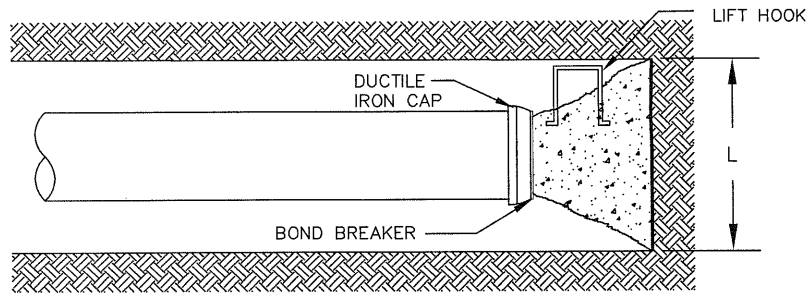


HORIZONTAL BEND






END OF LINE

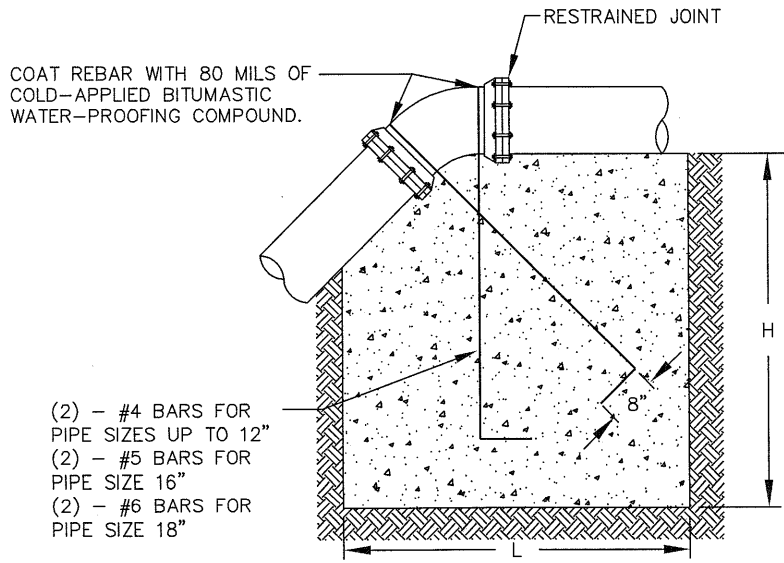
GENERAL NOTES:

1. INSTALL CONCRETE THRUST BLOCKS ONLY WHEN APPROVED BY DWP GENERAL MANAGER OR DESIGNEE.
2. THRUST BLOCK BEARING AREA BASED ON ALLOWABLE SOIL BEARING VALUE OF 1500 PSF PRESSURE, 200 PSI LINE PRESSURE WITH THREE FEET COVER MINIMUM, AND A MINIMUM SAFETY FACTOR OF 1.5.  
FOR BEARING = 2000 PSF, 0.75 X AREA SHOWN  
FOR BEARING = 1000 PSF, 1.5 X AREA SHOWN  
FOR BEARING = 500 PSF, 3.0 X AREA SHOWN
3. ALL THRUST BLOCKS SHALL BE PORTLAND CEMENT CONCRETE MIX 560-C-3250 PLACED AGAINST UNDISTURBED SOIL AND CENTERED VERTICALLY AND HORIZONTALLY ABOUT THE DIRECTION OF THRUST.
4. KEY THRUST BLOCKS ON REDUCERS INTO THE TRENCH BOTTOM AS SHOWN.
5. DO NOT EXTEND CONCRETE ONTO FLANGE OR ADJOINING PIPE.
6. DO NOT COVER FITTING BOLTS WITH CONCRETE.
7. WHEN VALVES ARE FLANGED TO FITTINGS AVOID PLACING CONCRETE ON ANY PART OF THE VALVE BONNET OR VALVE OPERATOR.
8. COAT REBAR WITH 80 MILS OF COLD-APPLIED BITUMASTIC WATER-PROOFING COMPOUND. WRAP EXTERIOR OF VALVE, ACTUATOR AND FITTING WITH 2 LAYERS OF 8 MIL POLYETHYLENE SHEETING AND TAPE.
9. PROVIDE 3-INCH MINIMUM CONCRETE COVER OVER REBAR.
10. DO NOT PLACE CONCRETE ON VALVE OR PIPE JOINT.
11. YIELD STRENGTH OF STEEL BARS IS ASSUMED TO BE 36 KSI.
12. CONSULT STRUCTURAL ENGINEER FOR CASES NOT SHOWN.
13. THRUST BLOCK REQUIREMENTS FOR PIPE LARGER THAN 18-INCH OR OPERATING PRESSURE GREATER THAN 175 PSI REQUIRE SUBMITTAL OF DETAIL CALCULATIONS TO DWP GENERAL MANAGER OR DESIGNEE FOR APPROVAL.
14. FORM ALL CONCRETE THRUST BLOCKS.

