZONTAL 1 EACH FACE FOR 49\times 33" TO 71\times 47" ENDWALLS INCLUSIVE.

SECTION A-A

5' DISTANCES

4" FOR 17\times 13" TO 24\times 18" INCLUSIVE.
6" FOR 28\times 20" TO 42\times 29" INCLUSIVE.
8" FOR 49\times 33" TO 71\times 47" INCLUSIVE.

GENERAL NOTES

SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO. 2
REINFORCING: DEFORMED STEEL BARS NO. 4
CHAMFER: ALL EXPOSED EDGES 1" x 1" OR AS DIRECTED.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E ENDWALL
METAL PIPE ARCH

STANDARD NO. MD 357.01
### Quantities for Estimating Purposes Only

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### General Notes

**Specifications:** Latest S.H.A.

Concrete shall be Mix No. 2

Reinforcement: Deformed Steel Bars

Vertical No. 6 Bars 12" C/C

Horizontal No. 4 Bars 12" C/C Hooked on One End

Chamfer: All Exposed Edges 1"x1" or as Directed.

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**Maryland Department of Transportation**

**State Highway Administration**

Standards for Highways and Incidental Structures

**Standard Type F Endwall**

Metal or Concrete Round Pipe

**Standard No. MD 358.01**
**ISOMETRIC VIEW**

**QUANTITIES FOR ESTIMATING PURPOSES ONLY**

**SLOPE: 1:1**

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**GENERAL NOTES**

SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX No.2
REINFORCING: DEFORMED STEEL BARS
ENDWALLS: NO.6 BARS 12" C/C
WINGWALLS: VERTICAL NO.6 BARS 12" C/C.
18° BEND ON ONE END
HORIZONTAL NO.4 BARS 12" C/C
5" HOOK ON ONE END
FLOOR: NO.4 BARS 12" C/C, 2 WAYS
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

**SLOPE: 2:1**

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**SLOPE: 4:1**

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**SPECIFICATION 305**

**CATEGORICAL CODE ITEMS**

**APPROVED**

**DIRECTORY OF HIGHWAY DEVELOPMENT**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**SPECIAL TYPE F ENDWALL METAL OR CONCRETE ROUND PIPE**

**STANDARD NO. MD 358.02**

**MARYLAND DEPARTMENT OF TRANSPORTATION**

**STATE HIGHWAY ADMINISTRATION**

**ELEVATION**

**PLAN**

**TOE OF SLOPE**

**W**
CASE 1. STANDARD TYPE "F" ENDWALL

CASE 2. WHEN A WATER COURSE IS PERPENDICULAR OR ASKEW TO THE D, AND THE SIDE DITCH DRAINAGE IS IN BOTH DIRECTIONS AND IT IS MORE ECONOMICAL OR BETTER PRACTICE TO PLACE THE PIPE AT RIGHT ANGLES TO THE D, THE "F" ENDWALL CAN BE USED BY MAKING THE SHORTER WING EQUAL IN LENGTH AND ANGLE TO THE LONGER WING.

CASE 3. WHEN THE DRAINAGE CONDITIONS ARE SIMILAR TO CASE 2 BUT IT IS DESIRED TO PLACE THE PIPE ASKEW, THE "F" ENDWALL CAN BE USED. THE WINGS WILL BE PLACED THE SAME AS IN CASE 2, BUT THE LENGTH OF THE HEADWALL WILL BE INCREASED DUE TO THE INCREASED AREA OF THE PIPE.

CASE 4. WHEN A Pipe IS PLACED ASKEW TO FOLLOW THE NATURAL WATER COURSE AND THE SIDE DITCH DRAINAGE IS IN ONE DIRECTION, THE "F" ENDWALL WILL BE USED WITH THE EXCEPTION THAT THE HEADWALL WILL BE LENGTHENED DUE TO THE INCREASED AREA OF THE PIPE.

CASE 5. WHEN AN ASKEW ROAD OR ENTRANCE INTERSECTS THE MAIN LINE AND THE DRAINAGE IS PARALLEL TO THE MAIN LINE AND INTERSECTING ROAD OR ENTRANCE, THE "F" ENDWALL CAN BE USED AS FOLLOWS:

A. DETERMINE THE DIRECTION OF PIPE.
B. COMPUTE "S".
**CONCRETE INSERTS WITH**

\(\frac{3}{4}''\) GALV. LAG BOLTS

8'' LONG FOR BASE (WHEN REQUIRED)

**ISOMETRIC VIEW 1**

**CONCRETE INSERTS WITH**

\(\frac{3}{4}''\) GALV. LAG BOLTS

10'' LONG FOR WING WALLS

**ISOMETRIC VIEW 2**

**APRON BY CONTRACTOR**

(SEE ISOMETRIC VIEW 2)

**PLAN**

**APRON BY CONTRACTOR**

(SEE ISOMETRIC VIEW 2)

**PIPE BY CONTRACTOR**

OPENING BY MANUFACTURER

**ISOMETRIC VIEW 3**

**ELEVATION**

**NOTES**

1. THIS TYPE F ENDWALL SHALL NOT BE USED WITHIN THE CLEAR RECOVERY ZONE.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PS).
3. REINFORCEMENT SHALL BE DEFORMED BARS AS SHOWN OR WELDED WIRE FABRIC WITH AN EQUIVALENT AREA PER SQUARE FOOT. DEFORMED BARS SHALL CONFORM TO ASTM A 615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 82.
4. SEE CHARTS ON STANDARD MD 358.05 FOR DIMENSIONS NOT SHOWN.
5. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. EXCAVATION, BACKFILL, CONCRETE, REINFORCEMENT FOR APRON, AND NO. 57 AGGREGATE WILL BE INCIDENTAL TO THE CONTRACT PRICE PER EACH FOR THE ENDWALL.
7. CHAMFER ALL EXPOSED EDGES 1'' AT OR AS DIRECTED.

**MARYLAND DEPARTMENT OF TRANSPORTATION**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**PRECAST TYPE F ENDWALL**

**METAL OR CONCRETE ROUND PIPE**

**STANDARD NO. MD 358.04**
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**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**PRECAST TYPE F ENDWALL DIMENSIONS**

**METAL OR CONCRETE ROUND PIPE**

**STANDARD NO. MD 358.05**
### Isometric View

#### Quantities for Estimating Purposes Only

**Slope 2:1**

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**Slope 4:1**

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<td>12.57</td>
<td>5'-9&quot;</td>
<td>12&quot;</td>
<td>3'-9&quot;</td>
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</tbody>
</table>

### General Notes

**Specifications:** Latest S.N.A.

Concrete shall be mix No.2

Reinforcing: Deformed Steel bars

Vertical No.6 bars 12" C/C

Horizontal No.4 bars 12" C/C hooked on one end

Chamfer: All exposed edges 1"x1" or as directed.
CONCRETE INSERTS WITH 3/8" GALV. LAG BOLTS 8" LONG FOR BASE WHEN REQUIRED.

NO. 5 BARS AT 8" C/C 2 WAYS TYP. EACH WALL.

APRON BY CONTRACTOR (SEE ISOMETRIC VIEW 2)

APRON (SHAD ED AREA) CAST IN PLACE BY THE CONTRACTOR USING CONC. MIX NO. 2 AND REINFORCED WITH NO. 5 BARS AT 8" C/C 2 WAYS. 2" CL.

ISOMETRIC VIEW 2

APRON BY CONTRACTOR (SEE ISOMETRIC VIEW 2)

PIPE BY CONTRACTOR OPENING BY MANUFACTURER

NO. 5 BARS 8" C/C 2 WAYS TYP. EACH BASE PIECE

ELEVATION

PROVIDE 6" MINIMUM BEDDING OF NO. 57 AGGREGATE ON FIRM SUBGRADE

NOTES

1. THIS TYPE F ENDWALL SHALL NOT BE USED WITHIN THE CLEAR RECOVERY ZONE.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
3. REINFORCEMENT SHALL BE DEFORMED BARS AS SHOWN OR WELDED WIRE FABRIC WITH AN EQUIVALENT AREA FOR SQUARE FOOT. DEFORMED BARS SHALL CONFORM TO ASTM A 615, GRADE 60. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 82.
4. SEE CHARTS ON STANDARD MD-359.03 FOR DIMENSIONS NOT SHOWN.
5. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. EXCAVATION, BACKFILL, CONCRETE, REINFORCEMENT FOR APRON, AND NO. 57 AGGREGATE WILL BE INCIDENTAL TO THE CONTRACT PRICE PER EACH FOR THE ENDWALL.
7. CHAMFER ALL EXPOSED EDGES 1" X 1" OR AS DIRECTED.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST TYPE F ENDWALL
METAL PIPE ARCH

STANDARD NO. MD 359.02
### Dimensions - Slope 2:1

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**GENERAL NOTES**

**SPECIFICATIONS:** LATEST S.H.A.
**CONCRETE SHALL BE MIX NO. 2**
**REINFORCING:** DEFORMED STEEL BARS
**VERTICAL NO. 6 BARS 12" C/C**
**HORIZONTAL NO. 4 BARS**
**12" C/C HOOKED ON ONE END**
**CHAMFER:** ALL EXPOSED EDGES 1"x1"
**OR AS DIRECTED.**

---

### PLAN

![Plan Diagram](image)

**NO. 6 BARS BENT AS SHOWN**

---

### ELEVATION

![Elevation Diagram](image)

**VERTICAL NO. 6 BARS**
**HORIZONTAL NO. 4 BARS**

---

### ISOMETRIC VIEW

![Isometric View](image)

---

### SECTION A-A

![Section A-A](image)

---

### SLOPE 1½:1

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<th>AREA SO. FT.</th>
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**QUANTITIES FOR ESTIMATING PURPOSES ONLY**

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**Maryland Department of Transportation**
**STATE HIGHWAY ADMINISTRATION**
**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**STANDARD TYPE G ENDWALL**
**METAL OR CONCRETE ROUND PIPE**

**STANDARD NO. MD 360.01**
CASE 1

This condition is covered by the type "G" endwall.

CASE 2

When a pipe is to be placed askew to follow the natural water course the standard "G" endwall should be modified by lengthening the headwall to allow for the increased area of the pipe due to the askew and the wings lengthened to care for the slope.

CASE 3

When it is not practical to place the endwall on the outlet end in line with the endwall on the inlet end it is necessary to askew the pipe. This requires the lengthening of the headwall only to allow for the increased area of the pipe due to the askew. The length of the wings are standard.

CASE 4

When a water course is askew and it is more economical or better practice to place the pipe at right angles to the centerline and recut the outlet the "G" endwall can be used by placing the wings parallel to the course and lengthening the wingwalls only. The headwall remains standard.

CASE 5

This condition applies when a road or entrance intersects at right angles and the water course is perpendicular to the intersecting road or entrance the standard "G" endwall can be used.
DISPOSITION OF BARS DETAIL

NOTE
FOR DIMENSIONS AND QUANTITIES SEE TABLES ON STANDARD MD 362.01-01

GENERAL NOTES
SPECIFICATIONS: LATEST S.H.A.
CONCRETE SHALL BE MIX NO.2
REINFORCING: DEFomed Steel bars no.4
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED
SOD: PLACE SOD. 3' wide, around endwall as indicated on the plans.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE H ENDWALL
METAL OR CONCRETE ROUND PIPE

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**NOTE** FOR STANDARD H ENDWALL DETAILS SEE STANDARD MD 362.01

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE H ENDWALL
DIMENSIONS & QUANTITIES

STANDARD NO. MD 362.01-01
**NOTES**

1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS ON STANDARD MD 368.02.

2. END SECTIONS MUST BE REINFORCED TO CONFORM TO ASTM - CLASS IV REINFORCED CONCRETE PIPE.

3. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF CONCRETE FOOTER TO BE INCLUDED IN PRICE OF END SECTION. CONCRETE TO BE MIX NO. 2. REINFORCEMENT TO BE NO. 3 BARS.

* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.

**QUANTITIES FOR ESTIMATING PURPOSES ONLY**

<table>
<thead>
<tr>
<th>CONCRETE END SECTION</th>
<th>CONCRETE FOOTER</th>
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</thead>
<tbody>
<tr>
<td>DIA. SLOPE A B C D E</td>
<td>W X CONC. C.Y. STEEL LBS.</td>
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<tr>
<td>12” 3:1 4” 2’-0” 4’-0” 6’-0” 2’-0” 3’-0” 12”</td>
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<tr>
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NOTES

1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS CONFORMING TO DETAILS ON STANDARD NO. MD 368.01.

2. END SECTIONS MUST BE REINFORCED TO CONFORM TO ASTM - CLASS IV REINFORCED CONCRETE PIPE.

3. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF CONCRETE FOOTER TO BE INCLUDED IN PRICE OF END SECTION. CONCRETE TO BE MIX. NO.2 REINFORCEMENT TO BE NO.3 BARS.

* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION, ELEVATION TO BE NOTED ON THE CONSTRUCTION PLANS.

NOTES FOR ESTIMATING PURPOSES ONLY

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Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONCRETE END SECTION
ROUND CONCRETE PIPE

STANDARD NO. MD 368.02
NOTES:
1. END SECTIONS SHALL BE REINFORCED TO CONFORM TO ASTM - CLASS IV REINFORCED CONCRETE PIPE.
2. CONCRETE FOOTER SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF THE FOOTER TO BE INCLUDED IN PRICE OF THE END SECTION. THE CONCRETE SHALL BE MIX #2 AND THE REINFORCEMENT IS TO BE #3 BARS.
3. INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.

QUANTITIES FOR ESTIMATING PURPOSES ONLY

<table>
<thead>
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<th>HERCP</th>
<th>CONCRETE END SECTION</th>
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Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONCRETE END SECTION
HORIZONTAL ELLIPTICAL PIPE

STANDARD NO. MD 369.00
INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.

PIPE DIAM. | GA.  | A  | B  | H  | L  | W  | APPROX. SLOPE | UNIT
---|---|---|---|---|---|---|---|---
12"  | 16  | 6" | 6" | 6" | 21" | 24" | 2' | 1 PC.
15"  | 16  | 7" | 6" | 6" | 26" | 30" | 2' | 1 PC.
18"  | 16  | 8" | 10" | 6" | 31" | 36" | 2' | 1 PC.
21"  | 16  | 9" | 12" | 6" | 36" | 42" | 2' | 1 PC.
24"  | 16  | 10" | 17" | 6" | 41" | 48" | 2' | 1 PC.
30"  | 14  | 12" | 16" | 8" | 51" | 60" | 2' | 1 PC.
36"  | 14  | 14" | 19" | 9" | 60" | 72" | 2' | 2 PC.

* INVERT ELEVATION TO BE AT THE PIPE END OF THE STANDARD END SECTION. ELEVATIONS TO BE NOTED ON THE CONSTRUCTION PLANS.

NOTES

1. METAL END SECTIONS SHALL BE GAGE 16 FOR PIPES RANGING FROM 15" THRU 24", AND GAGE 14 FOR PIPES RANGING FROM 30" THRU 36". MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/8" DIAMETER GALVANIZED RIVETS OR BOLTS.

2. TOE PLATES SHALL BE USED WHEN SPECIFIED ON THE PLANS. THICKNESS OF END PLATE TO BE SAME AS END SECTION. COST OF TOE PLATE TO BE INCIDENTAL TO THE BID PRICE PER EACH OF METAL END SECTION.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD METAL END SECTION
ROUND METAL PIPE

STANDARD NO. MD 370.01
CONNECTIONS FOR ROUND PIPE

NOTE:

PIPES AND CONNECTION BANDS SHALL CONFORM TO APPLICABLE SECTION OF THE STANDARD SPECIFICATIONS AND TO AASHTO REQUIREMENTS.

CONNECTIONS FOR PIPE ARCH

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD CONNECTIONS
METAL END SECTIONS

STANDARD NO. MD 370.11
## Notes

1. Metal end sections shall be gage 16 for arch pipes ranging from 17"x13" thru 28"x20", and gage 14 for pipes ranging from 35"x24" thru 42"x29".

2. Toe plate shall be used when specified on the plans. Thickness of end plates to be same as end section. Cost of toe plate to be incidental to the bid price per each of metal end section.

