SECTION III
DRAINAGE
# TABLE OF CONTENTS

## DRAINAGE FACILITIES

<table>
<thead>
<tr>
<th>No.</th>
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</tr>
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<tr>
<td>D-1</td>
<td>Standard Underdrains</td>
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<td>D-2</td>
<td>Longitudinal Underdrain for Flexible Paving</td>
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<tr>
<td>D-3</td>
<td>Spring Control Method &amp; Detail</td>
</tr>
<tr>
<td>D-4</td>
<td>Trench Detail</td>
</tr>
<tr>
<td>D-5</td>
<td>Temporary Pavement Detail and Crusher Run Stone Payment Quantities</td>
</tr>
<tr>
<td>D-6</td>
<td>Payment Quantities for Repaving Trenches</td>
</tr>
<tr>
<td>D-6A</td>
<td>Trench Detail for Flowable Fill</td>
</tr>
<tr>
<td>D-7</td>
<td>Permissible Depth Table Concrete Pipe</td>
</tr>
<tr>
<td>D-8</td>
<td>Computed Loads on Conduits</td>
</tr>
<tr>
<td>D-9</td>
<td>Standard Limits of Tamped Fill Over Pipe Culverts</td>
</tr>
<tr>
<td>D-10</td>
<td>Standard Limits of Tamped Fill Over Box Culverts</td>
</tr>
<tr>
<td>D-11</td>
<td>Type A-1 Manhole (For Normal Depths)</td>
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<td>Type A-2 &amp; A-3 Precast Manhole</td>
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<tr>
<td>D-13</td>
<td>Type “B” Manhole (Shallow)</td>
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<td>D-14</td>
<td>Type “C” Manhole 42&quot; &amp; Larger Pipes</td>
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<td>D-15</td>
<td>Standard Drop Manhole</td>
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<td>D-16</td>
<td>Heavy Traffic Manhole Frame and Cover</td>
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<tr>
<td>D-17</td>
<td>Sidewalk Frame and Cover</td>
</tr>
<tr>
<td>D-18</td>
<td>Bend Structure Circular Pipe</td>
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<tr>
<td>D-19</td>
<td>Bend Structure Elliptical Pipe</td>
</tr>
<tr>
<td>D-20</td>
<td>Connection Locations to Bend Structures</td>
</tr>
<tr>
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<td>Type I Junction Chamber Top Slab Reinforcing</td>
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## TABLE OF CONTENTS

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<td>Standard Brick “Y” Single &amp; Double</td>
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<td>Type A-1 Inlet</td>
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<td>Type A-2 Inlet</td>
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<td>D-25</td>
<td>Type B-1 Inlet</td>
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<td>Type B-2 Inlet</td>
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<td>Type “C” Inlet</td>
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<td>Type “D” Inlet</td>
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<td>Type “E” Inlet</td>
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<td>Type No. 4 “E” Grate</td>
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<td>Standard Type E &amp; H Inlet Combination Reticular Replacement Grate</td>
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<tr>
<td>D-32</td>
<td>Standard Cog Inlets 5', 10', 15' &amp; 20'</td>
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<td>D-33</td>
<td>Standard Cog Inlets 5' &amp; 15'</td>
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<td>Pre-Cast Square and rectangular Cog Inlets 5', 10', 15' &amp; 20'</td>
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<td>Details For Pre-Cast Concrete Cog-20 Trough Slabs &amp; Details For Adjustment Collars And Inlet Slabs</td>
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<td>Pre-Cast Circular Cog Inlets 5', 10', 15' &amp; 20'</td>
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<td>Pre-Cast Square and Rectangular Cog Inlets 5' and 15'</td>
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<td>Pre-Cast Circular Cog Inlets 5', 10', 15' &amp; 20'</td>
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<td>D-35B</td>
<td>Alternate Pre-Cast Troughs For Pre-Cast Circular Cog &amp; Cog Inlets</td>
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<td>D-36</td>
<td>Standard NR Inlet</td>
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<td>Standard NRM Inlet</td>
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# TABLE OF CONTENTS

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<td>“S” Grate Details</td>
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<td>Yard Type Inlet</td>
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<td>D-51</td>
<td>Inlet Depression Detail</td>
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<td>D-52</td>
<td>Typical Infiltration Structure</td>
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<td>D-52A</td>
<td>Typical Infiltration Structure (From Roof Leaders of Building)</td>
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<tr>
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<td>Typical Infiltration Structure (Baffel)</td>
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<td>Standard Curb Opening Detail Curb &amp; Gutter Section</td>
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<td>Type “A” Headwall Circular Pipe</td>
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<td>Modified Type A-1 Headwall (48&quot;, 54&quot; &amp; 60&quot;)</td>
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<td>Modified Type A-1 Headwall (66&quot;, 72&quot;, 78&quot; &amp; 84&quot;)</td>
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# TABLE OF CONTENTS

## DRAINAGE FACILITIES

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<td>Type “A” Headwall Elliptical Concrete Pipe</td>
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<td>Type “B” Headwall Circular Pipe</td>
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<td>Standard Type C Endwall Round Pipe</td>
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<td>Standard Type C Endwall Arch Pipe</td>
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<td>Type “E” Headwall Circular Pipe</td>
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<td>Type “E” Headwall Metal Pipe Arch</td>
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<td>Standard Type “F” Headwall Modification</td>
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<td>D-66</td>
<td>Standard Type “F” Headwall Round Pipe</td>
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<tr>
<td>D-67</td>
<td>Standard Type “F” Headwall Arch Pipe</td>
</tr>
<tr>
<td>D-68</td>
<td>Standard Type H Endwall Round Pipe</td>
</tr>
<tr>
<td>D-68A</td>
<td>Standard Type H Endwall Dimensions and Quantities</td>
</tr>
<tr>
<td>D-69</td>
<td>Type “O” Headwall Circular Pipe</td>
</tr>
<tr>
<td>D-70</td>
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<td>Type “O” Headwall Elliptical Pipe</td>
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<td>Type “O” Headwall Elliptical Pipe</td>
</tr>
<tr>
<td>D-73</td>
<td>Details of Weepholes For Headwalls</td>
</tr>
<tr>
<td>D-74</td>
<td>Standard Concrete End Section Round Concrete Pipe</td>
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<tr>
<td>D-75</td>
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<td>D-76</td>
<td>Standard Metal End Section Round Metal Pipe</td>
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TABLE OF CONTENTS

DRAINAGE FACILITIES

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<td>Standard Connections Metal End Sections</td>
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<td>Standard Metal End Section Arch Metal Pipe</td>
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<td>D-80</td>
<td>Standard Metal End Section Arch Metal Pipe</td>
</tr>
<tr>
<td>D-81</td>
<td>Cutoff Wall And Outlet Paving</td>
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<tr>
<td>D-82</td>
<td>Energy Dissipator</td>
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<td>Energy Dissipator Floor</td>
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<td>D-84</td>
<td>Energy Dissipator Walls</td>
</tr>
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<td>D-85</td>
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<td>5&quot; concrete Energy Dissipating Gutter</td>
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<td>Riser Detail</td>
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<td>Water Quality Inlet</td>
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<td>D-90</td>
<td>Concrete Cradle Detail</td>
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</table>
NOTE: WHERE UNDERDRAIN IS OUTLETTED INTO AN INLET, OR WHERE ANY OTHER UNUSUAL CONDITIONS PREVAIL, THESE DIMENSIONS MAY BE VARIED AS DIRECTED.

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

Sub-Base Ditch Section

Place top paper on top of joints for Bell and Spigot type pipe.

Sub-Surface Ditch Section

Earth backfill

Underdrain Pipe Outlet

Outlet Ditch Section

This length shall be underdrain pipe outlet of specified size in all cases. To be measured and paid for at contract unit price for underdrain outlet.

5" Concrete Gutter for Underdrain Outlet

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
STANDARD UNDERDRAINS

REVERSED
No. 57 aggregate - crushed material in shoulder. All other material in shoulder No. M6 fine aggregate.

NOTE:
The underdrain trench shall not be constructed before the completion of the top base course.
Circular Plan View not shown. To be used where noted on Plans.

Two layers of three ply asphalt roofing paper. Cost of paper and installation must be included in the Contract price for aggregate backfill for underdrain.
NOTES:
1. MAXIMUM CLEAR TRENCH WIDTH AND PAY WIDTH TO 1' OVER OUTSIDE DIAMETER OF PIPE SHALL BE 2E+ OUTSIDE DIAMETER OF PIPE.
2. MAXIMUM PAY WIDTH FROM 1' ABOVE OUTSIDE DIAMETER OF PIPE TO EXISTING SURFACE OR FINISHED GRADE SHALL BE \( W_1 \).
3. FOR PIPE ARCH AND ELLIPTICAL PIPE SPANS USE NEXT HIGHER TABLE VALUE FOR E. SEE DETAIL D/5 FOR \( W_1 \) VALUE.

<table>
<thead>
<tr>
<th>D</th>
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<tr>
<td>12&quot;</td>
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<td>9&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
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<tr>
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NOTES:
1. Temporary surface to be maintained at contractors expense.
2. Aggregate quantities are based on:
   Depth-6” for Dirt Roads, Shoulders, Driveways, Sidewalks, etc.
   12” for Paved Roads and Shoulders.
   Weight-130 Lbs. Per Cubic Foot.
3. For maximum clear trench width see detail D/4.
4. See detail D/6 for method of cutting & repairing openings in county roadways.

TRENCHES IN ROADS OTHER THAN STATE ROADS

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<tr>
<td>W1</td>
<td>6”</td>
<td>12”</td>
<td>6”</td>
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<tr>
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GA S/B = Graded Aggregate for Subbase in Tons per Linear Foot, For Estimating only.

STANDARD DRAINAGE DETAILS
TEMPORARY PAVEMENT DETAIL AND CRUSHER RUN STONE PAYMENT QUANTITIES

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED
CHIEF ENGINEER
DATE:

REVIEWED
DESIGN ENGINEER
DATE:
III-6 of 99

Published: 01/01
Revised:

DETAIL OF CUTTING & REPLACING PAVEMENT IN ROADWAYS OTHER THAN STATE ROADS

(BITUMINOUS CONCRETE FOR SURFACE COURSE AND BASE COURSE IN TONS PER LINEAR FOOT ARE FOR ESTIMATING ONLY)

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ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS

PAYMENT QUANTITIES FOR REPLAVING TRENCHES

SHORT FILL FLAT BOTTOM TRENCH FOR FULL LENGTH OF BARREL WITH EXCAVATED BELL HOLES. UNSTABLE MATERIAL SHALL BE REPLACED WITH SELECTED BACKFILL. STABLE BUT UNSUITABLE MATERIAL SHALL BE REPLACED WITH BORROW.

NOTES:

1. TEMPORARY SURFACE (EITHER GRADED AGGREGATE OR BITUMINOUS CONCRETE) TO BE INSTALLED AND MAINTAINED AT THE CONTRACTORS EXPENSE.
2. CONTRACTOR RESPONSIBLE FOR TRENCH SUPPORT.
3. AGGREGATE SUBBASE SHALL BE CLEANED AND THOROUGHLY COMPACTED PRIOR TO PLACING PERMANENT PAVEMENT MATERIAL.
4. TRENCH SUPPORT MATERIAL TO BE REMOVED IN SUCH A MANNER THAT BACKFILL MATERIAL FOR FIRST TWO FEET ABOVE PIPE WILL BE COMPACTED AGAINST UNDISTURBED EARTH.
5. MINIMUM PAVED QUANTITIES BASED ON DEPTH 1/2 BITUMINOUS CONCRETE SURFACE COURSE (SC) AND 5" BITUMINOUS CONCRETE BASE COURSE (BF) PLACED IN TWO LAYERS WEIGHT 150 LBS PER CUBIC FOOT
6. SMALL AREA TO BE MULLED TO A DEPTH OF 1/2" TO ACCOMODATE PLACEMENT OF THE BITUMINOUS CONCRETE SURFACE COURSE.
7. SURFACE COURSE PATCH PAVING SHALL EXTEND A MINIMUM DISTANCE OF 1/0" BEYOND ANY DISTURBED SURFACE PAVEMENT INDEPENDENT OF THE SURFACE COURSE PATCH PAVEMENT MAXIMUM PAY WIDTH.
8. REQUIRED THAT FLOATABLE FILL BE USED IN TRENCHES IN ROADS CLASSIFIED AS ARTERIAL OR ANY ROAD WHOSE PAVEMENT IS CUT WITHIN FIVE (5) YEARS OF THE ROAD BEING CONSTRUCTED OR RESURFACED SEE PLATE D/6A.

OPINIONS OF ENGINEERS

APPROVED

CHIEF ENGINEER

DEPARTMENT OF PUBLIC WORKS

DATE:

DESIGN ENGINEER

D
6
SURFACE COURSE PATCH

PAVEMENT MAXIMUM PAY WIDTH (P)
1'-0"

BASE COURSE TRENCH
MAXIMUM PAY WIDTH (W1)
1'-0"

EXIST PAVEMENT SURFACE

DEPTH (SEE NOTE NO.5 FOR MINIMUM PAVEMENT DEPTH)
OR DEPTH OF EXISTING PAVING WHICH EVER IS GREATER.

