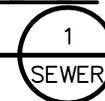


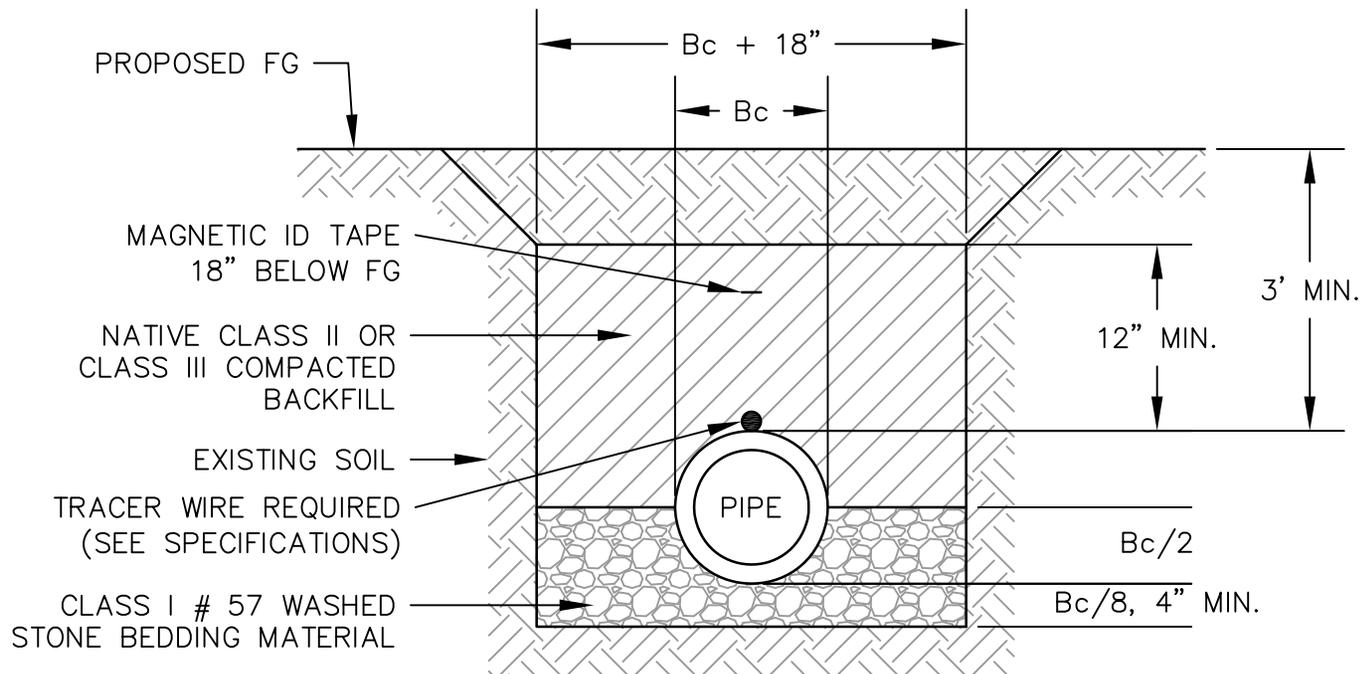
NOTES:

1. USE FOR ALL GRAVITY SEWER PVC PIPE.
2. USE SUITABLE TAMP RODS TO ENSURE BEDDING IS THOROUGHLY TAMPED UNDER THE PIPE HAUNCHES.
3. B_c = DIAMETER OF PIPE BARREL.

**CLASS B BEDDING FOR GRAVITY SEWER
DETAIL**

SCALE: NOT TO SCALE



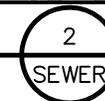


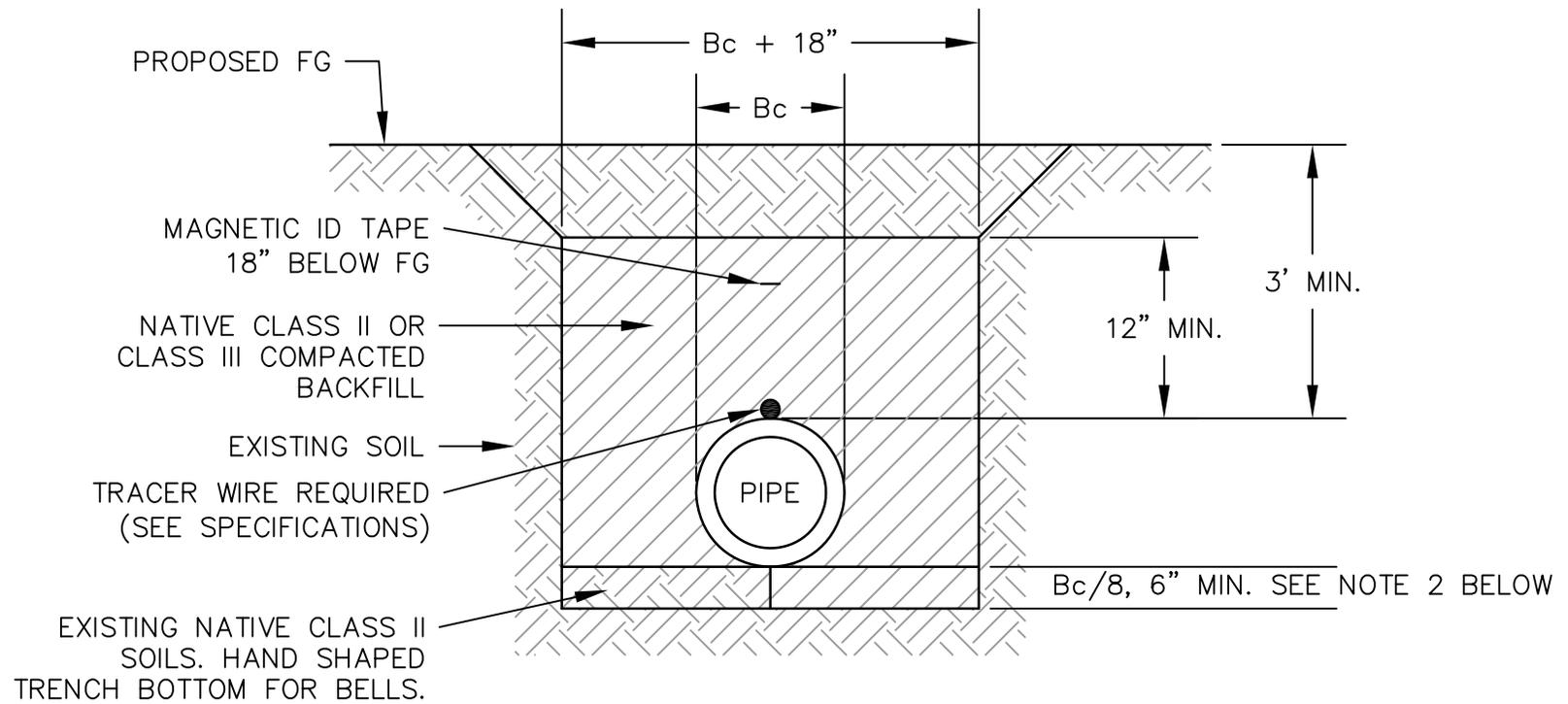
NOTES:

1. USE FOR ALL PVC PRESSURE LINES WHEN EXCAVATION OF TRENCH BOTTOM RESULTS IN UNSTABLE CONDITIONS.
2. USE FOR ALL GRAVITY SEWER DUCTILE IRON PIPE.
3. USE SUITABLE TAMP RODS TO ENSURE BEDDING IS THOROUGHLY TAMPED UNDER THE PIPE HAUNCHES.
4. B_c = DIAMETER OF PIPE BARREL.

**CLASS C BEDDING FOR PRESSURE SEWER
DETAIL**

SCALE: NOT TO SCALE



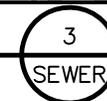


NOTES:

1. USE FOR PRESSURE PIPE WHEN EXCAVATION OF TRENCH BOTTOM RESULTS IN STABLE CONDITIONS.
2. CLASS II BEDDING REQUIRED WHEN NATIVE ROCK BEDS ENCOUNTERED.
3. USE SUITABLE TAMP RODS TO ENSURE BEDDING IS THOROUGHLY TAMPED UNDER THE PIPE HAUNCHES.
4. B_c = DIAMETER OF PIPE BARREL.

**CLASS D BEDDING FOR PRESSURE SEWER
DETAIL**

SCALE: NOT TO SCALE



DEFINITIONS

CLASS I: CRUSHED STONE CONFORMING TO N.C.D.O.T. #57.

CLASS II: COARSE SANDS AND GRAVELS WITH MAXIMUM PARTICLE SIZE OF 40 MM (1-1/2 IN.), INCLUDING VARIOUSLY GRADED SANDS AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NON-COHESIVE, EITHER WET OR DRY. CLASS II MATERIALS ARE DEFINED AS SOIL TYPES GW, GP, SW, AND SP.

CLASS III: FINE SAND AND CLAYEY GRAVELS, INCLUDING FINE SANDS, SAND-CLAY MIXTURES AND GRAVEL-CLAY MIXTURES. CLASS III MATERIALS ARE DEFINED AS SOIL TYPES GM, GC, SM, AND SC.

BACKFILLING AT SIDES OF PIPE: BACKFILL BY HAND OR ACCEPTABLE MECHANICAL MEANS FROM THE TOP OF THE BEDDING TO THE CROWN OF THE PIPE USING NATIVE CLASS II OR CLASS III MATERIALS. LAYERS OF BACKFILL MATERIAL SHALL BE PLACED IN EVEN LIFTS ON BOTH SIDES OF THE PIPE. DO NOT MOVE, INJURE, OR DISTURB THE PIPE. INSURE THAT UNIFORM SIDE SUPPORT IS PROVIDED THROUGHOUT THE LENGTH OF PIPE. USE ONLY HAND TAMPING FOR COMPACTION.

BACKFILLING OVER THE PIPE: BACKFILL WITH CLASS II AND CLASS III MATERIAL FROM TOP OF PIPE OR TOP OF BEDDING TO A MINIMUM DEPTH OF 12" ABOVE THE CROWN OF THE PIPE PROVIDING SUFFICIENT CARE TO PREVENT INJURING OR MOVING THE PIPE. PLACE BACKFILL IN EVEN LAYERS AND COMPACT TO SPECIFIED DENSITY BY HAND OR APPROVED MECHANICAL MEANS.

