<table>
<thead>
<tr>
<th>TABLE OF DIMENSIONS AND QUANTITIES FOR TWO TYPE A HEADWALLS</th>
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<tr>
<td><strong>Reinf. Steel for Two Headwalls</strong></td>
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<tr>
<td><strong>Sheet Concrete</strong></td>
</tr>
<tr>
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</table>

**TABLE DETAILS**

- **G**: Depth of concrete
- **K**: Diameter of bars
- **L**: Length of bars
- **E**: Spacing of bars
- **H**: Height of bars
- **W**: Width of bars
- **BARS A1**: Reinforcement for lateral support
- **BARS A2**: Reinforcement for vertical support
- **BARS B**: Reinforcement for shear
- **BARS F1**: Reinforcement for foundation
- **BARS F2**: Reinforcement for footing
- **ALUMINUM**: Total aluminum content
- **CONCRETE**: Total concrete content
- **C.Y.**: Cubic yards

**REMARKS**

- **Steel Conc.**: Steel concentration

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**GARLAND TYPE A HEADWALLS**

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**DIMENSIONS AND QUANTITIES**

---

**PAGE 2**
ELEVATION TYPE B

PLAN TYPE B

TYPICAL WING ELEVATION

NOTES: 1. DIMENSIONS ARE FOR TYPICAL INSTALLATION.
2. SPECIFIC SITE CONDITIONS MAY REQUIRE MODIFICATION OF DIMENSIONS AND ARRANGEMENT, WITH ENGINEERING DEPT. APPROVAL.
3. ALL CONCRETE SHALL BE CLASS "C".
4. ALL HEADWALLS SHALL BE CLASS "C" CAST-IN-PLACE CONCRETE (UNLESS AUTHORIZED BY CITY OF GARLAND)

PROVIDE 12" FOOTING AS SHOWN WHERE REQUIRED TO MAINTAIN 4" MIN. COVER FOR PIPES. CONCRETE FOR FOOTING SHALL BE ADDED TO TOTAL QUANTITIES SHOWN.
ELEVATION MULTIPLE TYPE B

PLAN MULTIPLE TYPE B

TYPICAL WING ELEVATION

NOTES:
1. DIMENSIONS ARE FOR TYPICAL INSTALLATION.
2. SPECIFIC SITE CONDITIONS MAY REQUIRE MODIFICATION OF DIMENSIONS AND ARRANGEMENT, WITH ENGINEERING DEPT. APPROVAL.
3. ALL CONCRETE SHALL BE CLASS "C".
4. ALL HEADWALLS SHALL BE CLASS "C" CAST-IN-PLACE CONCRETE (UNLESS AUTHORIZED BY CITY OF GARLAND).

PROVIDE 12" FOOTING AS SHOWN WHERE REQUIRED TO MAINTAIN 4" MIN. COVER FOR PIPES. CONCRETE FOR FOOTING SHALL BE ADDED TO TOTAL QUANTITIES SHOWN.
<table>
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<tr>
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<th>TYPE C</th>
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**Note:** The table represents the dimensions and quantities for two Type B Headwalls. Each row corresponds to a different number of bars, with columns indicating the dimensions and quantities for various types of headwalls.
NOTES: 1. All Cross Pipes, calculations, and dimension are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

2. The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.
LIMITS OF RIPRAP TO BE INCLUDED WITH S.E.T. FOR PAYMENT

3'-0"  2'-0"
MAX. ~ 6" MIN.

CROSS PIPE
EQ SPA AT 2'-0" MAX

 Reception Date

3 1/2" (4" O.D.) CROSS PIPE

6" Max.

A

SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

NOTES:

1. All Cross Pipes, calculations, and dimension are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

2. The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.
SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

NOTES:
1. All Cross Pipes, calculations, and dimension are based on the pipe culverts mitered, as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

2. The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor’s option, all other Cross Pipes may also be installed using the bolted connection details.
DETAIL "A"

SECTION B–B
(Cross Pipes not shown for clarity.)

PIPE CULVERT
PARALLEL DRAINAGE
LIMITS OF RIPRAP TO BE INCLUDED WITH S.E.T. FOR PAYMENT

1'-6" (TYP.)

TANGENT TO WIDEST PORTION OF PIPE CULVERT

1/2" RIPRAP

1/2" PIPE CULVERT

SHOWING TYPICAL PIPE CULVERT & RIPRAP

Q. CROSS PIPE (FLUSH WITH TOP OF RIPRAP)

#6 REINFORCING ANCHOR BAR

2" MIN. CLEAR

2 1/4" TYP.

PIPE CULVERT

RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR
PIPE W/ BOLTED ANCHOR

#6 ANCHOR BAR X 1'-4" (TYP.)

30° TYP.

BEND FIRST CROSS PIPE ANCHOR BARS AS NECESSARY TO MAINTAIN 2" CLEAR COVER TO TOE WALL EDGE OF CONCRETE RIPRAP

PIPE W/ ANCHOR BARS

CROSS PIPE LENGTH

Q2 (SEE TABLE) CROSS PIPE OVER INSIDE BARREL

Q1 (SEE TABLE) CROSS PIPE OVER OUTSIDE BARREL

15/16" DIA. THROUGH HOLE (TYP.)

SECTION C-C
CROSS PIPE DETAILS

Pipe Culvert Parallel Drainage

Revision Date:
Scale: N/A Date: 06/01/05
Design:
Drawn: SEL
Dwg. File: HDW_002.DWG
Project No.: STANDARD-DETAILS

PAGE 11
## CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAPH QUANTITIES

<table>
<thead>
<tr>
<th>Nominal Culvert I.D.</th>
<th>Conc Riprap (CY)</th>
<th>Pipe Culvert Spacing ~ G</th>
<th>Single Barrel ~ Q1</th>
<th>Multi-Barrel ~ Q1</th>
<th>Q2</th>
<th>Conditions for use of Cross Pipes</th>
<th>Cross Pipe Size</th>
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<tbody>
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<td>N/A</td>
<td>2’- 1”</td>
<td>1’- 9”</td>
<td>3 or more Pipe Culverts</td>
<td>3” Std (3.500” O.D.)</td>
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<td>15”</td>
<td>0.7</td>
<td>11”</td>
<td>N/A</td>
<td>2’- 5”</td>
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<td>3 or more Pipe Culverts</td>
<td>3 1/2” Std (4.000” O.D.)</td>
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<td>2’-10”</td>
<td>2’- 8”</td>
<td>2 or more Pipe Culverts</td>
<td>4” Std (4.500” O.D.)</td>
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</table>

### NOTES:
1. Concrete riprap quantities are for one end of a single pipe culvert.
2. Payment for riprap & toe wall is subsidiary to the unit bid price for safety and treatment.
3. Cross pipes shall conform to ASTM A500, grade B.
5. All exposed steel components shall be hot dip galvanized and approved for use.
GENERAL NOTES:

1. All Cross Pipe Headwalls shall be Class ‘C’ Cast-In-Place Concrete (unless authorized by City of Garland).

2. Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52. of Item 432, "Riprap".


4. All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.