FLOWABLE FILL

PROVIDE FIRM SUBGRADE FLAT BOTTOM TRENCH FOR
FULL LENGTH OF BARRELL WITH EXCAVATED BELL HOLES.
UNSTABLE MATERIAL SHALL BE REPLACED WITH SELECTED
BACKFILL. STABLE BUT UNSUITABLE MATERIAL SHALL BE
REPLACED WITH BORROW.

NOTES:
1. TEMPORARY SURFACE (OTHER GRADED AGGREGATE OR BITUMINOUS CONCRETE) TO BE INSTALLED AND MAINTAINED AT THE CONTRACTORS EXPENSE.
2. CONTRACTOR RESPONSIBLE FOR TRENCH SUPPORT.
3. PRIOR TO PLACEMENT OF THE FLOWABLE FILL THE CONTRACTOR SHALL PROVIDE POSITIVE CONTAINMENT OF THE FLOWABLE FILL MATERIAL TO PREVENT FLOW BEYOND THE DESIRED PLACEMENT LOCATION.
4. FOR PAY WIDTH QUANTITIES SEE STANDARD PLATE D/6
5. MINIMUM PAVED QUANTITIES BASED ON:
DEPTH 1 1/2" BITUMINOUS CONCRETE SURFACE COURSE (SC) AND 5" BITUMINOUS CONCRETE BASE COURSE (BF PLACED IN TWO LAYERS)
WEIGHT 150 LBS. PER CUBIC FOOT
6. AREA TO BE MOLDED TO A DEPTH OF 1 1/2" TO ACCOMODATE PLACEMENT OF THE BITUMINOUS CONCRETE SURFACE COURSE.
7. SURFACE COURSE PATCH PAYMENT SHALL EXTEND A MINIMUM DISTANCE OF 1'-0" BEYOND ANY DISTURBED SURFACE PAVEMENT INDEPENDENT OF THE SURFACE COURSE PATCH PAVEMENT MAXIMUM PAY WIDTH.
8. REQUIRED THAT FLOWABLE FILL BE USED IN TRENCHES IN ROADS CLASSIFIED AS ARTERIAL OR ANY ROAD WHOSE PAVEMENT IS CUT WITHIN FIVE YEARS OF THE ROAD BEING CONSTRUCTED OR RESURFACED.
FIGURES SHOWN IN TABLE ARE MEASURED FROM INVERT OF PIPE TO GRADE

| Pipe Dia. | Class I | | Class II | | Class III | | Class IV | | Class V |
|-----------|---------|---|---------|---|---------|---|---------|---|
| 12"       | 4        | 7    | 3        | 14       | 3        |           |
| 14"       | 4        | 11   | 3        | 22       | 3        |           |
| 15"       | 4        | 12   | 3        | 23       | 3        |           |
| 16"       | 4        | 12   | 3        | 23       | 3        |           |
| 18"       | 4        | 12   | 3        | 23       | 3        |           |
| 20"       | 4        | 12   | 3        | 23       | 3        |           |
| 21"       | 4        | 12   | 3        | 24       | 3        |           |
| 24"       | 5        | 13   | 4        | 25       | 4        |           |
| 27"       | 5        | 13   | 4        | 20       | 4        |           |
| 30"       | 5        | 13   | 4        | 21       | 4        |           |
| 36"       | 6        | 14   | 5        | 22       | 5        |           |
| 42"       | 6        | 14   | 5        | 21       | 5        |           |
| 48"       | 6        | 15   | 5        | 22       | 6        |           |
| 54"       | 6        | 16   | 6        | 23       | 6        |           |
| 60"       | 7        | 17   | 7        | 23       | 7        |           |
| 66"       | 8        | 17   | 7        | 24       | 7        |           |
| 72"       | 8        | 18   | 8        | 25       | 8        |           |

PIPE SHALL NOT BE USED WHERE THERE ARE BLANK SPACES IN THE TABLE.
<table>
<thead>
<tr>
<th>SIZE PIPE</th>
<th>TRENCH WIDTH</th>
<th>DEPTH OF COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 FT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DEAD</td>
</tr>
<tr>
<td>12&quot;</td>
<td>3.0'</td>
<td>613</td>
</tr>
<tr>
<td>15&quot;</td>
<td>3.0'</td>
<td>613</td>
</tr>
<tr>
<td>18&quot;</td>
<td>3.42'</td>
<td>603</td>
</tr>
<tr>
<td>21&quot;</td>
<td>3.70'</td>
<td>493</td>
</tr>
<tr>
<td>24&quot;</td>
<td>4.0'</td>
<td>518</td>
</tr>
<tr>
<td>27&quot;</td>
<td>4.82'</td>
<td>540</td>
</tr>
<tr>
<td>30&quot;</td>
<td>5.08'</td>
<td>607</td>
</tr>
<tr>
<td>36&quot;</td>
<td>5.67'</td>
<td>737</td>
</tr>
<tr>
<td>42&quot;</td>
<td>6.75'</td>
<td>799</td>
</tr>
<tr>
<td>48&quot;</td>
<td>7.33'</td>
<td>862</td>
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<td>54&quot;</td>
<td>7.92'</td>
<td>944</td>
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<td>60&quot;</td>
<td>8.5'</td>
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</tr>
<tr>
<td>66&quot;</td>
<td>9.08'</td>
<td>1059</td>
</tr>
<tr>
<td>72&quot;</td>
<td>9.67'</td>
<td>1200</td>
</tr>
</tbody>
</table>

**BASIC TABLE**

**DEAD LOAD AT 110 LBS. PER CU. FT AND Kp = 0.130, ORDINARY MAXIMUM FOR CLAY**

**LIVE LOAD H = 0.20 LOADING WITHOUT IMPACT**

---

**ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS**

**STANDARD DRAINAGE DETAIL**

**COMPUTED LOADS ON CONDUITS IN POUNDS PER LINEAR FOOT**

**REvised**

**DATE**
In the case of pipe, for pipe culverts, the yardage of tamped fill to be included shall be rounded by vertical planes, equidistant from the center line of the pipe and separated by a distance of not more than three times the external diameter of the body of the pipe. The upper pay limit in fill sections shall consist of a horizontal plane one foot above the top of the pipe. In the event that the pipe is in a cut section, the pay limits shall be extended to a horizontal plane at the elevation of the finished grade of the earthwork. In either case a deduction shall be made for the area occupied by the pipe.

---

Published: 01/01 Revised:
NOTES
1. Manhole shall be brick or Mix No. 3 Concrete poured in place.
2. Where A (cover) is less than 6'-9" use Type B Manhole (for pipes 36" & smaller).
3. For pipe sizes 42" and larger use Type C Manhole.
3. For pipe sizes 42" and larger, use Type C Manhole.
4. Where A (cover) is more than 6'-9" use Type A-2 Manhole; 6'-9" or less, use Type A-3 Manhole.
5. Other types of Precast Manholes may be used if approved by D.P.W.

Rubber Joint as per Specifications.
Standard Drainage Heavy
Traffic Manhole Frame & Cover

Same as above

Mix No. 3 Concrete

ANNE ARUNDELE COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
TYPE A-2 & A-3
PRECAST MANHOLE

Published: 01/01  Revised:
PLAN

4" Brick masonry. Additional brick shall be used to bring MH Cover to existing grade if required. Max. Depth = 12" Grade

Standard Drainage Heavy Traffic Manhole Frame and Cover. See Detail D/16

SECTION

Install Frame, then mortar.
Mix No. 3 Concrete
1/4" Cement Mortar

Bench full height of pipe as shown on Type A Manhole.

Invert brick laid on edge

Notes:
1. Walls and base slab shall be brick.
2. Where A (cover) is greater than 6'-9" use Type "A" Manhole.
3. For pipe sizes 42" and larger use Type "C" Manhole.
Basis of Payment

Storm Drain Manhole Type "C" shall be paid for on the basis of the Lump Sum Price Bid for each size Manhole complete and in place. No additional Payment will be made for linear feet of Vertical Depth.

Notes:
1. Walls and base slab shall be brick or Mix No. 3 concrete poured in place.
2. For pipes 36" or smaller use Type "A" or Type "B" Manhole. Use Type "B" where "A" cover is less than 619".
3. Where "A" is less than 3'-6" use Alternate Manhole Stack.
4. Where "C" is less than 12' use 8" wall, where greater than 12' use 12" wall.

Section

Invert brick laid on edge

Anne Arundel County
Department of Public Works

Standard Drainage Details
Type "C" Manhole
42" & Larger Pipes

Published: 01/01 Revised:
GRANITE DRIp STONEs ARE PREFERENCES BUT IF NOT AVAILABLE SOME OTHER APPROVED TYPE MAY BE USED.

NOTE: LOCATION OF Drip STONES MAY BE ADJUSTED TO MEET THE REQUIREMENTS OF EACH BASE BUT NORMALLY SHALL BE 6' APART

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

WALL THICKNESS
6" TO DEPTH OF 12'-0"
13" BELOW DEPTH OF 12'-0"
TO DEPTH OF 24'-0"

NOTES

1. For details not shown on this sheet see Std. Detail D-11.
III-17 of 99

Cover to be provided with 3/4" holes <= 3%.

Core four 1" holes in frame, 90° apart.

2" Letters

Pry bar holes on edge of cover.

STORM DRAIN

DEPT. PUBLIC WORKS

ANNE ARUNDEL COUNTY

1 1/2" Letters

Standard diamond grid

1 1/2" Letters

SECTION "A-A"

TOTAL WT. 420 LBS.

SECTION "B-B"

CASTINGS MUST BE GROUND, CHIPPED OR TURNED

3/4" hole

3/8"
SECTION "A"-"A"

WEIGHT 185 LBS.

COVER TO BE PROVIDED WITH 3/4" HOLES @ 3" O/C.
Basis of Payment:
Standard Bend Structure shall be paid for on the basis of the lump sum price bid for each Bend Structure. Price bid shall include the cost of the Manhole Stack.

Mix No. 3 Concrete
Flush with outside top of pipe.

½" Cement Mortar

Invert brick laid on edge

SECTION E-E

6. Frame and cover for manhole on 54° and larger bends shall be 2'-6" with lettering and holes as shown for 2'-0" frame.

<table>
<thead>
<tr>
<th>Pipe Dia.</th>
<th>Radius</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Bars E</th>
<th>Bars F</th>
<th>d</th>
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<tbody>
<tr>
<td>30&quot;</td>
<td>5'-0&quot;</td>
<td>3'-10&quot;</td>
<td>8'</td>
<td>8'</td>
<td>#5 @ 6%</td>
<td>#5 @ 5%</td>
<td>2'-6&quot;</td>
</tr>
<tr>
<td>33&quot;</td>
<td>6'-0&quot;</td>
<td>4'-1&quot;</td>
<td>8'</td>
<td>8'</td>
<td>#5 @ 6%</td>
<td>#5 @ 5%</td>
<td>2'-6&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>6'-0&quot;</td>
<td>4'-4&quot;</td>
<td>8'</td>
<td>8'</td>
<td>#5 @ 5%</td>
<td>#5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>7'-0&quot;</td>
<td>4'-10&quot;</td>
<td>8'</td>
<td>10&quot;</td>
<td>#5 @ 6%</td>
<td>#5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>8'-0&quot;</td>
<td>5'-4&quot;</td>
<td>8'</td>
<td>10&quot;</td>
<td>#5 @ 6%</td>
<td>4 #5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>54&quot;</td>
<td>9'-0&quot;</td>
<td>6'-6&quot;</td>
<td>12&quot;</td>
<td>10&quot;</td>
<td>#5 @ 6%</td>
<td>5 #5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>10'-0&quot;</td>
<td>7'-0&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>#6 @ 8%</td>
<td>6 #5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>66&quot;</td>
<td>11'-0&quot;</td>
<td>7'-5&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>#6 @ 8%</td>
<td>7 #5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>12'-0&quot;</td>
<td>8'-0&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>#6 @ 8%</td>
<td>7 #5 @ 5%</td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. Material walls and base shall be brick or Mix No. 3 concrete see Section E-E where 12" thickness is required 8" reinforced concrete may be substituted, see Section R-R.
3. Manhole Details steps, frame, cover, walls and max. batter shall be as shown on contract drawings or standard manhole Type A.
4. Bend Data C, radius, B, C, and reinforcement shall be based upon D1 or D2 whichever is smaller.
5. Manhole Opening d shall be based on downstream pipe size D2.

SECTION R-R

7. Min. length of curve is 4'-0" for type "C" manhole stack.
8. Manhole stack shall conform to that of Type "C" Manhole (D-14).

ANNE ARUNDELE COUNTY
DEPARTMENT OF PUBLIC WORKS

REVIEWED
APPROVED
CHIEF ENGINEER
DESIGN ENGINEER
DATE

STANDARD DRAINAGE DETAILS
BEND STRUCTURE
CIRCULAR PIPE

Published: 01/01 Revised:
Basis of Payment: Standard bend structure shall be paid for on the basis of the lump sum price bid for each bend structure. Price bid shall include the cost of the manhole stack.