---

**Pipe Arch Dimensions**

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<tr>
<th>Span</th>
<th>Rise</th>
<th>A</th>
<th>B</th>
<th>H</th>
<th>L</th>
<th>W</th>
<th>Approx. Slop</th>
<th>Unit</th>
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<td>8&quot;</td>
<td>46&quot;</td>
<td>2/&quot;</td>
<td>1 PC.</td>
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</table>

**Plan**

- Reinforced edge
- 12" C/C (max. spacing)
- Galvanized toe plate (see note no. 2)

**End View**

- Same grade as pipe invert

**Notes**

- Invert elevation to be at the pipe end of the standard end section. Elevations to be noted on the construction plans.
Type #1 Connector Detail

Type #2 Connector Details

End Treatment of Safety Bars Detail

Parallel Drainage Structure

Use with single pipe installations 30" dia. or larger. Use with multiple pipe installations 15" dia. or larger

Cross Drainage Structure

Use with pipe installations 36" dia. and larger

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

SAFETY END SECTION FOR METAL PIPE

STANDARD NO. MD-372.00
### STEEL END SECTIONS FOR ROUND PIPE CULVERT

<table>
<thead>
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<th>PIPE DIAMETER (in)</th>
<th>METAL THICK (MIN.) (in/Gage)</th>
<th>DIMENSIONS (inches)</th>
<th>A</th>
<th>H</th>
<th>W</th>
<th>OVERALL WIDTH</th>
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### STEEL END SECTIONS FOR ARCH PIPE CULVERT

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<th>W</th>
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</table>

**GENERAL NOTES FOR ALL DETAILS:**

1. **FOR ROUND PIPES WITH DIAMETERS 24" OR LESS USE TYPE #1 CONNECTOR.**
   ALL ARCH PIPES EQUIVALENT ROUND DIAMETER, AND ROUND PIPES OVER 24" DIAMETER USE TYPE #2 CONNECTOR.
2. **THE PLATE EXTENSIONS ARE TO BE THE SAME MIN. THICKNESS AS END SECTION. DIMENSIONS SHALL BE OVERALL WIDTH LESS 6" BY 8" HIGH.**
3. **CROSS DRAINAGE AND SAFETY BARS SHALL BE 3" DIA, SCHEDULE 40 ALUMINIZED STEEL PIPE.**
4. **SLOTTED HOLES FOR SAFETY BAR ATTACHMENT SHALL BE PROVIDED FOR ALL END SECTIONS.**
5. **CROSS-SECTIONAL DIMENSIONS OF ATTACHING PIPE MAY VARY WITH DIFFERENT MATERIALS.**
6. **OPEN ENDS OF PIPES NORMALLY REQUIRE A SITE SPECIFIC DESIGN, AND MAY REQUIRE SPECIAL TREATMENT (SLOPE ENDS, CULVERT EMBANKMENT PROTECTION, PAVED END SLOPES, SAFETY END SECTIONS, OR OTHER MEASURES). SEE SPECIAL DETAILS OR STANDARD DRAWINGS AS CALLED FOR ON PLANS.**

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**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**SAFETY END SECTION FOR METAL PIPE**

**STANDARD NO.** MD-372.01
**Type #1 Connector Detail**

- 1/4" x 6" Bolt w/Hut
- Aluminized Strap

**Type #2 Connector Details**

- 1/2" Dia. Threaded Rod over top of end section. Side lugs to be bolted to end section.
- Corrugation sized to fit pipe.

**End Treatment of Safety Bars Detail**

- 2" Aluminized Pipe; Flatten end, then bend outside 4" to match end section sides.

**Section A-A**

- Edge of sidewall sheet rolled snugly against steel rod.
- Min. 1/4" Dia. Aluminized steel rod or No. 4 aluminized reinforcing bar.

**Reinforced Edge Full Length of End Section (See Section A-A)**

**Number of Bars Required Will Vary Depending On the Length of the End Section.**

**Side View**

**Cross Drainage Structure**

- Smooth tapered sleeve for attaching safety end sections to smooth pipe.

**Parallel Drainage Structure**

- Use with single pipe installations 18" dia. or larger.
- Use with multiple pipe installations 15" dia. or larger.

**Location Diagram**

**Maryland Department of Transportation**

**State Highway Administration**

**Standards for Highways and Incidental Structures**

**Safety End Section for Concrete, Plastic Pipe**

**Standard No.** MD-373.00
### Steel End Sections for Round Pipe Culvert

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<th>Metal Thickness (Minimum, In./F.g.)</th>
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<tr>
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<td>16</td>
<td>12</td>
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**General Notes for All Details:**

1. For round pipes with diameters 24" or less use Type #1 connector. All arch pipes equivalent round diameter and round pipes over 24" diameter use Type #2 connector.

2. Toe plate extensions are to be the same min. thickness as end section. Dimensions shall be overall width less 6" by 8" high.

3. Cross drainage and safety bars shall be 3" dia. Schedule 40 aluminum steel pipe.

4. Slotted holes for safety bar attachment shall be provided for all end sections.

5. Open ends of pipes normally require a site specific design and may require special treatment (slope ends, culvert embankment protection, paved end slopes, safety end sections, or other measures).

See special details or standard drawings as called for on plans.

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**Maryland Department of Transportation**
**STATE HIGHWAY ADMINISTRATION**
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**Safety End Section for Concrete, Plastic Pipe**

**Standard No.** MD-373.01
REMOVE 3" x 3" OF VERTICAL LEG OF ANGLE (TYP.)
(SQUARE CUT ONLY)
1/4" TYP.

C H A M F E R A L L C O R N E R S
O F GRATE S x 3/4"".

P L A N
D O U B L E G R A T E

R E M O V E 3" x 3" OF VERTICAL
LE G O F A N G L E ( T Y P . )
3'-6" (O.A. FRAME)

C U R B S I D E

E A C H B R G . B A R

T C - U 40 TYP

C H A M F E R A L L C O R N E R S
O F GRATE S x 3/4"".

P L A N
S I N G L E G R A T E

G E N E R A L N O T E S

1. FRAMES & GRATES TO BE SQUARE, FLAT AND TRUE
3. FRAMES AND GRATES TO BE G A L V A N I Z E D
AFTER FABRICATION IN ACCORDANCE WITH
A. S. T. M. A - 123.
4. GRADE AND SLOPE ADJUSTMENTS COMPLETED
IN THE FIELD USING CONCRETE MIX # 6.
5. MANUFACTURER TO VERIFY THAT GRATE AND
FRAME HAVE BEEN DESIGNED FOR HS-25
LOADING, ACCORDING TO AASHTO LRFD BRIDGE
DESIGN SPECIFICATIONS.
G A L V A N I Z E D 1½" ANCHOR BOLT
W I T H D O U B L E N U T F O R A D J U S T I N G
FRAME TO GRADE (FOUR BOLTS
P E R F R A M E . L E N G T H TO BE
DETERMINED IN FIELD.)

O P E N F A C E D C U R B I S U S E D

C O N C R E T E
M I X N O . 6

D R I L L , S E T A N D
G R O U T I N F I E L D
A S D I R E C T E D B Y
T H E E N G I N E E R.

M a r y l a n d D e p a r t m e n t o f T r a n s p o r t a t i o n
S T A T E H I G H W A Y A D M I N I S T R A T I O N
S T A N D A R D W R & W R M I N L E T
F R A M E & G R A T E
S T A N D A R D N O . M D 3 7 4 . 0 2
SECTION A-A

13-3/8" x 3/8" x 2" - 9 5/8" BEARING BARS (PER GRADE)
2-3/16" x 1/2" x 2" - 8 5/16" BAND BARS (PER GRADE)
12-2" x 3/8" RETICULAR BARS (PER GRADE)
3/8" Ø RIVETS (FLAT OR ROUND HEAD)

5" C/C IN 3/32" Ø Holes

USE 4" x 1/4" FLAT BAR WHEN OPEN FACED CURB IS USED.

SECTION B-B

NOTE 'A'- WELD 5 5/8" x 1/2" BAR TO 4" x 3" x 1/2" BAR
BEFORE WELDING 3 5/8" x 1/2" BAR

SECTION C-C

NOTE 'B'- WELD 3 5/8" x 1/2" x 2" - 8 5/8" BAR TO 4" x 3" x 1/2" BAR
BEFORE WELDING 3 5/8" x 1/2" x 2" - 9 5/8" BAR

SECTION D-D

5 5/8" x 1 1/2" x 2" - 8 5/8" BAR
BEVEL BOTH ENDS

SECTION E-E

(Shown without grate)

SUPPORT BEAM
#8 x 31 (GALVANIZED)

<table>
<thead>
<tr>
<th>INLET</th>
<th>DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>WR</td>
<td>4&quot; - 6&quot; x 3&quot; - 4&quot; x 3&quot; - 1/4&quot;</td>
</tr>
<tr>
<td>WRM</td>
<td>6&quot; - 4&quot; x 3&quot; - 4&quot; x 3&quot; - 3/4&quot;</td>
</tr>
</tbody>
</table>

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD WR & WRM INLET
FRAME & GRATE

STANDARD NO. MD 374.03
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).

2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.

3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.

4. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3.5' COVER. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN THE 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE OF WALL WITH 2' COVER.

5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2' COVER FROM TOP OF BASE.

6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.

7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.

8. FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE.

9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.

10. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND TO A MAXIMUM DEPTH OF 15'-0".
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).

2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.

3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.

4. WHEN "A" IS LESS THAN "I'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BAR @ 6" C/C, TWO WAYS, AND HAVE 4" COVER. WHEN "A" IS GREATER THAN "I'-0" AND LESS THAN THE 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BAR @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.

5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BAR @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.

6. PLACE 4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.

7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.

8. FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE.

9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.

10. FROM THE CURB LINE/SIDEWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND TO A MAXIMUM DEPTH OF 15'-0".
GENERAL NOTES
1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.
4. WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3.5" COVER FROM INSIDE WALL.
5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF Base.
6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.
8. FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE.
9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
10. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND FOR A MAXIMUM DEPTH OF 15'-0".
**GENERAL NOTES**

1. CONCRETE TO BE MIX NO. 2 (3,000 PS)
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.
4. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3 1/2" COVER. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS. ON INSIDE AND OUTSIDE WALLS WITH 2" COVER.
5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C + TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIDGE PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.
8. FOR UNDEPRESSSED INLETS USE NORMAL PAVEMENT SLOPE.
9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
10. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND TO A MAXIMUM DEPTH OF 15'-0".

**TRIPLE WR INLET**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**SPECIFICATION**

**305**

**CATEGORY CODE ITEMS**

**APPROVED**

**STATE HIGHWAY ADMINISTRATION**

**STANDARD NO.**

**MD 374.08**
TRIPLE WR FRAME TO BE USED WITH 3 STANDARD WR GRATES FOR DETAILS SEE STANDARD MD 374.02 & MD 374.03

NOTE MANUFACTURER TO VERIFY THAT FRAME IS DESIGNED FOR HS-25 LOADING.

TRIPLE WR FRAME & INLET WALLS

NOTE - MANUFACTURER TO VERIFY THAT FRAME IS DESIGNED FOR HS-25 LOADING.

SECTION A-A

NOTE 'A' - WELD 5'-9" x 5/8" BAR TO 4'x3'x1/2" L BEFORE WELDING 3'-9" x 5/8" BAR

SECTION B-B

SECTION C-C

SECTION D-D

SECTION E-E

FRAME ANCHORAGE DETAIL

NOTE 'B' - WELD 3'-9" x 5/8" x 3'-9" x 5/8" BAR TO 4'x3'x1/2" L BEFORE WELDING 3'-9" x 5/8" x 3'-9" x 5/8" BAR

GALVANIZED 5/8" Ø ANCHOR BOLT WITH DOUBLE NUT FOR ADJUSTING FRAME TO GRADE. 14 BOLTS PER FRAME LENGTH TO BE DETERMINED IN FIELD.

INSIDE INLET WALL

DRILL, SET AND GROUT IN FIELD AS DIRECTED BY THE ENGINEER.

CONCRETE MIX NO. 6

GRADE ADJUSTMENT VARIES

2'-9" (INSIDE FRAME) 3'-9" 3'-9"

3'-9" x 5/8" x 2'-9/32" BAR

3'-9" x 5/8" x 2'-9/32" BAR

BEVEL BOTH ENDS

BEVEL BOTH ENDS

SUPPORT BEAM Ø SUPPORT BEAM

NOTE 'C' - TC-U40" "NOTE 'C'"
PLAN

GENERAL NOTES
1. FRAMES & GRATES TO BE SQUARE, FLAT & TRUE.
3. FRAMES & GRATES TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M. A-123.
4. SEE LATEST S.H.A. SPECIFICATIONS.
5. MANUFACTURER TO VERIFY THAT GRATE AND FRAME HAVE BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

SECTION A-A
USE 4"x4" FLAT BAR WHEN OPEN FACED CURB IS USED.

FRAME ANCHORAGE DETAIL

GALVANIZED 3/4" ANCHOR BOLT WITH DOUBLE NUT FOR ADJUSTING FRAME TO GRADE. (4 BOLTS PER FRAME. LENGTH TO BE DETERMINED IN FIELD.)

INSIDE INLET WALL
CONCRETE MIX NO. 6

SECTION B-B

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD NR & NRM INLET FRAME & GRATE

STANDARD NO. MD 374.12
NOTE "A" - WELD 5 1/2"x1/4" BAR TO 4"x3"x1/2" BEFORE WELDING 3 1/2"x1/8" BAR

SECTION C-C

3 1/2"x1/8"x1 1/2" - 10 1/2" BAR
5 1/2"x1/8"x1 1/2" - 10 1/2" BAR
BEVEL BOTH ENDS

SECTION D-D
(GRATE NOT SHOWN)

TC-U40
NOTE "A"

3 1/2"x1/8"x1 1/2" - 10 1/2" BAR

4"x3"x1/2"

SUPPORT BEAM
W8x31 (GALVANIZED)

3"x2"x2"x1/2" - 4 1/2" LONG
GALVANIZED AFTER WELDING

GRATING DETAIL

3/8" BEARING BAR - 3/16" RETICULAR BAR - 1/2" BAND BAR

INLET     | DIMENSIONS
--------- |-----------
NR        | 3 1/2"x3 1/2" 2"x5 1/2" 1 1/2"x2 1/2"
NRM       | 5"x5 1/2" 2"x5 1/2" 3"x3 1/2"

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD NR & NRM INLET FRAME & GRATE

STANDARD NO. MD 374.13
LEAVE 4"x4" OPENINGS FOR SUBGRADE DRAINAGE IF DIRECTED

SUPPORT BEAM

FACE OF TYPE A CURB

TOP OF CURB

CURB JOINT WITH 1/8"
EXPANSION MATERIAL

ANCHOR BOLT 4 PER FRAME
(FOR DETAILS SEE STD. MD 374.12)

SECTION A-A

BRICK OR CONCRETE CHANNEL TO SLOPE AT LEAST 2" PER FOOT TOWARD OUTLET
SEE NOTE 4

SECTION B-B

SPECIAL PRECAST CURB (SEE DETAIL B-B)

NORMAL PAVEMENT SLOPE

W8x31 (GALVANIZED)
SUPPORT BEAM 3'-4 1/2" LONG
FOR DETAILS SEE STD. MD 374.13
FOR METHOD OF ANCHORING
SEE STD. MD 374.15
FOR CONSTRUCTED BRICK
SEE STD. MD 374.15
FOR INLET REPAIR ONLY

DETAIL B-B

CONCRETE, SEE S.H.A.
SPECIFICATIONS

PRECAST CURB

NO. 6 DEFORMED BAR, STRAIGHT

NO. 4 DEFORMED BARS, 8" C/C, BENT THUS = ALL OTHER BARS, NO. 4 DEFORMED BARS, 8" C/C STRAIGHT.

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE S.H.A. LATEST SPECIFICATIONS FOR INLETS.
4. FOR INLETS 1'-0" OR LESS, WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3" COVER. FOR INLETS 1'-0" TO 15'-0", WALL REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE WALLS WITH 2" COVER.
5. FOR INLETS 15'-0" OR LESS, BASE SHALL BE 6 1/2" THICK. BASE REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING Rigid PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. BRICK FOR MASONRY TO COMPLY WITH THE S.H.A. SPECIFICATION.
8. FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE.
9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
10. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHO LRFD BRIDGE DESIGN SPECIFICATIONS AND TO A MAXIMUM DEPTH OF 15'-0".

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD NR INLET

STANDARD NO. MD 374.14
METHOD OF ANCHORING SUPPORT BEAM IF INLET IS CONSTRUCTED OF BRICK (THIS DETAIL TO BE USED FOR INLET REPAIR ONLY)

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.
4. FOR INLETS 7'-0" OR LESS, WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3-1/2" COVER. FOR INLETS 7'-0" TO 15'-0" WALL REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE WALLS WITH 2" COVER.
5. FOR INLETS 15'-0" OR LESS, BASE SHALL BE MINIMUM OF 6" INCH. BASE REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
7. BRICK FOR MAS Nancy TO COMPLY WITH THE SHA SPECIFICATION.
8. FOR UNDEPRESSURED INLETS USE NORMAL PAVEMENT SLOPE.
9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
10. FROM THE CURB LINE/SIDWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND TO A MAXIMUM DEPTH OF 15'.
GENERAL NOTES

1. CONCRETE TO BE MIX NO.6 (4500 PSI).
2. WALL REINFORCING SHALL BE 2 LAYERS OF 4X4 - W6.0 X W6.0 WELDED WIRE FABRIC WITH 1 1/2" COVER FROM EACH SIDE. BASE REINFORCING SHALL BE 2 LAYERS OF 4X4 - W12.0 X W12.0 WELDED WIRE FABRIC WITH 1 1/2" COVER FROM EACH SIDE.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTIONS PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
8. MINIMUM DEPTH PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3 1/2", VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3 1/2".
9. FROM CURB LINE/SIDWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

THIS PORTION OF INLET SHALL BE PROVIDED IN THE FIELD AND SHALL BE CONSTRUCTED OF BRICK MASONS OR REINFORCED CONCRETE MIX NO.6.

BRICK FOR MASONS TO COMPLY WITH LATEST S.R.A. SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST WRM INLET

STANDARD NO. MD 374.22
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).

2. REINFORCING: WALLS - 2 LAYERS OF 4X4X-W4.0 X W4.0 WELDED WIRE FABRIC WITH 11.12" COVER FROM EACH SIDE; BASE - 2 LAYERS OF 4X4 - W5.0 X W5.0 WELDED WIRE FABRIC WITH 1/2" COVER FROM EACH SIDE.

3. THREAD PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.


5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION, AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.

6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.

7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD MD 383-91 AND MD 383-92 OR AS DIRECTED BY THE ENGINEER.

