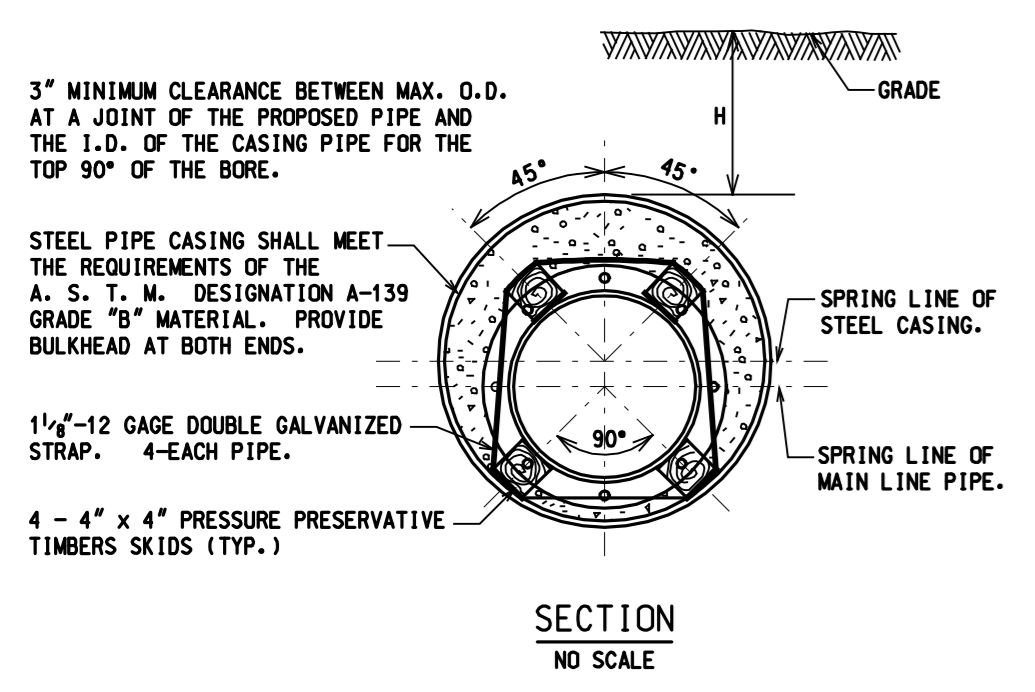


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 PEN - I:\standards\stds\watermain\watermain.tbl
 USER NAME - thntz
 DESIGN FILE - I:\200700\20070048\wmain.dwg
 DATE - JULY, 2007



ALL VOIDS BETWEEN THE WATER MAIN AND THE CASING PIPE SHALL BE FILLED WITH A LEAN GROUT. 12" MIN. BULKHEADS MUST BE PLACED AT EACH END.

ALLOWABLE HEIGHT OF COVER (H.) IN FT., FOR STEEL CASING

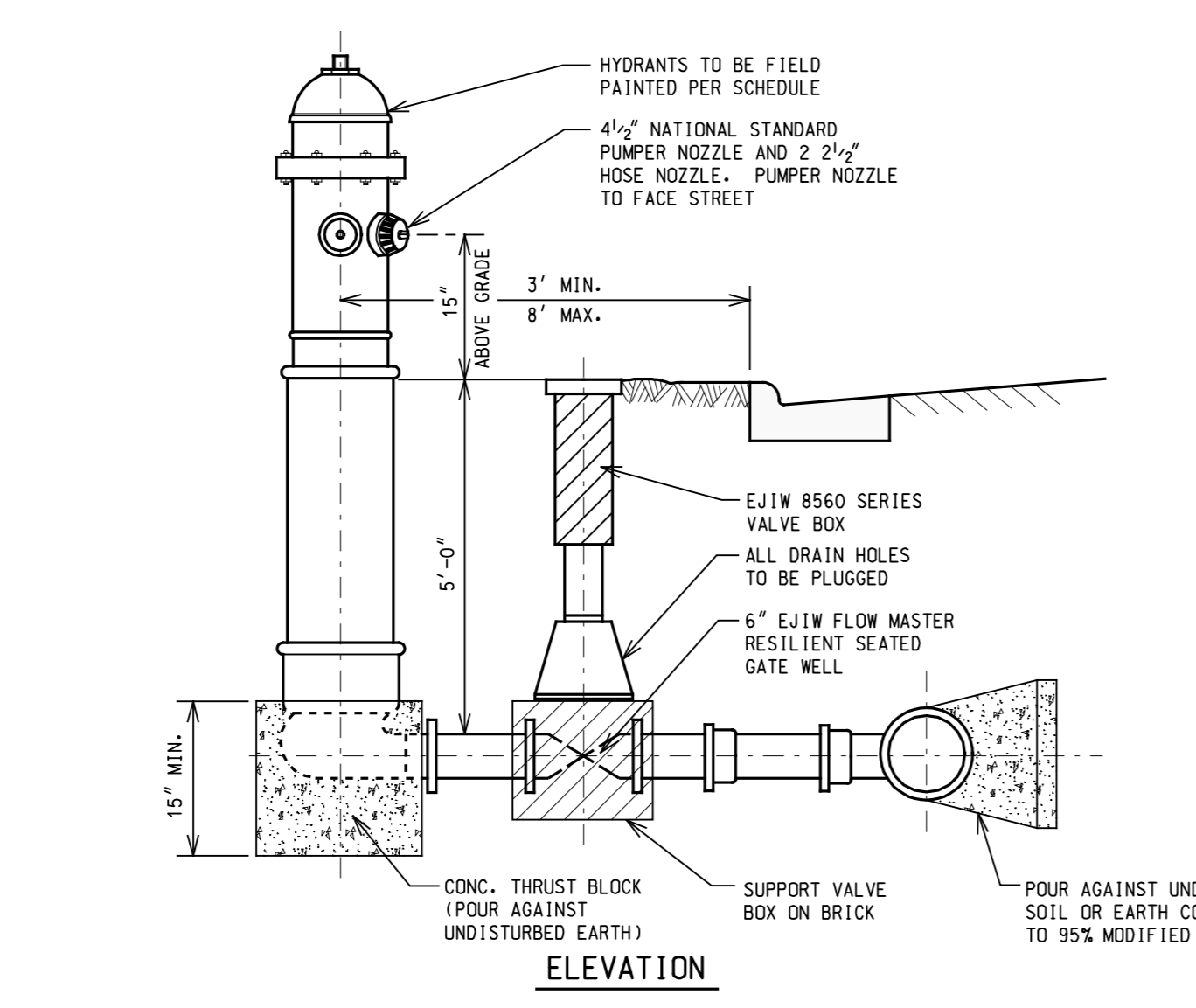
WALL THICKNESS (IN.)	STEEL CASING OUTSIDE DIAMETER (IN.)																													
	12	14	16	18	20	24	28	30	36	42																				
1/4	.1875	.39	.30	.24	.21	.19	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01							
3/8	.250	.50	.50	.39	.31	.27	.21	.19	.18	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01					
1/2	.3125	.75	.75	.50	.48	.39	.28	.23	.21	.18	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01			
5/8	.375	1.00	1.00	.50	.50	.39	.29	.27	.22	.19	.18	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01		
3/4	.4375	1.25	1.25	.50	.50	.39	.34	.26	.21	.18	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01			
7/8	.500	1.50	1.50	.50	.50	.39	.44	.31	.25	.21	.20	.19	.18	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01
1	.5625	1.75	1.75	.50	.50	.39	.44	.31	.25	.21	.20	.19	.18	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01
1 1/8	.625	2.00	2.00	.50	.50	.39	.44	.31	.25	.21	.20	.19	.18	.17	.16	.15	.14	.13	.12	.11	.10	.09	.08	.07	.06	.05	.04	.03	.02	.01