Vary radii so as to form smooth taper when D1 differs from D2.

If indicated on contract drawings, manhole shall be located as shown.

**SECTION A-A (Brick)**

Notes:
1. Walls and bottom shall be brick or mix no. 3 concrete where 12" brick thickness is required. 6" reinforced concrete may be substituted.
3. Bend data, e-r, b, c, and reinforcing

<table>
<thead>
<tr>
<th>EQRD</th>
<th>PIPE DIAMETER</th>
<th>A RAD</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>BARS E</th>
<th>SPACING</th>
<th>BARS F</th>
<th>SPACING</th>
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<tbody>
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<td>30</td>
<td>30&quot; x 24&quot;</td>
<td>6-0</td>
<td>4-0</td>
<td>6</td>
<td>10</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>42&quot; x 27&quot;</td>
<td>7-0</td>
<td>4-10</td>
<td>6</td>
<td>10</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td></td>
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<tr>
<td>36</td>
<td>45&quot; x 29&quot;</td>
<td>6-0</td>
<td>5-1</td>
<td>8</td>
<td>10</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
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<tr>
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<td>53&quot; x 34&quot;</td>
<td>9-0</td>
<td>5-9</td>
<td>8</td>
<td>10</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td>#5 @ 8&quot;</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>60&quot; x 38&quot;</td>
<td>10-0</td>
<td>6-4</td>
<td>8</td>
<td>12</td>
<td>#6 @ 8&quot;</td>
<td>#6 @ 10&quot;</td>
<td>#6 @ 10&quot;</td>
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<tr>
<td>54</td>
<td>68&quot; x 43&quot;</td>
<td>11-0</td>
<td>7-0</td>
<td>12</td>
<td>12</td>
<td>#6 @ 8&quot;</td>
<td>#6 @ 10&quot;</td>
<td>#6 @ 10&quot;</td>
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<tr>
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<td>8-4</td>
<td>12</td>
<td>12</td>
<td>#6 @ 8&quot;</td>
<td>#6 @ 10&quot;</td>
<td>#6 @ 10&quot;</td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>83&quot; x 53&quot;</td>
<td>13-0</td>
<td>8-11</td>
<td>12</td>
<td>12</td>
<td>#6 @ 8&quot;</td>
<td>#6 @ 10&quot;</td>
<td>#6 @ 10&quot;</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>91&quot; x 58&quot;</td>
<td>14-0</td>
<td>9-7</td>
<td>12</td>
<td>12</td>
<td>#6 @ 8&quot;</td>
<td>#6 @ 10&quot;</td>
<td>#6 @ 10&quot;</td>
<td></td>
</tr>
</tbody>
</table>

Section A-A (Concrete)

Shall be based upon D1 or D2, whichever is smaller.

4. Manhole opening "g" shall be based on downstream pipe size (D2).

5. Manhole details shall be shown on contract drawings. Use standard type "A" manhole (D/11)

6. Min. length of curve is 6'0" for type "C" manhole stack.

7. Manhole stack shall conform to that of type "C" manhole (D/14)

8. For CMP dimension A will be horizontal dimension of arch plus 2B.

(4) See notes 6 and 7.
Notes
Manhole location, size and details, concrete and reinforcing steel requirements, center line radius and other details shall be in accordance with Bend Structure Detail D/18 or D/19

Published: 01/01  Revised:
NOTES:
Sections E-E (between limits shown) shall conform to Standard Bend Structure (D/18 or D/19).
Where manhole is required (as indicated on Contract Drawings), manhole location and extra reinforcing shall be as shown on Standard Bend Structure D/18 or D/19.
Walls and base shall conform to Standard Bend Structure D/18 or D/19.
Manhole stack shall conform to that of Type "C" Manhole D/14.
Apply Dampproofing on Exterior Surfaces.
BASIS OF PAYMENT Standard Junction Chamber shall be paid for on the basis of the lump sum price bid for each Junction Chamber. Price bid shall include the price of the manhole stack where required.

Published: 01/01   Revised:
NOTES
1. Walls and beam shall be
   Brick or Mix No.3 Concrete.
2. Superload = A.A.S.H.T.O. - 20
   Earth Load = 0' to 12'.

BASIS OF PAYMENT
Standard Single or Double
Brick "Y" shall be paid for
on the basis of the lump
sum bid for each type "Y"
Structure.

MINIMUM DIMENSIONS

<table>
<thead>
<tr>
<th>D</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-18</td>
<td>3' - 9&quot;</td>
<td>2' - 9&quot;</td>
</tr>
<tr>
<td>21-30</td>
<td>4' - 4&quot;</td>
<td>3' - 7&quot;</td>
</tr>
<tr>
<td>33-36</td>
<td>4' - 7&quot;</td>
<td>3' - 11&quot;</td>
</tr>
</tbody>
</table>

PLAN OF ROOF SLAB REINFORCING
2" Clear
Slab, Mix No.3 Concrete

SECTION A - A
Vitrified
Brick Lining, (Lay on edge)

STANDARD DRAINAGE DETAILS
STANDARD BRICK "Y"
SINGLE & DOUBLE

Published: 01/01        Revised:
NOTES

1. Invert shall be brick laid on edge
2. Base shall be brick or Mix No. 3 Concrete.
3. Walls shall be Brick (Br.), Mix No. 3 Concrete(P.C.) or Reinforced Concrete(R.C.). See Table for dimensions.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>WALLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6&quot;</td>
<td>6&quot;</td>
<td>6'-4&quot;</td>
<td>Br. or P.C.</td>
</tr>
<tr>
<td>6'-10&quot;</td>
<td>12&quot;</td>
<td>7'-0&quot;</td>
<td>Br. or P.C.</td>
</tr>
<tr>
<td>6'-10&quot;</td>
<td>6&quot;</td>
<td>6'-4&quot;</td>
<td>R.C.</td>
</tr>
</tbody>
</table>

4. Reinforcing - 4 @ 10" E.W. in 6 of wall. Reinforcing continuous at corners. All laps 1'-4".
5. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY - 4" MIN., 12" MAX.
6. Precast inlet shall meet the requirements of AASHTO M 199.

3. Wall Thickness, (B) may be stepped at depths shown.

2" Support for Sidewalk
Slopes top slab to conform to sidewalk slope.

SECTION A-A

ANNE ARUNDELE COUNTY
DEPARTMENT OF PUBLIC WORKS

Published: 01/01 Revised:
Standard manhole steps shall be installed as shown. See Detail 5/21

Leaving a 4" x 4" opening for subgrade drain

NOTES

1. Invert shall be brick laid on edge.
2. Base shall be brick or Mix No. 3 Concrete.
3. Wells shall be Brick (Br.) Mix No. 3 Concrete (P.C.) or Reinforced Concrete (R.C.)
   See Table for dimensions.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Wells</th>
</tr>
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<tbody>
<tr>
<td>&lt; 6'</td>
<td></td>
<td>8&quot;</td>
<td>6'-4&quot;</td>
<td>Br or P.C.</td>
</tr>
<tr>
<td>6' to 10'</td>
<td>12&quot;</td>
<td>7'-0&quot;</td>
<td>Br or P.C.</td>
<td></td>
</tr>
<tr>
<td>6' to 15'</td>
<td>8&quot;</td>
<td>6'-4&quot;</td>
<td>R.C.</td>
<td></td>
</tr>
</tbody>
</table>

4. Reinforcing "4 @ 10" % E.W. in t. of wall. 
   Reinforcing continuous at corners. All tops 1'-4"

5. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY = 4" MIN., 12" MAX.

6. Bench (as per Type A Manhole) shall be built into inlet where drains 24" and larger run through inlet.

PLAN BELOW SLAB

2" Support for Sidewalk 
Snake top slab to conform to sidewalk slope.

SECTION A-A

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS TYPE A-2 INLET

Published: 01/01 Revised:
Standard manhole steps shall be installed as shown, See Detail 5/21.

Curb Section Monolithic with gutter. (Paid for as Curb and Gutter).

Leave 4" x 4" openings for subgrade drain.

2"-0" or to meet existing Curb and Gutter.

### PLAN BELOW SLAB

e Wall thickness (B) may be stepped at depths shown.

Slope top slab to conform to sidewalk slope.

2" Support for Sidewalk

Sidewalk Frame and Cover

Manhole Steps 1'-3"7/8

4" Cement Mortar on brick inlet

### NOTES

1. Invert shall be brick laid on edge.
2. Base shall be brick or Mix No. 3 Concrete.
3. Wells shall be Brick (Br.), Mix No. 3 Concrete (P.C.), or Reinforced Concrete (R.C.). See Table for dimensions

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Wells</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5&quot;</td>
<td>8&quot;</td>
<td>12'-6&quot;</td>
<td>Br. or P.C.</td>
</tr>
<tr>
<td>5&quot; to 8&quot;</td>
<td>12&quot;</td>
<td>12'-6&quot;</td>
<td>Br. or P.C.</td>
</tr>
<tr>
<td>8&quot;</td>
<td>8&quot;</td>
<td>8'-4&quot;</td>
<td>R.C.</td>
</tr>
</tbody>
</table>

4. Reinforcing - 3@10" @ E.W. in 6 of walls. Reinforcing continuous at corners. All bars 1/4".

5. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY - 4" MIN., 12" MAX.

6. Precast inlet shall meet the requirements of AASHTO N 199.
Standard manhole steps shall be installed as shown, See Detail 5/21.

Curb Section Monolithic with Gutter. (Poured as Curb and Gutter).

Leaves 4" x 4" opening for subgrade drain.  
2'-0" to meet existing Curb and Gutter.

**PLAN BELOW SLAB**

Slope Top Slab to conform to Sidewalk Step(s).

2" Support for Sidewalk

Sidewalk Frame and Cover

Manhole Steps 1' - 3" %

4 C x 5.4 to have one shop coat and one field coat of any approved paint.

Sidewalk Frame and Cover
See Detail 3/17

Slab reinforcing 4" x 136" as shown.

Mix No.3 Concrete

3/4" x 10" Anchor bolts welded to C as shown.

6@6" % 4% 6@6" % 4%

**SLAB**

NOTES

1. Invert shall be brick laid on edge.

2. Bottom Slab shall be Brick or Mix No.3 Concrete.

3. Walls shall be Brick(Br.), Mix No.3 Concrete(PC), or Reinforced Concrete (R.C.)

See Table for Dimensions

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Walls</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5&quot;</td>
<td>8&quot;</td>
<td>11-1/2&quot;</td>
<td>Br. or PC</td>
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<tr>
<td>5' to 6&quot;</td>
<td>12&quot;</td>
<td>12-1/2&quot;</td>
<td>Br. or PC</td>
</tr>
<tr>
<td>5' to 10&quot;</td>
<td>8&quot;</td>
<td>11-1/2&quot;</td>
<td>R.C.</td>
</tr>
</tbody>
</table>

4. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY - 4" MIN., 12" MAX.

5. Reinforcing - 4-10")% E.W. in ft. of walls. Reinforcing continuous of corners. All Lags 1-4".

6. Bench (as per Type A Manhole) shall be built into inlet where drains 24" & larger run through inlet.

7. Precast inlet shall meet the requirements of AASHO H-199.

---

**ANNE ARUNDELE COUNTY**

**DEPARTMENT OF PUBLIC WORKS**

**STANDARD DRAINAGE DETAILS**

**TYPE B-2 INLET**

**APPROVED**

**CHIEF ENGINEER**

**DESIGN ENGINEER**

Published: 01/01  Revised:
Notes:
1. Base and walls shall be brick or Mix No. 3 concrete.
2. Maximum depth of wall shall be 3-6" where outlet pipe requires greater depth, drop section shall be formed around pipe.
3. Invert shall be brick laid on edge.

<table>
<thead>
<tr>
<th>FRAME DIMENSION TABLE</th>
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<tbody>
<tr>
<td>W</td>
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<tr>
<td>---</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
</tbody>
</table>

4. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY 4'-MIN., 12'-MAX.
5. Precast inlet shall meet the requirements of AASHTO M 199.

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED
CHIEF ENGINEER
DESIGN ENGINEER
DATE

Published: 01/01 Revised:
NOTES:
1. Invert shall be brick laid on edge.
2. Allowable grade adjustment with brick masonry 4 min, 12 max.
3. Where Depth is 3'-6" or greater Standard Manhole steps shall be installed as shown. See Detail S-21
4. Maximum Vertical Depth of inlet shall be 8'-0".
5. Precast inlet shall meet the requirements of AASHTO M 199

SLAB

PLAN BELOW SLAB

SECTION

Mix No. 3 Concrete

Mainhole Steps 1'-3" apart %.

1/2" Cement Mortar on brick inlet

Walls shall be brick Mix No. 3 Concrete or reinforced concrete

Base shall be brick or Mix No. 3 Concrete.