8. MINIMUM DEPTH PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

9. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST SINGLE WR INLET

STANDARD NO. MD 374.23
Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST NRM INLET

STANDARD NO.  MD 374.25
**NOTES**

1. **CONCRETE TO BE MIX NO. 6 (4500 PSI)**.
2. **REINFORCING: WALLS - 2 LAYERS OF 4X4-W8.5 X W8.5 WELDED WIRE FABRIC; BASE - 2 LAYERS OF 4X4 - W10.0 X W7.0 WELDED WIRE FABRIC.**
3. **THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.**
4. **GRADE AND SLOPE ADJUSTMENTS AND SUPPORT BEAM ANCHORAGE SHALL BE COMPLETED IN THE FIELD USING CONCRETE MIX NO.6.**  
   **GRADE AND SLOPE ADJUSTMENTS SHALL BE MIN. 2", MAX. 9".**
5. **PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND ELEVATIONS REFER TO THE CONSTRUCTION PLANS.**
6. **PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.**
7. **LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD 383.91 OR 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.**
8. **MINIMUM DEPTH PAYMENT PER EACH INLET INCLUDES DEPTHS UP TO 3'-0". VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 3'-0" INCLUDING ALL APPURTENANCES.**
9. **BASE UNIT WALLS MAY BE DESIGNED FOR H5-2S LOADING, ACCORDING TO AASHTO H5-2S BRIDGE DESIGN SPECIFICATIONS.**
10. **FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO H5-2S BRIDGE DESIGN SPECIFICATIONS.**

**SECTIONS A-A**

**BASE UNIT**

- **Provide 6" min. bedding of No. 57 aggregate on firm subgrade (by others).**

**B-B**

- **Provide 6" min. bedding of No. 57 aggregate on firm subgrade (by others).**

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**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**PRECAST TRIPLE WR INLET**

**STANDARD NO.**

**MD 374.26**
NOTES
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCING: WALLS - 2 LAYERS OF 4X4-B.5 X W8.5 WELDED WIRE FABRIC; BASE - 2 LAYERS OF 4X4 - M1.0 X W1.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRADE AND SLOPE ADJUSTMENTS AND SUPPORT BEAM ANCHORAGES SHALL BE COMPLETED IN THE FIELD USING CONCRETE MIX NO.6 GRADE AND SLOPE ADJUSTMENTS SHALL BE MIN. 2", MAX. 9".
5. PIPE OPENINGS SHALL BE PROVIDED AS REQUIRED, FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO THE CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
8. MINIMUM DEPTH PAYMENT PER EACH RUNG SHALL BE 3'-10" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE GRATE AT ITS HIGHEST POINT. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 3'-10" INCLUDING ALL APPURTENANCES.
9. BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.
10. FROM CURB LINE/SIDEWALK, INLET HAS BEEN DESIGNED FOR MS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

PLAN

FOR SECTION B-B SEE STD. MD 374.27-01

TOP OF GRATE
CURB JOINTS WITH 1/4" EXPANSION MATERIAL
5" ø 8 ANCHOR BOLT, 4 PER FRAME
SEE FRAME ANCHORAGE DETAIL ON STANDARD MD 374.09

2-W8 X 31 GALVANIZED SUPPORT BEAMS 6'-7" LONG ANCHORED WITH CONCRETE SEE NOTE 4

JOINT SEALER AASHTO M 198 TYPE B (APPLIED TO KEYWAY)
SEE NOTE 2

BOTTOM OF BASE UNIT
PROVIDE 6" MIN. BEDDING OF NO. 57 AGGREGATE ON FIRM SUBGRADE (BY OTHERS)

LAP SPlice REINFORCEMENT 1'-0" (TYP.) AROUND OUTSIDE CORNERS AS SHOWN (MONOLITHIC BASE ONLY)

SECTION A-A

SPECIFICATION
305

CATEGORY CODE ITEMS

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST TRIPLE WRM INLET

STANDARD NO. MD 374.27
**Type B Precast Concrete Slab**

- Specification: 305
- Category Code Items
- Approved by Office of Highway Development
  - Approval: 2-22-91
  - Revised: 10-7-14

**Type C Precast Concrete Slab**

- Specification: 305
- Category Code Items
- Approved by Office of Highway Development
  - Approval: 1-2-91
  - Revised: 9-29-14

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**Note**

- Type 'B' slab shall be used with std. Type 'B' conc. curb.
- Type 'C' slab shall be used with std. Type 'C' conc. curb.
- For standard curb details see std. MD 620.02.

---

**Grate Slope Same As Gutter Pan**

- Top of Grate
- Vertical Walls
- Keyed Joint
- Riser Unit
- Base Unit

---

**Reinforcement No. 4 Bars At 4" C/C 2 Ways**

- Type 'B' or 'C' conc. slab see details

---

**Provide 6" Min. Bedding Of No. 57 Aggregate On Firm Subgrade (By Others)**

---

**Section B-B**

---

**Base**

- The base may be cast monolithic with the base unit or jointed per the manufacturer's design

**Lap Splice Reinforcement 1'-0" (Typ.) Around Outside Corners As Shown (Monolithic Base Only)**
CONCRETE SLAB

SLAB ELEVATION

SECTION C-C

3" RUSTPROOF PIPES
1'-0" LONG WITH FLANGE
AT EACH END. FILL PIPES WITH CONCRETE.

PLAN

SHOW WITHOUT CONC. SLAB

SECTION A-A

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2
   (3,000 PSI).

2. SIZE, TYPE, AND DIRECTION OF INLET
   CONNECTION WILL VARY TO SUIT
   CONDITIONS.

3. SEE SHA LATEST SPECIFICATIONS FOR
   INLETS.

4. CURB OPENING SHOULD NOT ENCROACH
   ON CROSSWALK AREAS.

5. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL
   BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C. TWO WAYS,
   AND HAVE 3" OVERHANG WHEN "A" IS GREATER THAN 7'-0" AND
   LESS THAN THE 15'-0", WALL REINFORCEMENT TO BE TWO
   LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C. TWO WAYS. ON
   INSIDE AND OUTSIDE OF WALL WITH 2" COVER.

6. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED
   BARS @ 6" C/C. TWO WAYS. WITH 2" COVER FROM TOP OF BASE.

7. PLACE EXPANSION MATERIAL (SAME TYPE APPROVED
   FOR PAYMENT) AS INDICATED

8. ANGLES AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE
   WITH ASTM A413 AFTER WELDING

9. INLET DEPTH MUST BE INCREASED WHEN PIPES LARGER THAN
   18" ARE USED UNDER THE TROUGH SECTION.

10. LADDER RUNGS SHALL BE IN ACCORDANCE WITH MD MD 383.91
    AND MD 383.93 OR AS DIRECTED BY THE ENGINEER.

11. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR
    HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE
    DESIGN SPECIFICATIONS FOR A MAXIMUM DEPTH OF 15'-0". * THIS DIMENSION TO BE MAINTAINED
    FOR ALL STANDARD COG INLETS

SPECIFICATION

305

CATEGORY CODE ITEMS

APPROVED

STATE HIGHWAY ADMINISTRATION

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD COG INLETS

5', 10', 15' & 20'

STANDARD NO.

MD 374.31

Maryland Department of Transportation
CONCRETE SLAB

STANDARD TYPE 'C' FRAME & COVER SEE STANDARD MD-383.61

ALL REINFORCEMENT TO BE #4 DIAMETER DEFORMED BARS 4" C/C 2 WAYS 2" COVER EXCEPT AS NOTED.

SLAB ELEVATION

5" x 1/2" ANCHOR BOLTS, SPACED 9 3/8" MAX., GALVANIZED AFTER WELDING

SECTION C-C

3" RUSTPROOF PIPES 1'-0" LONG WITH FLANGE AT EACH END. FILL PIPES WITH CONCRETE.

SECTION A-A

Provide 6" WIDE GRANULAR BANDING ON FORM SURFACE (BY OTHERS)

SEE NOTE 5

NORMAL ROADWAY SLOPE

SECTION B-B

INLET 4'-3/4" 5'-0/2" 5'-0/2" 5'-0/2" 5'-0/2"

SECTION B-B

THIS STANDARD TO BE USED WITH TYPE B CURB ONLY

INLET "L" "L" "L" 15'-8/2" 17'-11/2"

센터 justified

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2
   (3,000 PSI).
2. SIZE TYPE AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLTS.
4. CURB OPENING SHOULD NOT ENCROACH ON CROSSTRAKE AREAS
5. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS #6 C/C 2 WAYS AND HAVE 3" COVER. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS #6 C/C 2 WAYS 2" ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.
6. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS #6 C/C 2 WAYS WITH 2" COVER FROM TOP OF BASE.
7. PLACE EXPANSION MATERIAL (SAME TYPE APPROVED FOR PAYMENTS) AS INDICATED.
8. ANGLES AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A123 AFTER WELDING.
9. INLET DEPTH MUST BE INCREASED WHEN PIPES LARGER THAN 18" AND USED UNDER THE TROUGH SECTION.
10. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
11. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR H-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR A MAXIMUM DEPTH OF 15'-0"

* THIS DIMENSION TO BE MAINTAINED FOR ALL STANDARD COS INLETS.

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD COS INLETS
5' & 15'

STANDARD NO. MD 374.41
GENERAL NOTES

1. THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.

2. CURB OPENINGS SHALL NOT ENCROACH ON CROSSWALK AREAS.

3. CONCRETE SHALL BE MIX NO. 6 (4500 PSI) FOR PRECAST UNITS AND MIX NO. 3 (3500 PSI) FOR STRUCTURES CAST IN PLACE.

4. INLET MAY BE PRECAST OR CAST IN PLACE. ON WALLS, REINFORCEMENT SHALL BE AS SHOWN ON STD MD 351.52-01 TABLE WITH 1/2" COVER FOR WELDED WIRE FABRIC (PRECAST) OR 2" COVER FOR DEFORMED BARS (CAST IN PLACE). ON BASE, REINFORCEMENT SHALL BE AS SHOWN ON MD STD. 374.51-01 TABLE WITH 1/2" COVER (PRECAST) AND 2" COVER (CAST IN PLACE) FROM TOP OF BASE.

5. A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT TOWARD THE OUTLET SHALL BE PROVIDED IN THE FIELD.

6. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.

7. SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1:5:1 OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.

8. PRECAST INLET JOINTS - THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATER-TIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AAASHO APPROVED SEALANT.

9. LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" CYCLE TYPE SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.

10. ANGLE IRON AND SHARP STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123, SEE STD. MD 374.55 & MD 374.64.

11. SEE STANDARD MD 374.65 FOR DEPRESSED GUTTER PAN.

12. SEE STANDARD MD 374.64 FOR ALTERNATE PRECAST COG TROUGHS.

13. PAY MEASUREMENTS FOR CAST IN PLACE UNIT SHALL BE THE SAME AS THE PRECAST UNIT. REFER TO NOTE 14. ALL OTHER DIMENSIONS SHOWN FOR PRECAST SHALL APPLY TO CAST IN PLACE.

14. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6'-0" MEASURED FROM THE PIPE INLET TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6'-0" INCLUDING ALL APPURTENANCES.

15. PRECAST BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.

16. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AAASHO LRFD BRIDGE DESIGN SPECIFICATIONS.

17. SEE STD MD 374.51-01 FOR PIPE / PRECAST DIMENSIONS TABLE.

18. SEE NOTE 11 INTERLOCKING BLOCKOUT SEE STD. MD 374.55.

19. LADDER RUNGS SEE NOTE 9 BASE UNIT SEE NOTE 9.

20. PROVIDE 6" MIN. BEDDING OF NO. 57 AGGREGATE ON FIRM SUBGRADE (BY OTHERS).

21. BOTTOM OF BASE UNIT SEE NOTE 5.

SECTION A-A (SHOWN AS PRECAST)

SECTION B-B (SHOWN AS PRECAST)

SPECIFICATION

305

CATEGORY CODE ITEMS

APPROVED

DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT

SHA
State Highway Administration

STATE HIGHWAY ADMINISTRATION

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST OR CAST IN PLACE

SQUARE AND RECTANGULAR COG INLETS

5', 10', 15' & 20'

STANDARD NO.

MD 374.51
<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>MIN. TO MAX.</th>
<th>W</th>
<th>A'</th>
<th>P</th>
<th>Y</th>
<th>H1</th>
<th>BASE</th>
<th>H2</th>
<th>RISER</th>
<th>WALL REINFORCING</th>
<th>CAST IN PLACE/ PRECAST DIMENSIONS</th>
<th>BASE REINFORCING</th>
<th>PRECAST MIN.</th>
<th>CAST IN PLACE/ PRECAST</th>
<th>BASE DENSITY</th>
<th>PRECAST MIN.</th>
<th>MIN. DISTANCE (ft)</th>
<th>Top of Curb - Pipe Invert</th>
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</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>4&quot; - 0'</td>
<td>4'-0&quot;</td>
<td>2' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
<td>4x4, W15.0xW7.0</td>
<td>3.84</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>24&quot; - 24&quot;</td>
<td>4&quot; - 0'</td>
<td>4'-0&quot;</td>
<td>3' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
<td>4x4, W15.0xW7.0</td>
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<tr>
<td>36&quot;</td>
<td>4&quot; - 0'</td>
<td>4'-0&quot;</td>
<td>4' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
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<td>48&quot; - 54&quot;</td>
<td>4&quot; - 0'</td>
<td>4'-0&quot;</td>
<td>5' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
<td>4x4, W15.0xW7.0</td>
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<tr>
<td>60&quot;</td>
<td>4&quot; - 0'</td>
<td>4'-0&quot;</td>
<td>6' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
<td>4x4, W15.0xW7.0</td>
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<td>72&quot; - 72&quot;</td>
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<td>4'-0&quot;</td>
<td>7' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
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<td>84&quot;</td>
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<td>8' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
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<td>7.5&quot;</td>
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<td>90&quot;</td>
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<td>4'-0&quot;</td>
<td>9' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
<td>4x4, W15.0xW7.0</td>
<td>8.71</td>
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<tr>
<td>102&quot;</td>
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<td>4'-0&quot;</td>
<td>10' to 10'</td>
<td>110 5'</td>
<td>6&quot;</td>
<td>NO. 4 @ 6&quot; C/C, 2 LAYERS</td>
<td>4x4, W15.0xW7.0</td>
<td>7.5&quot;</td>
<td>NO. 4@6&quot; C/C, 1 LAYER</td>
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</tbody>
</table>

**Notes:**
- Standards for highways and incidental structures.
- Precast or cast in place square and rectangular cog inlets.
- 5', 10', 15' & 20' standard.
**Precast Concrete Inlet Slab for Circular Cog & Cos Inlets**

*This dimension for the 96" and the 108" diameter inlets shall be the same as the wall thickness. See STD. MD 374.62 or MD 374.63.*

**Precast Concrete Inlet Slab for Square & Rectangular Cog & Cos Inlets (6" thick)**

See STD. MD 374.51 OR 375.61

**Precast Concrete Adjustment Collar for Square, Rectangular and Circular Inlets**

(Cast in 3", 6", & 9" thickness)

See STD. MD 374.51 OR MD 374.61

**Notes**

1. Concrete shall be mix No. 6 (4500 PSI).
2. Angle iron and shear stud connectors shall be galvanized after welding in accordance with ASTM A123.

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**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**PRECAST CONCRETE INLET SLABS AND ADJUSTMENT COLLARS FOR COG AND COS INLETS**

**STANDARD NO. MD 374.55**
**PRECAST CONCRETE INLET SLAB FOR CIRCULAR COG & COS INLETS**

* THIS DIMENSION FOR THE 96" AND THE 108" DIAMETER INLETS SHALL BE THE SAME AS THE WALL THICKNESS

SEE STD. MD 374.62 OR MD 374.63.

---

**PRECAST CONCRETE INLET SLAB FOR SQUARE & RECTANGULAR COG & COS INLETS**

(6" THICK)

SEE STD. MD 374.51 OR 375.61

---

**PRECAST CONCRETE ADJUSTMENT COLLAR**

FOR SQUARE, RECTANGULAR AND CIRCULAR INLETS

(CAST IN 3", 6", & 9" THICKNESS)

SEE STD. MD 374.51 OR MD 374.61

---

**NOTES**

1. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).

2. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 723.