TYPICAL TUNNEL CASING DETAIL

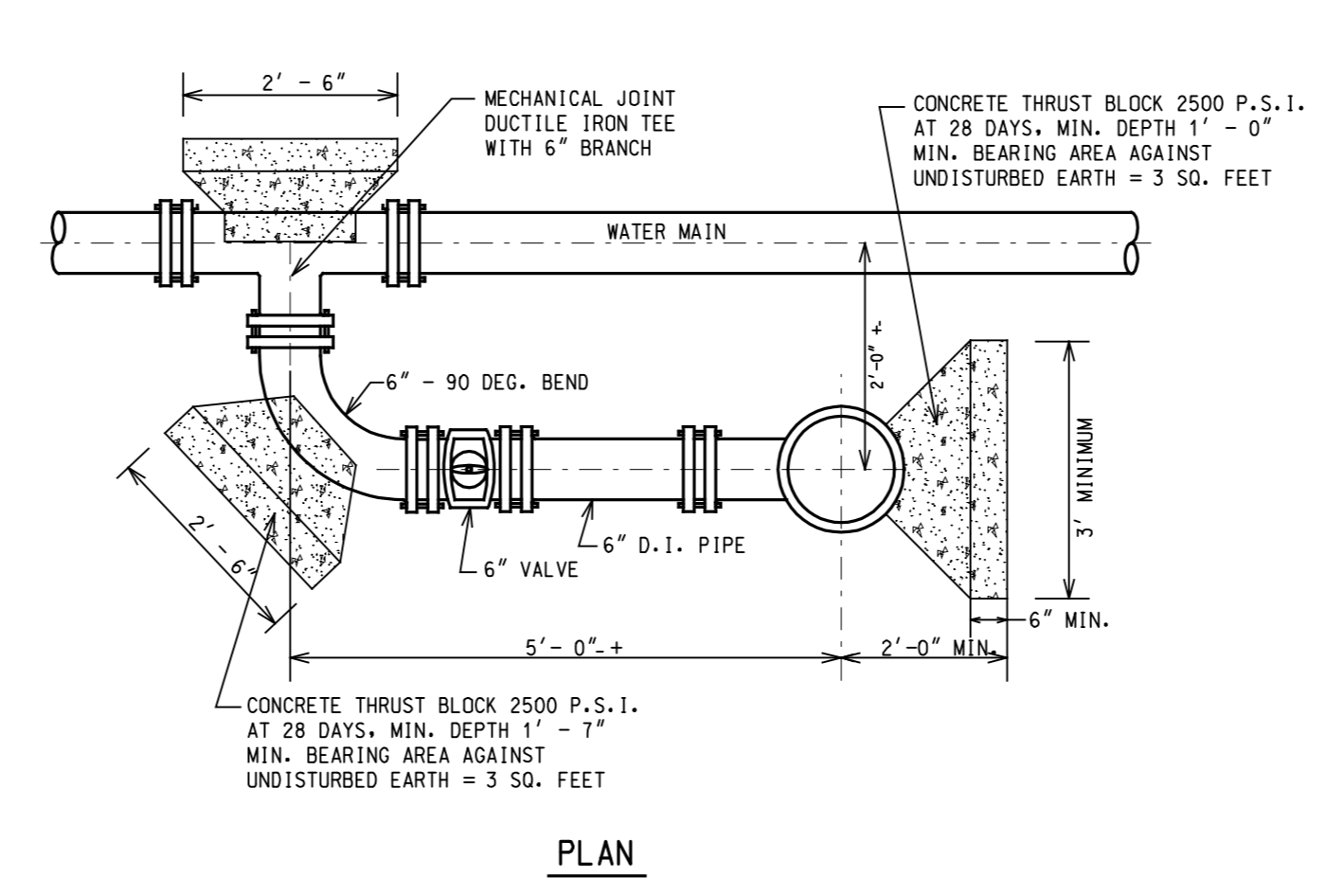
- NOTES:
- CASING PIPE JOINTS TO BE FULLY WELDED AROUND THE CIRCUMFERENCE BY A CERTIFIED WELDER.
 - THE DIAMETER OF THE BORE CASING SHALL BE A MINIMUM OF 8" LARGER THAN THE WATERMAIN TO ACCOMMODATE 4" SKIDS ON ALL SIDES.
 - A 4" MIN. DIA. PVC GROUT FILL TUBE SHALL BE INSTALLED AT EACH END OF THE CASING. FLOWABLE FILL SHALL BE INSERTED FROM ONE END UNTIL ALL AIR IS REMOVED FROM CASING.