Sidewalk Frame and Cover
See Detail B/17
Exact elevation to be fixed in the field.
Arch brick around pipe

1'-6" Min

Std Min. Depth = 3'-0"

Published: 01/01 Revised:
Notes:
1. Base shall be Brick or Mix No. 3 Conc. invert shall be brick laid on edge.
2. Walls shall be Brick (Br) Mix No. 3 Conc. (PC) or Reinforced Mix No. 3 Conc. (RC) See Table below for dimensions.
3. * Reinforcing = 4 10" % EW in E of walls. Reinforcing continuous at corners. All laps 4'.
4. Top 4" of walls shall be brick masonry. Additional brick shall be used to bring Cover to existing grade if required.
5. Bench (as per Type A Manhole) shall be built into inlet where drains 24" and larger run through inlet.
6. Standard manhole steps shall be installed as shown, See Detail S/21
7. Precast inlet shall meet the requirements of AASHTO M199.
NOTE

1. APPROXIMATE WEIGHTS:
   EA. GRATE - 216 LBS.
   FRAME (FULL FLANGE) - 668 LBS.
2. END AND/OR SIDE FLANGES MAY BE OMITTED IF NECESSARY.

STANDARD DRAINAGE DETAILS
TYPE NO. 4 "E" GRATE

Published: 01/01 Revised:
NOTE: IF AFTER SEATING GRATE, THE OUTSIDE VIO, BETWEEN THE FRAME AND GRATE, EXCEEDS 2 INCHES, A FILLER BAR $\frac{3}{4}$ INCHES THICK X $\frac{3}{4}$ INCHES LONG SHALL BE TIG WELDED TO THE OUTSIDE EDGE OF GRATE AS SHOWN.

GENERAL NOTES:
1. GRATES TO BE SQUARE, FLAT & TRUE.
2. STRUCTURAL STEEL SHALL BE ASTMD DESIGNATION A992.
3. GRATES TO BE GALLICIZED AFTER FABRICATION IN ACCORDANCE WITH ASTMD DESIGNATION A992.

SECTION A-A

SECTION B-B

SECTION C-C

STANDARD DRAINAGE DETAILS
TYPE E & H INLET COMBINATION
RETICULAR REPLACEMENT GRATE
CONCRETE SLAB

SIDEWALK FRAME & COVER
SEE DETAIL 0/17

2" COVER

SLAB ELEVATION

2" COVER

5" x 5" ANCHOR BOLTS, SPACED @ 3'-6" MAX. GALVANIZED AFTER WELDING.

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

SECTION C-C

LADDER RUNGS ADJACENT TO MANHOLE

FACE OF NORMAL CURB

GUTTER PAN TO BE ROUGH FINISH

T" (THROAT OPENING)

"L" (C.A. LENGTH)

PLAN B - (SHOWN WITHOUT CONC. SLAB)

JOINT FILLER SHALL BE A CORK MATERIAL MEETING REQUIREMENTS OF AASHTO M-63 TYPE III

"4" DEFORMED BARS (12" LENGTHS)

NORMAL ROADWAY SLOPE

INLET "R" "L"

COS 5 4'-3½" 5'-8½"
COS 15 15'-8½" 17'-1½"

SECTION A-A

PROVIDE 6" WIDE GRANULAR BEDDING ON FIRM SUBGRADE

NOTE:
CURB OPENING SHOULD NOT ENERGACH ON CROSSWALK AREAS. INLETS SHALL BE CONSTRUCTED OF REINFORCED CONCRETE (MIN. NO. 2). SIZE, TYPE & DIRECTION OF INLET CONNECTION WILL VARY TO SUIT CONDITIONS. REINFORCEMENT REQUIRED ON OUTSIDE, AS WELL AS ON INSIDE OF WALL, WHEN "A" IS GREATER THAN 7'-0" SPACING, SAME AS FOR INSIDE OF WALL. PLACE EXPANSION MATERIAL (SAME TYPE APPROVED FOR PAVEMENT) AS INDICATED. STANDARD MANHOLE STEPS SHALL BE INSTALLED AS SHOWN OR DIRECTED BY THE ENGINEER. SEE DETAIL 8/81 ANGLES & ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A-125, AFTER WELDING. THIS STANDARD TO BE USED WITH STANDARD CURB & GUTTER, DETAIL 1/24 ONLY.

THIS DIMENSION TO BE MAINTAINED FOR ALL STANDARD COS INLETS

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS

STANDARD COS INLETS

5' & 15'

APPROVED

CHIEF ENGINEER

DESIGN ENGINEER

DATE

REvised

Published: 01/01 Revised:
GENERAL NOTES:
1. CURB OPENING SHOULD NOT ENCROACH ON CROSSWALK AREAS.
2. CONCRETE TO BE MIX NO. 4 (4500 PSI).
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. PIPE KNOCKOUT, 4.5' VERTICALLY, TO BE PROVIDED AS SHOWN ON PLANS.
5. INLET INVERTS TO BE PROVIDED IN THE FIELD AS REQUIRED.
6. GRADE AND SLOPE ADJUSTMENT COMPLETED IN THE FIELD AS REQUIRED.
7. WHERE PIPE INVERT ARE ABOVE BOTTOM OF BOX PROVIDE CONCRETE OR BRICK MASONRY TO MEET PIPE INVERT.
9. CHANNELS AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A 123, AFTER WELDING.
10. PIPE KNOCKOUT, HORIZONTALLY, ARE CONTINGENT UPON THE SIZE OF THE PIPE CONNECTED. A 4" THICKNESS, HOWEVER MUST BE MAINTAINED AROUND THE PERIMETER OF THE WALL.
11. FOR CONFIGURATION OF GUTTER PAN AND STRIPING DETAILS REFER TO DETAIL 0/33.
12. 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, ROUNDED PRECAST TROUGH FLOOR.
13. REFER TO DETAIL 2/34A FOR DETAILS OF COB-20 PRECAST CONCRETE TROUGH SLAB, ALSO DETAILS FOR ADJUSTMENT COLLARS AND INLET SLABS FOR OTHER COB INLETS.

PLAN (SHOWN WITHOUT CONC. SLAB)
* LOCATE TROUGH ON OPPOSITE SIDE OF INLET WHEN DIRECTION OF FLOW IS FROM THAT SIDE.

SECTION A-A
1. PROVIDE 6" MIN. GRANULAR BEDDING ON FIRM SUBGRADE
2. KEYED JOINT
3. INVERT TO SLOPE 2" PER FOOT TOWARDS OUTLET OR AS DIRECTED (TO BE CONSTRUCTED IN FIELD)
4. DEFORMED BARS @ 8" C/C

SECTION C-C
1. "E" THROUGH OPENING
2. "L" THROUGH OPENING
3. "G" THROUGH OPENING
4. "F" THROUGH OPENING

SECTION B-B
1. "D" THROUGH OPENING
2. "C" THROUGH OPENING
3. "B" THROUGH OPENING

INLET TYPE: "T" "L" "M"
1. COB-3 5'-0" 5'-0"
2. COB-6 10'-0" 10'-0"
3. COB-15 15'-0" 15'-0"
4. COB-20 20'-0" 20'-0"

STEEL SUPPORT POSTS
1. 5'-0" C/C 3'-3"
2. WITH 4"x9"x3" CAP B BASE PLATE

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED

CHIEF ENGINEER

DESIGN ENGINEER

DATE

STANDARD DRAINAGE DETAILS

PRECAST SQUARE AND RECTANGULAR COB INLETS 5', 10', 15' & 20'

REVISED

34

Published: 01/01 Revised:
ELEVATION

COG-20 TROUGH SLAB
(TO BE CAST IN TWO SECTIONS)

CONCRETE INLET SLAB
(6' THICK)

NOTES:
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. SEE DETAILS D/34 FOR COG INLET DETAILS.
3. THE CONCRETE INLET SLAB AND CONCRETE ADJUSTMENT COLLAR ARE FOR ALL COG INLETS.
CONCRETE TROUGH SLAB
(6" THICK)

CONCRETE ADJUSTMENT COLLAR
(CAST IN 3", 6" & 9" THICKNESS)

INTERLOCKING BLOCK OUTLINE
PLAN CONCRETE INLET SLAB
* FOR 96" & 108" DIAMETERS DIMENSION WILL BE SAME AS WALL THICKNESS

NOTE: FOR CONFIGURATION OF CONCRETE SUTTER PANELS & STRIPING SEE DETAIL 0/33.

REINFORCING TO BE EITHER WELDED WIRE FABRIC OR DEFORMED BARS AND TO CONFORM TO AREAS GIVEN UNDER R IN CHART AT BOTTOM OF SHEET.

LADDER RUNGS
SEE NOTE 6

SECTION A-A
NOTES:
1. CURB OPENING SHALL NOT ENCROACH ON CROSSWALK AREAS.
2. CONCRETE TO BE MIX. NO. 6 (4500 PSI)
3. ANGLES AND ANCHOR BOLTS TO BE GASKETED AFTER WELDING IN ACCORDANCE WITH ASTM A 325.
4. GRADE AND SLOPE ADJUSTMENTS SHALL BE COMPLETED IN THE FIELD USING PRECAST ADJUSTMENT COLLAR AND MORTAR.
5. A CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FT TOWARD OUTLET.
7. 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 WHEN PRECAST TROUGH FLOOR.
8. SEE DETAIL D/358 FOR ALTERNATE PRECAST TROUGH FLOOR.

CIRCULAR BASE AND RISER UNIT DIMENSIONS

<table>
<thead>
<tr>
<th>CIRCULAR BASE</th>
<th>RISER UNIT</th>
<th>D X W</th>
<th>R-REIN.</th>
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<tbody>
<tr>
<td>5' 10&quot;</td>
<td>10'</td>
<td>5' 10&quot;</td>
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</tr>
<tr>
<td>15' 8&quot;</td>
<td>20'</td>
<td>15' 8&quot;</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>STANDARD DRAINAGE DETAILS</th>
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<tbody>
<tr>
<td>PRECAST CIRCULAR COG INLETS</td>
</tr>
<tr>
<td>5', 10', 15', 20'</td>
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</tbody>
</table>

| REVISED D 34B |

Published: 01/01  Revised:
CONCRETE SLAB

SECTION A-A

GENERAL NOTES
1. CURB OPENING SHOULD NOT ENCROACH ON CROSSWALK AREAS.
2. CONCRETE TO BE MIX NO.6
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. PIPE KNOCKOUTS 4 1/2 VERTICALLY, TO BE PROVIDED AS SHOWN ON PLAN.
5. INLET INVERTS TO BE PROVIDED IN FIELD AS REQUIRED.
6. WHERE PIPE INVERTS ARE ABOVE BOTTOM OF BOX PROVIDE CONCRETE OR BRICK CHANNEL TO MEET PIPE INVERT.
8. CHANNELS AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A-123, AFTER WELDING.
9. PIPE KNOCKOUTS, HORIZONTALLY, ARE CONTINGENT UPON THE SIZE OF THE PIPE CONNECTED. A 6" THICKNESS, HOWEVER, MUST BE MAINTAINED AROUND THE PERIMETER OF THE WALL.
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. THIS STANDARD TO BE USED WITH STANDARD COMBINATION CURB AND GUTTER, DETAIL 1/24 ONLY.

SLOPED FLOOR TO BE CAST IN FIELD (SEE NOTE 10)
4 \( \frac{1}{2} \) DEFORMED BARS @ 24" C/C

SECTION A-A

PLAN

(SHOWN WITHOUT CONC SLAB)

GENERAL NOTES
1. CURB OPENING SHOULD NOT ENCROACH ON CROSSWALK AREAS.
2. CONCRETE TO BE MIX NO.6
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. PIPE KNOCKOUTS 4 1/2 VERTICALLY, TO BE PROVIDED AS SHOWN ON PLAN.
5. INLET INVERTS TO BE PROVIDED IN FIELD AS REQUIRED.
6. WHERE PIPE INVERTS ARE ABOVE BOTTOM OF BOX PROVIDE CONCRETE OR BRICK CHANNEL TO MEET PIPE INVERT.
8. CHANNELS AND ANCHOR BOLTS TO BE GALVANIZED IN ACCORDANCE WITH ASTM A-123, AFTER WELDING.
9. PIPE KNOCKOUTS, HORIZONTALLY, ARE CONTINGENT UPON THE SIZE OF THE PIPE CONNECTED. A 6" THICKNESS, HOWEVER, MUST BE MAINTAINED AROUND THE PERIMETER OF THE WALL.
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. THIS STANDARD TO BE USED WITH STANDARD COMBINATION CURB AND GUTTER, DETAIL 1/24 ONLY.