| PIPE SIZE | 11 1/4° BEND |        |            |              | 22 1/2° BEND |        |            |              | 45° BEND |        |            |              | 90° BEND |        |            |              | END OF LINE |        |            |              |
|-----------|--------------|--------|------------|--------------|--------------|--------|------------|--------------|----------|--------|------------|--------------|----------|--------|------------|--------------|-------------|--------|------------|--------------|
|           | L (IN)       | H (IN) | AREA (FT²) | THRUST (LBS) | L (IN)       | H (IN) | AREA (FT²) | THRUST (LBS) | L (IN)   | H (IN) | AREA (FT²) | THRUST (LBS) | L (IN)   | H (IN) | AREA (FT²) | THRUST (LBS) | L (IN)      | H (IN) | AREA (IN²) | THRUST (LBS) |
| 4"        | 13           | 8      | 0.7        | 1064         | 18           | 11     | 1.4        | 2118         | 25       | 16     | 2.8        | 4155         | 34       | 22     | 5.1        | 7677         | 29          | 18     | 3.6        | 5429         |
| 6"        | 18           | 12     | 1.5        | 2199         | 26           | 16     | 2.9        | 4377         | 36       | 23     | 5.7        | 8586         | 49       | 31     | 10.6       | 15864        | 41          | 26     | 7.5        | 11218        |
| 8"        | 24           | 15     | 2.5        | 3782         | 34           | 22     | 5.0        | 7530         | 47       | 30     | 9.8        | 14771        | 64       | 41     | 18.2       | 27291        | 54          | 34     | 12.9       | 19298        |
| 10"       | 29           | 19     | 3.8        | 5690         | 41           | 26     | 7.6        | 11328        | 58       | 37     | 14.8       | 22220        | 78       | 50     | 27.4       | 41055        | 66          | 42     | 19.4       | 29031        |
| 12"       | 35           | 22     | 5.4        | 8047         | 49           | 31     | 10.7       | 16019        | 69       | 44     | 20.9       | 31423        | 93       | 60     | 38.7       | 58059        | 78          | 50     | 27.4       | 41054        |
| 16"       | 46           | 29     | 9.3        | 13982        | 65           | 41     | 18.6       | 27835        | 90       | 58     | 36.4       | 54601        | 123      | 79     | 67.3       | 100884       | 103         | 66     | 47.6       | 71336        |
| 18"       | 51           | 33     | 11.7       | 17561        | 72           | 46     | 23.3       | 34960        | 101      | 65     | 45.7       | 68576        | 138      | 88     | 84.5       | 126705       | 116         | 74     | 59.7       | 89595        |

CONCRETE THRUST BLOCK DETAILS

|          |          |      |   |  |   |                |
|----------|----------|------|---|--|---|----------------|
| REVISION |          |      | APPROVED:   |  |  | CITY OF CORONA |
| NO.      | APPROVED | DATE | <br>NELSON D. NELSON, PE.<br>CITY ENGINEER                             |  |   |                |
|          |          |      | <br>TOM KOPER, PE, DISTRICT ENGINEER,<br>DEPARTMENT OF WATER AND POWER |  | DATE  | SHEET 1 OF 4   |