---

**MARYLAND DEPARTMENT OF TRANSPORTATION**

**STATE HIGHWAY ADMINISTRATION**

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**PRECAST CONCRETE**

INLET SLABS AND ADJUSTMENT COLLARS FOR COG/COS INLETS TO ACCOMMODATE 6" CURB

**STANDARD No. MD 374.55-01**
NOTES

1. THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.
2. CURB OPENINGS SHALL NOT ENROCCH ON CROSSWALK AREAS.
3. CONCRETE SHALL BE MIX NO. 6 (4500 PSI) FOR PRECAST UNITS AND CONCRETE MIX NO. 3 (3500 PSI) FOR CAST IN PLACE UNITS.
4. INLET MAY BE PRECAST OR CAST IN PLACE. ON WALLS, REINFORCEMENT SHALL BE AS SHOWN ON TABLE 1, STANDARD MD 374.61.01, WITH 2" COVER FOR WELDED WIRE FABRIC (PRECAST) OR 2" COVER FOR DEFORMED BARS (CAST IN PLACE). ON BASE, REINFORCEMENT SHALL BE AS SHOWN ON STANDARD MD 374.61.01, WITH 1/2" COVER (PRECAST) AND 2" COVER (CAST IN PLACE) FROM TOP OF BASE.
5. A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT TOWARD THE OUTLET SHALL BE PROVIDED IN THE FIELD.
6. GRASE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
7. SLOPED TRough FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TRough FLOOR IS USED, ROUNCHEN PRECAST TRough FLOOR.
8. PRECAST INLET JOINTS - THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.
9. LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" C/C. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
10. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STD. MD 374.55 & MD 374.64.
11. SEE STANDARD MD 374.65 FOR DEPRESSED GUTTER PAN.
12. SEE STANDARD MD 374.64 FOR ALTERNATE PRECAST COS TRoughS.
13. PAY MEASUREMENTS FOR CAST IN PLACE UNIT SHALL BE THE SAME AS THE PRECAST UNIT. REFER TO NOTE 14. ALL OTHER DIMENSIONS SHOWN FOR PRECAST UNIT SHALL APPLY TO CAST IN PLACE UNIT.
14. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6"-2" AS MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TRough SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCEEDING 6"-2" INCLUDING ALL APPURTENANCES.
15. PRECAST BASE UNIT WALLS MAY TAPER PENS MANUFACTURER'S DESIGN.
16. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

SECTION A-A
(SHOWN AS PRECAST)

SPECIFICATION 305  CATEGORY CODE ITEMS
APPROVED

DIRECTION OF HIGHWAY DEVELOPMENT

SHA Approval

PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COS INLETS 5', 10', 15' & 20'

MARYLAND DEPARTMENT OF TRANSMISSION
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STATE HIGHWAY ADMINISTRATION

PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COS INLETS
5', 10', 15' & 20'

STANDARD NO. MD 374.61
<table>
<thead>
<tr>
<th>PIPE SIZE MIN. TO MAX.</th>
<th>CAST IN PLACE/PRECAST DIMENSIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WALL REINFORCEMENT</td>
</tr>
<tr>
<td></td>
<td>CAST IN PLACE</td>
</tr>
<tr>
<td>12&quot; 4'-0&quot; 4'-0&quot; 2'-10&quot; 1'-5&quot; 6 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 5.0x5.0</td>
</tr>
<tr>
<td>15&quot; - 24&quot; 4'-0&quot; 4'-0&quot; 3'-10&quot; 1'-7&quot; 6 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 5.0x5.0</td>
</tr>
<tr>
<td>27&quot; - 33&quot; 4'-0&quot; 4'-0&quot; 4'-10&quot; 1'-7&quot; 5 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 5.0x5.0</td>
</tr>
<tr>
<td>36&quot; 4'-0&quot; 4'-0&quot; 5'-0&quot; 1'-7&quot; 6 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 5.0x5.0</td>
</tr>
<tr>
<td>42&quot; 4'-0&quot; 6'-0&quot; 6'-0&quot; 5'-10&quot; 7 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 6.0x6.0</td>
</tr>
<tr>
<td>48&quot; - 54&quot; 4'-0&quot; 6'-0&quot; 6'-0&quot; 6'-10&quot; 7 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 6.0x6.0</td>
</tr>
<tr>
<td>60&quot; 4'-0&quot; 6'-0&quot; 7'-0&quot; 1'-7&quot; 7 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 6.0x6.0</td>
</tr>
<tr>
<td>66&quot; - 72&quot; 6'-0&quot; 8'-0&quot; 8'-0&quot; 1'-7&quot; 8.5 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 10.0x10.0</td>
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<tr>
<td>78&quot; - 84&quot; 6'-0&quot; 8'-0&quot; 9'-0&quot; 1'-7&quot; 8.5 4W 6&quot; C/C 2 LAYERS</td>
<td>4W, 10.0x10.0</td>
</tr>
</tbody>
</table>
NOTES
1. THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.
2. CURB OPENINGS SHALL NOT ENCROACH ON CROSSWALK AREAS.
3. CONCRETE SHALL BE MIX NO. 6 (4500 PSI) FOR PRECAST UNITS AND CONCRETE MIX NO. 3 (3500 PSI) FOR CAST IN PLACE UNITS.
4. INLET MAY BE PRECAST OR CAST IN PLACE, REINFORCEMENT SHALL BE EITHER WELDED WIRE FABRIC (PRECAST) OR REINFORCING BARS (CAST IN PLACE) AND SHALL CONFORM TO THE AREAS GIVEN UNDER IN THE CHART ON STD MD 374.62-01. WIRE REINFORCEMENT SHALL BE CENTERED AT THE MIDDLE OF THE WALL. BASE REINFORCEMENT SHALL HAVE 1/8" COVER (PRECAST) AND 2" COVER (CAST IN PLACE) FROM THE TOP OF THE BASE.
5. ANGLE IRON AND SNARE STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STD MD 374.55 & 374.64.
6. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND WARTOR.
7. A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT. TOWARD OUTLET SHALL BE PROVIDED IN THE FIELD.
8. PRECAST INLET JOINTS—THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING THE MANUFACTURERS RECOMMENDED ASTM OR AASTHO APPROVED SEALANT.
9. LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1'-3" C/C. RUNGS SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
10. SLOPED TROUGH FLOOR TO BE CONSTRUCTED IN THE FIELD USING BRICK OR CONCRETE AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ADUGNE PRECAST TROUGH FLOOR.
11. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6'-2" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6'-2" INCLUDING ALL APPURTENANCES.
12. INLET SLAB NOT REQUIRED FOR 36" DIAMETER INLET. TROUGH SITS DIRECTLY ON TOP OF THE CIRCULAR UNIT. WARTOR AREA BETWEEN THE OUTSIDE WALLS OF THE TROUGH AND THE UNIT WALL.
13. SEE STD. MD 374.64 FOR ALTERNATE PRECAST CGG TROUGHS AND STD. MD 374.65 FOR DEPRESSED GUTTER PAN DETAILS.
14. BASE UNIT WALLS MAY TAPER PER MANUFACTURER'S DESIGN.
15. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST
IN PLACE CIRCULAR CGG INLETS
5’, 10’, 15’, & 20’

STANDARD NO. MD 374.62
<table>
<thead>
<tr>
<th>PIPE SIZE MIN TO MAX</th>
<th>H1 BASE</th>
<th>H2 RISER</th>
<th>W</th>
<th>WALL AREA S/F FT2</th>
<th>MAX SPACING IN.</th>
<th>B</th>
<th>BASE AREA S/F FT2</th>
<th>MAX SPACING IN.</th>
<th>D</th>
<th>G</th>
<th>Min. Distance B.E. Top of curb-Pipe invert</th>
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</thead>
<tbody>
<tr>
<td>12&quot; 2' TO 4' 1' TO 4'</td>
<td>4&quot;</td>
<td>.09</td>
<td>12&quot;</td>
<td>6.5&quot;</td>
<td>.15</td>
<td>6&quot;</td>
<td>36&quot;</td>
<td>NOT REG.</td>
<td>3.84</td>
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<tr>
<td>15&quot; TO 24&quot; 3' TO 5' 1' TO 5'</td>
<td>5&quot;</td>
<td>.12</td>
<td>12&quot;</td>
<td>6.5&quot;</td>
<td>.18</td>
<td>6&quot;</td>
<td>48&quot;</td>
<td>4.11-4.92</td>
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<td></td>
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</tr>
<tr>
<td>27&quot; TO 33&quot; 3' TO 6' 1' TO 6'</td>
<td>6&quot;</td>
<td>.15</td>
<td>12&quot;</td>
<td>6.5&quot;</td>
<td>.27</td>
<td>6&quot;</td>
<td>60&quot;</td>
<td>5.19-5.73</td>
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<tr>
<td>36&quot; 5' TO 6' 1' TO 6'</td>
<td>6&quot;</td>
<td>.15</td>
<td>12&quot;</td>
<td>6.5&quot;</td>
<td>.27</td>
<td>6&quot;</td>
<td>60&quot;</td>
<td>6.00</td>
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<tr>
<td>42&quot; 5' TO 7' 1' TO 7'</td>
<td>7&quot;</td>
<td>.18</td>
<td>11&quot;</td>
<td>7.5&quot;</td>
<td>.30</td>
<td>6&quot;</td>
<td>72&quot;</td>
<td>6.55</td>
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<td>48&quot; 6' TO 7' 1' TO 7'</td>
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<td>.18</td>
<td>11&quot;</td>
<td>7.5&quot;</td>
<td>.30</td>
<td>6&quot;</td>
<td>72&quot;</td>
<td>7.09</td>
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<tr>
<td>54&quot; 6' TO 8' 1' TO 8'</td>
<td>8&quot;</td>
<td>.21</td>
<td>8&quot;</td>
<td>9.5&quot;</td>
<td>.36</td>
<td>6&quot;</td>
<td>84&quot;</td>
<td>7.63</td>
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<tr>
<td>60&quot; 7' TO 8' 1' TO 8'</td>
<td>8&quot;</td>
<td>.21</td>
<td>8&quot;</td>
<td>9.5&quot;</td>
<td>.36</td>
<td>6&quot;</td>
<td>84&quot;</td>
<td>8.17</td>
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<tr>
<td>66&quot; TO 72&quot; 8' TO 9' 1' TO 8'</td>
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<td>.24</td>
<td>7&quot;</td>
<td>9.5&quot;</td>
<td>.40</td>
<td>6&quot;</td>
<td>96&quot;</td>
<td>8.71-9.25</td>
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<tr>
<td>78&quot; TO 84&quot; 9' TO 10' 1' TO 8'</td>
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<td>.27</td>
<td>4&quot;</td>
<td>12.5&quot;</td>
<td>.40</td>
<td>6&quot;</td>
<td>120&quot;</td>
<td>9.80-10.34</td>
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<td></td>
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</tr>
</tbody>
</table>
NOTES

1. THIS STANDARD TO BE USED WITH TYPE A COMBINATION CURB AND GUTTER ONLY.

2. CURB OPENING SHALL NOT ENTRAP IN CROSSWALK AREAS.

3. CONCRETE TO BE MIX NO. 6 (4500 PSI) FOR PRECAST UNITS AND CONCRETE MIX NO. 3 (3500 PSI) FOR STRUCTURES CAST IN PLACE.

4. INLET MAY BE PRECAST OR CAST IN PLACE. REINFORCEMENT SHALL BE EITHER WELDED WIRE FABRIC (PRECAST) OR REINFORCING BARS (CAST IN PLACE) AND SHALL CONFORM TO THE AREAS AND SPACING GIVEN IN THE TABLE ON STD MD 374.62-01. WALL REINFORCEMENT SHALL BE CENTERED AT THE MIDDLE OF THE WALL. BASE REINFORCEMENT SHALL HAVE 1/4" COVER (PRECAST) AND 2" COVER (CAST IN PLACE) FROM THE TOP OF THE BASE.

5. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING IN ACCORDANCE WITH ASTM A 123. SEE STD. MD 374.55 & 374.64.

6. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.

7. A CONCRETE OR BRICK CHANNEL WHICH SLOPES AT LEAST 2 IN./FT. TOWARD OUTLET SHALL BE PROVIDED IN THE FIELD.

8. PRECAST INLET JOINTS - THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE INSTALLER AND MADE WATERPROOF USING THE MANUFACTURER'S RECOMMENDED ASTM OR AASHTO APPROVED SEALANT.

9. LADDER RUNGS SHALL BE PLACED IN VERTICAL ALIGNMENT AT 1"-3" C/C RUNG TYPE SHALL BE IN ACCORDANCE WITH STD. MD 383.91 OR MD 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.

10. SLOPED TROUGH FLOOR TO BE CONSTRUCTED IN THE FIELD USING BRICK OR CONCRETE AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.

11. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 6"-2" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 6"-2" EXCLUDING ALL APPURTENANCES.

12. INLET SLAB NOT REQUIRED FOR 36" DIAMETER INLET. TROUGH SITS DIRECTLY ON THE TOP OF THE CIRCULAR UNIT. MORTAR AREA BETWEEN THE OUTSIDE WALLS OF THE TROUGH AND THE UNIT WALL.

13. SEE STD. MD 374.64 FOR ALTERNATE PRECAST COS TROUGHS AND STD. MD 374.65 FOR DEPRESSED GUTTER PAN DETAILS.

14. BASE UNIT WALLS TAPER PER MANUFACTURER'S DESIGN.

15. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST OR CAST IN PLACE
CIRCULAR COS INLETS
5', 10', 15', & 20'

STANDARD NO.  MD 374.63
ELEVATION
ALTERNATE C/O G TROUGH
(TROUGH FRONT NOT SHOWN)

SLOPED TROUGH FLOOR SEE NOTE 4

ELEVATION
ALTERNATE C/O G TROUGH
(TROUGH FRONT NOT SHOWN)

NOTES
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. ASTM A 185 GRADE 65 STEEL.
3. THESE TROUGHS MAY BE USED AS ALTERNATES FOR THOSE SHOWN ON
STANDARDS MD 374.51, MD 374.61, MD 374.62, & MD 374.63.
4. SLOPED TROUGH FLOOR TO BE CONSTRUCTED IN THE FIELD USING BRICK OR
CONCRETE AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED
TROUGH FLOOR IS USED, REPLACE THE PRECAST TROUGH FLOOR.
5. ANGLE IRON AND SHEAR STUD CONNECTORS SHALL BE GALVANIZED AFTER WELDING
IN ACCORDANCE WITH ASTM A 123.
6. WHEN USING THESE TROUGHS THE MINIMUM DEPTH PER EACH SHALL BE THE DEPTH
SPECIFIED FOR THE RESPECTIVE INLET.

SPECIFICATION
305

CATEGORY CODE ITEMS

APPROVED

STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

ALTERNATE PRECAST TROUGHS FOR
C/O G & COS INLETS

STANDARD NO. MD 374.64
ISOMETRIC

SECTION A-A
(SHOWN LOOKING TOWARD ROADWAY)

PLAN

DETAILS FOR CDD AND COS INLETS ARE SHOWN ON THE FOLLOWING STANDARDS
MD 374.51 PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR CDD INLETS 5", 10", 15", & 20"
MD 374.55 PRECAST CONCRETE TROUGH INLET SLABS AND ADJUSTMENT COLLAR FOR CDD AND COS INLETS
MD 374.61 PRECAST OR CAST IN PLACE SQUARE AND RECTANGULAR COS INLETS 5", 10", 15", & 20"
MD 374.62 PRECAST CIRCULAR CDD INLETS 5", 10", 15", & 20"
MD 374.63 PRECAST CIRCULAR COS INLETS 5", 10", 15", & 20"
MD 374.64 ALTERNATE PRECAST TROUGHS FOR CDD AND COS INLETS

NOTES
1. COST OF DEPRESSED CONCRETE GUTTER PAN IS INCIDENTAL TO THE COST OF THE INLET.
2. STANDARD TYPE A COMBINATION CURB AND GUTTER PAID FOR SEPARATELY.
GENERAL NOTES

1. SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.

2. CONCRETE SHALL BE MIX NO. 6.

3. FOR CAST IN PLACE INLET, REINFORCEMENT SHALL BE NO. 4 BARS AT 6" C/C. TWO WAYS, PLACED AT THE CENTER OF BOTH WALLS AND BASE. FOR PRECAST INLET, REINFORCEMENT SHALL BE TWO LAYERS OF 4X4" W4.0 X W4.0 WELDED WIRE FABRIC WITH 1/2" COVER AT WALLS AND TWO LAYERS OF 4X4" W5.0 X W5.0 WELDED WIRE FABRIC WITH 1/2" COVER AT BASE.

4. FOR MANHOLE FRAME AND COVER SEE MD 393.61.

5. MINIMUM DEPTH PAYMENT SHALL BE 3'-6" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT IN EXCESS OF 3'-6" IS NOT PERMITTED. USE OTHER STANDARDS IF ADDITIONAL VERTICAL DEPTH IS REQUIRED.

6. PIPE TO BE PAID FOR SEPARATELY.

7. FROM CURB LINE/SIDWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHO LRFD BRIDGE DESIGN SPECIFICATIONS.
NOTES

1. SLOPED TROUGH FLOOR TO BE CAST IN THE FIELD AND USED ONLY WHEN ROAD GRADE IS 1.5% OR LESS. WHEN SLOPED TROUGH FLOOR IS USED, ROUGHEN PRECAST TROUGH FLOOR.

2. CONCRETE SHALL BE MIX NO. 6.

3. FOR CAST IN PLACE INLET, REINFORCEMENT SHALL BE NO. 4 BARS AT 6" C/C, TWO WAYS, PLACED IN THE CENTER OF THE INLET WALLS AND BASE. FOR PRECAST INLETS, REINFORCEMENT SHALL BE TWO LAYERS OF 4X4- M5.0 X M5.0 WELDED WIRE FABRIC WITH 1/2" COVER AT WALLS AND TWO LAYERS OF 4X4- M5.0 X M5.0 WELDED WIRE FABRIC WITH 1/2" COVER AT BASE.

4. FOR MANHOLE FRAME AND COVER SEE MD 383.61.

5. MINIMUM DEPTH PAYMENT SHALL BE 3'-6" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE TROUGH SLAB. VERTICAL DEPTH PAYMENT IN EXCESS OF 3'-6" IS NOT PERMITTED. USE OTHER STANDARDS IF ADDITIONAL VERTICAL DEPTH IS REQUIRED.