SLOPED FLOOR TO BE CAST IN FIELD
(SEE NOTE 10)
4 \( \frac{1}{2} \) DEFORMED BARS @ 24" C/C

SECTION A-A

III-38 of 99
Published: 01/01 Revised:

ANNE ARUNDEL COUNTY DEPARTMENT OF PUBLIC WORKS

REVIEWED

STANDARD DRAINAGE DETAILS PRECAST SQUARE AND RECTANGULAR COS INLETS 5' & 15'

CHIEF ENGINEER
DESIGN ENGINEER

DATE

35
III-40 of 99

Published: 01/01 Revised:
PLAN

LEAVE 4" x 4" OPENINGS FOR SUBGRADE DRAINAGE IF DIRECTED

CURB JOINT WITH 1/4 EXPANSION MATERIAL

REINFORCEMENT:
NO. 4 8 DEFORMED BARS, 0.6 C/C 2 WAYS 2" COVER

SECTION A-A

SPECIAL PRECAST CURB
(SEE DETAIL B-B)

NORMAL PAVEMENT SLOPE

W8 x 31 ELEC. GALV.
SUPPORT BEAM 3' 7½" LONG
FOR DETAILS SEE DETAIL 0-59
FOR METHOD OF ANCHORING
SUPPORT BEAM IF INLET IS
CONSTRUCTED OF BRICK
SEE DETAIL 0-37

INVERT SHALL BE BRICK
LAID ON EDGE SLOPED
AT LEAST 2" PER FOOT
TOWARD OUTLET

SECTION B-B

1/4" CEMENT MORTAR ON BRICK INLET

NOTES:
1. Base shall be Brick or Mix No. 3 Concrete.
2. Walls shall be Brick, Mix No. 3 Concrete, or reinforced Hi: No. 3 Concrete.
   Depth 6"; Wall 8" Brick or Concrete
   6" to 10"; Wall 12" Brick or Concrete
   6" to 12"; Wall 8" Reinforced Concrete
3. Reinforcing = 4/0.666 C/E of Wall; Reinforcing continuous at corners; Minimum 1/16"
4. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY
   3° MIN., 12" MAX.
5. Standard manhole steps shall be installed (Detail S/2/1)
6. Size, type and direction of outlet pipe will vary to suit each case and the invert altered accordingly.
7. Precast inlet shall meet the requirements of AASHTO M-99.

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED

CHIEF ENGINEER

DATE

REvised:

standard drainage details

standard nr inlet

6/30

D.

36
III-42 of 99

Published: 01/01     Revised:

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

CHIEF ENGINEER
DESIGN ENGINEER

[Signature]

STANDARD DRAINAGE DETAILS
STANDARD NRM INLET

REvised: D 37
GENERAL NOTES
1. FRAMES & GRATES TO BE SQUARE FLAT & TRUE.
2. STRUCTURAL STEEL SHALL BE A.S.T.M. DESIGNATION A-36.
3. FRAMES & GRATES TO BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH A.S.T.M.
   DESIGNATION A-123

SECTION A-A
USE 4" x 1/2 FLAT BAR WHEN OPEN FACED CURB IS USED.

SECTION B-B
SUPPORT BEAM OF INLET 3/4 x 1-10/8 DEVEL. BOTH ENDS
SUPPORT BEAM OF BAND BARS 3/8 x 1-10/8 2 PER FRAME
CHAMFER BOTTOM OF BAND BARS 5/8 16 16

Published: 01/01 Revised:
NOTES:
1. Wall and Base shall be Brick or Mix No. 3 Concrete
2. B=8'' Where A is less than 8''
   B=12'' Where A is 8'' to 14''
3. Allowable grade adjustment with brick masonry 4''Min., 12''Max.
4. Invert shall be brick laid on edge.
5. Bench (as per Type A Manhole) shall be built into inlet where drains 24'' and longer run through inlet.
6. Where A is 3''-6'' or greater standard manhole steps shall be installed as shown, See Detail S/21.
7. Precast inlets shall meet the requirements of AASHTO M199

Published: 01/01 Revised:
NOTE: THE CONCRETE MEDIAN DITCH 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 WITHIN A DISTANCE OF TEN (10) FEET FROM THE INLET.

FOR INLET IN A SUMP SEE GUTTER DETAILS AS SHOWN IN THE ISOMETRIC VIEW ON STL. D/43

ISOMETRIC VIEW

"S" FRAME & GRATE

SEE DETAIL D/47

MIX NO. 2 CONCRETE

SECTION B-B

4" Cement Mortar on brick inlet

SECTION A-A

NOTES:

1. Base shall be plain Mix No.3 Concrete or Brick. Invert shall be brick laid on edge. Invert to slope down toward outlet at the rate of two (2) inches per foot, or as directed.

2. Walls shall be constructed of reinforced Mix No.3 Concrete or brick. Size, type & direction of inlet connection will vary to suit conditions.

3. Reinforcement No.4 (4/8) deformed bars at 6"C. to C., 2" cover.

4. Reinforcement required on outside, as well as on inside, of walls below 7'-0", when "A" is greater than 7'-0" spacing, same as for inside of wall.

5. Allowable grade adjustment with brick masonry 4" Min., 12" Max.

6. Standard manhole steps should be installed, see Detail S/21.

7. Precast inlets shall meet the requirements of A.A.S.H.T.O. M 199

Published: 01/01 Revised:
SECTION "A - A"

Notes:
1. Base shall be Brick or Mix No. 3 Concrete.
2. Walls shall be Brick (Br.)
   Mix No. 3 Concrete (P.C.)
   or Reinf. Mix No. 3 Conc. (R.C.)
   See Table for dimensions.
   6" to 10" 12" Br. or P.C.
   6" to 15" 8" R.C.*
3. *Reinforcing = "4@10"% E.W. in f. of walls.
   Reinforcing continuous at corners. All laps 1'-4".
4. Allowable grade adjustment with brick masonry 4
   4" min., 12" max.
5. Invert shall be brick laid on edge.
6. Bench (as per Type A Manhole) shall be
   built into inlet where drains 2.4" and
   larger run through inlet.
7. Precast inlets shall meet the requirements of AASHTO M 199

Arch brick over pipe

SECTION "B - B"

Leave 4" x 4" opening for Subgrade drainage.

"S" Grate & Frame with cut Flanges See Detail D/47

Where A is 3'-6" or greater standard manhole seats shall be installed as shown.
See Detail S/21.

4" Cement Mortar on brick inlet

ANSZARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC WORKS

Published: 01/01 Revised:
NOTE: The concrete median ditch 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 within a distance of ten (10) feet from the inlet.

**ISOMETRIC VIEW**

For inlet on grade, modify slopes as shown in the isometric view on std. D/41.

"S" frame and grate with cut flanges, see detail D/55. Mix No. 2 concrete.

**SUPPORT BEAM IS NOT TO BE USED.**

**SECTION B-B**

- Arch brick over pipe
- 1/4" Cement Mortar on brick inlet

**SECTION A-A**

**NOTES:**

1. Base shall be plain Mix No.3 Concrete or Brick. Invert shall be brick laid on edge. Invert to slope down toward outlet at the rate of two (2) inches per foot, or as directed.

2. Walls shall be constructed of reinforced Mix No.3 Concrete or brick. Size, type & direction of inlet will vary to suit conditions.

3. Reinforcement No.4 (1/2") deformed bars at 6" C. to C., 2" cover.

4. Reinforcement required on outside, as well as on inside, of walls below 7'-0" when "A" is greater than 7'-0" spacing, same as for inside of wall.

5. Allowable grade adjustment with brick masonry 4" Min., 12" Max.

6. Standard manhole steps should be installed, see Detail S/21.

7. Precast inlets shall meet the requirements of AASHTO M 199.

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**ANNE ARUNDELE COUNTY DEPARTMENT OF PUBLIC WORKS**

**CHIEF ENGINEER**

**DESIGN ENGINEER**

**DATE**

**STANDARD DRAINAGE DETAILS**

**TYPE SOT INLET**

**DOUBLE GRATE TANDEM**

Published: 01/01 Revised:
III-49 of 99

Published: 01/01    Revised:

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED
RICE ENGINEER
DESIGN ENGINEER
DATE

STANDARD DRAINAGE DETAILS
STANDARD WR INLET

NOTES:
1. Inlet may be constructed of Reinforced Concrete (Mix No. 3) or brick. Size, type & direction of inlet connection will vary to suit conditions.
2. ALLOWABLE GRADE ADJUSTMENT WITH BRICK MASONRY 4" MIN.; 12" MAX.
3. Reinforcement required on outside, as well as on inside, at walls below 7'-0" when "A" is greater than 7'-0" Spacing, same as for inside of wall.
4. Place expansion material of same type approved for pavement between the frame & abutting rigid pavement & between ends of inlet curb & normal curb.
5. For depressed inlets, use normal pavement slope, for depressed inlets see detail D-51.
6. Precast inlets shall meet the requirements of AASHO M199.
7. Standard manhole steps shall be installed 8'1"-3 3/4"; See Detail S/21.
III-50 of 99

Published: 01/01 Revised:

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
STANDARD WRM INLET

NOTE:
1. Inlet may be constructed of Reinforced Concrete (Mix No. 3) or brick, Alum, type B direction of inlet connection will vary to suit conditions.
2. ALLOWABLE GRADE ADJUSTMENT WITH BRICK NASONRY 4" MIN , 12" MAX.
3. Reinforcement required on outside, as well as inside of wall below 7'-0" when "A" is greater than 7'-0". Spacing, same as for inside of wall.
4. Place expansion material of same type approved for pavement between ends of inlet curb & normal curb.
5. For undepressed inlets, use normal pavement slope, for depressed inlets, See Detail D/9!
6. Precast inlet shall meet the requirements of AASHTO M-199.
7. Standard manhole steps shall be installed 8'-3"/C, See Detail 5/27.
III-51 of 99

Standard Drainage Details - Standard WR Inlet

Published: 01/01 Revised:
GENERAL NOTES

1. Frames & grates to be square flat bar true.
2. Structural steel shall be A.S.T.M. designation A36.
3. Frames & grates to be galvanized after fabrication in accordance with A.S.T.M. designation A123 except for adherence which shall be in accordance with A.S.T.M. designation A755.

Anne Arundel County
Department of Public Works

Approved: [Signature]

Standard Drainage Details
Standard WR Inlet Frame & Grate

Published: 01/01  Revised:
NOTE:
Inlet to be used in a swale or sump. To be used only when
Max. capacity under 25' head = 3 c.f.s.
To be used with 15' conn. or smaller.
Not to be used in roadway or parking
area.

STANDARD DRAINAGE DETAILS
YARD TYPE INLET

Published: 01/01  Revised:
NOTES:

1. INFILTRATION TRENCH IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST STANDARD SPECIFICATIONS AND AS SHOWN ON THE PLANS.
2. FILTER CLOTH SHALL BE PLACED ON THE SIDES AND TOP OF THE TRENCH.
   OVERTOP FILTER CLOTH: TOP – 6 INCHES, SIDE – 2 FEET
3. COURSE FABRIC WITH (1/2" to 1") MESH TO BE PLACED AT BOTTOM OF TRENCH.
4. TRENCH SHALL BE THE SIZE NOTED ON THE PLANS.
5. DISTRIBUTION PIPE SHALL BE SET (1'-0" MIN) BELOW THE LOWEST INVERT OF THE DRAINAGE STRUCTURE	OUTLET PIPES (EXCLUDING DEWATERING PIPE).
6. CLEANOUT AT THE END OF DISTRIBUTION PIPE SIMILAR TO DETAIL (5/18) SHALL BE PROVIDED WHERE NOTED ON THE PLANS OR FOR SYSTEMS REQUIRING MORE THAN 100' OF DISTRIBUTION PIPE.

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

PROOFED
CHIEF ENGINEER

DESIGN ENGINEER

STANDARD DRAINAGE DETAILS
TYPICAL INFILTRATION STRUCTURE
(FROM DRAINAGE STRUCTURE)
NOTES:

1. INFILTRATION TRENCH IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST STANDARD SPECIFICATIONS AND AS SHOWN ON THE PLANS.
2. FILTER CLOTH SHALL BE PLACED ON THE SIDES AND TOP OF THE TRENCH. OVERLAP FILTER CLOTH: TOP—6 INCHES, SIDE—2 FEET.
3. LOAD BEARING SURFACE: PARKING lots, SIDEWALKS DRIVEWAYS USE S.D.R.—35 OR S.D.R. 40 OR P.V.C. PIPE STAMPED WITH 3,000 LBS.—CRUSH.
4. NON-LOAD BEARING SURFACE: USE S.D.R.—35 OR S.D.R. 40 OR P.V.C. PIPE STAMPED WITH 3,000 LBS.—CRUSH.
5. 4" OR 6" P.V.C. PIPE USED AS PER APPROVED PLANS.
6. TRENCH SHALL BE THE SIZE NOTED ON THE PLANS.
7. ALL DOWN-SPOUTS FROM SITE HAVE TO BE HOOKED-UP TO THE S.W.M. DEVICE.

STANDARD DRAINAGE DETAILS

TYPICAL INFILTRATION STRUCTURE
(From Roof Leaders of Building)
1" DIA. HOLES @ 4" C.C. BOTH WAYS THROUGHOUT ENTIRE TRASH RACK

GALVANIZED EXPANSION BOLTS (TYPICAL)

4" C.C. (TYPICAL)

END PLATES WELDED TO BOTH ENDS OF TRASH RACK

OUTLET PIPE (SIZE AS NOTED ON PLANS)

WALL OF DRAINAGE STRUCTURE

END PLATES WELDED TO BOTH SIDES OF TRASH RACK

ACCMP TRASH RACK (MIN. HALF 24")

WALL OF DRAINAGE STRUCTURE

MIN. HALF 24" ACCMP WITH 1" DIA HOLES @ 4" C.C. BOTH WAYS, BOLTED TO WALL HORIZONTALLY WITH GALVANIZED EXPANSION BOLTS.