TYPICAL WATER MAIN TUNNEL CASING DETAIL

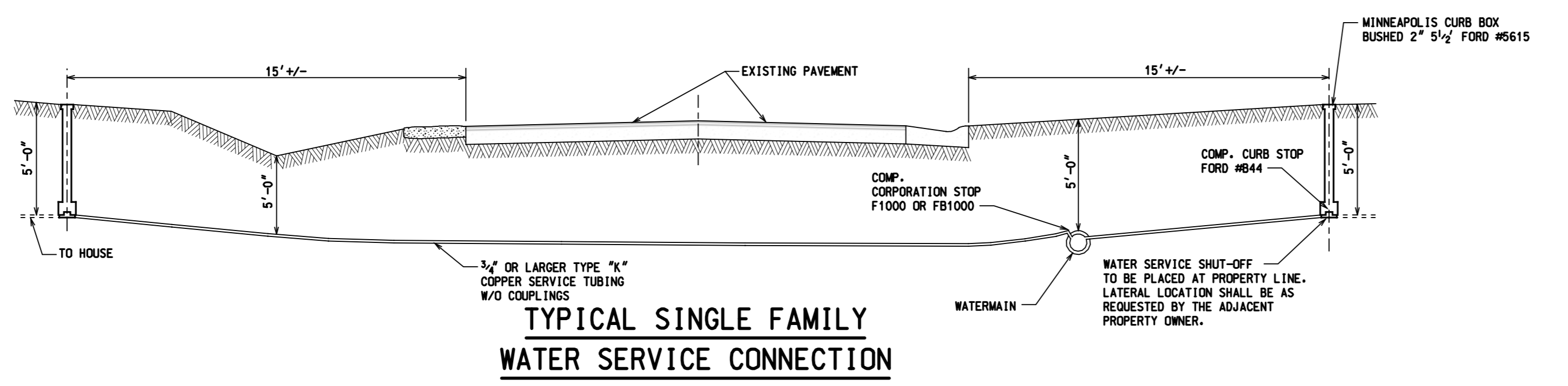
- GENERAL NOTES:
- ALL CONSTRUCTION PROCEDURES AND MATERIALS USED SHALL CONFORM TO THE CITY OF FENTON CURRENT ENGINEERING DESIGN STANDARDS AND SPECIFICATIONS.
 - ALL HYDRANTS SHALL BE EAST JORDAN IRON WORKS NO. 5-BR TRAFFIC MODEL OR MUELLER CENTURION A-423. SELF DRAINING HYDRANTS SHALL NOT BE USED.
 - ALL HYDRANTS SHALL BE PAINTED IN ACCORDANCE WITH THE PAINTING SCHEDULE ABOVE GROUND AND BLACK BELOW.
 - ALL GATE VALVES WITH OPERATING NUTS AT A DISTANCE GREATER THAN 5 FEET BELOW GROUND SURFACE SHALL BE PROVIDED WITH AN EXTENSION STEM. THE LENGTH OF THE STEM SHALL BE SUCH THAT IT WILL BE WITHIN 5 FEET OF THE GROUND SURFACE WHEN AN EXTENSION STEM IS USED. THE EXTENSION STEM SHALL BE MECHANICALLY ATTACHED TO THE OPERATING NUT. DETAILS OF THE EXTENSION STEM AND METHOD OF INSTALLATION SHALL BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
 - FOR PIPE DIAMETERS 20" AND SMALLER, DUCTILE IRON PIPE SHALL BE CLASS 54 DOUBLE CEMENT LINED WITH TWO BRASS WEDGES PER JOINT. MINIMUM DEPTH COVER IS 5' BELOW FINISHED GRADE.
 - THE CONTRACTOR SHALL OBTAIN A WATER MAIN CONSTRUCTION PERMIT AND WATER USE PERMIT PRIOR TO THE START OF CONSTRUCTION FROM THE CITY OF FENTON.
 - THE CONTRACTOR SHALL NOTIFY THE CITY OF FENTON FOR TAP INSPECTION TO THE EXISTING WATER MAIN. PRESSURE TEST WITNESS, BACTERIOLOGICAL SAMPLING AND FOR FINAL INSPECTION. (MINIMUM 48 HOURS PRIOR NOTICE IS REQUIRED).
 - FOR NON CITY ADMINISTERED PROJECTS, ALL 2 INCH AND SMALLER WATER SERVICE CONNECTIONS ARE MADE BY THE CITY OF FENTON DPW PERSONNEL AFTER WATER MAIN ACCEPTANCE AND APPLICABLE PERMITS ARE OBTAINED.
 - 2 BAND BRONZE TAPPING SADDLES SHALL BE USED FOR ALL SERVICE TAPS LARGER THAN 1".
 - ALL NECESSARY EASEMENTS SHALL BE PROVIDED IN THE NAME OF THE CITY OF FENTON AND/OR ITS AGENT FOR THE INSTALLATION, OPERATION AND MAINTENANCE OF THE PROVIDED WATER MAINS BEFORE ACCEPTANCE OF THE WATER MAIN DISTRIBUTION SYSTEM.
 - THE DESIGN ENGINEER SHALL FURNISH THE CITY OF FENTON WITH MYLAR "RECORD DRAWING" WATER MAIN PLANS PER CITY STANDARDS UPON JOB COMPLETION. PLANS SHALL LOCATE ALL WATER MAINS, HYDRANTS AND GATE VALVES PER CITY "RECORD DRAWING" STANDARDS.
 - ALL REQUIRED CROSS CONNECTION AND CONTROL DEVICES SHALL BE INSTALLED AS REQUIRED BY THE CITY OF FENTON AND IN ACCORDANCE WITH THE STANDARDS OF THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY.
 - THE CONTRACTOR SHALL NOTIFY THE CITY OF FENTON OR THEIR AGENT 48 HOURS PRIOR TO THE START OF CONSTRUCTION AND REQUEST INSPECTION.
 - ALL TRENCHES UNDER 45 DEGREE LINE OF INFLUENCE OF EXISTING OR PROPOSED PAVEMENTS, SIDEWALKS, BIKE PATHS & DRIVE APPROACHES SHALL BE BACK FILLED WITH MDOT CLASS II SAND COMPACTED TO 95% OF MAXIMUM UNIT WEIGHT.