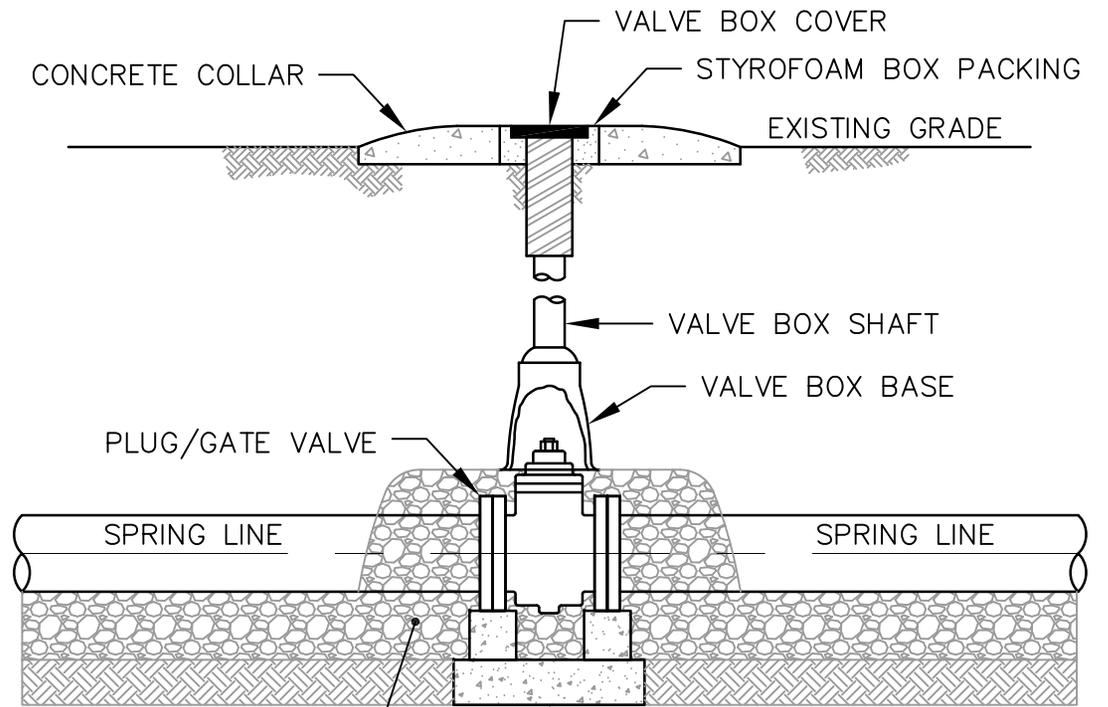
BACKFILLING TO GRADE: BACKFILL AND COMPACT FROM 12" ABOVE THE CROWN OF THE PIPE TO FINISHED GRADE WITH NATIVE SOIL MATERIAL, COMPACTING SAME TO THE DENSITY REQUIRED FOR THE AREA CLASSIFICATION. THE FINISHED GRADE SHALL CONFORM TO ELEVATIONS, SLOPES, AND CONTOURS AS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR SETTLEMENT OVER ALL TRENCHES AND HE SHALL BE REQUIRED TO ADD MATERIAL AND COMPACT AS DIRECTED IF SUCH SETTLEMENTS OCCUR.

PIPES AND RELATED APPURTENANCES: BACKFILL AND COMPACT TRENCHES IN UNIFORM LAYERS TO 1' ABOVE THE CROWN OF THE PIPE OR BEDDING TO 90% MAXIMUM DRY DENSITY. BACKFILL FROM 1' ABOVE THE CROWN OF THE PIPE TO FINISH GRADE AS REQUIRED FOR THE AREA CLASSIFICATION OR TO 95% MAXIMUM DRY DENSITY.

BEDDING DEFINITIONS **DETAIL**

SCALE: NOT TO SCALE





BACKFILL WITH #57 WASHED STONE TO SPRING LINE OF PIPE (MIN. 4" BELOW VALVE AND PIPE)

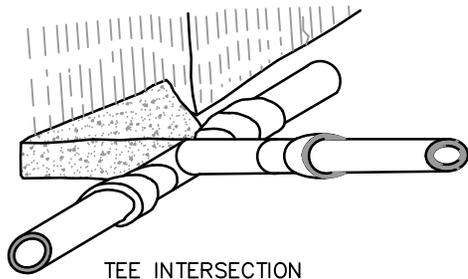
PROVIDE SOLID CONCRETE BLOCK SUPPORT DIRECTLY UNDER VALVE FLANGE/PIPE FLANGE

NOTES:

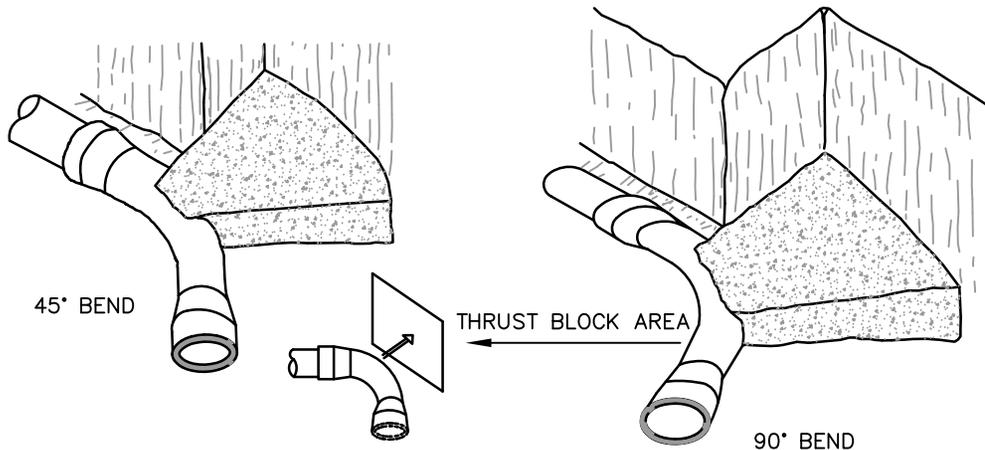
1. A VALVE BOX SHOULD BE PROVIDED FOR EACH VALVE USED IN BURIED SERVICE APPLICATION. VALVE BOXES SHOULD BE INSTALLED SUCH THAT NO LOAD IS TRANSFERRED TO THE VALVE.
2. PREPARE PIPE ENDS ACCORDING TO MANUFACTURERS INSTRUCTIONS. INSTALL VALVE PER PROPER METHODS ACCORDING TO END JOINT TYPE. ALL PIPING SHOULD BE PROPERLY SUPPORTED TO AVOID LINE STRESS ON THE VALVE. DO NOT USE THE VALVE AS A JACK TO FORCE A PIPELINE INTO POSITION.

**TYPICAL PLUG/GATE VALVE, VALVE BOX, & PROTECTION
DETAIL**

SCALE: NOT TO SCALE



1. CONCRETE SHALL BE 3000 PSI.
2. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
3. TRENCHES SHALL CONFORM TO STANDARD DETAILS AS SHOWN ON THIS SHEET.
4. SEE STANDARD THRUST BLOCK QUANTITY TABLE (RIGHT) FOR CONCRETE REQUIRED.
5. ALL BENDS AND INTERSECTIONS SHALL HAVE CONCRETE THRUST BLOCKING.



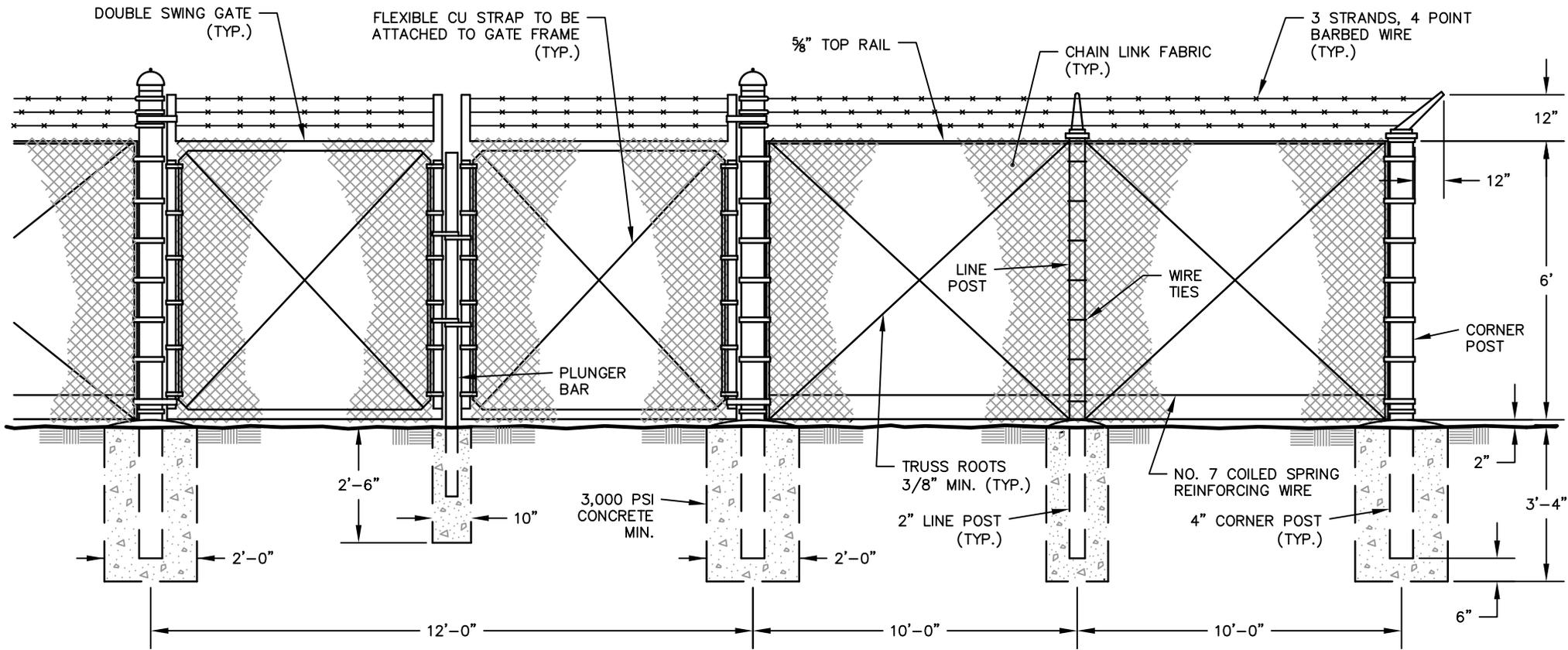
REACTION BEARING AREAS FOR HORIZONTAL PIPE BENDS									
BASED ON TEST PRESSURE OF 200 P.S.I. (ALL AREA IN SQUARE FEET)									
SIZE AND DEGREE OF BEND	STATIC THRUST IN POUNDS	FAIRLY DRY CLAY 4000 LBS/FT Sq.	SOFT CLAY 2000 LBS/FT Sq.	GRAVEL COARSE SAND 1600 LBS/FT Sq.	DRY CLAY-ALWAYS 800 LBS/FT Sq.	SAND, COMPACT, FIRM 4000 LBS/FT Sq.	SAND-CLEAN, DRY 4000 LBS/FT Sq.	QUICK-SAND, VERY POOR SOIL 1000 LBS/FT Sq.	ROCK-POOR 10,000 LBS/FT Sq.
6"									
11 1/4°	1,108	1	1	1	1	1	2	1	
22 1/2°	2,207	1	2	2	1	1	3	1	
45°	4,328	2	3	3	1	1	5	1	
90°	7,996	2	4	5	1	1	8	1	
PLUG	5,655	2	3	4	1	1	6	1	
8"									
11 1/4°	1,970	1	1	2	1	1	2	1	
22 1/2°	3,922	1	2	3	1	1	4	1	
45°	7,694	2	4	5	1	1	8	1	
90°	14,215	4	8	9	2	2	15	2	
PLUG	10,053	3	5	6	2	2	10	1	
12"									
11 1/4°	4,433	2	3	3	1	1	5	1	
22 1/2°	8,826	3	5	6	2	2	9	1	
45°	17,312	5	9	11	3	3	18	2	
90°	31,983	8	16	19	4	4	32	4	
PLUG	22,619	6	12	14	3	3	23	3	
16"									
11 1/4°	7,881	2	4	5	1	1	8	1	
22 1/2°	15,691	4	8	10	2	2	16	2	
45°	30,779	8	16	19	4	4	31	4	
90°	56,861	15	29	35	8	8	57	6	
PLUG	40,213	10	21	25	5	5	41	5	

NOTES:
 REACTION BEARING AREAS ARE IN SQUARE FEET MEASURED IN A VERTICAL PLANE IN THE TRENCH SIDE AT AN ANGLE OF 90° TO THE THRUST VECTOR.
 USE 6°-90° BEND VALUE FOR HYDRANTS FOR ADDITIONAL SAFETY FACTOR