PROVIDE 2" MIN. CLEARENCE BETWEEN TRASH RACK AND SIDE WALLS - (TYPICAL BOTH SIDES)

STANDARD DRAINAGE DETAILS

TYPICAL INFILTRATION STRUCTURE (BAFFEL)
III-61 of 99

Published: 01/01 Revised:
EXPOSED EDGES TO BE CHAMFERED 1" x 1"

CHAMFER FRONT AND BACK OF WALL 1/2

BOTTOM SLAB REINFORCING

#4-12"% T&B staggered

PLAN

MIX NO. 3 CONCRETE

FINISHED GRADE

VARYING

FRONT ELEVATION

SECTION A-A

SECTION B-B

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

APPROVED:

CHIEF ENGINEER

DESIGN ENGINEER

DATE

STANDARD DRAINAGE DETAILS
TYPE "A" HEADWALL
CIRCULAR PIPE

NOTE:
HEADWALL TO BE PARALLEL TO 1/3 OF ROADWAY UNLESS OTHERWISE NOTED IN CONTRACT DRAWINGS.

<table>
<thead>
<tr>
<th></th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>N</th>
<th>R</th>
<th>VOL%</th>
<th>CY</th>
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<td>4-0&quot;</td>
<td>8&quot;</td>
<td>10&quot;</td>
<td>10&quot;</td>
<td>5-12&quot;%</td>
<td>3.87</td>
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<td>10-0&quot;</td>
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<td>10&quot;</td>
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<td>5-0&quot;</td>
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<td>10&quot;</td>
<td>10&quot;</td>
<td>5-12&quot;%</td>
<td>6.50</td>
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<tr>
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<td>13-0&quot;</td>
<td>4-6&quot;</td>
<td>5-6&quot;</td>
<td>3-0&quot;</td>
<td>10&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>6-8&quot;%</td>
<td>7.98</td>
<td></td>
<td></td>
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<tr>
<td>54&quot;</td>
<td>6-5&quot;</td>
<td>14-6&quot;</td>
<td>5-0&quot;</td>
<td>6-0&quot;</td>
<td>3-3&quot;</td>
<td>9&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>6-8&quot;%</td>
<td>9.14</td>
<td></td>
<td></td>
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<td>60&quot;</td>
<td>7-0&quot;</td>
<td>16-0&quot;</td>
<td>5-6&quot;</td>
<td>6-6&quot;</td>
<td>3-6&quot;</td>
<td>9&quot;</td>
<td>12&quot;</td>
<td>12&quot;</td>
<td>6-8&quot;%</td>
<td>11.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NOTE: Whenever this headwall is used in conjunction with a paved channel the footing of the headwall shall be lowered below the finished grade of the channel. The thickness of the channel paving in order that the channel might be blended into the headwall. The H and F dimensions and the steel reinforcing shall be adjusted.

GENERAL NOTES
Concrete: Mix No. 3
Reinforcing: Deformed steel bars #4 & #6
Chamfer: All exposed edges 1/8" or as directed

Disposition of BARS DETAIL

<table>
<thead>
<tr>
<th>Opening</th>
<th>Dimensions</th>
<th>Vol.</th>
<th>Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Inches</td>
<td>Area Sq. Ft.</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>48</td>
<td>12.87</td>
<td>1-4&quot;</td>
<td>1-0&quot;</td>
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<td>54</td>
<td>19.99</td>
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<td>1-0&quot;</td>
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<tr>
<td>60</td>
<td>29.84</td>
<td>1-6&quot;</td>
<td>1-0&quot;</td>
</tr>
</tbody>
</table>

Published: 01/01  Revised: D

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
MODIFIED TYPE A-1 HEADWALL
48"  54"  60"

REVISED
D  56
GENERAL NOTES

CONCRETE: MIX NO. 3
REINFORCING: DEFORMED STEEL BARS #4, #6
CHAMFER: ALL EXPOSED EDGES 1/4 IN. OR AS DIRECTED


QUANTITIES IN TABLE TO BE USED FOR ESTIMATING ONLY

<table>
<thead>
<tr>
<th>OPENING</th>
<th>DIMENSION</th>
<th>VOL.</th>
<th>STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCHES</td>
<td>SQ.FT.</td>
<td></td>
<td>C.Y.</td>
</tr>
<tr>
<td>66</td>
<td>23.80</td>
<td>1-3/4</td>
<td>3-3/4</td>
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<tr>
<td>72</td>
<td>26.67</td>
<td>1-3/4</td>
<td>3-3/4</td>
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<tr>
<td>78</td>
<td>33.20</td>
<td>1-3/4</td>
<td>3-3/4</td>
</tr>
<tr>
<td>84</td>
<td>39.45</td>
<td>1-3/4</td>
<td>3-3/4</td>
</tr>
</tbody>
</table>

STANDARD DRAINAGE DETAILS

MODIFIED TYPE 'A'-1' HEADWALL

- 66" - 72" - 78" - 84"
### Plan

- Chamfer front and back of wall 1/2".

### Elevation

- Angle varies.

### Section A-A

- Reinforcing not shown.
- Similar to B-B.

### Section B-B

- 2" Clear
- 4"
- 6" Span

### Note:

1. Chamfer exposed edges 1" x 1".
2. Concrete quantities to be used for estimating only.
3. Headwall to be parallel to roadway.

### Table: Opening

<table>
<thead>
<tr>
<th>Throngs (SR)</th>
<th>Area (SF)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>F</th>
<th>G</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>N</th>
<th>R</th>
<th>Δ Conc. C.Y.</th>
</tr>
</thead>
<tbody>
<tr>
<td>17&quot;x13&quot;</td>
<td>1.1</td>
<td>2' - 1&quot;</td>
<td>2' - 0&quot;</td>
<td>2' - 5&quot;</td>
<td>7' - 5&quot;</td>
<td>3' - 0&quot;</td>
<td>1' - 0&quot;</td>
<td>6'</td>
<td>8'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>21&quot;x15&quot;</td>
<td>1.6</td>
<td>2' - 3&quot;</td>
<td>2' - 0&quot;</td>
<td>2' - 9&quot;</td>
<td>7' - 9&quot;</td>
<td>3' - 0&quot;</td>
<td>1' - 0&quot;</td>
<td>8'</td>
<td>8'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>24&quot;x18&quot;</td>
<td>2.2</td>
<td>2' - 6&quot;</td>
<td>2' - 9&quot;</td>
<td>3' - 0&quot;</td>
<td>8' - 0&quot;</td>
<td>3' - 0&quot;</td>
<td>1' - 0&quot;</td>
<td>8'</td>
<td>8'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>28&quot;x20&quot;</td>
<td>2.9</td>
<td>2' - 8&quot;</td>
<td>2' - 0&quot;</td>
<td>3' - 4&quot;</td>
<td>8' - 4&quot;</td>
<td>3' - 0&quot;</td>
<td>1' - 2&quot;</td>
<td>8'</td>
<td>8'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>35&quot;x26&quot;</td>
<td>4.5</td>
<td>3' - 0&quot;</td>
<td>2' - 0&quot;</td>
<td>3' - 11&quot;</td>
<td>8' - 11&quot;</td>
<td>3' - 0&quot;</td>
<td>1' - 4&quot;</td>
<td>8'</td>
<td>8'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>42&quot;x29&quot;</td>
<td>6.5</td>
<td>3' - 5&quot;</td>
<td>2' - 0&quot;</td>
<td>6' - 6&quot;</td>
<td>9' - 6&quot;</td>
<td>3' - 0&quot;</td>
<td>1' - 11&quot;</td>
<td>8'</td>
<td>10'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>49&quot;x33&quot;</td>
<td>8.9</td>
<td>3' - 9&quot;</td>
<td>2' - 0&quot;</td>
<td>5' - 1&quot;</td>
<td>10' - 1&quot;</td>
<td>3' - 0&quot;</td>
<td>2' - 3&quot;</td>
<td>8'</td>
<td>10'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>57&quot;x38&quot;</td>
<td>11.6</td>
<td>4' - 2&quot;</td>
<td>2' - 0&quot;</td>
<td>5' - 0&quot;</td>
<td>9' - 9&quot;</td>
<td>3' - 5&quot;</td>
<td>2' - 5&quot;</td>
<td>8'</td>
<td>10'</td>
<td>8'</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
<tr>
<td>64&quot;x43&quot;</td>
<td>14.7</td>
<td>4' - 7&quot;</td>
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<td>13' - 0&quot;</td>
<td>3' - 10&quot;</td>
<td>2' - 8&quot;</td>
<td>9'</td>
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<td>14' - 3&quot;</td>
<td>4' - 2&quot;</td>
<td>2' - 10&quot;</td>
<td>9&quot;</td>
<td>12&quot;</td>
<td>10&quot;</td>
<td>8&quot;</td>
<td>#5812</td>
</tr>
</tbody>
</table>

Δ Conc. C.Y. based on 2:1 channel side slopes and 45° angle.
III-66 of 99

Published: 01/01
Revised:

PLAN
(Showing reinforcement)

ELEVATION

Note:
1. Chamfer exposed edges 1" x 1"
2. Concrete quantities to be used for estimating only.
3. Headwall to be parallel to ½ of roadway.

Mix No.3 concrete

SECTION A-A

(Reinforcing not shown
Similar to B-B)

SECTION B-B

Based on 2:1 channel side slopes and 45° angle.

<table>
<thead>
<tr>
<th>E.O.R.D.</th>
<th>W</th>
<th>H</th>
<th>A</th>
<th>B</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>J</th>
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<td>36°</td>
<td>45&quot;</td>
<td>29&quot;</td>
<td>3'-9&quot;</td>
<td>2'-0&quot;</td>
<td>5'-6&quot;</td>
<td>9'-9&quot;</td>
<td>3'-0&quot;</td>
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<td>5@12&quot;</td>
<td>2.17</td>
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<tr>
<td>42°</td>
<td>53&quot;</td>
<td>34&quot;</td>
<td>4'-3&quot;</td>
<td>2'-0&quot;</td>
<td>6'-3&quot;</td>
<td>11'-6&quot;</td>
<td>3'-6&quot;</td>
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<td>5@12&quot;</td>
<td>2.99</td>
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<tr>
<td>48°</td>
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<td>4'-6&quot;</td>
<td>2'-0&quot;</td>
<td>7'-0&quot;</td>
<td>12'-4&quot;</td>
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<td>10&quot;</td>
<td>10&quot;</td>
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<tr>
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<td>13'-8&quot;</td>
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<td>12&quot;</td>
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<td>5@12&quot;</td>
<td>4.53</td>
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<td>10&quot;</td>
<td>5@12&quot;</td>
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<td>12&quot;</td>
<td>12&quot;</td>
<td>6@8&quot;</td>
<td>7.88</td>
</tr>
</tbody>
</table>

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
TYPE "A" HEAD WALL
ELLiptical Concrete Pipe

REVISED

DATE

5/9
VERTICAL WALL WILL REQUIRE TEMPERATURE REINFORCING—
#4 BARS @ 12°% E.W., 2" COVER.

FLOW

2" X 6" KEY

MIX NO.3 CONCRETE

NOTE:
1. HEADWALL CAN BE CONSTRUCTED
   WITH A 5" CONCRETE APRON, AS
   SHOWN ON D/81, IF DESIRED.
2. EXPOSED EDGES TO BE
   CHAMFERED 1" X 1".
3. CONCRETE QUANTITIES TO BE
   USED FOR ESTIMATING ONLY.
4. HEADWALL TO BE PARALLEL
   TO £ OF ROADWAY.
PLAN

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

2 - NO. 4 STRAIGHT BARS HORIZONTAL IN EACH FACE FOR 36" DIA. TO 72" DIA. PIPE ENDO WALLS INCLUSIVE.

1 - NO. 4 STRAIGHT BAR HORIZONTAL IN FRONT FACE FOR 24" DIA. TO 72" DIA. PIPE ENDO WALLS INCLUSIVE.

ELEVATION

DISPOSITION OF BARS DETAIL

NO. 4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH SIDES OF OPENING FOR 36" DIA. TO 72" DIA. PIPE ENDO WALLS INCLUSIVE.

SECTION A-A

QUANTITIES FOR ESTIMATING PURPOSES ONLY

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<td>72</td>
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'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:

CONCRETE: MIX NO. 3
REINFORCING: DEFORMED STEEL BARS - NO. 4
CHAMFER: ALL EXPOSED EDGES 1/8 FOR AS DIRECTED.
III-69 of 99

Disposition of Bars Detail

Section A-A

Quantities for Estimating Purposes Only

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<tr>
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<th>Quantities</th>
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<td>71x47</td>
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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.

Concrete: Mix No. 3
Reinforcement: Deformed Steel Bars No. 4
Chamfer: All exposed edges 1" x 1" or as directed.

Published: 01/01  Revised:
III-70 of 99

Published: 01/01 Revised:
III-71 of 99

PLAN

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

NO. 4 STRAIGHT BARS VERTICAL @ 1'-6" MIN. TO 2'-0" MAX. FRONT FACE FOR 35'x24' TO 71'x47' ENDWALLS INCLUSIVE.