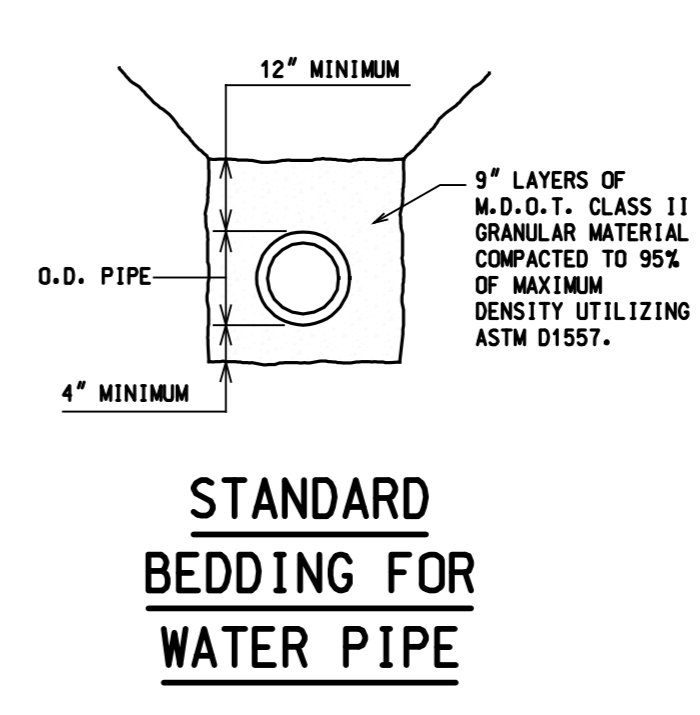
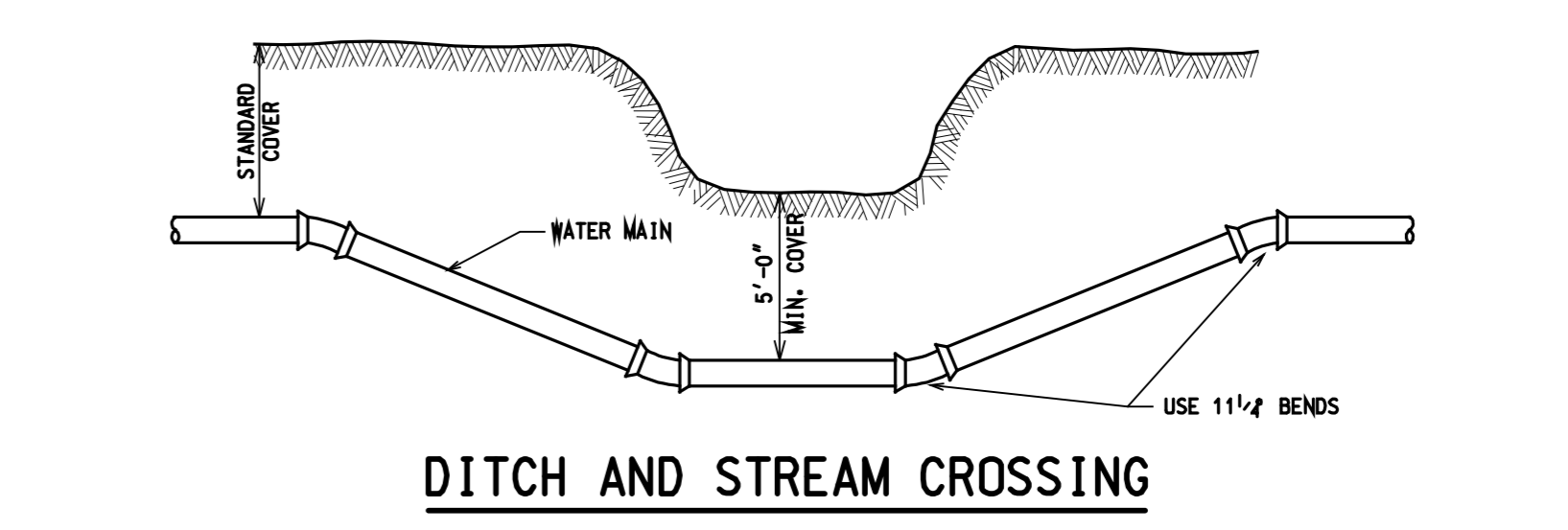
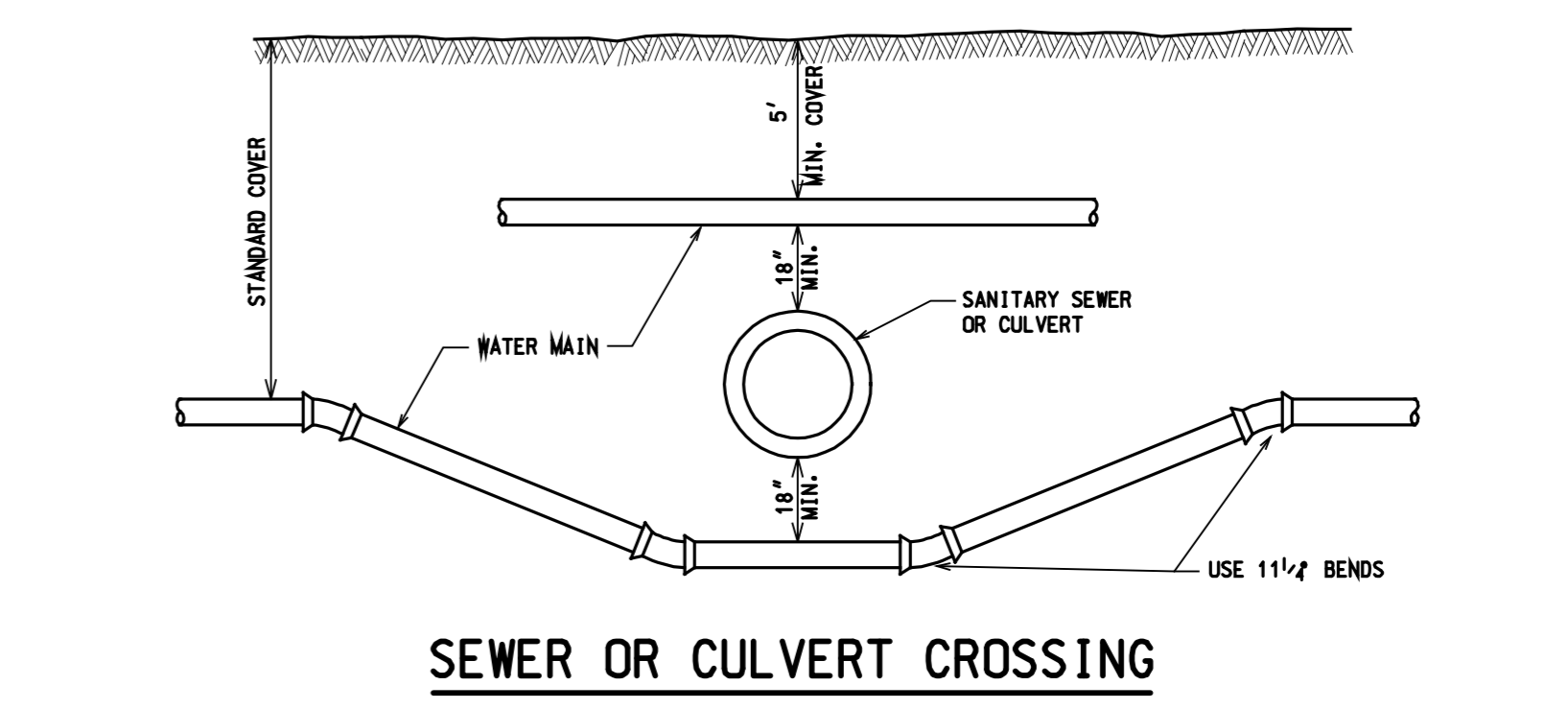
"L" HYDRANT CONNECTION