STANDARD THRUST BLOCKING VIEWS AND DESIGN QUANTITY TABLE
DETAIL

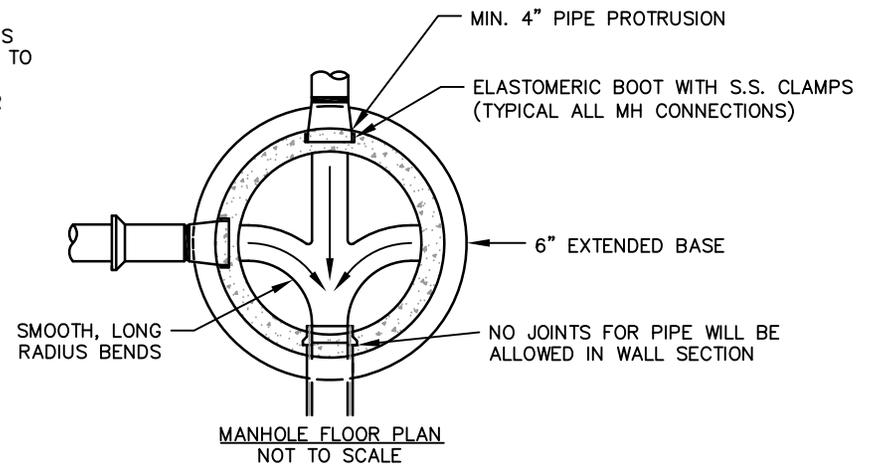
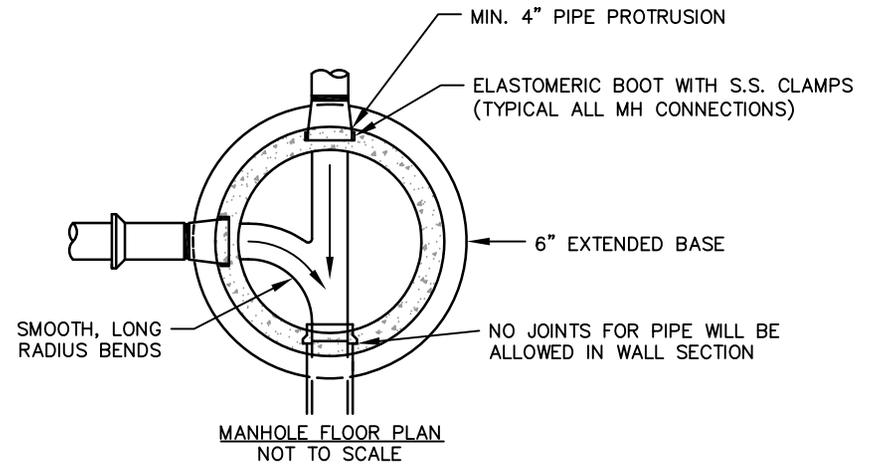
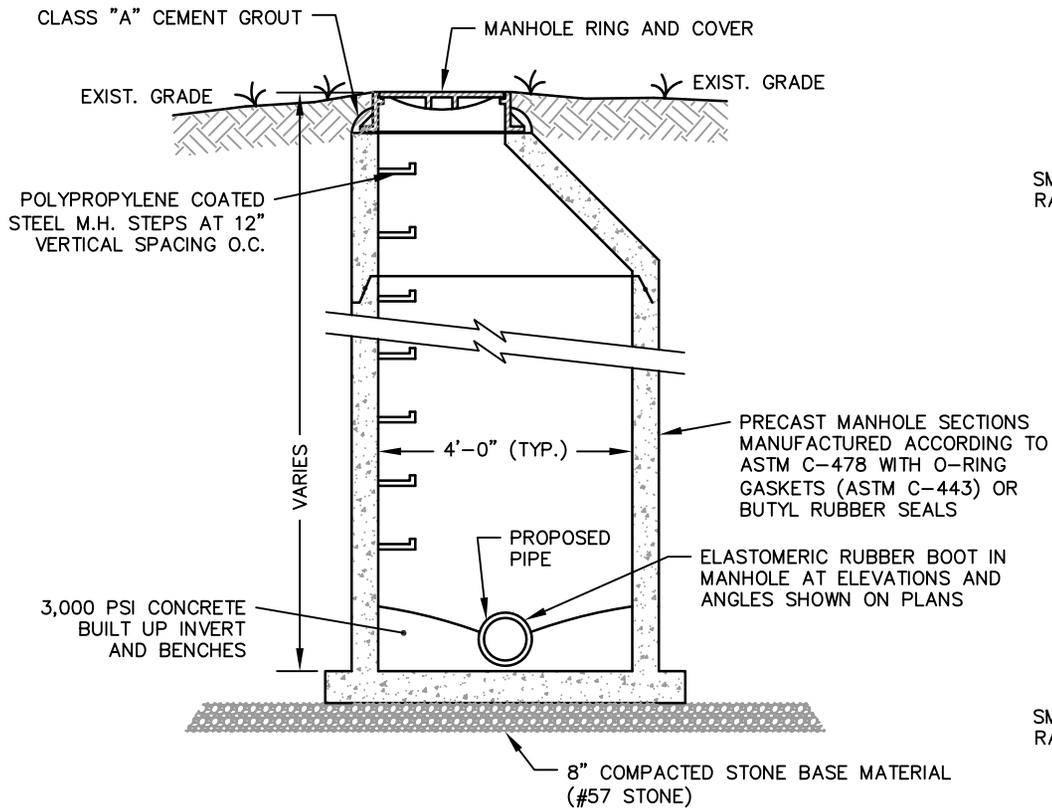
SCALE: NOT TO SCALE





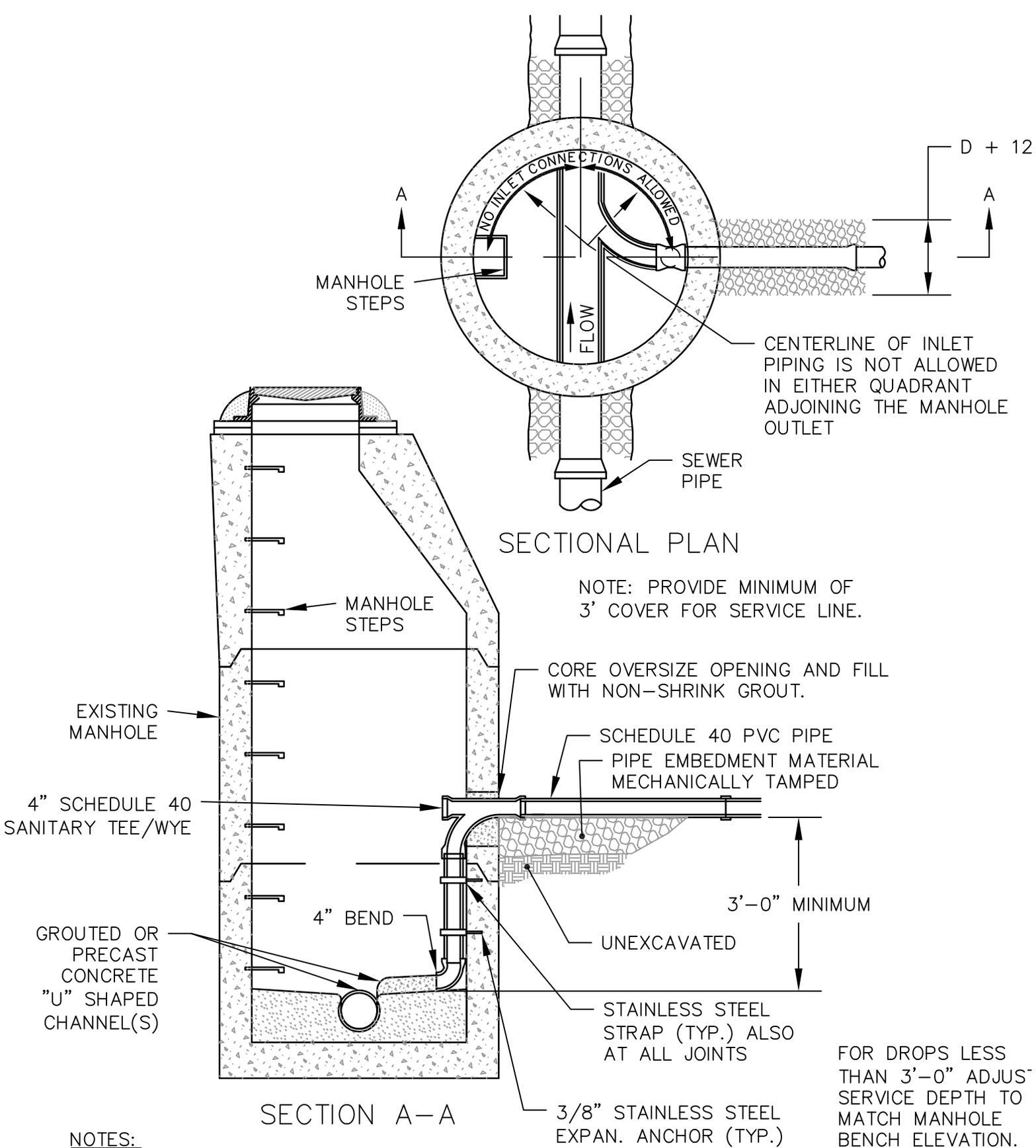
6' CHAIN LINK FENCE & DOUBLE SWING GATE DETAIL

SCALE: NOT TO SCALE



**STANDARD 48" MANHOLE ASSEMBLY
DETAIL**

SCALE: NOT TO SCALE

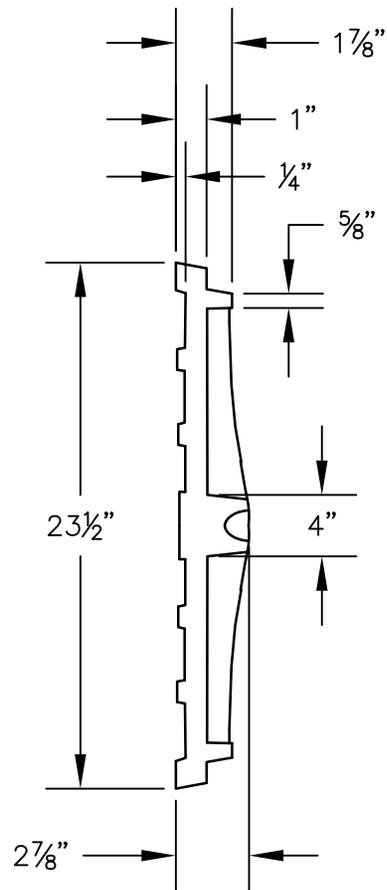


NOTES:

1. THIS DETAIL FOR USE ON 4" SERVICE LINES CONNECTED TO EXIST. MANHOLES, AND ON A CASE BY CASE BASIS AS APPROVED BY THE ENGINEER.
2. MANHOLE STEPS TO BE VERTICALLY IN LINE WITH "INVERT OUT" FOR PIPE 18" AND LESS. OVER 18" TO BE LOCATED IN LINE WITH BENCH.