6. PIPE TO BE PAID FOR SEPARATELY

7. FROM CURB LINE/SIDEWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
**NOTES**

1. CONCRETE TO BE MIX NO. 6 (4500 PS).
2. REINFORCING: WALLS - 2 LAYERS OF 4X4 - W6.0 X W6.0 WELDED WIRE FABRIC; BASE - 2 LAYERS OF 4X4 - W7.0 X W7.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO THE CONSTRUCTION PLANS.
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD MD 383.91 OR 383.92. RUNGS ARE INCIDENTAL TO THE COST OF THE INLET.
8. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 3'-6" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE GRATE AT ITS HIGHEST POINT. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 3'-6" INCLUDING ALL APPURPANCES.
9. CONCRETE OR BRICK INVERT TO BE PROVIDED IN THE FIELD AND SHALL SLOPE 2 IN./FT TOWARD OUTLET OR AS DIRECTED.
10. BASE WALLS UNIT MAY TAPER PER MANUFACTURER'S DESIGN.
11. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PS).  
2. REINFORCING: WELD 2 LAYERS OF 4X4 - 6.0 X 6.0 WELDED WIRE FABRIC; BASE - 2 LAYERS OF 4X4 - 10.0 X 10.0 WELDED WIRE FABRIC.  
3. THREAD INSERTS TO BE PROVIDED FOR HANDLING.  
4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6.  
5. PIPE OPENING TO BE PROVIDED AS REQUIRED.  
6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.  
7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD WD 383.51 & WD 383.52 OR AS DIRECTED BY THE ENGINEER.  
8. MINIMUM DEPTH PAYMENT PER "EACH", INCLUDES DEPTHS UP TO 3' - 6". VERTICAL DEPTH PAYMENT PER LINEAL FOOT FOR DEPTHS IN EXCESS OF 3' - 6".  
9. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO ASHTO LFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation  
STATE HIGHWAY ADMINISTRATION  
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES  
PRECAST STANDARD 
TYPE S COMBINATION INLET  
DOUBLE GRATE TANDEM  
STANDARD NO.  
MD 374.71
POSITION OF CURB IF REQUIRED TO BE PAID FOR PER LINEAR FOOT OF STANDARD CURB.

TOP OF PAVEMENT

SEE NOTE 4

LAP SPLICE TO MAKE REINFORCING CONTINUOUS AROUND OUTSIDE CORNERS

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).

2. REINFORCING WALLS - 2 LAYERS OF 4x4 - W4.0 W4.0 WELDED WIRE FABRIC B35 - 2 LAYERS OF 4x4 - W5.0 X W5.0 WELDED WIRE FABRIC

3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.

4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6.

5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.

6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.

7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD WD 383.91 AND WD 383.92 OR AS DIRECTED BY THE ENGINEER.

8. MINIMUM DEPTH PAYMENT PER EACH INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

9. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

PRECAST STANDARD
TYPE S INLET SINGLE GRATE

STANDARD NO. MD 374.73
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).

2. REINFORCING WALLS - 2 LAYERS OF 4x4 - W4.0x W4.0 WELDED WIRE FABRIC: BASE - TWO LAYERS OF 4x4 - W6.5 X W6.5 WELDED WIRE FABRIC.

3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.

4. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6.

5. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS.

6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE CONSTRUCTION PLANS.

7. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STANDARD NO. 383.91 AND NO. 383.93 OR AS DIRECTED BY THE ENGINEER.

8. MINIMUM DEPTH PAYMENT PER EACH INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

9. FROM CURB LINE/ SIDEWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

LAP SPLICE TO MAKE REINFORCING CONTINUOUS AROUND OUTSIDE CORNERS.

NORMAL PAVEMENT SLOPE - SEE NOTE 4

JOINT SEALER AASHTO M 198 TYPE B (APPLIED TO INSIDE EDGE ONLY).

INVERT TO BE CONCRETE OR BRICK SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED. (TO BE PROVIDED IN THE FIELD).
GENERAL NOTES:

1. CONCRETE SHALL BE MIX NO. 6.

2. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185. DEFORMED STEEL CONFORMS TO ASTM A615 GRADE 60.

3. OVERALL HEIGHT OF PRECAST IS ADJUSTABLE IN 6" INCREMENTS. FINAL GRADE ADJUSTMENT SHALL BE MADE BY CONTRACTOR WITH CONCRETE MIX NO. 6.

4. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.

5. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD. MD 383.09 AND STD. MD 383.90 OR AS DIRECTED BY THE ENGINEER.

6. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NEEDED ON THE CONSTRUCTION PLANS.

7. MINIMUM DEPTH PAYMENT PER "EACH" INLETS INCLUDES DEPTH UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".

8. CONCRETE OR BRICK INVERT TO BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARDS THE OUTLET OR AS DIRECTED.

9. REINFORCING: WALLS - 2 LAYERS OF 4X4 W4.0 X W4.0 WELDED WIRE FABRIC; BASE - 2 LAYERS OF 4X4 W5.0 X W5.0 WELDED WIRE FABRIC WITH 1/2" COVER (TYP).

10. FROM CURB LINE, INLET HAS BEEN DESIGNED FOR H5-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
GENERAL NOTES
1. MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
2. FINISH: NO PAINT
3. WEIGHT: FRAME 165 LBS., GRATE 164 LBS.
4. MANUFACTURER TO VERIFY THAT FRAME AND GRATE ARE DESIGNED FOR HS-25 LOADING.
5. LONG DIMENSION MUST BE PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.
GENERAL NOTES

1. MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
2. FINISH: NO PAINT
3. WEIGHT: FRAME 120 LBS, GRATE 190 LBS EACH
4. MANUFACTURER TO VERIFY THAT FRAME AND GRATE ARE DESIGNED FOR HS-25 LOADING.
5. LONG DIMENSION MUST BE PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD "ADA" COMPLIANT INLET
DOUBLE FRAME & GRATE

STANDARD NO. MD 374.86-01
GENERAL NOTES:

1. BRICK FOR MASONSARY TO COMPLY WITH THE LATEST SHA
   SPECIFICATIONS.

2. INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE
   MIX NO. 2 (3,000 PSI)

3. WHEN DEPTH IS LESS THAN 7'-0", WALL REINFORCEMENT
   SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6"
   C/C. TWO WAYS. AND HAVE 3" COVER ON INSIDE. WHEN
   DEPTH IS GREATER THAN 7'-0" AND LESS THAN 15'-0",
   WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4
   DEFORMED BARS @ 6" C/C. TWO WAYS. ON INSIDE AND
   OUTSIDE OF WALL WITH 2" COVER.

4. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4
   DEFORMED BARS @ 6" C/C. TWO WAYS, WITH 2" COVER
   FROM TOP OF BASE.

5. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR
   NS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE
   DESIGN SPECIFICATIONS AND FOR A MAXIMUM DEPTH OF
   15'-0".
SECTION A-A

NOTES
FRAME AND GRATE HAVE A RADIAL SEAT OF 52 7/8" RAD.
TOP OF FRAME ALSO HAS RADIUS OF 52 7/8" RAD.
TOP OF GRATE HAS FLAT SURFACES WHICH CLOSELY MATCH THE
RADIUS OF THE FRAME.

MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH: NOT PAINTED
FRAMES TO BE CASTING WITH FLANGE CUT,
AS SHOWN. WHEN INLET TO BE PLACED ADJACENT
TO CURB OPENING.
FOR FULL FLANGE/DETAILS, REFER TO THE
RESPECTIVE STANDARD PLATES FOR TYPE
"E" INLET

* CONTRACTOR IS RESPONSIBLE FOR CORRECT
ORIENTATION OF THE CV-GRATE TOWARD
THE DIRECTION OF FLOW.

SECTION B-B

MANUFACTURER TO VERIFY THAT FRAME AND GRATE ARE DESIGNED FOR HS-25 LOADING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

CURVED VANE GRATES WITH FRAME
FOR TYPE "E" INLET (E-CV)

STANDARD NO. MD 376.12-01
GENERAL NOTES

1. INLET SHALL BE CONSTRUCTED OF REINFORCED CONCRETE MIX NO. 2 (3,000 PSI).

2. WHEN DEPTH IS LESS THAN 7'-0". WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3" COVER ON INSIDE. WHEN DEPTH IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.

3. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.

4. FROM CURBLINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND FOR A MAXIMUM DEPTH OF 15'-0".

PLAN

(SHOWN WITHOUT TROUGH SLAB)

SECTION A-A

FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE. FOR DEPRESSED INLETS SEE STANDARD MD-374.65

FOR SPECIAL CURB SEE STANDARD MD-376.24

SECTION B-B

BRICK OR CONCRETE CHANNEL TO SLOPE AT LEAST 2" PER FOOT TOWARD OUTLET

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE E COMBINATION INLET

STANDARD NO. MD 376.21
PLAN

SECTION A-A

SECTION B-B

CAST IRON FRAME. APPROX. WEIGHT 653 LBS.

NOTE: MANUFACTURER TO VERIFY THAT FRAME IS DESIGNED FOR HS-25 LOADING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE E COMBINATION INLET
STANDARD CAST IRON FRAME

STANDARD NO. MD 376.22
RADIUS VARIES MIN. 3½"

TOP OF PAVEMENT

1" RADIUS FILLETS IN ALL CORNERS

SECTION B-B

NO. 6 DIAMETER DEFORMED BAR, STRAIGHT

NO. 4 DIAMETER DEFORMED BARS 8" C/C BENT THUS →
ALL OTHER BARS, NO. 4 DIAMETER DEFORMED BARS, 8" C/C STRAIGHT

SECTION A-A

NOTE: CONCRETE, S.H.A. FINISH, GRANOLITHIC APPROX., WEIGHT - 1200 LBS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD TYPE E COMBINATION INLET DETAIL OF SPECIAL CURB

STANDARD NO. MD 376.24
END STRAP DETAIL

5/8" SLOTTED HOLE TO RECEIVE 1/2" x 4" MACHINE BOLT (GALV.) IMBEDDED 3" IN CONC. WALL. NUT TO BE PLACED ON END OF BOLT AFTER GRATE IS INSTALLED.

PLAN

LONGITUDINAL DIRECTION OF GRATING

4 ANGLE CLIPS

2" x 2" x 1/4" x 21/2"

WELDED TO BOTTOM OF GRATING

END OR BINDING BARS

4 ANGULAR STEEL STRAPS BOLTED TO OUTSIDE BARS OF GRATE PRIOR TO SHIPPING.

SECTION A-A

ELEVATION

NOTES

1. THE CONCRETE VALLEY GUTTER TO BE USED IN CONNECTION WITH THIS INLET WILL BE WARPED FROM THE STANDARD SECTION TO MEET THE SECTION AT THE END OF THE INLET. THIS TRANSITION WILL TAKE PLACE WITH A DISTANCE OF TEN (10) FEET FROM THE INLET. GUTTER TO BE PAID FOR SEPARATELY.

2. PIPE OUTLETS AND GUTTER APPROACHES CAN BE REVISED TO MEET EXISTING CONDITIONS.

3. INLET MAY BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO.2) OR BRICK. CHAMFER INSIDE CORNER 1/2" x 1/2".

REINFORCEMENT NO.4 BARS @ 6" C/C. 2" COVER.

4. GRATINGS ARE SUBJECT TO APPROVAL FOR EACH JOB. ANY TYPE OF SUBSTANTIAL TRANSVERSE BARS MAY BE USED WHICH WILL SUPPORT A MINIMUM UNIFORM LOAD OF 50 LBS./SQA.FT.

5. TRANSVERSE BARS SHALL BE HELD RIGID BY SPACER BARS.

6. AREA TO BE MADE UP OF TWO EQUAL PANEDED WIDTHS, ARRANGED FOR BOLTING TOGETHER IN THE FIELD.

ALL MATERIAL TO BE HOT DIPPED GALVANIZED.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD SINGLE OR DOUBLE OPENING
TYPE K INLET OPEN-END GRATE
NON-TRAFFIC AREAS

STANDARD NO. MD 378.03
GENERAL NOTES

1. CONCRETE TO BE CONCRETE MIX NO. 2.
2. REINFORCEMENT TO BE NO. 4(1/2") @ DEFORMED BARS AT 6" C/C, 2" COVER.
3. GRATE TO BE OF STEEL CONSTRUCTION & SHALL BE SQUARE, FLAT & TRUE.
5. GRATE TO BE GALV. AFTER FABRICATION IN ACCORDANCE A.S.T.M. DESIGNATION A-123.
6. SEE LATEST S.H.A. SPECIFICATIONS.
7. INSTALL 4-1/4" @ CONCRETE EXPANSION ANCHORS WITH 4-1/4" HEX. HEAD BOLTS (GALV.)

PLAN

1/4" x 1/4" x 2'-10 1/4" PLATE (TYPICAL)
1/4" x 2 1/2" x 2 1/2" L (TYPICAL)
1/4" x 2" PLATE (TYPICAL)

SECTION C-C

PLAN GRADE

2'-10 1/4"
1/4"

SECTION A-A

DOUBLE OPENING

12" EXISTING INLET
5" L
12"

SECTION A-A

SINGLE OPENING

NOTE GRATE TO BE AS SHOWN OR FURNISH APPROVED EQUIVALENT
CONCRETE CURB TO BE PAID FOR SEPARATELY.

ISOMETRIC VIEW

SINGLE OPENING

ISOMETRIC VIEW

DOUBLE OPENING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE K INLET REPLACEMENT GRATE

STANDARD NO. MD 378.04
GENERAL NOTES
1. CONCRETE TO BE MIX NO. 2 (3300 PSI)
2. GRATE TO BE OF STEEL CONSTRUCTION & SHALL BE SQUARE, Flat & TRUE.
4. GRATE TO BE GALV. AFTER FABRICATION IN ACCORDANCE WITH ASTM. DESIGNATION A-123.
5. SEE LATEST S.N.A. SPECIFICATIONS.
6. THIS INLET IS TO BE USED IN MEDIAN DITCHES AND ANY DITCH BEYOND THE SHOULDER AREA. THIS INLET IS NOT TO BE USED IN ROADWAY OR SHOULDER PAVEMENT AREAS OR AREAS WHERE CYCLE OR MOTORCYCLE TRAFFIC IS ANTICIPATED.
7. WHEN DEPTH IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3" COVER ON INSIDE. WHEN DEPTH IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.
8. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
9. INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHO LRFD FOR MAXIMUM DEPTH OF 15'-0".

PLAN

SECTION A-A

NOTE: GRATE TO BE AS SHOWN OR FURNISH APPROVED EQUIVALENT.

SECTION B-B SINGLE OPENING

CONCRETE CUTTER TO BE PAID FOR SEPARATELY.

SECTION B-B DOUBLE OPENING

INVERT TO BE CONSTRUCTED OF BRICK OR CONC.

SECTION C-C

TYPICAL BOTH INLETS (SHOWN WITHOUT GRATE)

SEE NOTE 7

SIX "3'-6" NOTCH

1/2" PARAPING (FOR BRICK ONLY)

SIX "3'-6" NOTCH

1/2" PARAPING (FOR BRICK ONLY)

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
STANDARD SINGLE OR DOUBLE OPENING
TYPE K INLET OPEN - END GRATE

STANDARD NO. MD 378.05
PLAN

SECTION B-B

SECTION C-C

MATERIAL: CAST IRON (SEE LATEST S.H.A. SPECIFICATIONS).

AVERAGE WEIGHTS:
FRAME-270 ± LBS.
GRATE-340 ± LBS.

NOTE: MANUFACTURER TO VERIFY THAT FRAME IS DESIGNED FOR HS-25 LOADING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE K INLET
SINGLE FRAME AND GRATE

STANDARD NO. MD-378.06
CAST IRON FRAME & GRATES
SEE LATEST SHA SPECIFICATIONS

AVERAGE WEIGHTS
FRAME-CUT FLANGE-430 LBS. 1
FRAME-UNCUT=480 LBS. 1
GRATES-2=680 LBS. 1

AREA "H" DETAIL

PLAN

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

NOTE: MANUFACTURER TO VERIFY THAT FRAME IS DESIGNED FOR HS-25 LOADING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE K INLET
DOUBLE FRAME & GRATE

STANDARD NO. MD 378.07
GENERAL NOTES
1. CONCRETE TO BE MIX. NO. 6 (4500 P.S.I.)
2. REINFORCING WARES - 2 LAYERS OF 4X4-0X4.0 WELDED WIRE FABRIC; BASE - 2 LAYERS OF 4X4 - W5.0 X W5.0 WELDED WIRE FABRIC
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING
4. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO CONSTRUCTION PLANS
5. FOR GRATE DETAILS SEE STANDARD MD-378-05. GRATE TO BE AS SHOWN OR FURNISH APPROVED EQUIVALENT.
6. "MINIMUM DEPTH" PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6" - VERTICAL DEPTH PAYMENT PER "LINEAR FOOT" FOR DEPTHS IN EXCESS OF 3'-6".
7. THIS INLET IS TO BE USED IN MEDIANS DITCHES AND ANY DITCH BEYOND THE SHOULDER AREA. THIS INLET IS NOT TO BE USED IN ROADWAY OR SHOULDER PAVEMENT AREAS OR WHERE BICYCLE OR MOTORCYCLE TRAFFIC IS ANTICIPATED.
8. INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO ASHTOLRFD BRIDGE DESIGN SPECIFICATIONS

SECTION B-B SINGLE OPENING

SECTION B-B DOUBLE OPENING

DOUBLE OPENING (SHOWN WITHOUT GRATE)

SECTION C-C TYPICAL BOTH INLETS (SHOWN WITHOUT GRATE)

SINGLE OPENING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
PRECAST STANDARD
SINGLE OR DOUBLE OPENING
TYPE K INLET OPEN-END GRATE

STANDARD NO. MD 378.11
LEAVE 4"x4" OPENINGS FOR SUBGRADE DRAINAGE. IF DIRECTED.

FRAME AND GRATE FOR STANDARD CLASS 'S' INLET SEE STD. MD 379.02-01

SECTION B-B ADJACENT TO CURB

SECTION A-A ADJACENT TO CURB

FACE OF NORMAL CURB

NORMAL ROADWAY SLOPE

INLET CURB

CURB JOINT: 1/4" EXPA, MAT.

NORMAL CURB

SECTION B-B

SECTION A-A

BRICK OR CONCRETE CHANNEL TO SLOPE AT LEAST 2" PER FOOT TOWARD OUTLET.