NOTE: FOR CONSTRUCTION OF NEW FIRE HYDRANT TO EXISTING "LIVE" WATERMAIN, USE 6" TAPPING SLEEVE VALVE & BOX TO MAKE CONNECTION.



TYPICAL SINGLE FAMILY WATER SERVICE CONNECTION

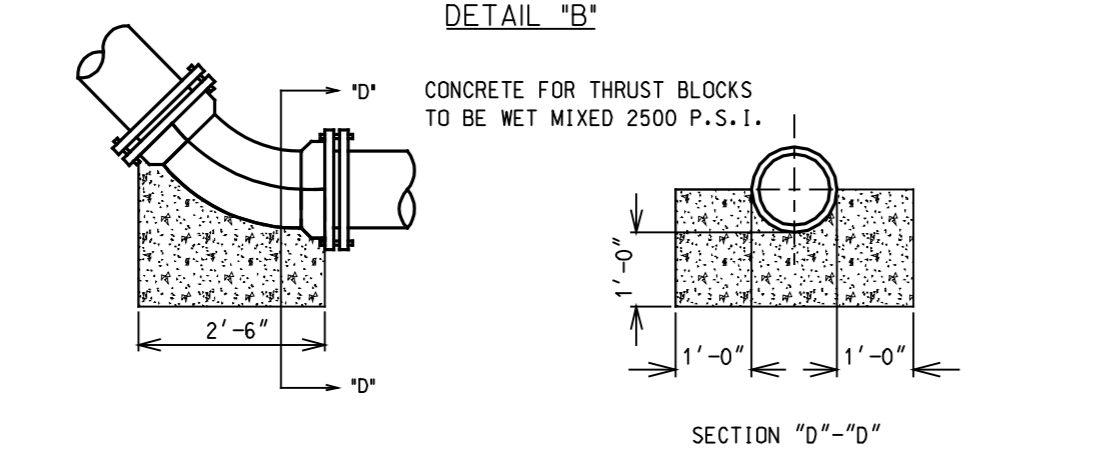
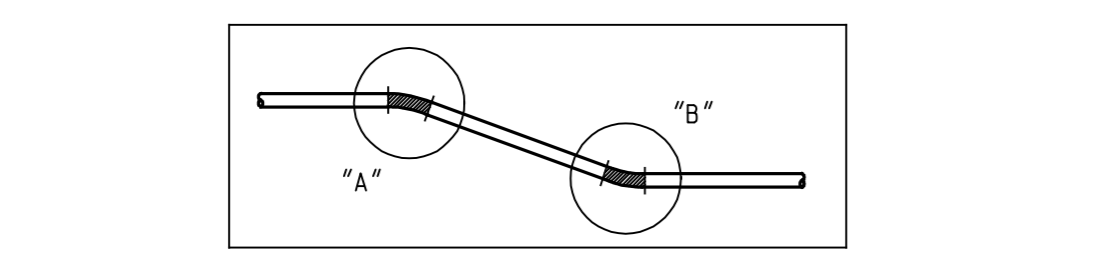
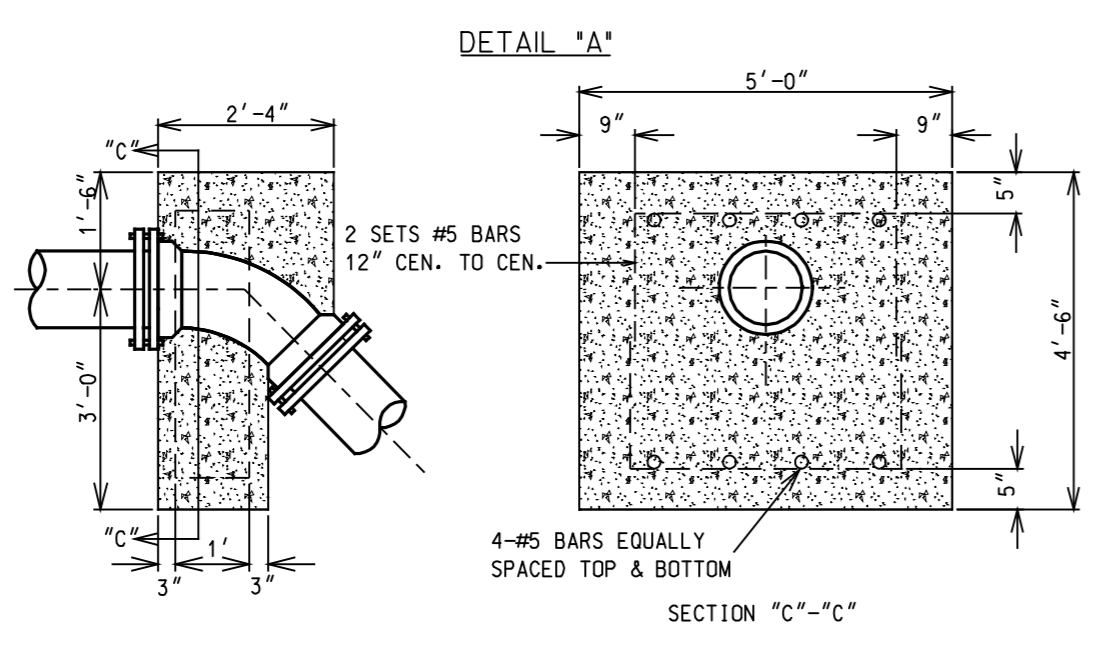