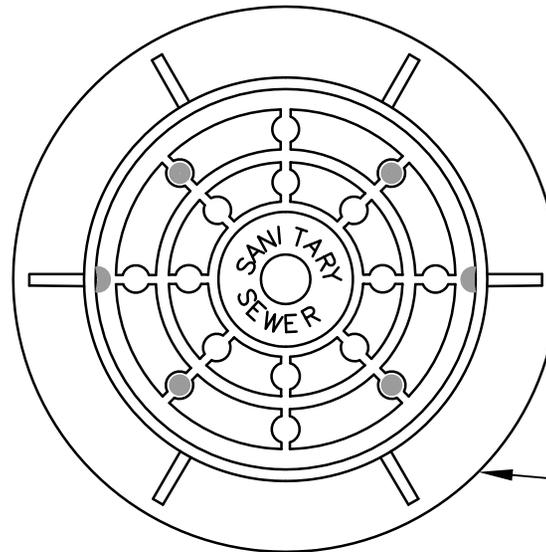
**DROP MANHOLE
DETAIL**

SCALE: NOT TO SCALE

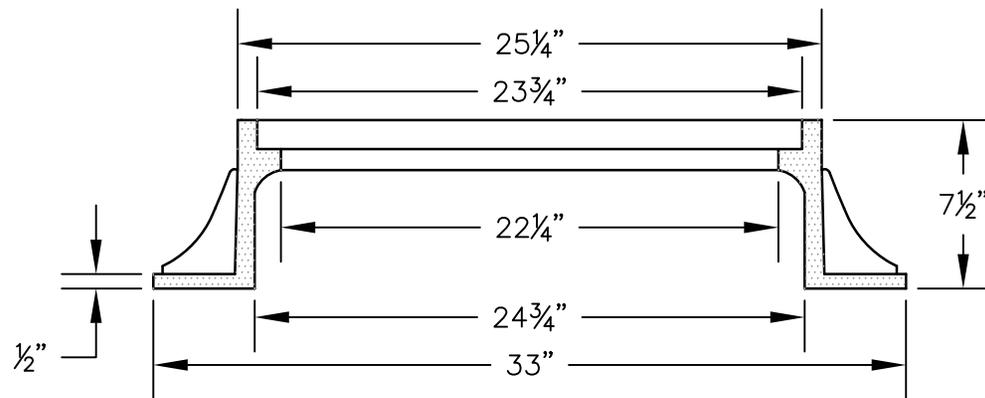


FRAME 182 LBS.

COVER 120 LBS. MINIMUM

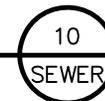


VENTING TO BE PROVIDED AS SPECIFIED IN STANDARD SPECIFICATIONS



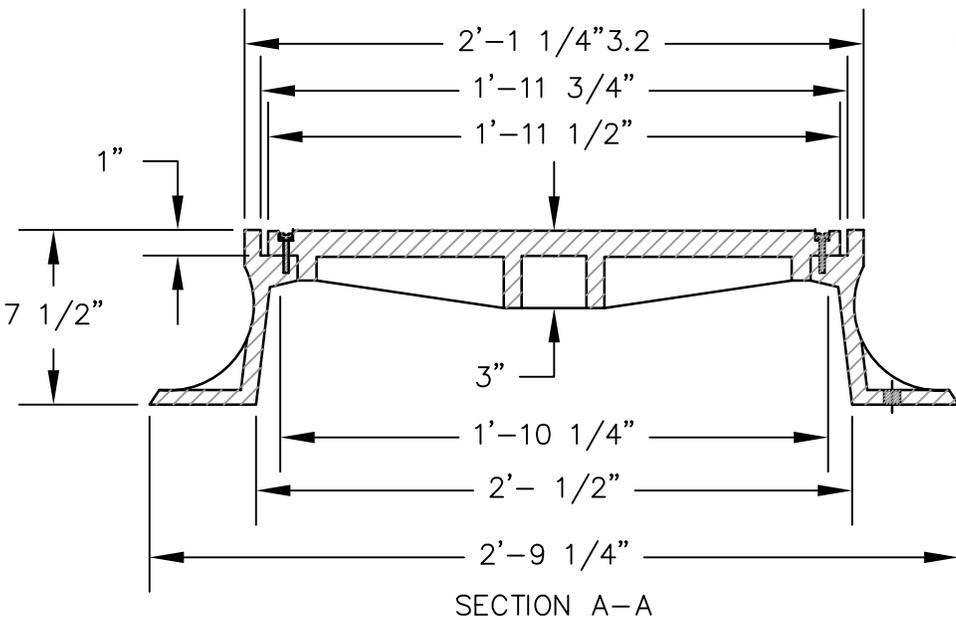
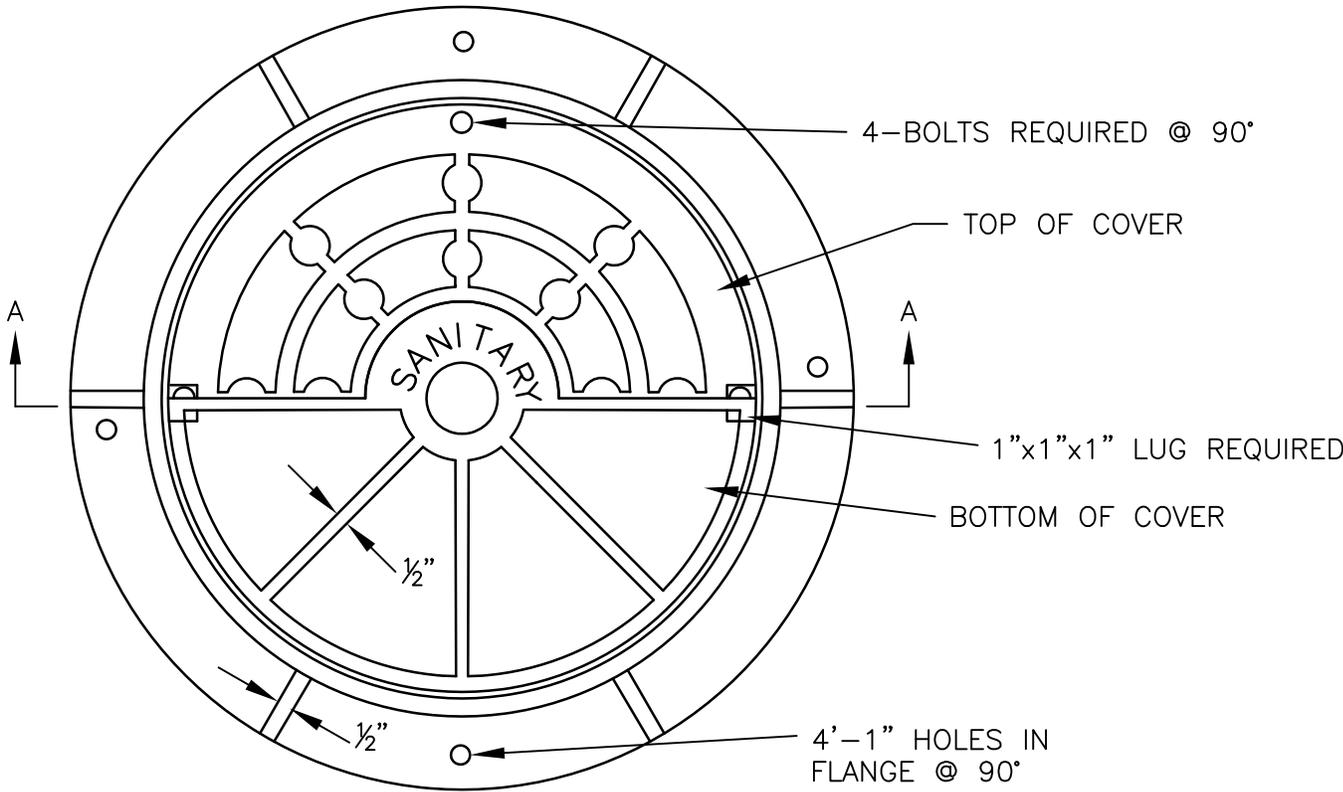
**TYPICAL MANHOLE COVER
DETAIL**

SCALE: NOT TO SCALE



MINIMUM AVERAGE WEIGHT
 RING 190
 COVER 120
 TOTAL 310

STANDARD LETTERS UNLESS
 OTHERWISE SPECIFIED

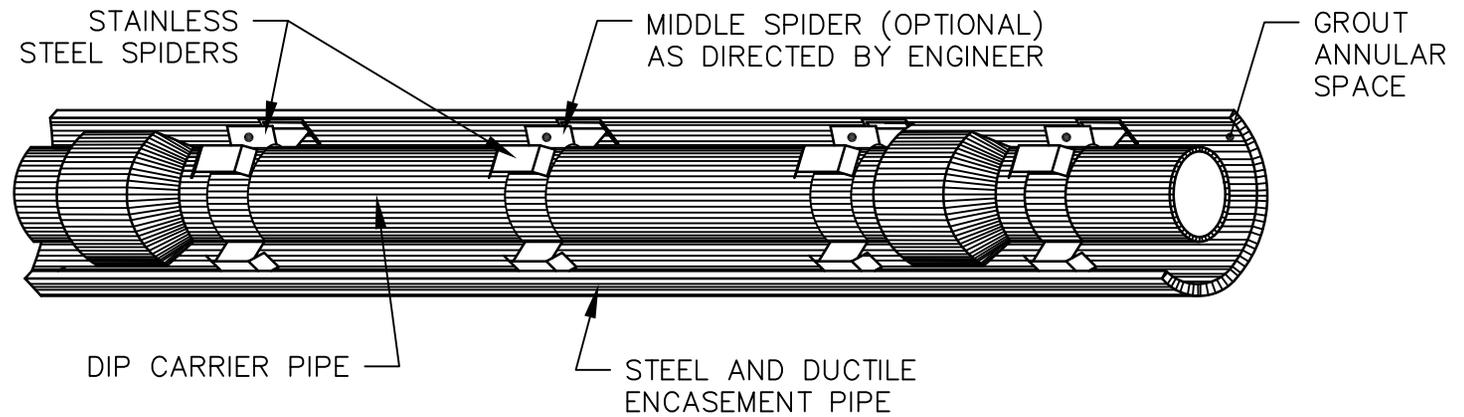


NOTES:

1. FURNISH 4-1/2 x 1 3/4 STAINLESS HEXHEAD MACHINE SCREWS @ 90° AND ONE POLYVINYL GASKET BETWEEN COVER AND FRAME SEAT.
2. DEWEY BROS MH RCR 2001 W OR APPROVED EQUAL.

**TYPICAL MANHOLE RING AND BOLT DOWN COVER
 DETAIL**

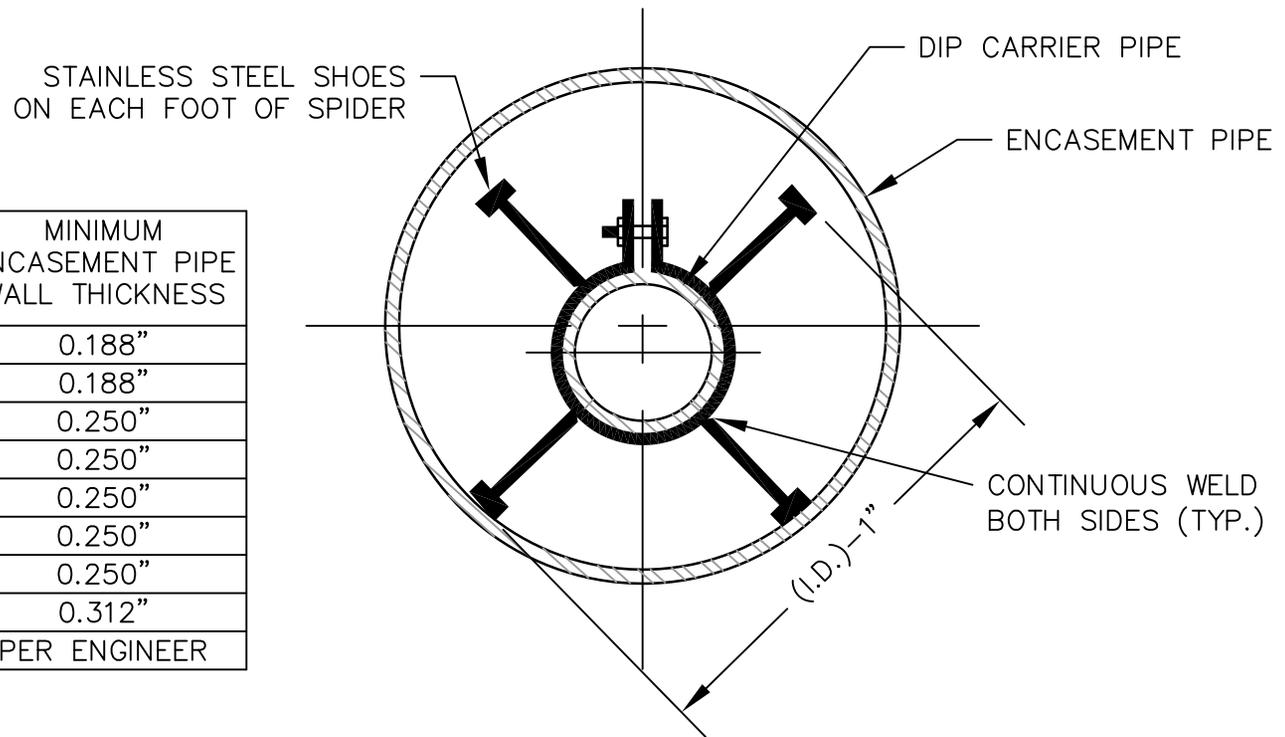
SCALE: NOT TO SCALE



NOTES:

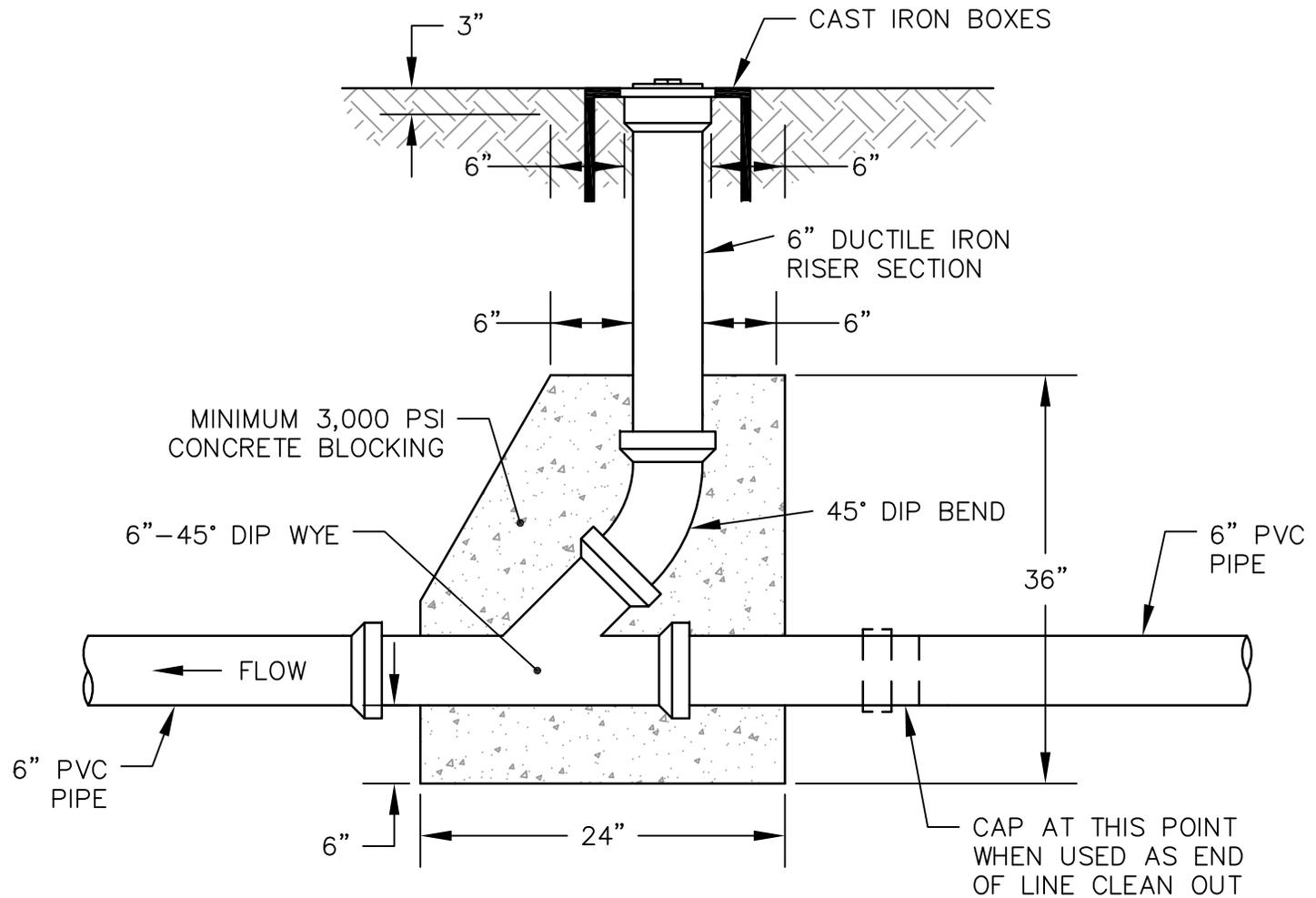
1. NORMAL SPACING FOR SPIDERS IS 3 PER 18 FOOT LENGTH OF PIPE, ONE SUPPORT AT EACH END AND A SUPPORT AT 9 FOOT CENTER.
2. ENTIRE SPIDER ASSEMBLY TO BE 306 STAINLESS STEEL.
3. FIELD MODIFY AS REQUIRED TO PROVIDE DESIGN SLOPE IN CARRIER PIPE.

CARRIER PIPE DIAMETER	MINIMUM ENCASEMENT PIPE DIAMETER	MINIMUM ENCASEMENT PIPE WALL THICKNESS
4"	12"	0.188"
6"	12"	0.188"
8"	12"	0.250"
12"	16"	0.250"
16"	24"	0.250"
18"	24"	0.250"
24"	30"	0.250"
30"	36"	0.312"
≥36"	PER ENGINEER	PER ENGINEER



**BORE AND JACK
DETAIL**

SCALE: NOT TO SCALE

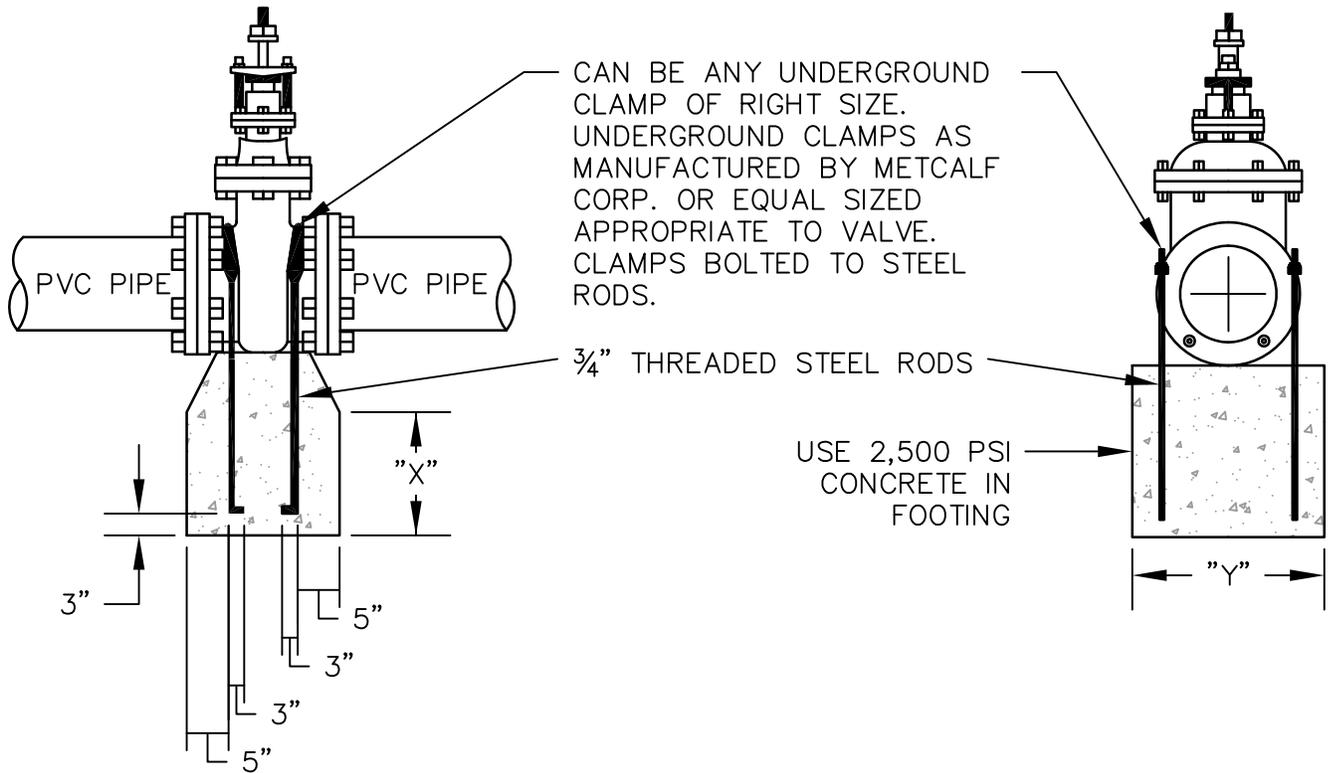


NOTES:

1. CONCRETE COLLAR NOT NEEDED WHEN CLEANOUT OCCURS IN CONCRETE PAVEMENT.
2. DUCTILE IRON PIPE AND FITTINGS TO BE USED IN CONCRETE BLOCKING.

**6" SANITARY SEWER CLEANOUT
DETAIL**

SCALE: NOT TO SCALE



NOTES:

1. RODS SHOULD EXTEND TO TOP OF PIPE CROWN.
2. X x Y MUST EQUAL THE SQUARE FOOTAGE OF THE BEARING AREA SHOWN IN THE TABLE BELOW.

BEARING SURFACE AREA FOR VALVE FOOTINGS			
TYPE OF MATERIAL			
	4"	6"	8"
QUICKSAND, POOR SOIL (1,000 psf)	3	7	12
GRAVEL, COURSE SAND (1,600 psf)	2	5	8
SOFT CLAY (2,000 psf)	2	4	6
FAIRLY DRY CLAY, CLEAN DRY SAND (4,000 psf)	1	2	3
DRY CLAY, COMPACT SAND (8,000 psf)	1	1	2
POOR ROCK (10,000 psf)	1	1	2

3. COAT EXPOSED STEEL RODS AND CLAMPS WITH BITUMINOUS BASE PAINT.

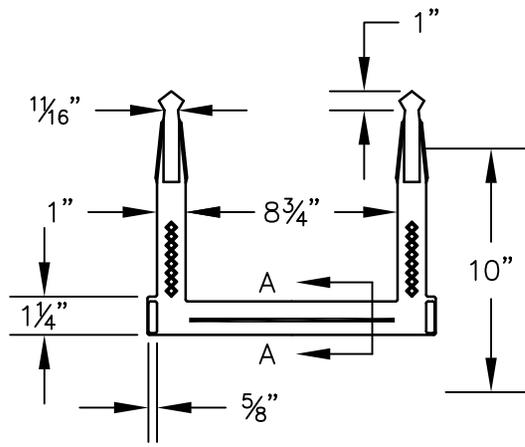
VALVE FOOTING FOR PVC MAINS
DETAIL

SCALE: NOT TO SCALE

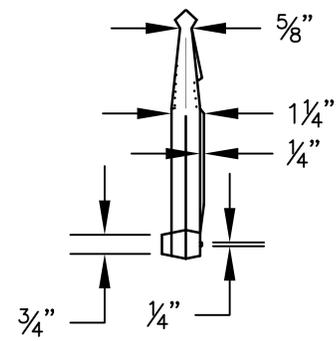


NOTES:

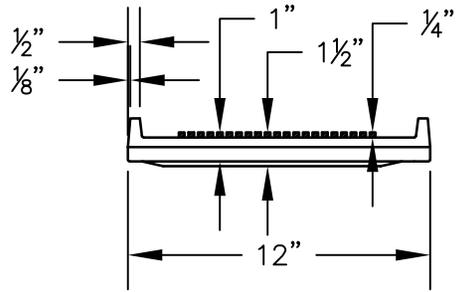
1. ALL PRECAST MANHOLES AND MANHOLE RINGS AND COVERS SHALL CONFORM TO NCDOT STANDARDS.
2. ALL AIR RELIEF VALVES SHALL BE CONSTRUCTED EITHER AT THE TOP OF BANK OF DITCH OR OUTSIDE OF THE DITCH BANK.