INSTALL CONCRETE THRUST BLOCKS ONLY WHEN APPROVED BY DWP GENERAL MANAGER OR DESIGNEE

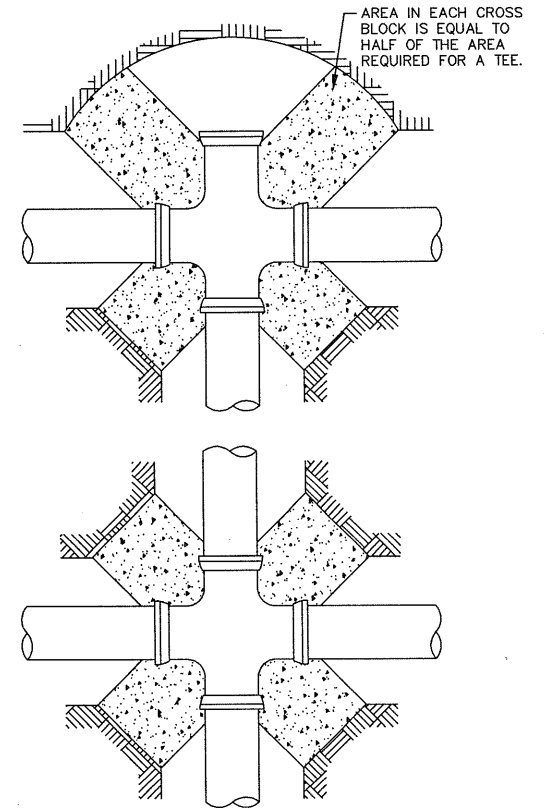
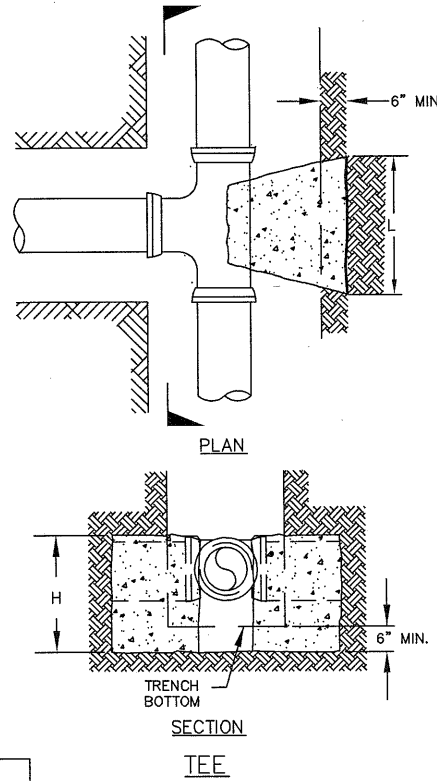
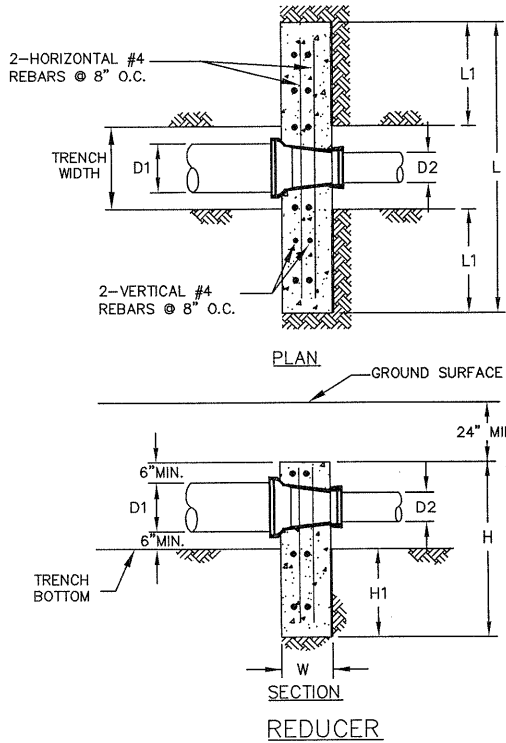
SECTION  
VERTICAL BEND ANCHOR