NOTES
1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.
4. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3" COVER ON INSIDE. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN 15'-0" WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.
5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP.
6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND АБУТ'TING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.
8. FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE.
9. WHEN INLET IS USED ADJACENT TO CURB, SLOPE CURB FACE TO MEET INSIDE EDGE OF FRAME, AS SHOWN IN SECTION B-B, ADJACENT TO CURB.
10. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE S INLET
SINGLE GRATE

STANDARD NO. MD 379.01
NOTES:

CLASS 35B
FINISH: NO PAINT
WEIGHT (LBS): FRAME 163#, GRATE 295#

FRAMES TO BE CASTING WITH FLANGE CUT, AS SHOWN, WHEN INLET TO BE PLACED ADJACENT TO CURB OPENING FOR FULL FLANGE/DETAILS. REFER TO THE RESPECTIVE STANDARD PLATES FOR TYPE "S" INLET.

* CONTRACTOR IS RESPONSIBLE FOR CORRECT ORIENTATION OF THE CV-GRADE TOWARD THE DIRECTION OF FLOW.

NOTE: MANUFACTURER TO VERIFY THAT FRAME IS DESIGNED FOR HS-25 LOADING

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

CURVE VANE GRADE WITH FRAME
FOR SINGLE TYPE S INLET (S-CV)

STANDARD NO. MD 379.02-01
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.
4. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 3'-0" COVER ON INSIDE. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.
5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
6. PLACE 3/8" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. SLOPE FACE OF CURB TO MEET INSIDE EDGE OF FRAME AS SHOWN IN SECTION B-B.
8. STANDARD CLASS "S" INLET (DOUBLE GRADE TANDEM) MAY BE USED WITH ONE END ADJACENT TO CURB. FRAME WILL BE LAID ON NORMAL SLOPE OF ROADWAY UNLESS NOTED OTHERWISE.
9. ALL WALL, FRAME, AND GRATE DIMENSIONS SAME AS WHEN SIDE IS ADJACENT TO CURB AS SHOWN ON LEFT.
10. INLET MAY BE USED IN LOW SPOTS, WHICH ARE NOT ADJACENT TO CURB.
11. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-20 LOADING. ACCORDING TO AASHO LRFD BRIDGE DESIGN SPECIFICATIONS AND FOR A MAXIMUM DEPTH OF 15'-0".
SECTION B-B

GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INSERTS.
4. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C. TWICE THIS, AND HAVE 3/4" COVER ON INSIDE. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C. TWO WAYS ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.
5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.
8. FOR UNDEPRESSED INLETS USE NORMAL PAVEMENT SLOPE.
9. FOR METHOD OF ANCHORING BEAM, SEE STD. MD 380.01 IF INLET IS CONSTRUCTED OF BRICK. (FOR INLET REPAIR ONLY).
10. FROM THE CURB LINE, INLET HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND FOR A MAXIMUM DEPTH OF 15'-0".

SECTION A-A

ELEVATION

SPECIFICATION

305

CATEGORY CODE ITEMS

MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE S COMBINATION INLET
DOUBLE GRATE TANDEM

STANDARD NO. MD 379.04
NOTES:

CLASS 358
FINISH: NO PAINT
WEIGHT (MIN.): FRAME 152#, FRAME 152#, GRADE 295# EA.
FRAMES TO BE CASTING WITH FLANGE CUT, AS SHOWN. WHEN INLET TO BE PLACED ADJACENT TO CURB OPENING.
FOR FULL FLANGE/DETAILS, REFER TO THE RESPECTIVE STANDARD PLATES FOR TYPE "S" INLET.
* CONTRACTOR IS RESPONSIBLE FOR CORRECT ORIENTATION OF THE CV-GRADE TOWARD THE DIRECTION OF FLOW.
NOTE: MANUFACTURER TO VERIFY THAT FRAME AND GRADE IS DESIGNED FOR HS-25 LOADING.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

CURVE VANE GRATES WITH FRAME
FOR DOUBLE TYPE "S" INLET (S2-CV)

STANDARD NO. MD 379.05-01
GENERAL NOTES:
1. FRAMES & GRATES TO BE SQUARE, FLAT & TRUE.
2. STRUCTURAL STEEL SHALL BE A.S.T.M. DESIGNATION A-36.
3. FRAMES AND GRATES TO BE GALVANIZED AFTER FABRICATION
   IN ACCORDANCE WITH A.S.T.M. DESIGNATION A-123
4. APPROX. WEIGHTS:
   DOUBLE FRAME = 280#  DOUBLE GRATE = 520#
   SINGLE FRAME = 175#  SINGLE GRATE = 260#
5. SEE LATEST S.H.A. SPECIFICATIONS
6. NOT COMPATIBLE WITH BICYCLE.
7. GRATE AND FRAME HAVE BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
GENERAL NOTES

1. CONCRETE TO BE MIX NO. 2 (3,000 PSI).
2. SIZE, TYPE, AND DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS.
3. SEE SHA LATEST SPECIFICATIONS FOR INLETS.
4. WHEN "A" IS LESS THAN 7'-0", WALL REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, AND HAVE 4" COVER ON INSIDE. WHEN "A" IS GREATER THAN 7'-0" AND LESS THAN 15'-0", WALL REINFORCEMENT TO BE TWO LAYERS OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, ON INSIDE AND OUTSIDE OF WALL WITH 2" COVER.
5. BASE REINFORCEMENT SHALL BE ONE LAYER OF NO. 4 DEFORMED BARS @ 6" C/C, TWO WAYS, WITH 2" COVER FROM TOP OF BASE.
6. PLACE 1/4" EXPANSION MATERIAL OF THE SAME TYPE APPROVED FOR PAYMENT IN BETWEEN THE FRAME AND ABUTTING RIGID PAVEMENT AND BETWEEN ENDS OF INLET CURB AND NORMAL CURB.
7. BRICK FOR MASONRY TO COMPLY WITH THE SHA SPECIFICATION.
8. FOR UNDERESSED INLETS USE NORMAL PAVEMENT SLOPE.
9. LADDER RUNGS SHALL BE IN ACCORDANCE WITH STD MD 383.91 AND MD 383.92 OR AS DIRECTED BY THE ENGINEER.
10. FROM THE CURB LINE/SIDWALK, INLET HAS BEEN DESIGNED FOR HS-25 LOADING ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND FOR A MAXIMUM DEPTH OF 15'-0".

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD TYPE HS COMBINATION INLET

STANDARD NO. MD 380.01
NOTES

1. GRATING TO BE GALVANIZED.

2. INLET TO BE CONSTRUCTED OF CONCRETE (MIX NO. 2) OR BRICK. WHEN INLET IS CONSTRUCTED OF CONCRETE ALL REINFORCING IS TO BE NO. 4 DEFORMED BARS 6" C/C.

NOTE EXPANSION ANCHORS MAY BE USED INSTEAD OF BOLTS.

SECTION A-A

INVERT TO BE CONCRETE OR BRICK AND TO SLOPE AT LEAST 2" PER FOOT TOWARD OUTLET

DEPT AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER.

SECTION B-B

PIPE TYPE, SIZE, SLOPE & INVERT ELEVATION AS SHOWN ON THE PLANS
**GENERAL NOTES**

1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCING-2 LAYERS OF 4x4-4x0.0.6 W4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRATING SHALL BE STEEL "IRVING X-BAR TYPE AA" OR APPROVED EQUIVALENT. ALL MATERIAL TO BE HOT DIPPED GALV.
5. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONC. MIX NO. 6 OR BRICK AND MORTAR. MIN. ONE LAYER OF BRICK OR 3" OF CONCRETE.
6. PIPE OPENINGS TO BE PROVIDE AS REQUIRED, FOR SIZE, LOCATION AND INVERT ELEVATIONS REFER TO PLANS.
7. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE PLANS.
8. MINIMUM DEPTH PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6" MEASURED FROM THE PIPE INVERT TO THE TOP OF THE GRADE. VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".
9. INVERT TO BE CONCRETE OR BRICK AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER. (INVERT PROVIDED IN THE FIELD)

**NOTE** EXPANSION ANCHORS MAY BE USED INSTEAD OF BOLTS.

**SECTION A-A**

- PROVIDE 6" MIN. BEDDING OF NO.57 AGGREGATE ON FIRM SUBGRADE.
- LAP SPICE TO MAKE REINFORCEMENT CONTINUOUS AROUND OUTSIDE CORNER.
- SEE NOTE 5
- COVER TYP.
- RISER SECTION
- JOINT SEALER AASHTO M 198 TYPE B (APPLIED TO INSIDE EDGE ONLY)
- KEYED JOINT
- BASE SECTION

**SECTION B-B**

- 6'-6 1/4" Ø HEX. HEAD BOLTS 2" LONG
- SLOPE GROUND TOWARD INLET

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**PRECAST YARD INLET**

**STANDARD NO. MD 381.02**
NOTES

1. THIS MANHOLE IS FOR PIPES UP TO 36" DIAMETER.
2. MANHOLE SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIX NO. 2). BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.
3. BENCH HEIGHT ABOVE OUTGOING PIPE INVERT SHALL BE HALF THE DIAMETER OF THE PIPE.
4. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF THE 3'-1/2".
5. WALL REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C. 2 WAYS, AND HAVE 3-1/2" COVER.
6. BASE REINFORCEMENT SHALL BE NO. 4 BARS @ 6" C/C. 2 WAYS, AND HAVE 2" COVER FROM TOP OF BASE.
7. MANHOLE HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHO LRFD BRIDGE DESIGN SPECIFICATIONS.

SECTION A-A

REINFORCING TO BE NO. 7 DEFORMED BARS @ 6" C/C 2 WAYS, 2 COVER.
2'-0" DIA., OPENING FOR TYPE 'A' FRAME & COVER.
FOR DETAILS OF TYPE 'D' FRAME & COVER SEE STD. MD 383.61

SECTION C-C

CONCRETE SLAB
(CONTACT MIX NO. 2)
CONCRETE SLAB WITH TYPE 'D' FRAME & COVER (NON-TRAFFIC AREAS)
GRADE ADJUSTMENT TO BE CONC. MIX NO. 2
BRICK & MORTAR MAY BE USED IN NON-TRAFFIC AREAS.

SECTION B-B

LADDER RUNGS SEE STANDARD MD-383.91 OR MOD-383.92.
1/2" PARING (FOR BRICK ONLY)
BENCH HEIGHT

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
48" SQUARE
STANDARD SHALLOW MANHOLE

STANDARD NO. MD 383.00
GENERAL NOTES

1. WALL REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C. 2 WAYS, AND HAVE 3" COVER BELOW DEPTH OF 12'-0" AND 4" COVER TO DEPTH OF 24'-0".

2. BASE REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C. 2 WAYS, AND HAVE 2" COVER FROM TOP OF BASE.

3. MANHOLE HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

4. BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.

PLAN

MANHOLE WALL THICKNESS

8" TO DEPTH OF 12'-0"

12" BELOW DEPTH OF 12'-0"

TO DEPTH OF 24'-0"

MANHOLE BASE THICKNESS

8" WALL-USE 12" BASE

12" WALL-USE 15" BASE

BENCH HEIGHT ABOVE OUTGOING PIPE INVERT

STORM WATER 0.5 D

SANITARY 0.9 D

SECTION A-A

Cement Mortar Plaster 1/2" Thick (For Brick Only)

See Note 1

Channel Shall Be Concrete or Brick

Concrete or Brick on Edge 1/4" Fall Per Foot

Bench Height

SECTION B-B

Ladder Rungs
See Standard WD 383.91 or WD 383.92

WD 383.31

Type A Frame & Cover

See Note 1

State Highway Administration

Maryland Department of Transportation

State Highway Administration

Specifications for Highways and Incidental Structures

Standard Manhole

Standard No. MD 383.01
GRANITE DRIP STONES ARE PREFERABLE BUT IF NOT AVAILABLE SOME OTHER APPROVED TYPE MAY BE USED.
LOCATION OF DRIP STONES MAY BE ADJUSTED TO MEET THE REQUIREMENTS OF EACH CASE BUT NORMALLY SHALL BE 5" APART.

WALL THICKNESS
8" TO DEPTH OF 12'" O
13' BELOW DEPTH OF 12'" O
10' DEPTH OF 24'" O

BASE THICKNESS
6" WALL-USE 12" BASE
13" WALL-USE 16" BASE

1. WALL REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, 2 WAYS, AND HAVE 3" COVER BELOW DEPTH OF 12'" O AND 4½" COVER FROM TOP OF BASE.
2. BASE REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, 2 WAYS, AND HAVE 3" COVER FROM TOP OF BASE.
3. MANHOLE HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
4. BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD DROP MANHOLE

STANDARD NO. MD 383.11
NOTES

1. WALL REINFORCEMENT SHALL BE NO. 4 BARS @ 6" C/C, 2 WAYS, AND HAVE 3" COVER BELOW DEPTH OF 12'-0", 4" COVER TO DEPTH OF 24'-0", AND 6" COVER TO DEPTH OF 36'-0".

2. BASE REINFORCEMENT SHALL BE NO. 4 DEFORMED BARS @ 6" C/C, 2 WAYS, AND HAVE 2" COVER FROM TOP OF BASE.

3. CURBLINE MANHOLE HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

4. BRICK AND MORTAR MAY BE USED IN NON-TRAFFIC AREAS ONLY.

5. BENCH HEIGHT ABOVE OUTGOING PIPE INVERT SHALL BE HALF THE DIAMETER OF THE PIPE.

ELEVATION - SECTIONAL VIEW

STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD 4 FT. CIRCULAR MANHOLE
MAX. DEPTH 36 FT.

STANDARD NO. MD 383.21
SECTION A-A

MATERIAL - CAST IRON
APPROX. WEIGHT 250 LBS.

NOTE:
MANUFACTURER TO VERIFY THAT MANHOLE FRAME IS DESIGNED FOR NS-25 LOADING.
NOTE:
MANUFACTURER TO VERIFY THAT MANHOLE COVER IS DESIGNED FOR HS-25 LOADING.

MATERIAL - CAST IRON
APPROX. WEIGHT 170 LBS.
SECITON A-A

MATERIAL - Cast Iron
APPROX. WEIGHT OF FRAME 66 LBS.
APPROX. WEIGHT OF COVER 107 LBS.

NOTE:
MANUFACTURER TO VERIFY THAT FRAME AND COVER ARE DESIGNED FOR HS-25 LOADING
NOTES

Metal ladder rungs are to be used in inlets, manholes, and junction boxes over three feet in depth or as directed by the engineer. Used either with brick or concrete construction, whether brick construction is employed. The mortar joints shall be adjusted to accommodate ladder rungs. Metal ladder rungs may be comprised of one of the following:

1. Aluminum alloy shall conform to A.S.T.M. designation B 221 alloy 6061-T6. That portion embedded in the structure shall be coated with zinc chromate or approved equivalent coating.

2. Cast iron shall conform to A.S.T.M. A-48 class 30 B.

NOTES

1. TYPES A & B ARE TO BE DRIVEN INTO RECEPTACLES THAT ARE CAST INTO THE WALL.
2. TYPE C IS FOR BRICK AND BLOCK INSTALLATIONS.
3. TYPE D IS PRESS FITTED INTO PREFORMED CONCRETE HOLES.
4. LADDER RUNGS ARE TO BE USED IN INLETS, MANHOLES, AND JUNCTION BOXES OVER THREE FEET IN DEPTH OR AS DIRECTED BY THE ENGINEER. USED EITHER WITH BRICK OR CONCRETE CONSTRUCTION. (WHERE BRICK CONSTRUCTION IS EMPLOYED, THE MORTAR JOINTS SHALL BE ADJUSTED TO ACCOMMODATE LADDER RUNGS.)
5. COPOLYMER POLYPROPYLENE ENCAPSULATED 3/4 IN. DIA. STEEL REINFORCEMENT BAR. STEEL SHALL CONFORM TO ASTM 615 GRADE 60.
6. COPOLYMERS POLYPROPYLENE SHALL BE CERTIFIED BY THE MANUFACTURER TO CONFORM TO ASTM D 4101 AND HAVE A MINIMUM EXPOSED SECTION THICKNESS OF 3/8 IN.
7. SECTION A-A SHOWS 3/4 IN. DIA. STEEL REINFORCEMENT BAR.
8. INSTALLATION SHALL CONFORM TO MANUFACTURER’S RECOMMENDATIONS.
**ALTERNATE ECCENTRICAL CONE UNIT**

**FLAT SLAB TOP**

*SHOWN WITHOUT FRAME & COVER*

**NOTES**

1. MANHNOLLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
3. WALL REINFORCEMENT FOR BASE UNITS, RISER UNITS AND ECCENTRICAL CONE UNITS SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.12 IN²/FT AND MAXIMUM SPACING OF 12" FOR THE 48" DIAMETER MANHNOLLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 52. REINFORCEMENT SHALL MEET ASTM A 615, GRADE 60.
4. BASE REINFORCEMENT SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.20 IN²/FT AND A MAXIMUM SPACING OF 10" WITH 2" COVER FROM THE TOP OF BASE. THE BASE SHALL BE CAST MONOLITHIC WITH THE UNIT OR JOINTED PER THE MANUFACTURER'S DESIGN.
5. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERIGHT USING (WHERE APPLICABLE) WOOL, RUBBER O-RING GASKETS MEETING ASTM C 361 & C 443 OR FLEXIBLE PLASTIC GASKETS MEETING AASHTO M 198 TYPE B.
6. LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92. LADDER RUNGS SHALL BE INCIDENTAL TO THE COST OF THE MANHNOLLE.
7. WHEN THE DISTANCE BETWEEN MULTIPLE OPENINGS IN THE BASE UNIT OR ANY RISOR UNIT IS LESS THAN 6" ADDITIONAL NO. 3 BARS ARE REQUIRED AROUND OPENINGS.
8. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.
9. MIX NO. 2 CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.
10. THE DRIIP STONE LANDING SHALL BE USED ONLY WHERE THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STD. MD 384.13 FOR DETAILS.
11. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 9'-0" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE MANHNOLLE COVER. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 9'-0". THE COST OF THE DRIIP STONE LANDING, NO. 3 AGGREGATE, CRUSHED SEALANT, AND ALL NECESSARY APPURTENANCES SHALL BE INCIDENTAL TO THE BASE BID.
12. MANHNOLLE HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

**SECTION VIEW**

*SHOWN WITHOUT FRAME & COVER*

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**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**48" DIAMETER PRECAST MANHNOLLE**

FOR 12" TO 24" PIPES

**STANDARD NO.** MD 384.01
3/8" @ HEX HEAD BOLTS WITH THREADED INSERTS OR 3/8" THREADED STUDS WITH HEX HEAD NUTS. STUDS TO BE GROUTED IN PLACE OR ANCHORED WITH A CONCRETE COMPATIBLE CHEMICAL ADHESIVE.