STANDARD BEDDING FOR WATER PIPE

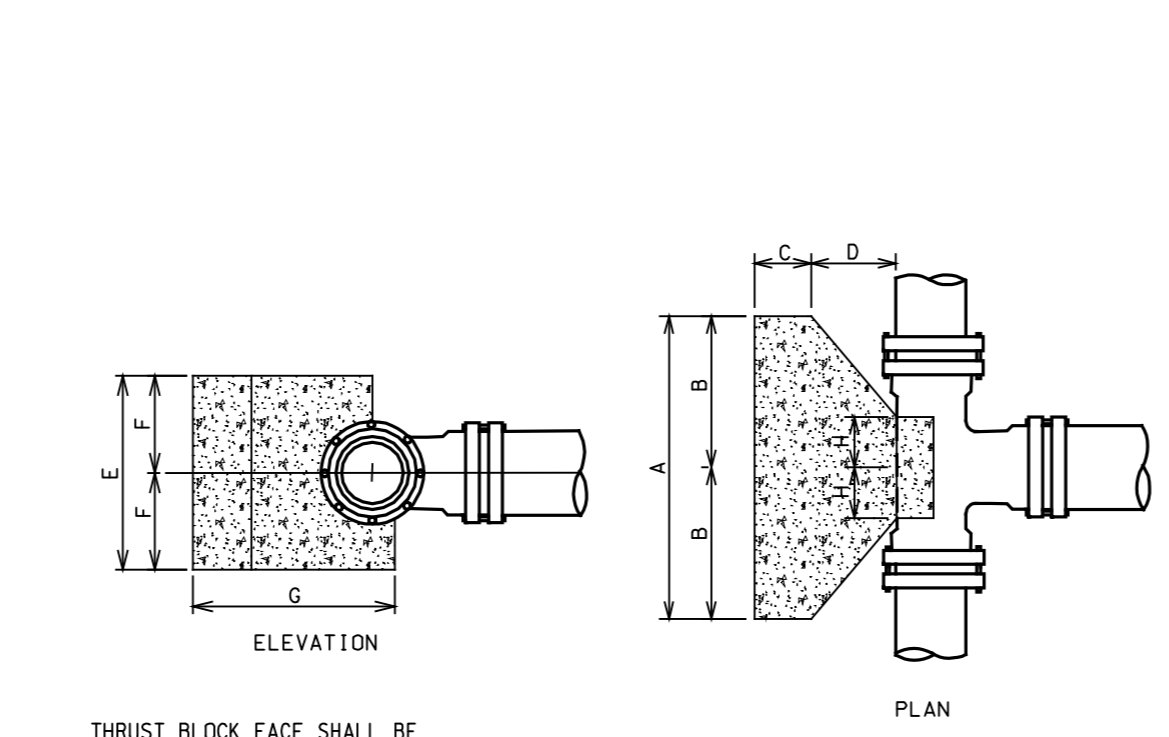
HYDRANT PAINTING SCHEDULE

WATER MAIN SIZE	COLOR OF HYDRANT BODY	HYDRANT ACCENT COLOR *
LESS THAN 6"	YELLOW	RED
6" TO 8"	YELLOW	OMAHA ORANGE
10" TO 16"	YELLOW	HUNTER GREEN

* FOR EAST JORDAN HYDRANTS, PAINT ACCENT COLOR ON ENTIRE SWIVEL FLANGE AND UP, INCLUDING CAPS. FOR MUELLER HYDRANTS, PAINT ACCENT COLOR ON ALL CAPS AND THE BONNET. THE SHADE OF THE ACCENT COLOR TO BE APPROVED BY THE CITY D.P.W.



