



PLAN

SECTION A-A

| HORIZONTAL BENDS, 22.5, 45 & 90 DEGREE TURNS | | | | | | | | | | | | | |
|--|----------------|---------------|--------------------|-------------------------------|--------|------------|--------|--------|--------|--------|--------|------------|--------|
| SIZE OF PIPE (IN) | DEGREE OF BEND | AREA (SQ.IN.) | THRUST FORCE (IBS) | MINIMUM BEARING AREA (SQ.FT.) | A (FT) | B MIN (FT) | C (FT) | D (FT) | E (FT) | F (FT) | G (FT) | H MIN (FT) | J (FT) |
| 12 | 22.5 | 136.8 | 8,006.5 | 7.6 | 1.75 | 0.75 | 1.00 | 3.00 | 1.50 | 2.66 | 1.33 | 2.00 | 1.33 |
| 16 | 22.5 | 237.7 | 13,911.9 | 13.2 | 2.66 | 1.00 | 1.66 | 4.00 | 2.00 | 3.33 | 1.67 | 3.00 | 1.17 |
| 6 | 45 | 37.3 | 4,282.2 | 4.1 | 1.75 | 0.75 | 1.00 | 2.08 | 1.04 | 2.00 | 1.00 | 1.92 | 1.33 |
| 8 | 45 | 64.3 | 7,382.0 | 7.0 | 1.75 | 0.75 | 1.00 | 2.66 | 1.33 | 2.66 | 1.33 | 1.92 | 1.33 |
| 12 | 45 | 136.8 | 15,705.3 | 15.0 | 2.08 | 0.75 | 1.33 | 4.50 | 2.25 | 3.33 | 1.67 | 2.33 | 1.33 |
| 16 | 45 | 237.7 | 27,289.2 | 26.0 | 1.75 | 1.00 | 1.66 | 6.00 | 3.00 | 4.33 | 2.17 | 3.00 | 1.50 |
| 6 | 90 | 37.3 | 7,912.5 | 7.5 | 1.75 | 0.75 | 1.00 | 3.00 | 1.50 | 2.33 | 1.17 | 1.92 | 1.17 |
| 8 | 90 | 64.3 | 13,640.1 | 13.0 | 1.75 | 0.75 | 1.00 | 4.00 | 2.00 | 3.25 | 1.63 | 1.92 | 1.17 |
| 12 | 90 | 136.8 | 29,019.7 | 27.6 | 2.08 | 0.75 | 1.33 | 6.50 | 3.25 | 4.25 | 2.13 | 2.33 | 1.66 |
| 16 | 90 | 237.7 | 50,423.8 | 48.0 | 1.75 | 1.00 | 1.66 | 8.00 | 4.00 | 6.00 | 3.00 | 3.00 | 2.66 |

NOTE

THE DESIGN ENGINEER IS RESPONSIBLE FOR ENSURING THAT THE THRUST BLOCKS ARE CORRECTLY SIZED FOR EACH APPLICATION. CALCULATIONS FOR THRUST BLOCK TO SUPPORT HORIZONTAL BENDS ARE BASED ON EQUATIONS AND CONSTANTS TAKEN FROM AMERICAN WATER WORKS ASSOCIATION DUCTILE-IRON PIPE AND FITTINGS (AWWA M41). THE ONLY DEVIATION IS TO SUBSTITUTE THE RANKINE PASSIVE PRESSURE FOR THE SOIL BEARING STRENGTH AS SUGGESTED IN THE MANUAL.

1. D.W.S.D. TEST PRESSURE USED IS 150 POUNDS/SQUARE INCH.
2. SAFETY FACTOR 1.5.
3. WEIGHT OF CONCRETE IS 150 POUNDS/CUBIC FOOT.
4. RANKINE PASSIVE PRESSURE IS 1050 POUNDS/SQUARE FEET (BASED ON SOFT CLAY). THE CALCULATIONS ABOVE ARE FOR A CONSERVATIVE CONDITION. THE SIZE OF THE THRUST BLOCK CAN BE REDUCED AS THE BEARING CAPACITY OF THE SOIL INCREASES.

| | | | | | |
|--------------------|-------------|-----|-----|-----|------|
| C | | | | | |
| B | | | | | |
| A | | | | | |
| | DESCRIPTION | DRW | CKD | APP | DATE |
| REVISIONS | | | | | |
| DRAWN BY: S.D.A. | | | | | |
| CHECKED BY: S.D.A. | | | | | |
| APPROVED: | | | | | |

**THRUST BLOCK,
HORIZONTAL
BEND
(AWWA SIZING)**

SCALE: NONE

CITY OF DETROIT
WATER AND SEWERAGE
DEPARTMENT
ENGINEERING
DIVISION

SHEET 1 OF 1

DWG No. 02620-18