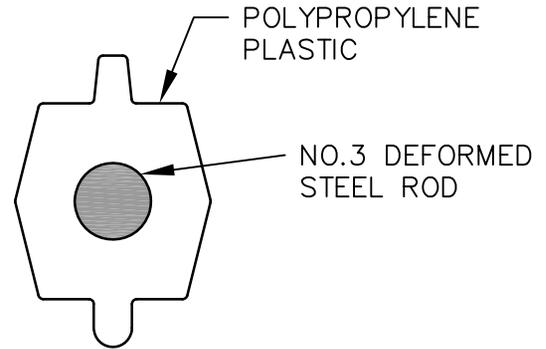
PLAN



SIDE ELEVATION



ELEVATION

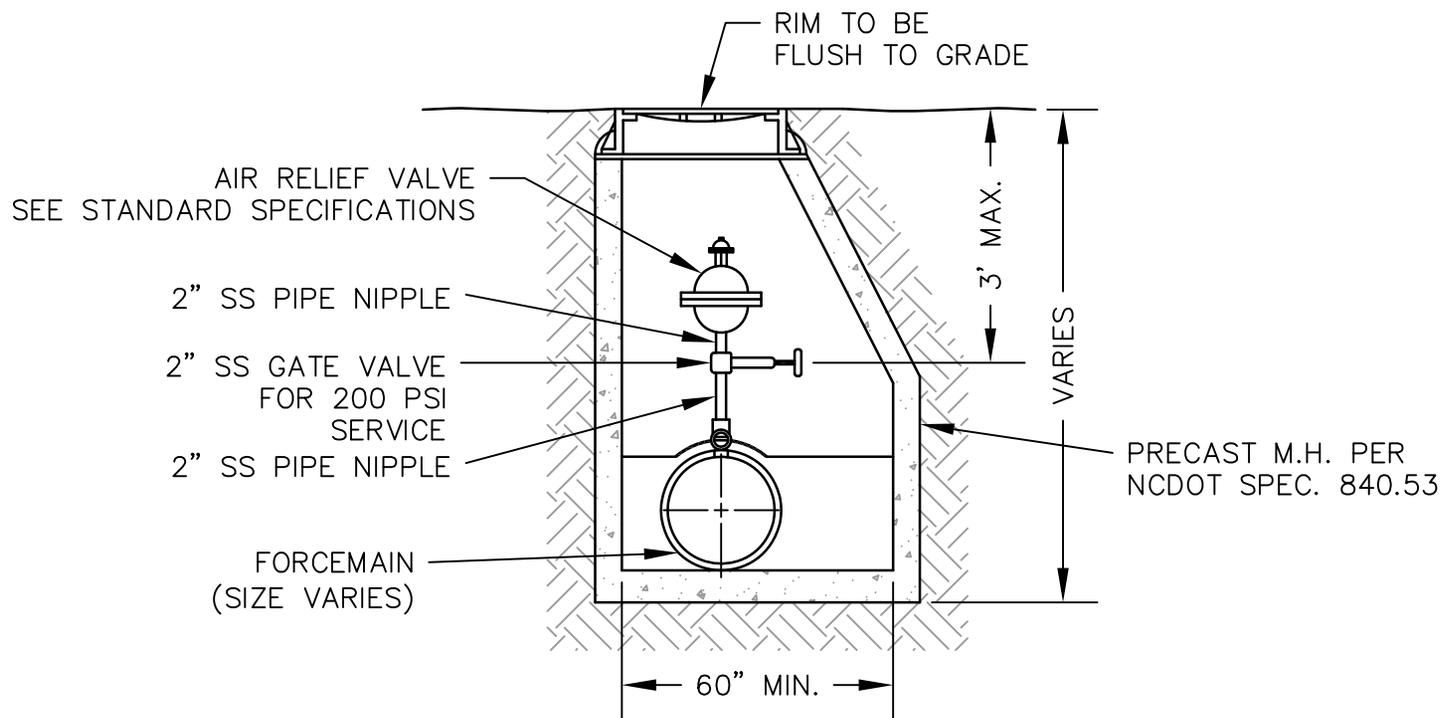


SECTION A-A

NOTE: FOR MANHOLES AND CATCH BASINS 3'-6" DEPTH AND GREATER, SPACED 12" O.C.

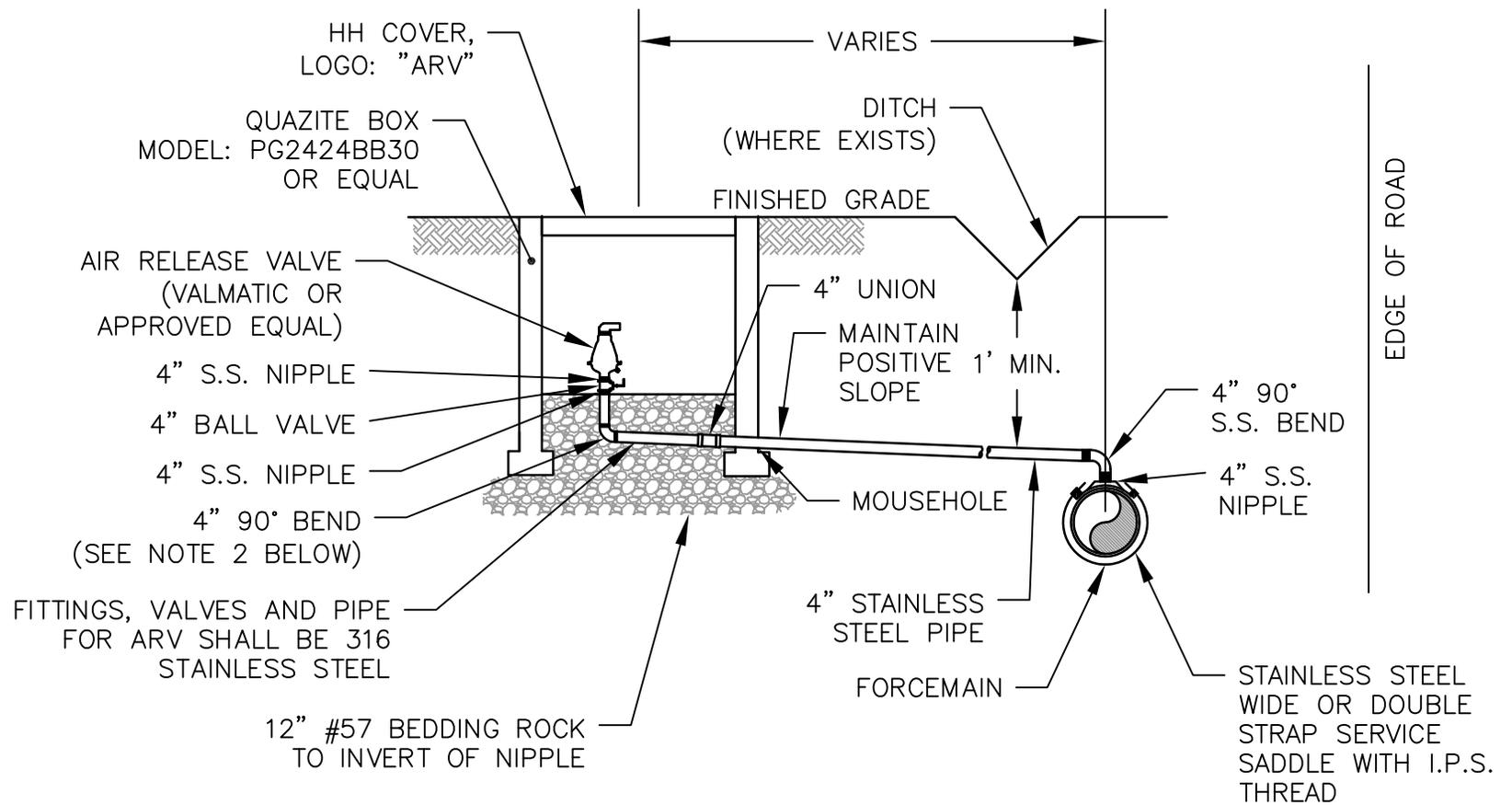
**MANHOLE/CATCH BASIN STEPS
DETAIL**

SCALE: NOT TO SCALE



**AIR RELIEF VALVE
DETAIL**

SCALE: NOT TO SCALE

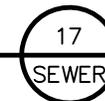


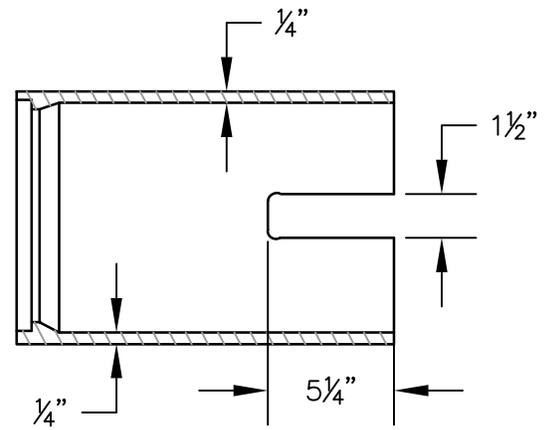
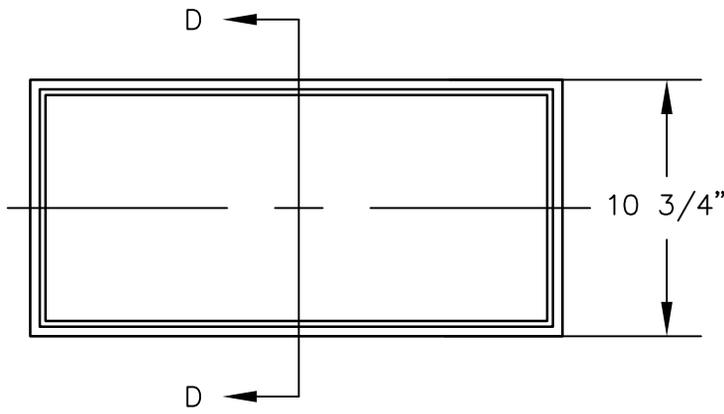
NOTES:

1. ABOVE DETAIL IS BASED ON 4" AIR RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES SHALL BE DETERMINED BY THE ENGINEER.
2. THE MINIMUM DIMENSION FROM INVERT TO FINISHED GRADE SHALL BE 24".
3. CONTRACTOR TO VERIFY ACTUAL ROW/PROPERTY LINE LOCATION AT ARV LOCATION. WHEN ARV PLACEMENT CONFLICTS WITH EXISTING DITCH, CONTRACTOR TO CONTACT ENGINEER FOR FINAL ARV PLACEMENT.
4. LOOP SUFFICIENT AMOUNT OF TRACER WIRE INTO BOX TO ALLOW EASE OF ACCESS.