| VERTICAL BEND ANCHOR |                             |                           |              |                             |                           |              |                         |                           |              |                         |                           |              |
|----------------------|-----------------------------|---------------------------|--------------|-----------------------------|---------------------------|--------------|-------------------------|---------------------------|--------------|-------------------------|---------------------------|--------------|
| PIPE SIZE            | 11 1/4' BEND L,H, AND W(IN) | VOLUME (YD <sup>3</sup> ) | THRUST (LBS) | 22 1/2' BEND L,H, AND W(IN) | VOLUME (YD <sup>3</sup> ) | THRUST (LBS) | 45° BEND L,H, AND W(IN) | VOLUME (YD <sup>3</sup> ) | THRUST (LBS) | 90° BEND L,H, AND W(IN) | VOLUME (YD <sup>3</sup> ) | THRUST (LBS) |
| 4"                   | 23                          | 0.3                       | 1064         | 29                          | 0.5                       | 2118         | 36                      | 1.0                       | 4155         | 40                      | 1.4                       | 7677         |
| 6"                   | 30                          | 0.6                       | 2199         | 37                          | 1.1                       | 4377         | 46                      | 2.0                       | 8586         | 51                      | 2.9                       | 15864        |
| 8"                   | 36                          | 1.0                       | 3782         | 45                          | 1.9                       | 7530         | 55                      | 3.5                       | 14771        | 61                      | 5.0                       | 27291        |
| 10"                  | 41                          | 1.5                       | 5690         | 51                          | 2.9                       | 11328        | 63                      | 5.3                       | 22220        | 70                      | 7.5                       | 41055        |
| 12"                  | 46                          | 2.1                       | 8047         | 57                          | 4.0                       | 16019        | 70                      | 7.5                       | 31423        | 79                      | 10.6                      | 58059        |
| 16"                  | 55                          | 3.6                       | 13982        | 69                          | 7.0                       | 27835        | 85                      | 13.0                      | 54601        | 95                      | 18.3                      | 100884       |
| 18"                  | 59                          | 4.5                       | 17561        | 74                          | 8.8                       | 34960        | 91                      | 16.3                      | 68576        | 102                     | 23.0                      | 126705       |

| REVISION |          |      |                         | APPROVED:  |          | CITY OF CORONA |  |
|----------|----------|------|-------------------------|--|----------|----------------|--|
| NO.      | APPROVED | DATE |                         |  | DATE     |                |  |
|          |          |      | <i>Nelson D. Nelson</i> | NELSON D. NELSON, PE.<br>CITY ENGINEER                             | 11-21-12 |                |  |
|          |          |      | <i>Tom Koper</i>        | TOM KOPER, PE. DISTRICT ENGINEER,<br>DEPARTMENT OF WATER AND POWER | 11-20-12 |                |  |