1-1/8" @ HOLES FIELD DRILLED THROUGH FRAME

TYPE A MANHOLE FRAME AND COVER SEE STD. MD 383.31 & MD 383.32

GRADE ADJUSTMENT VARIES 4" TYP.

ECCENTRICAL CONE UNIT, ALTERNATE ECCENTRICAL CONE UNIT OR FLAT SLAB TOP (SHOWN IS THE ECCENTRICAL CONE UNIT)

SECTION A-A
ECCENTRICAL CONE REDUCER
(ALTERNATIVE FOR FLAT TOP REDUCER)

SECTION A-A

NOTES
1. MANHOLE SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.
2. CONCRETE SHALL BE MIX NO. 6 (500PSI).  
3. ALL REINFORCEMENT FOR BASE UNITS, RISER UNITS AND ECCENTRICAL CONE UNITS SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.15 IN²/FT AND MAXIMUM SPACING OF 9" FOR THE 60" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 52. REINFORCEMENT SHALL MEET ASTM A 615, GRADE 60.
4. BASE REINFORCEMENT SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.27 IN²/FT AND A MAXIMUM SPACING OF 6" WITH 2" COVER FROM THE TOP OF BASE. THE BASE SHALL BE CAST MONOLITHIC WITH THE UNIT OR JOINTED PER THE MANUFACTURER'S DESIGN.
6. LADDER RUNS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR 383.92. LADDER RUNS SHALL BE INCIDENTAL TO THE COST OF THE MANHOLE.
7. WHEN THE DISTANCE BETWEEN MULTIPLE OPENINGS IN THE BASE UNIT OR ANY RISER UNIT IS LESS THAN 6" ADDITIONAL NO.3 BARS ARE REQUIRED AROUND OPENINGS.
8. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.
9. MIX NO. 2 CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.
10. THE DRAIN STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNIT. SEE STD. MD 384.13 FOR DETAILS.
11. MINIMUM DEPTH OF PAYMENT PER EACH SHALL BE 9'-0" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE MANHOLE COVER. DEPTH OF PAYMENT PER LINEAL FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 9'-0". THE COST OF THE DRAIN STONE LANDING, NO.57 AGGREGATE, GROUT, SEALANT, AND ALL NECESSARY APPURTENANCES SHALL BE INCIDENTAL TO THE PRICE BD.
12. MANHOLE HAS BEEN DESIGNED FOR HS-25 LOADIN, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

60" DIAMETER PRECAST MANHOLE
FOR 27" TO 36" PIPES

STANDARD NO. MD 384.03


**Eccentric Cone Reducer**

(Alternate for Flattop Reducer)

**Frame Anchorage**

See Std. MD 384.02

**Ladder Rungs**

See Note 6

**Joints**

See Note 5

**Wall Reinforcement**

See Note 3

**Channel**

See Note 9

**Concrete or Brick on Edge**

1/4" Fall Per Foot

**Additional No. 3 Bars**

See Note 7

**Base & Base Reinforcement**

See Note 4

**Provide 6" Min. Bedding of No. 57 Aggregate on Firm Subgrade**

**SECTION VIEW**

**Notes**

1. Manholes shall be constructed in accordance with AASHTO M 199.

2. Concrete shall have a minimum compressive strength of 4500 psi.

3. Wall reinforcement for base units. Riser units and eccentric cone units shall be reinforced with bars or welded wire fabric with a minimum area of 0.18 in²/ft and maximum spacing of 6" for the 72" diameter manholes. Welded wire fabric shall conform to ASTM A 185 and A 52. Reinforcement shall meet ASTM A 615 or ASTM A 706, Grade 60.

4. Base reinforcement shall be reinforced bars or welded wire fabric with a minimum area of 0.27 in²/ft and a maximum spacing of 4" with 2" covered for the top of base. The base shall be cast monolithic with the base unit or jointed per manufacturer's design.

5. The manufacturer shall form male and female ends of joints using their own design. The joints shall be sealed by the contractor and made watertight using (where applicable) mortar, rubber O-ring gaskets meeting ASTM C 361 or C 443 or flexible plastic gaskets meeting AASHTO M 199. Type B.

6. Ladder rungs shall be installed in vertical alignment at 1"-4" maximum C.C. Types shall be in accordance with standards MD 383.91 or 383.92. Ladder rungs shall be incidental to the cost of the manhole.

7. When the distance between the multiple openings in the base unit or in any riser unit is less than 6" additional No. 3 bars are required around openings.

8. Lift holes or lift eyes shall be provided in each section for handling.

9. Mix No. 2 concrete or brick chimney shall be provided in the field and shall slope 2" per foot toward outlet or as directed by the engineer.

10. The drip stone landing shall be used only when there are pipes connected to the riser units. See Std. MD 384.13 for details.

11. Minimum depth payment per each shall be 9'-0" measured from the bottom of the base unit to the top of the manhole cover. Vertical depth payment per linear foot shall include all depths in excess of 9'-0". The cost of the drip stone landing, No. 57 aggregate, grout, sealant, and all necessary appurtenances shall be incidental to the price bid.

12. Manhole has been designed for 45-25 loading, according to AASHTO LFGC bridge design specifications.

**SPECIFICATION**

305

**CATEGORY CODE ITEMS**

**APPROVED**

**DIRECTOR - OFFICE OF HIGHWAY DEVELOPMENT**

**SHA**

**State Highway Administration**

**APPROVAL**

**SHA**

**Revisions**

**FEDERAL HIGHWAY ADMINISTRATION**

**APPROVAL**

**Revised**

**Standard No.**

MD 384.05
1. Manholes shall be constructed in accordance with AASHTO M 199.

2. Concrete shall be mix No. 6 (4500 psi).

3. Wall reinforcement for base units, riser units and eccentric core units shall be reinforcement bars or welded wire fabric with a minimum area of 0.21 in²/ft and maximum spacing of 5" for the 84" diameter manholes. Welded wire fabric shall conform to ASTM A 185 and A 92. Reinforcement shall meet ASTM A 615, Grade 60.

4. Base reinforcement shall be reinforcement bars or welded wire fabric with a minimum area of 0.45 in²/ft and a maximum spacing of 4" with 2" cover from the top of base. The base shall be cast monolithic with the unit or jointed per the manufacturer's design.

5. The manufacturer shall form male and female ends of joints using their own design. The joints shall be sealed by the contractor and made watertight using (where applicable) mortar, rubber O-ring gaskets meeting ASTM C 351 and C 443 or flexible plastic gaskets meeting AASHTO M 198 Type B.

6. Ladder rungs shall be installed in vertical alignment at 1-4" maximum C/C. Rung types shall be in accordance with standards MD 385.91 or 385.92. Ladder rungs shall be incidental to the cost of the manhole.

7. When the distance between multiple pipe opening in the base unit or any riser unit is less than 6" additional No. 3 bars are required around openings.

8. Lift holes or lift eyes shall be approved in each section for handling.

9. Mix No. 2 concrete or brick channel shall be provided in the field and shall slope 2" per foot toward outlet or as directed by the engineer.

10. The drip stone landing shall be used only when there are pipes connected to the riser units. See STD. 384.13 for details.

11. Minimum depth payment per each shall be 10'-1" measured from the bottom of the base unit to the top of the manhole cover. Vertical depth payment per linear foot shall include all depths in excess of 10'-1". The cost of the drip stone landing, No. 57 aggregate, gravel, slag, and all necessary appurtenances shall be incidental to the price bid.

12. Manhole has been designed for HS-25 loading. According to AASHTO LRFD bridge design specifications.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

84" DIAMETER PRECAST MANHOLE
FOR 54" & 60" PIPES

STANDARD NO. MD 384.07
NOTE: SEE STD. MD 384.12 FOR PRECAST FLAT SLAB TOP

BOTTOM NO. 5 BARS
6" C/C 2 WAYS

TOP NO. 4 BARS
6" C/C 2 WAYS

FLATTOP REDUCER

2'-10"
6'-10"

11'-8" DIAM.

RISER UNIT
SEE STD. MD 384.01

GRADE
ADJUSTMENT
RING SEE STD.
MD 384.01

LADDERS
RUNGS
SEE NOTE 6

NOTE: SEE STD. MD 384.02

LEVEL

ECCENTRICAL
CONC UNIT SEE
STD. MD 384.01

JOINTS
SEE NOTE 5

WALL REINF.
SEE NOTE 3

CHANNEL
SEE NOTE 9

CONCRETE OR
BRICK ON EDGE
1/4" FALL PER FOOT

ADDITIONAL
NO. 3 BARS
SEE NOTE 7

BASE & BASE REINFORCING 
SEE NOTE 4

PROVIDE 6" MIN. BEDDING OF NO. 57 AGGREGATE ON FIRM SUBGRADE (BY OTHERS)

SECTION VIEW

NOTES

SECTION A-A

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO M 199.

2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).

3. WALL REINFORCEMENT FOR BASE UNIT, RISER UNITS AND ECCENTRICAL CONE UNIT SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.33 IN²/FT AND MAXIMUM SPACING OF 6" FOR THE 120" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 AND A 52. REINFORCEMENT SHALL MEET ASTM A 615, GRADE 60.

4. BASE REINFORCEMENT SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.42 IN²/FT AND A MAXIMUM SPACING OF 8" WITH 2" COVER FROM THE TOP OF BASE. THE BASE SHALL BE CAST MONOLITHIC WITH THE UNIT OR JOINTED PER THE MANUFACTURER'S DESIGN.

5. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SECURED BY THE CONTRACTOR AND MADE WATERPROOF USING WHERE APPLICABLE: MORTAR, RUBBER O-RING GASKETS MEETING ASTM C 161 A & C 443 OR FLEXIBLE PLASTIC GASKETS MEETING AASHTO M 198 TYPE B.

6. LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD 383.91 OR MD 383.92. LADDER RUNGS SHALL BE INCIDENTAL TO THE COST OF THE MANHOLE.

7. WHEN THE DISTANCE BETWEEN MULTIPLE OPENINGS IN THE BASE UNIT OR ANY RISER UNIT IS LESS THAN 6" ADDITIONAL NO. 3 BARS ARE REQUIRED AROUND OPENINGS.

8. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.

9. MIX NO. 2. CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.

10. THE DRIPE STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STD. MD 384.13 FOR DETAILS.

11. MINIMUM DEPTH PAYMENT PER EACH SHALL BE 10'-7" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE MANHOLE COVER. VERTICAL DEPTH PAYMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 10'-7". THE COST OF THE DRIPE STONE LANDING, NO. 57 AGGREGATE, GROUT, SEALANT, AND ALL APPURTENANCES SHALL BE INCIDENTAL TO THE PRICE BID.

12. MANHOLE HAS BEEN DESIGNED FOR HS-25 LOADING. ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

120" DIAMETER PRECAST MANHOLE
FOR 78" TO 84" PIPES

STANDARD NO. MD 384.11
**GENERAL NOTES**

1. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
2. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
3. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
4. COST FOR THE PRECAST FLAT SLAB TOP IS INCIDENTAL TO THE COST OF THE 120" PRECAST MANHOLE.
5. FOR USE WITH THE 120" DIAMETER PRECAST MANHOLE, SEE STD. MD 384.11.
6. SLAB TOP HAS BEEN DESIGNED FOR HS-25 LOADING, ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

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**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**PRECAST FLAT SLAB TOP FOR 120" DIAMETER PRECAST MANHOLE**

**STANDARD NO.** MD 384.12
METHOD OF PLACING Drip STONE LANDINGS

NOTES
1. THE Drip STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS.
2. CONCRETE SHALL BE MIX NO. 6 (4000 PSI).
3. REINFORCEMENT SHALL MEET ASTM A 615 GRADE 60.
4. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
5. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. COST FOR THE Drip STONE LANDING IS INCIDENTAL TO THE COST OF THE MANHOLE.
SECTION A-A

<table>
<thead>
<tr>
<th>PRECAST MANHOLE DIAMETER</th>
<th>DIMENSIONS</th>
<th>REINFORCING BARS PLACED 2 WAYS</th>
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<tr>
<td></td>
<td>D  T  W  X</td>
<td>TOP LAYER</td>
</tr>
<tr>
<td>60&quot;</td>
<td>6'-0&quot; 5&quot; 6&quot; 3'-6&quot;</td>
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<td>120&quot;</td>
<td>11'-8&quot; 9&quot; 10&quot; 8'-10&quot;</td>
<td>ND. 4 AT 6&quot; C/C</td>
</tr>
</tbody>
</table>

NOTES

1. THE COMBINATION FLAT TOP REDUCER DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STANDARD NO. 384.13 FOR PLACEMENT.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).
3. REINFORCEMENT SHALL MEET ASTM A 615 GRADE 60.
4. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.
5. LIFT EYES SHALL BE PROVIDED FOR HANDLING.
6. COST FOR THE COMBINATION FLAT TOP REDUCER AND DRIP STONE LANDING IS INCIDENTAL TO THE COST OF THE MANHOLE.
**NOTES**

1. THE COMBINATION ECCENTRICALLY CONE REDUCER AND DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STANDARD MD 384.13 FOR PLACEMENT.

2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI).

3. REINFORCEMENT SHALL BE REINFORCING BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.15 IN. $\frac{2}{5}$ FT FOR THE 60" DIAMETER CONE UNIT AND 0.18 IN. $\frac{2}{5}$ FT FOR THE 72" DIAMETER CONE UNIT.

4. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN.

5. LIFT EYES SHALL BE PROVIDED FOR HANDLING.

6. COST FOR THE COMBINATION ECCENTRICALLY CONE REDUCER AND DRIP STONE LANDING IS INCIDENTAL TO THE COST OF THE MANHOLE.

**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

**PRECAST COMBINATION ECCENTRICALLY CONE REDUCER AND DRIP STONE LANDING FOR 60" AND 72" DIAMETER MANHOLES**

**STANDARD NO. MD 384.17**
PLAN

SECTION A-A

CONCRETE
SEE S.H.A. SPECIFICATIONS

WATER LEVEL

6" VITRIFIED TILE OUTLETS

TO BE DETERMINED BY THE ENGINEER

NO. 400 6" C/C
ALL WELLS SHALL BE CAPPED WITH AN 8" REINFORCED CONCRETE SLAB. WHERE THE WALLS OR THE WELL RINGS ARE SOUND, THE CAP SHALL BE SQUARE IN SHAPE AND OF A DIMENSION EQUAL TO THE MAXIMUM WELL DIAMETER PLUS 2'. WHERE THERE ARE NO WELL RINGS OR WHERE THE WALLS OR RINGS ARE UNSOUND, THE CAP SHALL BE SQUARE IN SHAPE AND OF A DIMENSION EQUAL TO THE MAXIMUM WELL DIAMETER PLUS 6'. THIS WILL ALLOW THE CAP TO REST UPON A MINIMUM OF 3' OF THE EXISTING GROUND BEYOND THE WELL OPENING.

FILL CAN BE EITHER CLEAN SAND (TAMPING NOT NECESSARY) CONCRETE CEMENT GROUT, NEAT CEMENT, OR SODIUM BASED BENTONIC CLAY.

REINFORCEMENT TO BE NO. 5 @ DEFORMED BARS #6" C/C 2" COVER.

* CONSULT CHIEF, HIGHWAY DESIGN DIVISION OR DIRECTOR, OFFICE OF HIGHWAY DEVELOPMENT WHEN THESE DIMENSIONS ARE EXCEEDED.
EXISTING GROUND OF SUBGRADE LINE

EARTH FILL

VARIABLE DIAMETER=LIMITS OF EXCAVATION

DEPTH OF EXCAVATION VARIABLE

UNDERGROUND PIPE

SPRING

NO. 57 AGGREGATE

CIRCULAR PLAN VIEW NOT SHOWN. TO BE USED WHERE NOTED ON THE PLANS OR WHERE DIRECTED BY THE ENGINEER.

TWO LAYERS OF THREE PLY ASPHALT ROOFING PAPER. COST OF PAPER AND INSTALLATION MUST BE INCLUDED IN THE CONTRACT PRICE FOR MEASUREMENT AND PAYMENT REFER TO 306.04.01 WHEN PIPE IS USED AND TO 306.04.02 WHEN THE PIPE IS OMITTED.