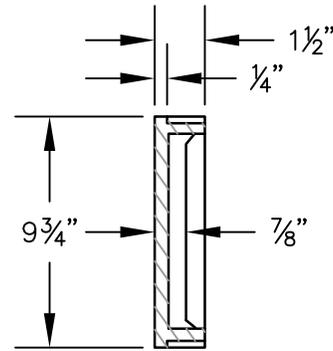
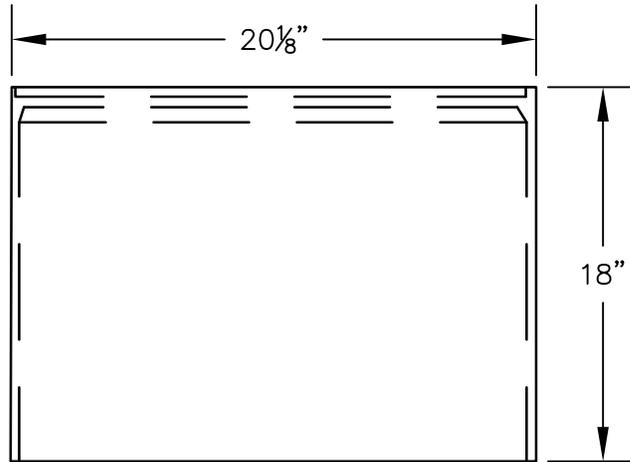
**OFFSET AIR RELEASE VALVE
DETAIL**

SCALE: NOT TO SCALE

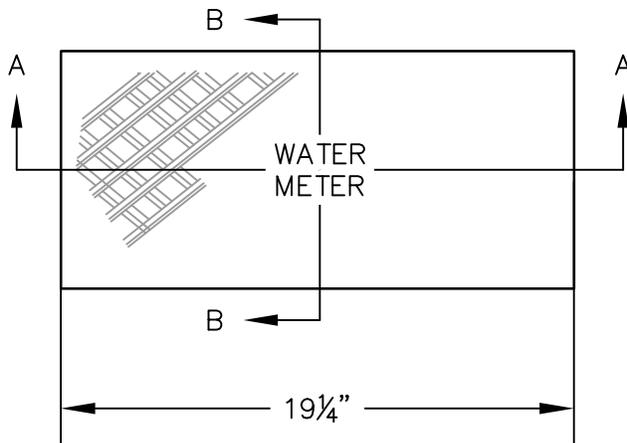




SECTION D-D



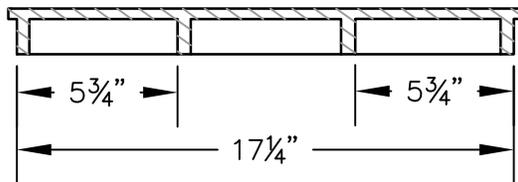
SECTION B-B



MINIMUM AVERAGE WEIGHT	
FRAME	50 LBS.
COVER	20 LBS.

NOTES:

1. DEEP PLASTIC WITH CAST IRON COVER.
2. ELSTER AMCO INC. FROM MILLER SUPPLY - METER REGISTER US GALLONS (RADIO READ).
3. BOXES AND COVERS SHALL MEET AASHTO H-20 SPECIFICATIONS.

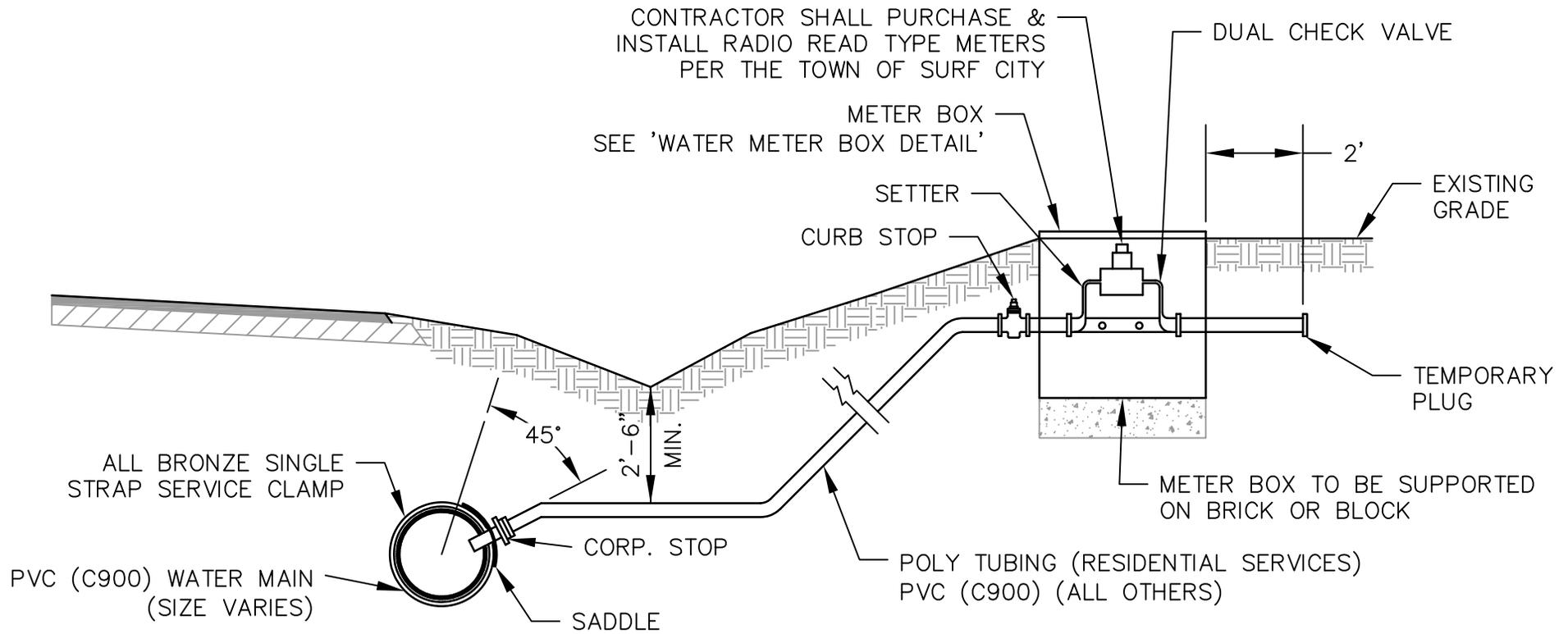


SECTION A-A

WATER METER BOX DETAIL

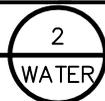
SCALE: NOT TO SCALE

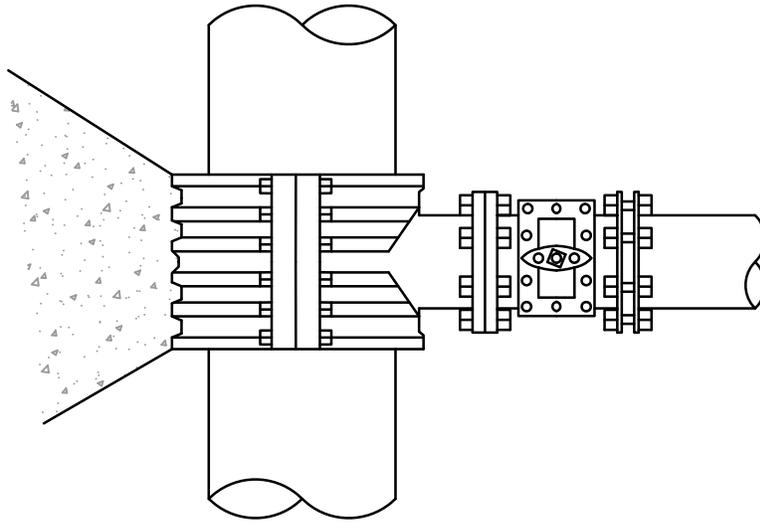




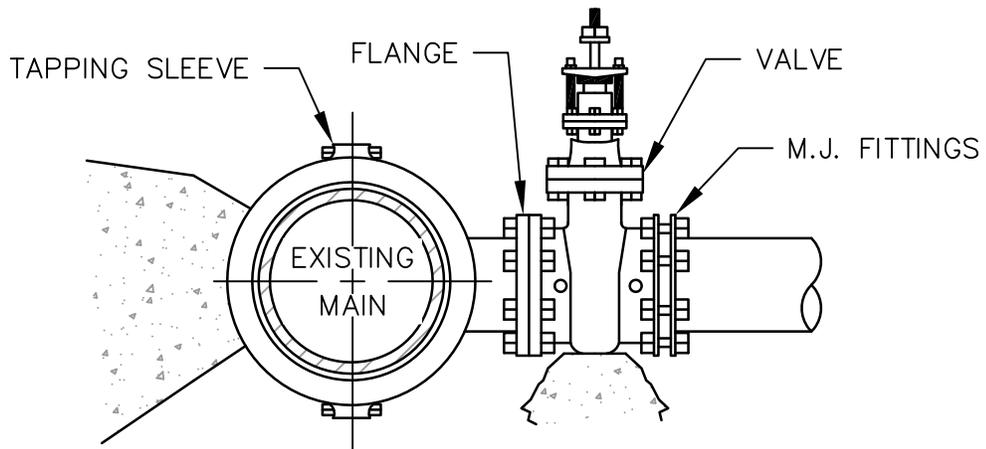
**STANDARD WATER CONNECTION DETAIL AND WATER METER
DETAIL**

SCALE: NOT TO SCALE





PLAN



ELEVATION

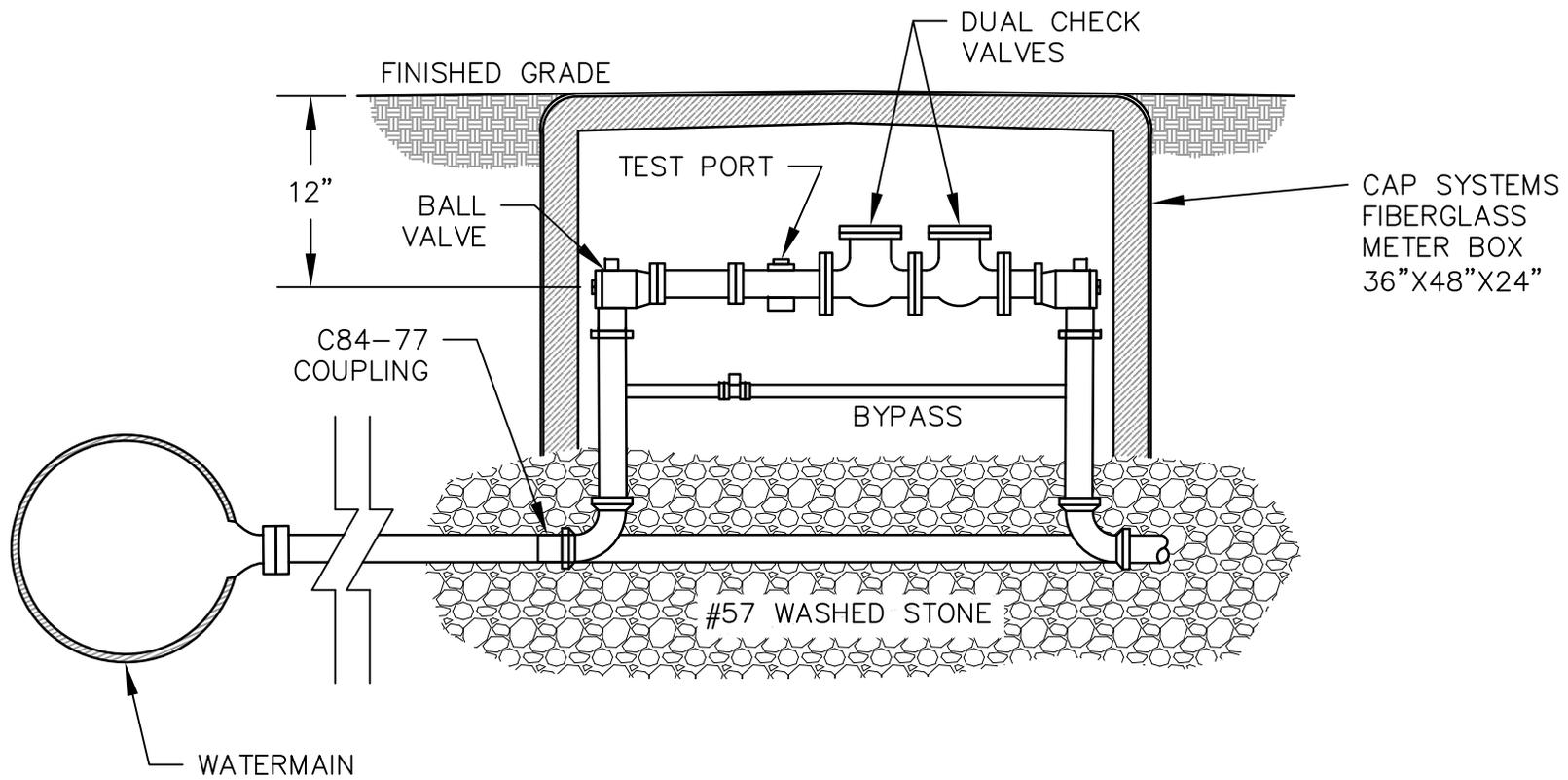
NOTES:

1. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OR MECHANICAL JOINT FITTINGS.
2. SEE STANDARD REACTION BLOCK TABLES FOR AREA OF CONCRETE REQUIRED.
3. SOLID CONCRETE OR BRICK BLOCKING SHALL BE USED AS FOOTING FOR DUCTILE IRON PIPE.
4. PVC PIPE SHALL REQUIRE A 2,500 P.S.I. CONCRETE FOOTING.

**4"–12" STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY
DETAIL**

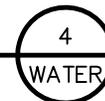
SCALE: NOT TO SCALE

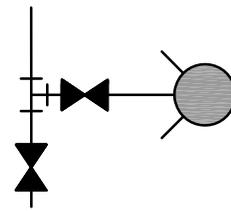
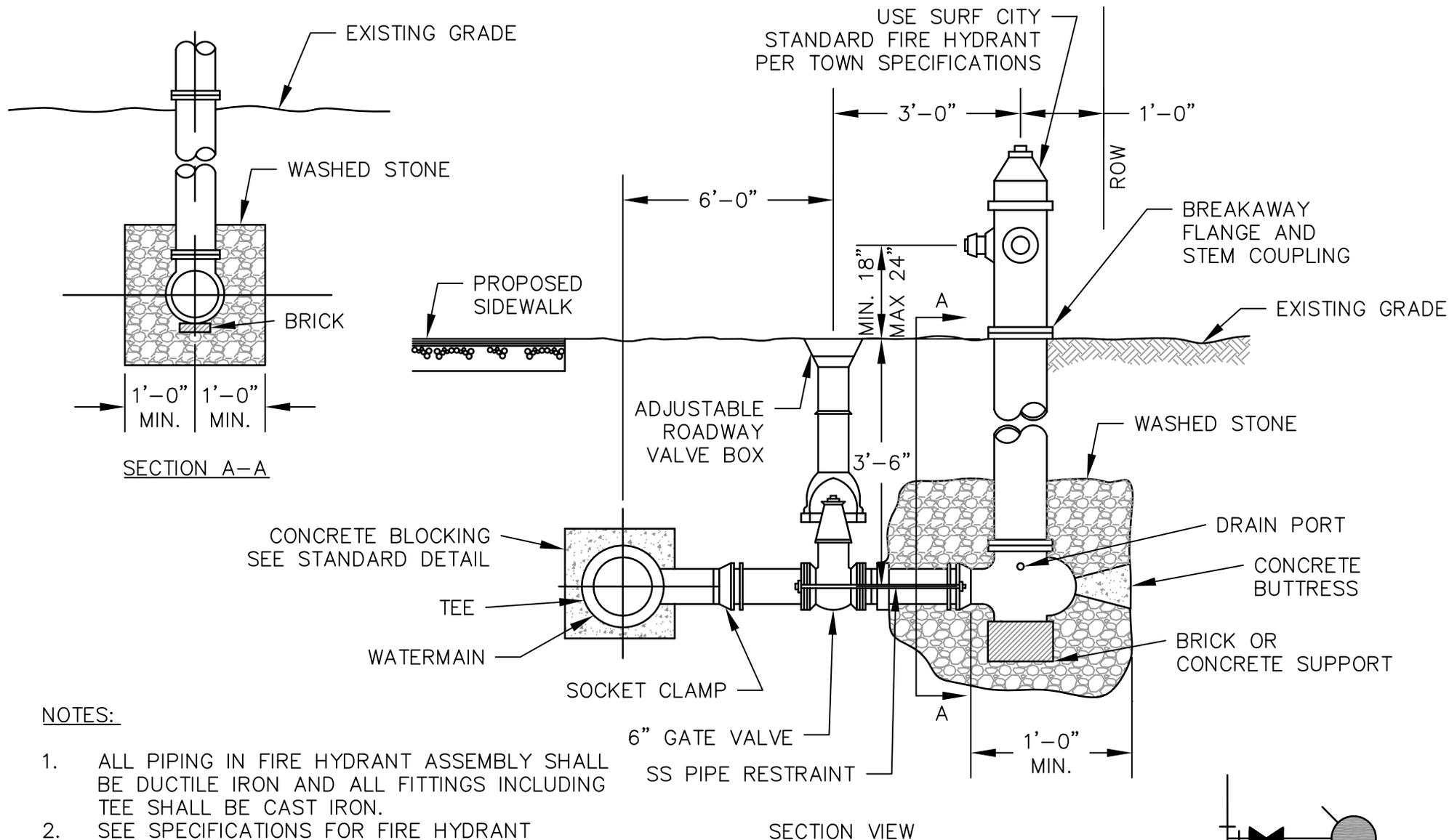




**WATER METER (1 1/2" TO 4")
DETAIL**

SCALE: NOT TO SCALE



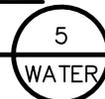


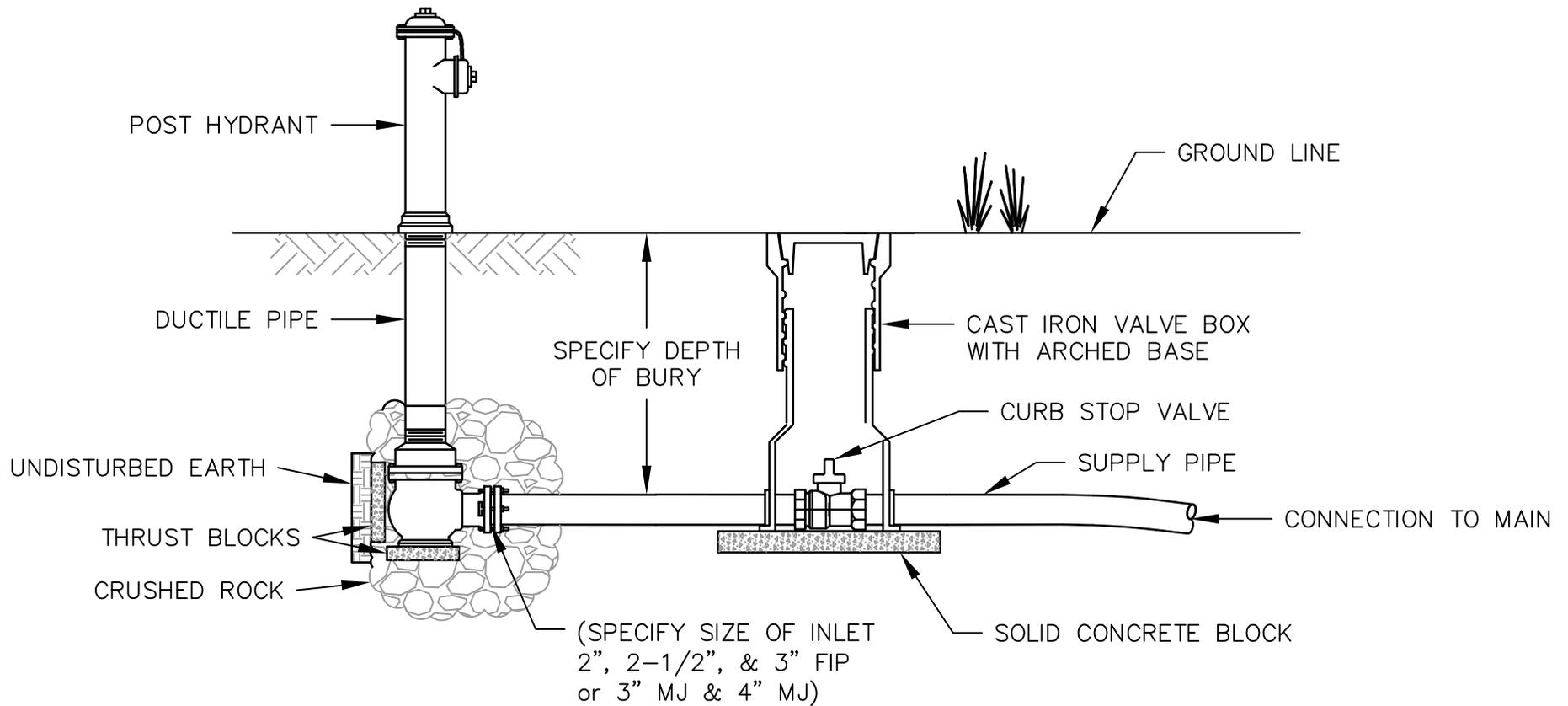
NOTES:

1. ALL PIPING IN FIRE HYDRANT ASSEMBLY SHALL BE DUCTILE IRON AND ALL FITTINGS INCLUDING TEE SHALL BE CAST IRON.
2. SEE SPECIFICATIONS FOR FIRE HYDRANT ASSEMBLY MATERIALS AND EQUIPMENT APPROVED FOR INSTALLATION.
3. CONTRACTOR TO SUPPLY FIRE HYDRANT EXTENSIONS AS NECESSARY.

**STANDARD FIRE HYDRANT ASSEMBLY
DETAIL**

SCALE: NOT TO SCALE





NOTES:

1. HYDRANTS SHALL BE SELF-DRAINING, NON-FREEZING, COMPRESSION TYPE WITH 2-3/16" MAIN VALVE OPENING. INLET CONNECTION SHALL BE (2" MJ, 3" MJ OR 4" MJ). OUTLET SHALL BE 1-1/4", 1-1/2" 2" OR 2-1/2" IP OR NST).
2. HYDRANTS SHALL HAVE A 3" DUCTILE IRON PIPE RISER WITH A CAST IRON STOCK TOP, AND NON-TURNING OPERATING ROD. PRINCIPAL INTERIOR OPERATING PARTS SHALL BE BRASS AND REMOVABLE FROM THE HYDRANT FOR SERVICING WITHOUT EXCAVATING THE HYDRANT.
3. HYDRANTS SHALL BE SET IN 4 CUBIC FEET OF CRUSHED STONE TO ALLOW FOR PROPER DRAINAGE OF THE HYDRANT. RECOMMENDATIONS OF THE AWWA SHOULD BE FOLLOWED WHEN INSTALLING THE HYDRANTS.

**FLUSHING HYDRANT
DETAIL**

SCALE: NOT TO SCALE