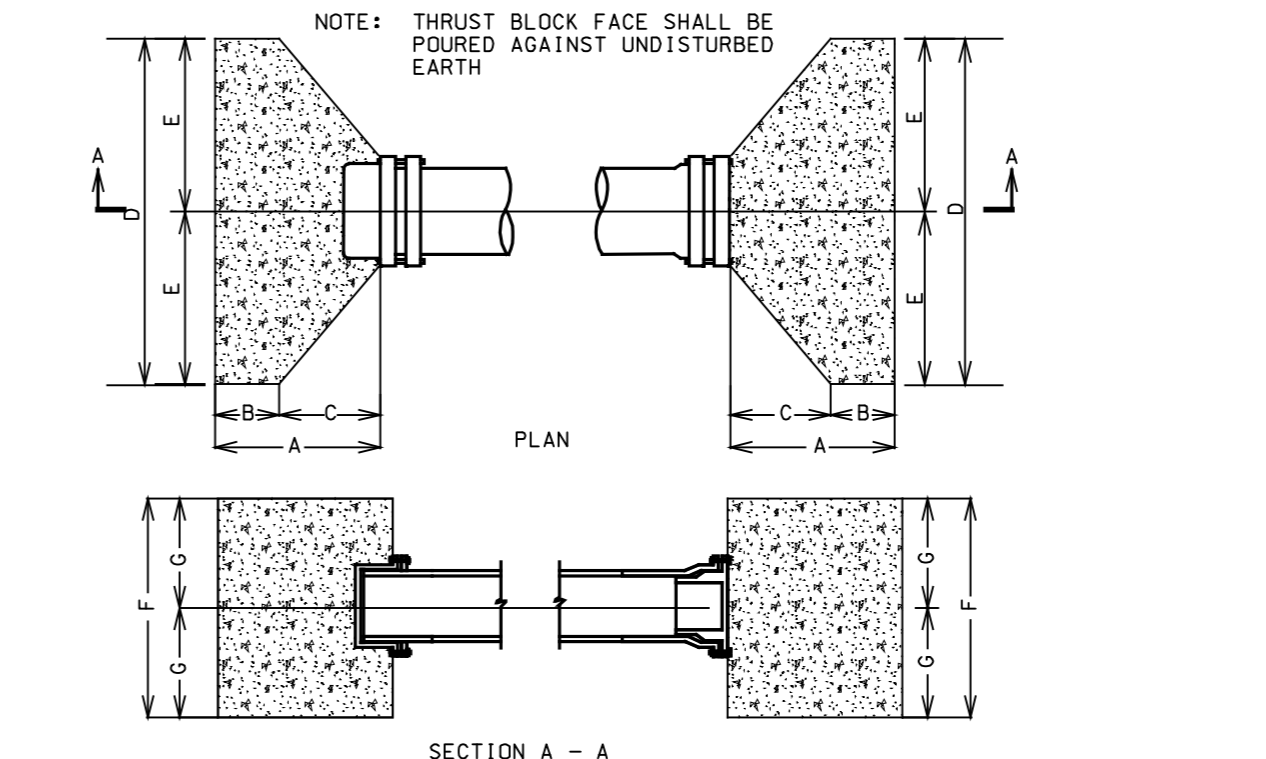
VERTICAL BEND THRUST BLOCKS FOR 8"-12" MAINS



SCHEDULE OF THRUST BLOCK DIMENSIONS

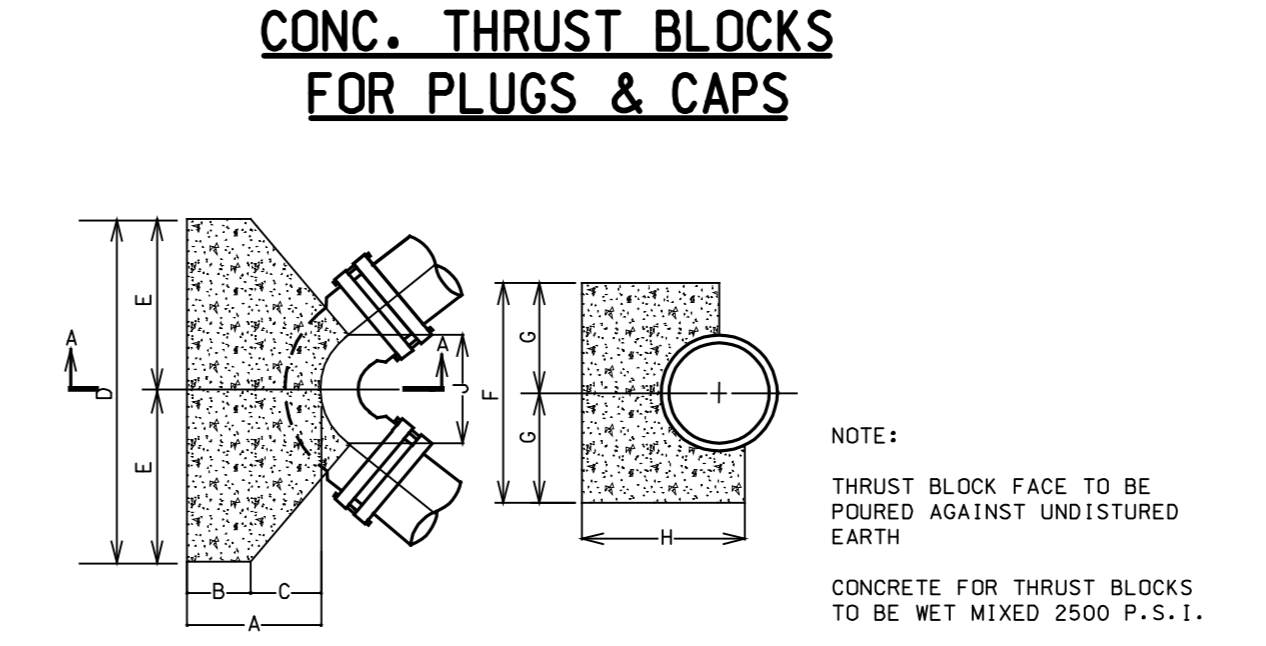
CODE	TEE SIZE		
	8"x8"	12"x12"	16"x16"
A	3'-0"	4'-0"	5'-0"
B	1'-6"	2'-0"	2'-6"
C	0'-9"	0'-9"	1'-0"
D	1'-0"	1'-4"	1'-8"
E	2'-0"	3'-0"	4'-0"
F	1'-0"	1'-6"	2'-0"
G	12"	2'-6"	2'-10"
	16"	2'-10"	3'-1"
	24"	3'-3"	3'-7"
H	8"	0'-6"	0'-10"
	12"	0'-6"	0'-10"
	16"	0'-6"	0'-10"
	24"	0'-6"	0'-10"