STD 401  
SHEET 2 OF 4




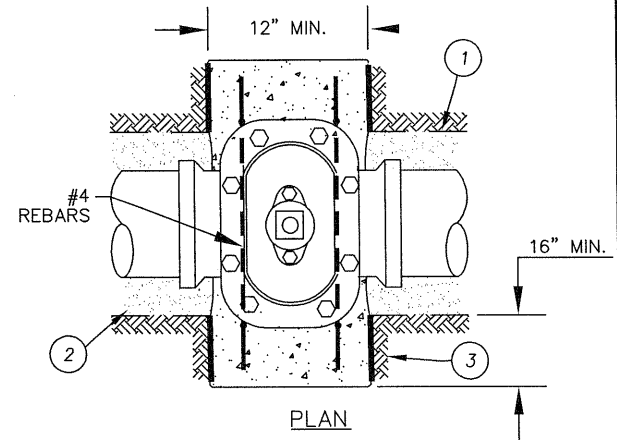
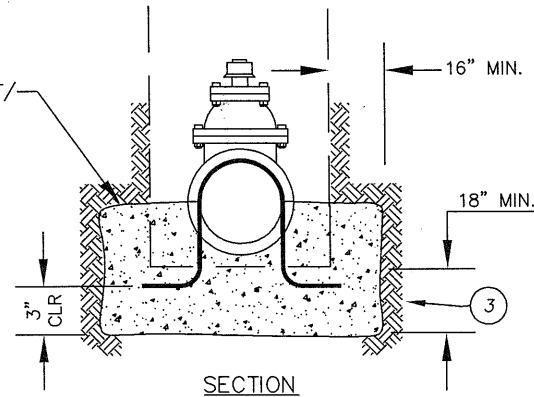
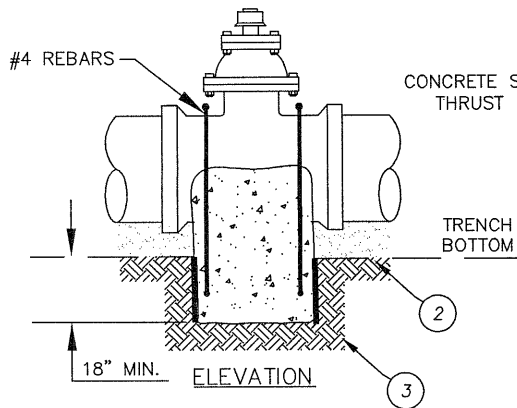
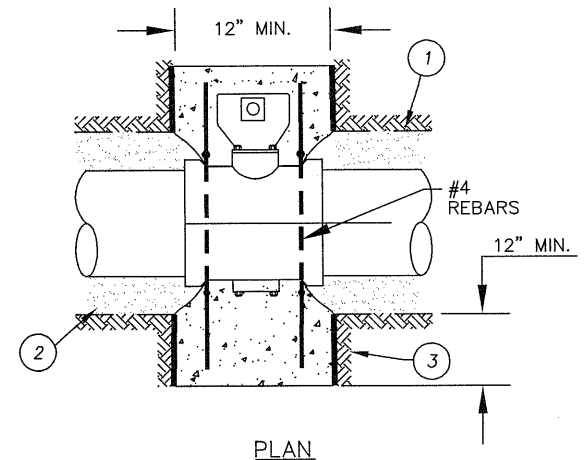
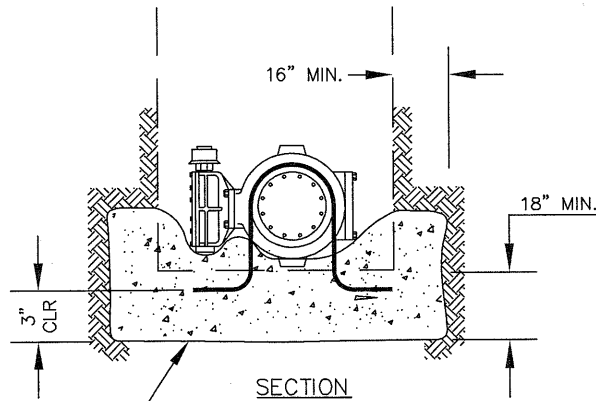
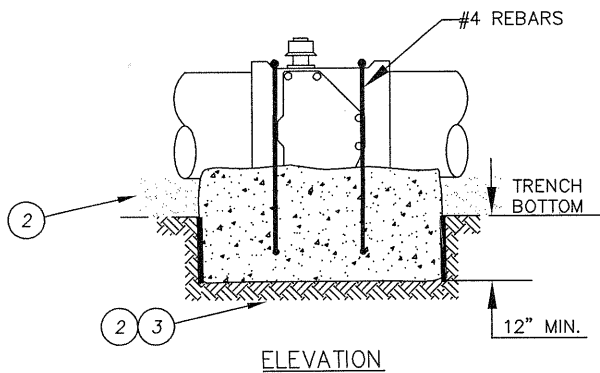
| D1xD2 (IN) | REDUCER            |        |        |         |         |        | TOTAL AREA INCLD. TRENCH (FT <sup>2</sup> ) | MIN. BEARING AREA** (FT <sup>2</sup> ) | THRUST (LBS) |
|------------|--------------------|--------|--------|---------|---------|--------|---|--|--------------|
|            | TRENCH WIDTH* (IN) | L (IN) | H (IN) | H1 (IN) | L1 (IN) | W (IN) |   |  |              |
| 18X16      | 36                 | 66     | 44     | 12      | 15      | 16     | 20  | 12.2                                   | 18258        |
| 18X12      | 36                 | 93     | 62     | 30      | 29      | 16     | 40  | 32.4                                   | 48540        |
| 18X10      | 36                 | 102    | 68     | 36      | 33      | 16     | 48  | 40.4                                   | 60564        |
| 18X8       | 36                 | 109    | 73     | 41      | 36      | 14     | 55  | 46.9                                   | 70297        |
| 16X12      | 36                 | 77     | 52     | 22      | 21      | 14     | 28  | 20.2                                   | 30282        |
| 16X10      | 36                 | 88     | 59     | 29      | 26      | 14     | 36  | 28.2                                   | 42306        |
| 16X8       | 36                 | 95     | 64     | 34      | 30      | 12     | 42  | 34.7                                   | 52038        |
| 12X10      | 30                 | 54     | 36     | 10      | 12      | 12     | 13  | 8.0                                    | 12024        |
| 12X8       | 30                 | 66     | 44     | 18      | 18      | 12     | 20  | 14.5                                   | 21757        |
| 12X6       | 30                 | 74     | 49     | 23      | 22      | 12     | 25  | 19.9                                   | 29837        |
| 12X4       | 30                 | 79     | 53     | 27      | 25      | 10     | 29  | 23.8                                   | 35626        |
| 10X8       | 30                 | 50     | 33     | 9       | 10      | 10     | 11  | 6.5                                    | 9733         |
| 10X6       | 30                 | 60     | 40     | 16      | 15      | 10     | 17  | 11.9                                   | 17813        |
| 10X4       | 30                 | 67     | 45     | 21      | 18      | 10     | 21  | 15.7                                   | 23602        |
| 8X6        | 24                 | 44     | 29     | 7       | 10      | 10     | 9   | 5.4                                    | 8080         |
| 8X4        | 24                 | 53     | 35     | 13      | 14      | 8      | 13  | 9.2                                    | 13869        |
| 6X4        | 24                 | 39     | 26     | 6       | 8       | 8      | 7   | 3.9                                    | 5789         |