GENERAL NOTES

CONCRETE: MIX NO. 3
REINFORCING: DEFORMED STEEL BARS - NO. 4
CHAMFER: ALL EXPOSED EDGES 1"x1" OR AS DIRECTED.

SECTION A-A

'S' DISTANCES
4" FOR 17'x13' TO 24"x18' INCLUSIVE.
6" FOR 28"x20' TO 42"x29' INCLUSIVE.
8" FOR 49'x33' TO 71'x47' INCLUSIVE.

END VIEW

NO. 4 STRAIGHT BARS HORIZONTAL @ 1'-7" MAX. C/C BOTH SIDES OF OPENING BOTH WINGWALLS - ALL ENDWALLS.

NO. 4 STRAIGHT BARS HORIZONTAL @ 1'-0" C/C BOTH FACES - LAP 1'-3" TOP & BOTTOM BARS @ CORNER - BOTH WINGWALLS - ALL ENDWALLS.

DISPOSITION OF BARS DETAIL

2-NO.4 STRAIGHT BARS HORIZONTAL, 1 EACH WINGWALL - ALL ENDWALLS.

QUANTITIES FOR ESTIMATING PURPOSES ONLY

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<td>71x47</td>
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CONC. C.Y. | STEEL LBS.
------------|-----------
 73 | 53        
 75 | 75        
 75 | 75        
 74 | 74        
 118| 118       
 117| 117       
 271| 271       
 261| 261       
 366| 366       
 355| 355       

Published: 01/01 Revised:
Case 1: Standard Type "F" Headwall.

Case 2: When a water course is perpendicular or askew to the E, 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 E, the F headwall 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 headwall 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 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 headwall will be used with the exception that the headwall will be lengthened due to the increased area of the pipe.

Case 5: When an assembed road or entrance intersects the main line and the drainage is parallel to the main line and intersecting road or entrance, the F headwall can be used as follows:

a. Determine direction of pipe - b. Compute "S," then a line which is perpendicular to the E. of the pipe and tangent to the arc whose radius is R+S determines the location of the headwall. The length of the wingwall is standard but the angle is such that the end of the wingwall is 60° from the toe of the slope, as shown. S is computed in like manner and the location of the headwall is the intersection of the arc R+S and the E. of the pipe. The wings are located as described above, or as shown.
ISOMETRIC VIEW

QUANTITIES FOR ESTIMATING PURPOSES ONLY

SLOPE 1 1/2:1

<table>
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<tr>
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<th>WINGS</th>
<th>1-ENDWALL 5-WINGS</th>
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ELEVATION

NOTES:
CONCRETE: MIX NO. 3
REINFORCING: DEFORMED STEEL BARS
VERTICAL NO. 6 BARS 12" C/C,
HORIZONTAL NO 4 BARS 12" C/C HOOKED ON END
CHAMFER: ALL EXPOSED EDGES 1" X 1" OR AS DIRECTED

NOTE: HANDOVER THIS HEADWALL IS USED IN CONJUNCTION WITH A PAPER CHANNEL.
THE PROFILES OF THE HEADWALL SHALL BE LOWERED BELOW THE FINISHED
GRADE OF THE CHANNEL. THE DIMENSIONS OF THE CHANNEL PAVING IN ORDER
THAT THE CHANNEL MIGHT BE BRANDED INTO THE HEADWALL THE "H", "F" AND
"D" DIMENSIONS AND THE STEEL REINFORCING SHALL BE ADJUSTED AS REQUIRED.

ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS

APPROVED
CHIEF ENGINEER
DESIGN ENGINEER

STANDARD DRAINAGE DETAILS
STANDARD TYPE "F" HEADWALL
ROUND PIPE

Published: 01/01 Revised:

REvised D 66
No. 4 bars horizontal @ 1'-7" max.
C/C both faces - lap 1'-3" top
and bottom bars @ corner both
wingwalls all endwalls.

No. 4 straight bars horizontal
@ 1'-0" C/C both side of
opening for 36" dia. to 60" dia.
Pipe endwalls inclusive.
2-no. 4 straight bars horizontal
1 each wingwall all endwalls.

Disposition of bars detail

Notes:
For dimensions and quantities see
Tables on detail 0/88 A.

2-no. 4 straight bars vertical
in front face for 12" dia. to
21" dia. pipe endwalls inclusive.

2-no. 4 bars horizontal
1 each face both wingwalls.

No. 4 bent bars
@ 1'-0" C/C both
wingwalls all
endwalls.

No. 4 straight bars vertical
@ 1'-6" min. to 2'-0" max.
front face, for 24" dia. to 60" dia.
pipe endwalls inclusive.

Section A-A

Notes:
Concrete: Mix No. 8
Reinforcing: all deformed steel bars No. 4
Chamfer: All exposed edges (1" X 1") or as directed.
Sod: Place sod 3' wide, around endwall as
indicated on the plans.

Anne Arundel County
Department of Public Works

Standard Drainage Details
Standard Type H Endwall
Round Pipe

Published: 01/01 Revised:
PLAN
(Showing wall reinforcement only)

NOTE:
R.F. = Rear Face
F.F. = Front Face (Exposed)
E.F. = Each Face
Use only where other headwalls cannot be used.
Headwall to be parallel to \( \varepsilon \) of roadway.

FOR SECTIONS A-A & B-B, SEE DETAIL, D-70

STEEL DETAIL

Weep hole, if required

SECTION C-C (Reinforcing not shown)

STANDARD DRAINAGE DETAILS
TYPE "O" HEADWALL
CIRCULAR PIPE
### Headwalls for Circular Pipe (R.C.C.P)

#### Dimensions vs. Diameter (D)

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<tr>
<td>B</td>
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<td>3'-0&quot;</td>
<td>4'-0&quot;</td>
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#### Notes

1. Steel to be 2" clear unless otherwise shown.
2. Provide one 3"cast iron weep hole in each wingwall, at center, for pipes over 36" dia. Place weep hole at top of clay subbase.
3. Use only where other headwalls cannot be used.
4. Headwall to be parallel to C of roadway.
5. For plan view, steel detail and section C-C, see detail D-69.

---

**Anne Arundel County Department of Public Works**

**Approved by:**

**Chief Engineer:**

**Design Engineer:**

**Date:**

**Standard Drainage Details**

**Type "O" Headwall**

**Circular Pipe**

**Revised:** D 70
III-79 of 99

NOTES:
1. R.F. - Rear Face
2. F.F. - Front Face
3. E.F. - Each Face
4. Steel to be 2" clear unless otherwise shown.
5. Headwall to be parallel to e of roadway.
6. For Sections "A-A" and "B-B," See Detail D/72

PLAN
(Showing wall reinforcement only)

III-79 of 99

Published: 01/01 Revised:

STANDARD DRAINAGE DETAILS
TYPE "O" HEADWALL
ELLiptICAL PIPE

ANNE ARUNDEL
COUNTY
DEPARTMENT
OF
PUBLIC WORKS

CHIEF ENGINEER
DESIGN ENGINEER

D 71
### Headwalls for Elliptical Pipe (R.C.E.C.P)

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<th>C</th>
<th>H</th>
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### Note
1. Provide one 3" cast iron pipe weep hole in each wing-wall, at center, for pipes over 60" span. Place weep hole at top of clay sub-base.
2. Use only where other headwalls cannot be used.
3. Headwall to be parallel to C of roadway.
4. For CMN dimensions B and H shall be based upon horizontal and vertical dimensions of arch.
5. For plan view, steel detail and section "C-C", see detail D/71.

### Section A-A

- Mix No. 3 concrete
- 2 #4 steel
- 2 #5 steel

### Section B-B

- Welded mesh 6 x 6 8/8
- Porous backfill
- Clay sub-base (slope to weep hole)
- 3 #12 steel

### Standard Drainage Details

**Type "O" Headwall**

- Elliptical Pipe
NOTE: DAMP-PROOF REAR FACE OF WALL
UP TO 1'-6" BELOW TOP OF WALL

ELEVATION

SECTION "A-A"

TYPE "B" HEADWALL

PLAN

SECTION "B-B"

ELEVATION

TYPE "A" HEADWALL

NOTE: THE PLACEMENT AND CONSTRUCTION OF WEEPHOLES FOR THE TYPE A, E, F AND "O" HEADWALLS WILL BE SIMILAR TO THAT SHOWN FOR THE TYPE "A" HEADWALL.

Published: 01/01 Revised:
### PLAN

TONGUE END ON INLET SECTION
GROOVE END ON OUTLET SECTION

### SECTION A-A

OPTIONAL CONCRETE FOOTER

### QUANTITIES FOR ESTIMATING PURPOSES ONLY

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<tr>
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<td>12-0</td>
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<td>66</td>
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</tr>
<tr>
<td>72</td>
<td>2:4:1</td>
<td>15-0</td>
</tr>
</tbody>
</table>

### NOTES:
- Contractor has option of furnishing end sections conforming to details on this sheet or end sections conforming to details on D/75.
- End sections must be reinforced to conform with Class IV pipe.
- 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.
NOTES:
1. CONTRACTOR HAS OPTION OF FURNISHING END SECTIONS
   CONFORMING TO DETAILS ON THIS SHEET OR END SECTIONS
   CONFORMING TO DETAILS 0/74.
2. END SECTIONS MUST BE REINFORCED TO CONFORM WITH
   CLASS IV 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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<tbody>
<tr>
<td>DIMENSIONS</td>
<td>QUANTITIES</td>
</tr>
<tr>
<td>DIA.</td>
<td>SLOPE</td>
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SEE NOTE 3 ABOVE FOR CONCRETE FOOTER

ISOMETRIC VIEW

ANNE ARUNDEL COUNTY
DEPARTMENT OF PUBLIC WORKS

STANDARD DRAINAGE DETAILS
STANDARD CONCRETE END SECTION
ROUND CONCRETE PIPE

Published: 01/01 Revised:
NOTES:

1. ALL 3 PIECE UNITS TO HAVE 12 GA. SIDES AND 10 GA. CENTER PANELS (EXCEPT 48" AND 54" PIPES, ALL PANELS SHALL BE 12 GA.) WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 2 3/8 GALVANIZED RIVETS OR BOLTS.

2. FOR 60" THRU 84" SIZES, REINFORCED EDGES TO BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES. THE ANGLES WILL BE 2" x 2" x 3/16 FOR 60" THRU 72" DIAMETER AND 2 3/8" x 2 3/8" x 3/16 FOR 78" AND 84" DIAMETER. THE ANGLES TO BE ATTACHED BY 3/8 GALVANIZED NUTS AND BOLTS.

3. TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF TOE PLATE TO BE INCLUDED IN BID PRICE PER EACH OF METAL END SECTION.

4. TYPE 3 CONNECTION INCLUDES ONE FOOT OF PIPE LENGTH FOR 42" THRU 84" DIAMETER AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS. SEE DETAIL 03/11.

5. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE, THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH AS STIPULATED IN NOTE 4; INSTEAD, DRILL HOLE AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE.

Published: 01/01 Revised:
Plan

Elevation

Typical Cross Section

<table>
<thead>
<tr>
<th>PIPE</th>
<th>GA.</th>
<th>A</th>
<th>B</th>
<th>H</th>
<th>L</th>
<th>M</th>
<th>N</th>
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<td>7</td>
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<td>9</td>
<td>43</td>
<td>72</td>
<td>2</td>
<td>PC</td>
</tr>
</tbody>
</table>

Note:
1) All rods, bolts, nuts, etc. to be hot dip galvanized, electro-galvanized or cadmium plated.
2) Specifications AASHTO Designation M 36.
3) End sections to be assembled with top finishing piece bolted in place and connection piece assembled in place.

Published: 01/01 Revised:
III-86 of 99

**CONNECTIONS FOR ROUND PIPE**

**NOTES:**

1. **TYPE 3 CONNECTION INCLUDES ONE FOOT OF THE PIPE LENGTH FOR 42° THRU 64° ROUND SIZES OR FOR 64" X 43° THRU 63"X57" ARCH SIZES AS A CONNECTOR SECTION.**
   The connector section will be attached to the end section by galvanized rivets or bolts.

2. **WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE OR STRUCTURAL PLATE PIPEARCH THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH.** INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE OR STRUCTURAL PLATE PIPE ARCH.

**CONNECTIONS FOR PIPE ARCH**

Published: 01/01    Revised:
### PLAN

- **GALVANIZED STEEL**
  - PIPE ARCH LENGTH
  - PLAN

### REINFORCED EDGE

- PIPE SLOPE
  - SLOPE

### STANDARD DRAINAGE DETAILS

#### STANDARD METAL END SECTION

**ARCH METAL PIPE**

**DIMENSIONS**

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<tr>
<th>PIPE ARCH DIMENSIONS</th>
<th>GA.</th>
<th>A</th>
<th>B MAX.</th>
<th>H</th>
<th>L 1/2</th>
<th>W 2/3</th>
<th>APPROX. SLOPE</th>
<th>UNIT</th>
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<td>7&quot;</td>
<td>5&quot;</td>
<td>6&quot;</td>
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<td>60&quot;</td>
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<td>10&quot;</td>
<td>6&quot;</td>
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<td>36&quot;</td>
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<td>6&quot;</td>
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<td>6&quot;</td>
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<td>42&quot;</td>
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<td>138&quot;</td>
<td>2 1/4</td>
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</table>

**NOTES**

1. ALL 3 PIECE UNITS 12 GA. SIDES AND 10 GA. CENTER PANELS EXCEPT 57" X 36" AND 64" X 43" PIPES, ALL PANELS SHALL BE (2 GA.). WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIMETER. MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/4 GALVANIZED RIVETS OR BOLTS.