EXISTING GROUND OF SUBGRADE LINE

EARTH FILL

VARIABLE DIAMETER

NO. 57 AGGREGATE

FOR AGGREGATE REFER TO SPECIFICATION 901

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

S P R I N G C O N T R O L
M E T H O D & D E T A I L

STANDARD NO. MD 386.03
CONCRETE SHALL BE MIX NO. 2
REINFORCEMENT-DEFORMED BARS

NOTE: NO PROVISION IS TO BE MADE IN
SLAB FOR INTAKE PIPE WHEN
NOT NEEDED.

SECTION AT PIPE OPENING

NO. 6 @ BARS 4" C/C
NO. 4 @ BARS 6" C/C

L = (D + 2T + (3" - 4")L

INTAKE PIPE
STEEL TO PROJECT 2" THRU
OPENING FOR PIPE AS SHOWN.
PROJECTED STEEL TO BE
PAINTED.

SECTION ALONG C OF PIPE

NO. 6 @ BARS 6" C/C
2- NO. 6 @ BARS

TOP SLAB, PRE-CAST CONCRETE

ISOMETRIC VIEW

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD JUNCTION BOX

STANDARD NO. MD 386.11
GENERAL NOTES

1. CONCRETE SHALL BE MIX NO. 2
2. REINFORCEMENT - DEFORMED BARS
3. MANHOLE CASTINGS: INSIDE DIA. - 2'-0"
4. MANHOLE CASTINGS: MAXIMUM DEPTH - 0'-7"
5. ALL MATERIAL TO CONFORM TO S.H.A. SPECIFICATIONS
6. SLAB HAS BEEN DESIGNED FOR HS-25 LOADING.
   ACCORDING TO AASHTO LRFD BRIDGE SPECIFICATIONS.
SUB-BASE DRAINAGE
DITCH SECTION

PLACE TAR PAPER ON TOP OF JOINTS
FOR BELL & SPIGOT TYPE PIPE

PERFORATED "PIPE UNDERDRAIN" SEE
SPECIFICATIONS-FOR TYPES.

SUB-SURFACE DRAINAGE
DITCH SECTION

EARTH BACKFILL
PLACED ACCORDING
TO SPECIFICATIONS
FOR "TAMPED FILL".

OUTLET DITCH SECTION

PLAIN UNDERDRAIN
PIPE OUTLET

5" CONCRETE GUTTER FOR UNDERDRAIN OUTLET

NOTE: UNDERDRAIN TO BE LAID
ON A MINIMUM OF 0.5% GRADE
UNLESS OTHERWISE DIRECTED.

**NOTE 'A': WHERE UNDERDRAIN IS OUTLETED
INTO AN INLET, OR WHERE ANY
OTHER UNUSUAL CONDITIONS PREVAIL,
THESE DIMENSIONS MAY BE VARIED
AS DIRECTED.

TOE WALL

ELEVATION-UNDERDRAIN OUTLET

SPECIFICATION | CATEGORY CODE ITEMS

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STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD UNDERDRAINS

STANDARD NO. MD 387.01
NOTES

1. **Longitudinal Underdrain** shall be placed according to the plans or as directed by the engineer.
2. The underdrain trench shall not be constructed before placement of the base (subbase) course.
3. **Longitudinal Underdrain** trench shall be wrapped in Class 5D Type II Geotextile.
5. Aggregate shall be tamped with a light vibratory tamper prior to overlapping the Geotextile fabric.
6. Contract unit price bid per linear foot for 6" perforated circular pipe longitudinal underdrain shall constitute full compensation for all materials, labor, equipment and incidentals necessary to do the work.
7. If any existing longitudinal underdrain is encountered during widening excavation, the underdrain pipe should be removed unless otherwise directed by the engineer. Any void created by the removal of the underdrain pipe should be backfilled by material suitable for embankment construction. If no longitudinal underdrain is found, but existing underdrain outlets may be impacted by new widening, outlets shall be connected to the new underdrains or other drainage facilities.
8. Outlet the underdrains into other drainage structures whenever possible at intervals not to exceed 250'. Refer to Std. Nos. 387.11, 387.11-01, 387.21 and 387.21-01.
**NOTES**

1. **LONGITUDINAL UNDERDRAIN SHALL BE PLACED ACCORDING TO THE PLANS OR AS DIRECTED BY THE ENGINEER.**
2. **THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE PLACEMENT OF THE BASE (SUBBASE) COURSE.**
3. **LONGITUDINAL UNDERDRAIN TRENCH SHALL BE WRAPPED IN CLASS SD TYPE I GEOTEXTILE.**
4. **AGGREGATE SHALL CONFORM TO NO. 57 AGGREGATE, 901.01 OF THE STANDARD SPECIFICATION FOR CONSTRUCTION AND MATERIALS.**
5. **AGGREGATE SHALL BE TAMPED WITH A LIGHT VIBRATORY TAMPER PRIOR TO OVERLAPPING THE GEOTEXTILE FABRIC.**
6. **CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR 6" PERFORATED CIRCULAR PIPE LONGITUDINAL UNDERDRAIN SHALL CONSTITUTE FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO DO THE WORK.**
7. **IF ANY EXISTING LONGITUDINAL UNDERDRAIN IS ENCOUNTERED DURING WIDENING EXCAVATION, THE UNDERDRAIN PIPE SHOULD BE REMOVED UNLESS OTHERWISE DIRECTED BY THE ENGINEER. ANY VOID CREATED BY THE REMOVAL OF THE UNDERDRAIN PIPE SHOULD BE BACKFILLED BY MATERIAL SUITABLE FOR EMBANKMENT CONSTRUCTION. IF NO LONGITUDINAL UNDERDRAIN IS FOUND, BUT EXISTING UNDERDRAIN OUTLETS MAY BE IMPACTED BY NEW WIDENING, OUTLETS SHALL BE CONNECTED TO THE NEW UNDERDRAINS OR OTHER DRAINAGE FACILITIES.**
8. **OUTLET THE UNDERDRAINS INTO OTHER DRAINAGE STRUCTURES WHENEVER POSSIBLE AT INTERVALS NOT TO EXCEED 250', REFER TO STD. NOS. 387.11, 387.11-01, 387.21 AND 387.21-01.**

**Maryland Department of Transportation**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**LONGITUDINAL UNDERDRAIN LOCATED AT CURB & GUTTER EDGE FOR FLEXIBLE PAVEMENT**

**STANDARD NO.** MD 387.11-01
NOTES

1. LONGITUDINAL UNDERDRAIN SHALL BE PLACED ACCORDING TO THE PLANS OR DIRECTED BY THE ENGINEER.
2. THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE PLACEMENT OF THE BASE (SUBBASE) COURSE.
3. LONGITUDINAL UNDERDRAIN TRENCH SHALL BE WRAPPED IN CLASS 50 TYPE II GEOTEXTILE.
4. AGGREGATE SHALL CONFORM TO NO. 57 AGGREGATE, 901.01 OF THE STANDARD SPECIFICATION FOR CONSTRUCTION AND MATERIALS.
5. AGGREGATE SHALL BE Tamped WITH A LIGHT VIBRATORY TAMPER PRIOR TO OVERLAPPING THE GEOTEXTILE FABRIC.
6. CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR 6" PERFORATED CIRCULAR PIPE LONGITUDINAL UNDERDRAIN SHALL CONSTITUTE FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO DO THE WORK.
7. IF ANY EXISTING LONGITUDINAL UNDERDRAIN IS ENCOUNTERED DURING WIDENING EXCAVATION, THE UNDERDRAIN PIPE SHOULD BE REMOVED UNLESS OTHERWISE DIRECTED BY THE ENGINEER. ANY VOID CREATED BY THE REMOVAL OF THE UNDERDRAIN PIPE SHOULD BE BACKFILLED WITH MATERIAL SUITABLE FOR EMBANKMENT CONSTRUCTION. IF NO LONGITUDINAL UNDERDRAIN IS FOUND, BUT EXISTING UNDERDRAIN OUTLETS MAY BE IMPACTED BY NEW WIDENING, OUTLETS SHALL BE CONNECTED TO THE NEW UNDERDRAINS OR OTHER DRAINAGE FACILITIES.
8. OUTLET THE UNDERDRAINS INTO OTHER DRAINAGE STRUCTURES WHENEVER POSSIBLE AT INTERVALS NOT TO EXCEED 250'. REFER TO STD. NOS. 387.11, 387.11-01, 387.21 AND 387.21-01.

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
LONGITUDINAL UNDERDRAIN LOCATED AT SHOULDER EDGE FOR RIGID PAVEMENT

STANDARD NO. MD 387.21
NOTES

1. LONGITUDINAL UNDERDRAIN SHALL BE PLACED ACCORDING TO THE PLANS OR DIRECTED BY THE ENGINEER.
2. THE UNDERDRAIN TRENCH SHALL NOT BE CONSTRUCTED BEFORE PLACEMENT OF THE BASE (SUBBASE) COURSE.
3. LONGITUDINAL UNDERDRAIN TRENCH SHALL BE WRAPPED IN CLASS SD TYPE I GEOTEXTILE.
4. AGGREGATE SHALL CONFORM TO NO. 57 AGGREGATE, 901.01 OF THE STANDARD SPECIFICATION FOR CONSTRUCTION AND MATERIALS.
5. AGGREGATE SHALL BE TAMPERED WITH A LIGHT VIBRATORY TAMPER PRIOR TO OVERLAPPING THE GEOTEXTILE FABRIC.
6. CONTRACT UNIT PRICE BID PER LINEAR FOOT FOR 6" PERFORATED CIRCULAR PIPE LONGITUDINAL UNDERDRAIN SHALL CONSTITUTE FULL COMPENSATION FOR ALL MATERIALS, LABOR, EQUIPMENT AND INCIDENTALS NECESSARY TO DO THE WORK.
7. IF ANY EXISTING LONGITUDINAL UNDERDRAIN IS ENCOUNTERED DURING WIDENING EXCAVATION, THE UNDERDRAIN PIPE SHOULD BE REMOVED UNLESS OTHERWISE DIRECTED BY THE ENGINEER. ANY VOID CREATED BY THE REMOVAL OF THE UNDERDRAIN PIPE SHOULD BE BACKFILLED BY MATERIAL SUITABLE FOR EMBANKMENT CONSTRUCTION. IF NO LONGITUDINAL UNDERDRAIN IS FOUND, BUT EXISTING UNDERDRAIN OUTLETS MAY BE IMPAILED BY NEW WIDENING. OUTLETS SHALL BE CONNECTED TO THE NEW UNDERDRAINS OR OTHER DRAINAGE FACILITIES.
8. OUTLET THE UNDERDRAINS INTO OTHER DRAINAGE STRUCTURES WHENEVER POSSIBLE AT INTERVALS NOT TO EXCEED 250'. REFER TO STD. NOS. 387.11, 387.11-01, 387.21 AND 387.21-01.

SHA
State Highway Administration

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
LONGITUDINAL UNDERDRAIN LOCATED AT CURB & GUTTER EDGE FOR RIGID PAVEMENT

STANDARD NO.  MD 387.21-01
PLAN VIEW

SHOWN IS ONE ROADWAY OF A DUAL HIGHWAY. TWO LANE TWO WAY ROADWAY SAME AS THE OUTER SHOULDER

SECTION VIEW-CUT

SECTION VIEW-FILL

NOTE

1. FOR LOCATION, MATERIAL, METHOD OF MEASUREMENT AND BASIS OF PAYMENT REFER TO SECTION 306.
2. WHEN THE BOTTOM OF THE SHOULDER FLEXIBLE BASE PAVEMENT IS ABOVE THE MAINLINE BASE MATERIAL, THE MATERIAL REQUIRED TO FILL THE AREA WITHIN THE W DIMENSION WILL BE INCIDENTAL TO THE COST OF THE SHOULDER BASE MATERIAL. THIS CONDITION WILL BE INDICATED ON THE PLAN TYPICAL CROSS SECTIONS.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS. REFER TO SECTION 306 FOR METHOD OF MEASUREMENT AND BASIS OF PAYMENT.
SHOWN IS ONE ROADWAY OF A DUAL HIGHWAY. TWO LANE TWO WAY ROADWAY SAME AS THE OUTER SHOULDER

SECTION VIEW-FILL

CONCRETE PAVEMENT
SUBBASE MATERIAL
FLEXIBLE SURFACE PAVEMENT (SHOULDER)
FLEXIBLE BASE PAVEMENT (SHOULDER)
BASE MATERIAL (SHOULDER)
SUBGRADE DRAIN MATERIAL
GEOTEXTILE

NOTES
1. FOR LOCATION, MATERIAL, METHOD OF MEASUREMENT AND BASIS OF PAYMENT REFER TO SECTION 306.
2. WHEN THE BOTTOM OF THE SHOULDER FLEXIBLE BASE PAVEMENT ☐ IS ABOVE THE TOP OF THE MAINLINE SUBBASE MATERIAL ☐, THE MATERIAL REQUIRED TO FILL THE AREA WITHIN THE 1'-0" DIMENSION WILL BE INCIDENTAL TO THE COST OF THE SHOULDER BASE MATERIAL ☐. THIS CONDITION WILL BE INDICATED ON THE PLAN TYPICAL CROSS SECTIONS.
3. GEOTEXTILE CLASS SHALL BE AS SPECIFIED IN THE PLANS OR SPECIAL PROVISIONS. REFER TO SECTION 306 FOR METHOD OF MEASUREMENT AND BASIS OF PAYMENT.
NOTE: AT INTERSECTIONS, THE THICKNESS IS TO BE 8" AND THE TYPICAL SECTION IS SUBJECT TO EXISTING CONDITIONS.

VALLEY GUTTER

3'-0" Minimum

CONCRETE SHOULDER & REBUT

SHOULDER WIDTH VARIABLE
SLOPE 1/4"/1'-0"

CONCRETE FLUME

DIA. OF PIPE
SLOPE VARIABLE
SLOPE VARIABLE
VARIABLE

CONC. LUG 9" IN DEPTH AND 9" THICK TO BE CONSTRUCTED ON 6'-0" CENTERS

FLUME

2'-0" 2'-0"
SLOPE 2:1

PIPE LOCATIONS UNDER DEEP FILL

CONC. FLUME - SEE DETAIL ON THIS SHEET

ORIGINAL GROUND

MARYLAND DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES

STANDARD CONCRETE VALLEY GUTTER, FLUMES
CONCRETE SHOULDER & REBUT

STANDARD NO. MD 389.01
**TOE WALL DETAIL – 5" CONCRETE GUTTER**

**SPECIFICATION**

**CATEGORY CODE ITEMS**

**TOE WALL DETAIL – 5" CONCRETE GUTTER**

**STATE HIGHWAY ADMINISTRATION**

**STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES**

**Maryland Department of Transportation**

**STANDARD NO.** MD 389.02

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**ELEVATION "B-B"**

**SECTION A-A**

**PLAN**

**ISOMETRIC VIEW**

**REINFORCEMENT DATA**
ALL BARS TO BE NO. 3

1. BENT BARS
2. STRAIGHT BARS
3. COVER TO BE 1/4" THICKNESS OF CONC. MIN.; COVER ON ENDS
4. EXPANSION MATERIAL

**NOTE:** COST OF TOE WALL TO BE INCIDENTAL TO SQUARE YARDS OF 5" CONCRETE GUTTER.
NUMBER OF MAT WIDTHS TO BE NOTED ON PLANS.

WIDTH AS NOTED ON PLANS

EDGE OF MAT: PLACE STAPLES 24" APART LONGITUDINALLY.

4" OVERLAP OF MATTING STRIPS WHEN 2 OR MORE STRIP WIDTHS ARE REQUIRED. STAPLE AT 18" INTERVALS.

PLACE STAPLES 24" APART LONGITUDINALLY AS REQUIRED TO KEEP THE MATTING FIRMLY PRESSSED TO THE SOIL. DO NOT HAVE SPACE BETWEEN MATTING AND SOIL.

BURY END OF MATTING 6" INTO SOIL. TAMPER EVEN. STAPLE AT 6" INTERVALS.

BURY UPGRADE END OF MATTING 6" INTO SOIL. TAMPER EVEN. OVERLAP UPPER STRIP 6" OVER LOWER STRIP. STAPLE AT 6" INTERVALS.

EDGE OF MAT: PLACE STAPLES 24" APART LONGITUDINALLY.

NOTE: MAT WIDTH IS 48" x 1".

SEE SPECIFICATIONS FOR "SOIL STABILIZATION MATTING" FOR DETAILS OF MAT.
USE SEED MIX SPECIFIED.
MULCH IS NOT REQUIRED.
WHEN TOPSOIL IS SPECIFIED IN THE AREA ADJACENT TO THAT WHERE SOIL STABILIZATION MATTING IS TO BE CONSTRUCTED, IT SHALL ALSO BE PLACED AT THE SAME DEPTH IN THE AREA WHERE SOIL STABILIZATION MATTING IS REQUIRED, PRIOR TO THE INSTALLATION OF THE MATTING.

11 GAUGE WIRE OR HEAVIER LATERAL SPACING OF STAPLES TO BE AT EDGE OF MAT. AT OVERLAP OF MATS AND AT BREAK IN GROUND OR MIDPOINT OF MAT WHERE NO BREAKS OCCUR FOR THAT MAT.
Highway Shoulder

2:1 or as noted on plans

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Highway Shoulder

1½:1 or as noted on plans

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Note: Additional mat widths may be used as noted on the plans. Staples to be placed as noted by symbol (N).

Flume

Direction of flow

V-Ditch using one mat

Side ditch using two or more mats

Maryland Department of Transportation
STATE HIGHWAY ADMINISTRATION
STANDARDS FOR HIGHWAYS AND INCIDENTAL STRUCTURES
SOIL STABILIZATION MATTING
DRAINAGE DITCHES

STANDARD NO. MD 389.07