| PIPE SIZE | TEE    |        |                         |              |
|-----------|--------|--------|-------------------------|--------------|
|           | L (IN) | H (IN) | AREA (FT <sup>2</sup> ) | THRUST (LBS) |
| 4"        | 29     | 18     | 3.6                     | 5429         |
| 6"        | 41     | 26     | 7.5                     | 11218        |
| 8"        | 54     | 34     | 12.9                    | 19298        |
| 10"       | 66     | 42     | 19.4                    | 29031        |
| 12"       | 78     | 50     | 27.4                    | 41054        |
| 16"       | 103    | 66     | 47.6                    | 71336        |
| 18"       | 116    | 74     | 59.7                    | 89595        |

\* IF A DIFFERENT TRENCH WIDTH IS USED, THE THRUST SHALL MAINTAIN THE MINIMUM BEARING AREA SHOWN.  
 \*\* BEARING AREA REQUIRED ON UNDISTURBED SOIL OUTSIDE OF TRENCH.

CONCRETE THRUST BLOCK DETAILS

|          |          |  |          |  |
|----------|----------|--|----------|--|
| REVISION |          | APPROVED:  |          | CITY OF CORONA   |
| NO.      | APPROVED | DATE   | DATE     |  |
|          |          |  | 11-21-12 | <br>CITY OF CORONA<br>STD 401<br>SHEET 3 OF 4 |
|          |          |  | 11-20-12 |  |
|          |          | NELSON D. NELSON, PE.<br>CITY ENGINEER<br>TOM KOPER, PE. DISTRICT ENGINEER,<br>DEPARTMENT OF WATER AND POWER |          |  |



**NOTES:**


1. PROVIDE CONCRETE SUPPORT THRUST BLOCK FOR ALL BURIED VALVES.
2. ENGINEER SHALL PROVIDE CALCULATIONS FOR SIZING ANCHORS LARGER THAN 8 INCHES OR PIPELINES EXCEEDING 250 PSI OPERATING PRESSURE.

INSTALL CONCRETE THRUST BLOCKS ONLY WHEN APPROVED BY DWP GENERAL MANAGER OR DESIGNEE

**ITEM MATERIALS**

- 1 — BOUNDARY OF TRENCH.
- 2 — PIPE BEDDING PER CITY STD. DWG. 406.
- 3 — UNDISTURBED EARTH WITH MINIMUM 1500 LB/SF BEARING CAPACITY.

**CONCRETE THRUST BLOCK DETAILS**

| REVISION |          |      | APPROVED   |          | CITY OF CORONA   |
|----------|----------|------|--|----------|--|
| NO.      | APPROVED | DATE |  | DATE     |  |
|          |          |      | <i>Nelson D. Nelson</i>  | 11-21-12 | <br>CITY OF CORONA<br>STD 401<br>SHEET 4 OF 4 |
|          |          |      | <i>Tom Koper</i>   | 11-20-12 |  |
|          |          |      | NELSON D. NELSON, PE.<br>CITY ENGINEER<br>TOM KOPER, PE, DISTRICT ENGINEER,<br>DEPARTMENT OF WATER AND POWER |          |  |