CONCRETE THRUST BLOCK FOR TEES



SCHEDULE OF THRUST BLOCK DIMENSIONS

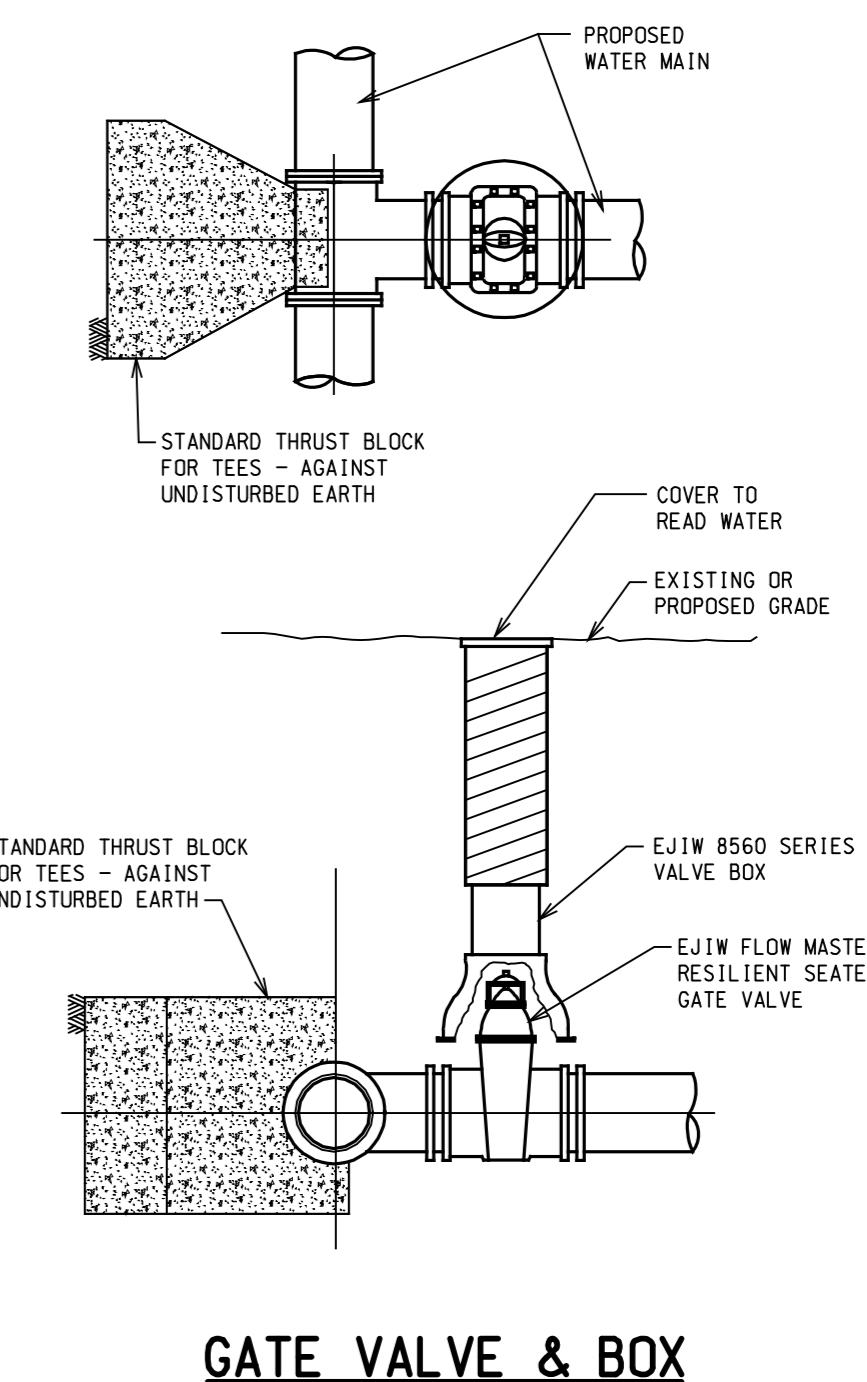
SIZE	A MIN.	B MIN.	C	D	E	F	G
8"	1'-11"	0'-9"	1'-2"	3'-0"	1'-6"	2'-0"	1'-0"
12"	2'-1"	0'-9"	1'-4"	4'-0"	2'-0"	3'-0"	1'-6"
16"	2'-8"	1'-0"	1'-8"	5'-0"	2'-6"	4'-0"	2'-0"



SCHEDULE OF THRUST BLOCK DIMENSIONS

SIZE	ANGLE	A MIN.	B MIN.	C	D	E	F	G	H MIN.	J
6"	45°	1'-6"	0'-9"	0'-9"	1'-6"	0'-9"	1'-6"	0'-9"	1'-8"	0'-10"
6"	90°	1'-6"	0'-9"	0'-9"	2'-0"	1'-0"	2'-0"	1'-0"	1'-8"	0'-10"
8"	45°	1'-9"	0'-9"	1'-0"	2'-4"	1'-2"	2'-0"	1'-0"	1'-11"	1'-4"
8"	90°	1'-9"	0'-9"	1'-0"	3'-4"	1'-8"	2'-6"	1'-3"	1'-11"	1'-2"
12"	22-1/2°	1'-9"	0'-9"	1'-0"	2'-6"	1'-3"	2'-0"	1'-0"	2'-0"	1'-4"
12"	45°	2'-1"	0'-9"	1'-4"	3'-6"	1'-9"	2'-6"	1'-3"	2'-4"	1'-4"
12"	90°	2'-1"	0'-9"	1'-4"	5'-6"	2'-9"	3'-0"	1'-6"	2'-4"	1'-8"
16"	22-1/2°	2'-8"	1'-0"	1'-8"	3'-4"	1'-8"	2'-6"	1'-3"	3'-0"	1'-2"
16"	45°	2'-8"	1'-0"	1'-8"	5'-4"	2'-8"	3'-0"	1'-6"	3'-0"	1'-6"
16"	90°	2'-8"	1'-0"	1'-8"	6'-0"	3'-0"	5'-0"	2'-6"	3'-0"	1'-8"
24"	90°	4'-7"	1'-0"	3'-7"	10'-0"	5'-0"	7'-0"	3'-6"	5'-4"	2'-4"

CONCRETE THRUST BLOCK FOR BENDS



GATE VALVE & BOX



HRC
HUBBELL, ROTH & CLARK, INC.
Consulting Engineers
3999 E. GRAND RIVER AVE. SUITE 102
HOWELL, MICHIGAN 48843-7555
PHONE: (248) 454-6300
DIRECT PHONE: (517) 552-9199
FAX: (517) 552-6099
WEB SITE: http://www.hrc-engr.com

3-24-08 ADOPTED BY CITY COUNCIL

DATE	ADDITIONS AND/OR REVISIONS
DESIGNED	
DRAWN	J. REC
CHECKED	M. DARGA
APPROVED	J. BOOTH

CITY OF FENTON
STANDARD
CONSTRUCTION
DETAILS

WATER MAIN
STANDARDS

HRC JOB NO.	SCALE
20070048	NONE
DATE	SHEET NO.
JULY, 2007	1 OF 1