2. FOR THE 77" X 52" AND 83" X 57" SIZES, REINFORCED EDGE TO BE SUPPLEMENTED BY 2" X 2" X 5/8 GALVANIZED ANGLES. THE ANGLES ARE TO BE ATTACHED TO 3/4 GALVANIZED MOUNTS AND BOLTS.

3. ANGLE REINFORCEMENT WILL BE PLACED UNDER THE CENTER PANEL SEAMS ON THE 77" X 52" AND 83" X 57" SIZES.

4. TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF TOE PLATE TO BE INCLUDED IN BID PRICE PER EACH OF METAL END SECTION.

5. TYPE 3 CONNECTION INCLUDES ONE FOOT OF PIPE LENGTH FOR 64" X 43" THRU 83" X 57" DIAMETER AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE END SECTION BY GALVANIZED RIVETS OR BOLTS. SEE DETAIL D/78.

6. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE ARCH, THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF PIPE LENGTH AS STIPULATED IN NOTE 5; INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE ARCH.

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**Published:** 01/01  **Revised:**
NOTES

1. ALL 3 PIECE UNITS 12 GA. SIDES AND 10 GA. CENTER PANELS (EXCEPT 57° x 28° AND 64° x 43° PIPES). ALL PANELS SHALL BE 12 GA. WIDTH OF CENTER PANELS TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MULTIPLE PANEL UNITS TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY 3/8" GALVANIZED RIVETS OR BOLTS.

2. FOR THE 77° x 32° AND 83° x 67° SIZES, REINFORCED EDGE TO BE SUPPLEMENTED BY 2" x 2" x 5/8" GALVANIZED ANGLES. THE ANGLES ARE TO BE ATTACHED BY 3/8" GALVANIZED NUTS AND BOLTS.

3. ANGLE REINFORCEMENT WILL BE PLACED UNDER THE CENTER PANEL SEAMS ON THE 77° x 32° AND 83° x 67° SIZES.

4. TOE PLATE SHALL BE USED WHEN SPECIFIED ON THE PLANS. COST OF TOE PLATE TO BE INCLUDED IN BID PRICE PER EACH OF METAL END SECTION.

5. TYPE 3 CONNECTION INCLUDES ONE FOOT OF PIPE LENGTH FOR 64° x 43° THRU 83° x 67° DIAMETER AS A CONNECTOR SECTION. THE CONNECTOR SECTION WILL BE ATTACHED TO THE ENDS BY GALVANIZED RIVETS OR BOLTS. SEE DETAIL D/78.

6. WHERE END SECTION IS TO BE APPLIED TO A STRUCTURAL PLATE PIPE ARCH, THE END SECTION SHALL BE ORDERED WITHOUT THE ONE FOOT OF Pipe LENGTH AS STIPULATED IN NOTE 5; INSTEAD, DRILL HOLES AND FIELD BOLT THE END SECTION DIRECTLY TO THE STRUCTURAL PLATE PIPE ARCH.

ANNE ARUNDELF COUNTY
DEPARTMENT OF PUBLIC WORKS
STANDARD DRAINAGE DETAILS
STANDARD METAL END SECTION
ARCH METAL PIPE

Published: 01/01 Revised:
NOTE:
TYPE B HEADWALL D/GO CAN BE USED IN PLACE OF CUTOFF WALL IF DESIRED.

SECTION A'A

WARP CHANNEL SECTION INTO HEADWALL, IF NECESSARY.

CUTOFF WALL TO BE PARALLEL TO 6, UNLESS OTHERWISE NOTED ON CONTRACT DRAWINGS.

SECTION B'B

ROUGH RIP-RAP APRON
MIX NO.3 CONCRETE CUTOFF WALL.

RIP-RAP SHALL BE LAID IN A FASHION THAT WILL GIVE MAXIMUM ROUGHNESS TO THE SURFACE BY DISPLACEMENT OF THE INDIVIDUAL STONES, ALTERNATELY UP OR DOWN ABOUT ONE INCH AND AS OTHERWISE DIRECTED BY THE ENGINEER.
WEEP H OLES
3-2" PIPE- W/ 4 C.
TO G.

PLAN

SLOPE DETAIL

NOTES:

1. Depth of sub-base against end sill shall be increased for "D" 1/8" to provide positive draining of weepholes. Condition illustrated applies only to medium range of "D".

2. In deep gully or ditch outlet embankment slope should intersect top of backwall.

3. In shallow ditch or gully outlet, toe of embankment should intersect normal ground level at "G" minimum above outlet flow line.

4. For outlet at normal ground level, embankment slope should intersect 2:1 side slopes of outlet channel at "G" above outlet flow line.

5. Basin dimensions are based on discharge and not pipe size. Dimensions of basin apply only to outlet velocities from 20 to 30 F.P.S.

6. See D83,84,85 & 86 for additional detail.

7. All concrete shall be Mix No. 3.

TABLE:

| PIPE SIZE | MAX DISSCHARGE C.F.S. | W | H | L | A | B | C | D | E | F | G | QUANTITIES | STEEL CONC. |
|-----------|-----------------------|---|---|---|---|---|---|---|---|---|---|   | LBS. | CUYD.   |
| 12"       | 10                    | 4'-3" | 3'-2" | 5'-8" | 2'-7" | 3'-1" | 1'-10" | 0'-8" | 0'-6" | 0'-6" | 0'-6" | 264 | 2.72 |
| 18"       | 21                    | 5'-6" | 4'-3" | 7'-4" | 3'-3" | 4'-1" | 2'-4" | 0'-11" | 2'-1" | 0'-6" | 0'-6" | 378 | 3.90 |
| 24"       | 38                    | 6'-9" | 5'-3" | 9'-0" | 3'-11" | 5'-1" | 2'-10" | 1'-2" | 2'-6" | 0'-6" | 0'-6" | 498 | 5.52 |
| 30"       | 59                    | 8'-0" | 6'-3" | 10'-8" | 4'-7" | 6'-1" | 3'-4" | 1'-4" | 3'-0" | 0'-7" | 0'-6" | 1023 | 8.53 |
| 36"       | 85                    | 9'-3" | 7'-3" | 12'-4" | 5'-3" | 7'-1" | 3'-10" | 1'-7" | 3'-6" | 0'-8" | 0'-7" | 1592 | 12.98 |
| 42"       | 115                   | 10'-6" | 8'-0" | 14'-0" | 6'-0" | 8'-0" | 4'-5" | 1'-9" | 3'-11" | 0'-9" | 0'-8" | 1926 | 18.15 |
| 48"       | 151                   | 11'-9" | 9'-0" | 15'-8" | 6'-9" | 8'-11" | 4'-11" | 2'-0" | 4'-5" | 0'-10" | 0'-9" | 2365 | 24.84 |

ANNE ARUNDEL
COUNTY
DEPARTMENT OF
PUBLIC WORKS

STANDARD DRAINAGE DETAILS
ENERGY DISSIPATOR

REVISED D 82
FLOOR PLAN

<table>
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<th>A2</th>
<th>B</th>
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NOTE: SEE D/82,84,85 & 86 FOR ADDITIONAL DETAILS.
### Table: Pipe Size and Lengths

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<th>V14</th>
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<th>V16</th>
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### Diagram:

- **Section A-A**
- **Note:**
  1. V bars (cyl. size 12" to 24") spcd. 12" C-C.
  2. V bars (cyl. size 30") spcd. 9" C-C.
  3. V bars (cyl. size 36" to 48") spcd. 6" C-C.
  4. D bars spcd. 12" C-C ALL WALLS.
  5. See 0/82,65,60,86 for additional details.

### Elevation

- **Standard Drainage Details**
- **Energy Dissipator Walls**

---

**Anne Arundel County**

**Design Engineer**

**Date**

**Revised:**

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**Revised:**

---

**Published:** 01/01
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**ELEVATION**

**SECTION B-B**

**SECTION A-A**

---

**note:** See D/82,83,84,85 for additional details.

---

**ANNE ARUNDEL COUNTY**

**DEPARTMENT OF PUBLIC WORKS**

**APPROVED:**

**DESIGN ENGINEER:**

**DATE:**

---

**STANDARD DRAINAGE DETAILS**

**ENERGY DISSIPATOR**

**BAFFLE**

---

**REVISED:**
# Backwall Bars

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## Wingwall Elevation

**NOTE:**
1. H bars SPCD 12" C-C ALL WALLS.
2. C AND V BARS (CULV SIZES 12", 18", 24") SPCD. 12" C-C.
3. C AND V BARS (CULV SIZES 30") SPCD. 9" C-C.
4. C AND V BARS (CULV SIZES 36", 42", 48") SPCD. 6" C-C.
5. SEE 0/82 83 84 85 FOR ADDITIONAL DETAILS.

---

**Backwall Elevation**

**Standard Drainage Details**

**Energy dissipator**

**Wing and Backwall**

---

**Anne Arundel County**
**Department of Public Works**

**PROOF**

**Design Engineer**

**DATE**

**REvised**

---

**D 86**
NOTE: ROW OF STONES (AS SHOWN BELOW)
OR PRE-CAST CONCRETE BLOCKS (4" X 8" X 8")
SHALL BE 18" A PART, STAGGER ALTERNATE ROWS.
DETAILS OF DITCH PAVING SHALL BE
AS SHOWN ON DETAILS EQ 17 OR EQ 18
STONES OR BLOCKS
TO BE EMBEDDED 3" MIN.
DITCH ELEVATIONS NOTED ON PLANS
SECTION A-A
III-96 of 99

PRECAST CONC. SLAB w/ TYPE 'D' FRAME & COVER FOR DETAILS OF TYPE 'D' FRAME & COVER. SEE STD. DETAIL D/16

TOP SLAB TO BE REINFORCED CONC. 4000 PSI. REINFORCING TO BE #7 DEFORMED BARS 6" C/C, 2 WAYS, w/2" COVER IN WALLS & BOTTOM SLAB.

WEIR CREST

REINFORCING TO BE #4 DEFORMED BARS @ 6" C/C, 2 WAYS WITH 2" COVER IN WALLS & BOTTOM SLAB.

REINFORCED CONC. 4000 PSI

BARREL

VARIES

REINFORCED CONC. 4000 PSI

PROPOSED GRADE

REINFORCED CONC. HEADWALL 4000 PSI

PLAN (SHOWN WITHOUT TOP SLAB)

POND DRAIN

VARIES

2'-0" 8"

ELEVATION/SECTION

PLAN VIEW OF POND DRAIN HEADWALL
III-97 of 99

ELEVATION

NOTES:

1. TOP SLABS SHALL BE DESIGNED TO SUPPORT US-20 LOADS.
2. \( L_1 \) SHALL BE GREATER THAN OR EQUAL TO \( L_2 \).
3. STEEL REINFORCING SIZES & SPACING SHALL BE SELECTED DURING DESIGN DEPENDING ON SIZE & DEPTH OF STRUCTURE.
4. MINIMUM ACCEPTABLE WALL THICKNESS SHALL BE 6".
5. HORIZONTAL STEEL REINFORCEMENT IN INTERIOR WALLS SHALL BE ANCHORED TO EXTERIOR WALLS.
6. EXTEND TO BOTTOM OF OIL STORAGE VOLUME.
7. TRASH RACK OPENINGS SHALL BE 3x AREA OF ORIFICE OPENINGS.
8. WHERE THE THROAT IS TO BE INCORPORATED INTO A CURB AND GUTTER LOCATION A DEPRESSED GUTTER PAN IS REQUIRED AS SHOWN ON STD. DETAIL D/24.
9. TRASH RACK MATERIAL SHALL BE HOT DIPPED GALVANIZED OR EPOXY COATED.
10. ALL REINFORCING STEEL TO BE ASTM A 615 GRADE 60. & CONCRETE TO BE \( f'c = 4000 \text{ psi} \) @ 28 DAYS.
11. 2" MINIMUM CONCRETE COVER OF REINFORCING STEEL UNLESS SPECIFIED.

REBAR TRASH RACK

ISOMETRIC

TUBE HINGES - 3 EA.
NO. 4 BARS

Anne Arundel County
Department of Public Works

Standard Drainage Details
Water Quality Inlet

Published: 01/01 Revised:
PLAN VIEW

ACCMP TRASH RACK

NO SCALE

Published: 01/01  Revised:
WIDTH OF TRENCH
SEE STANDARD DETAIL D-4

CONCRETE
LOW CRADLE

3" FOR < 24" D
4" FOR > 24" D

F'c = 3000 PSI