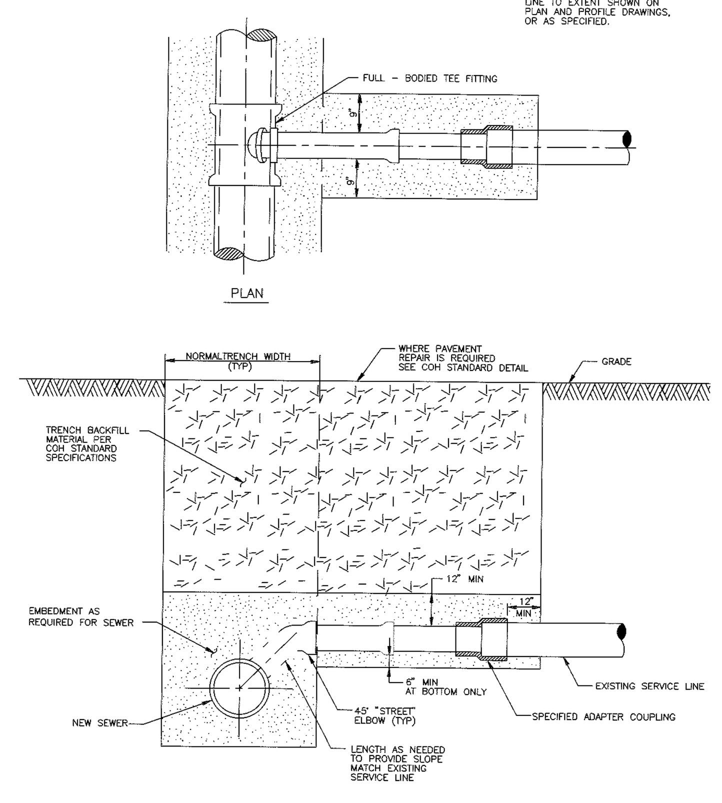
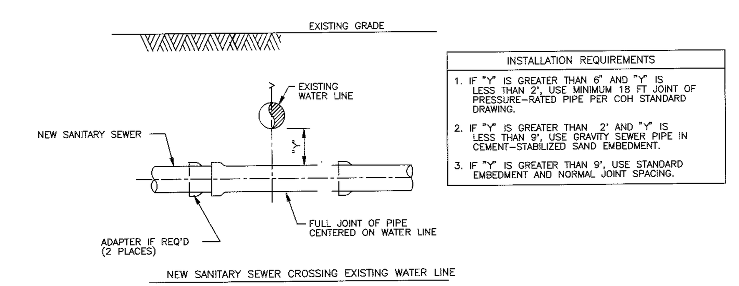
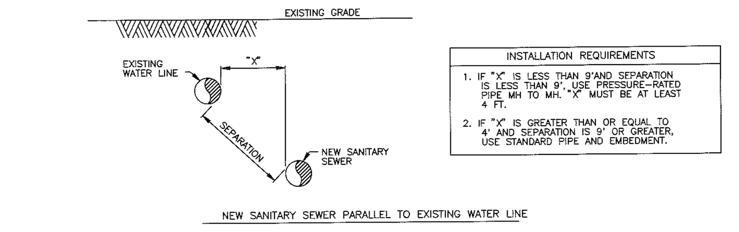
NOTE:
1. REPLACE EXISTING SERVICE LINE TO EXTENT SHOWN ON PLAN AND PROFILE DRAWINGS, OR AS SPECIFIED.



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
SANITARY SEWER SERVICE RECONNECTION ON NEW OR REPLACEMENT SEWER
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02534-04



INSTALLATION REQUIREMENTS
1. IF "Y" IS GREATER THAN 6" AND "Y" IS LESS THAN 2', USE MINIMUM 18 FT JOINT OF PRESSURE-RATED PIPE PER COH STANDARD DRAWING.
2. IF "Y" IS GREATER THAN 2' AND "Y" IS LESS THAN 9', USE GRAVITY SEWER PIPE IN CEMENT-STABILIZED SAND EMBEDMENT.
3. IF "Y" IS GREATER THAN 9', USE STANDARD EMBEDMENT AND NORMAL JOINT SPACING.



INSTALLATION REQUIREMENTS
1. IF "X" IS LESS THAN 9'AND SEPARATION IS LESS THAN 9', USE PRESSURE-RATED PIPE MH TO MH. "X" MUST BE AT LEAST 4 FT.
2. IF "X" IS GREATER THAN OR EQUAL TO 4' AND SEPARATION IS 9' OR GREATER, USE STANDARD PIPE AND EMBEDMENT.

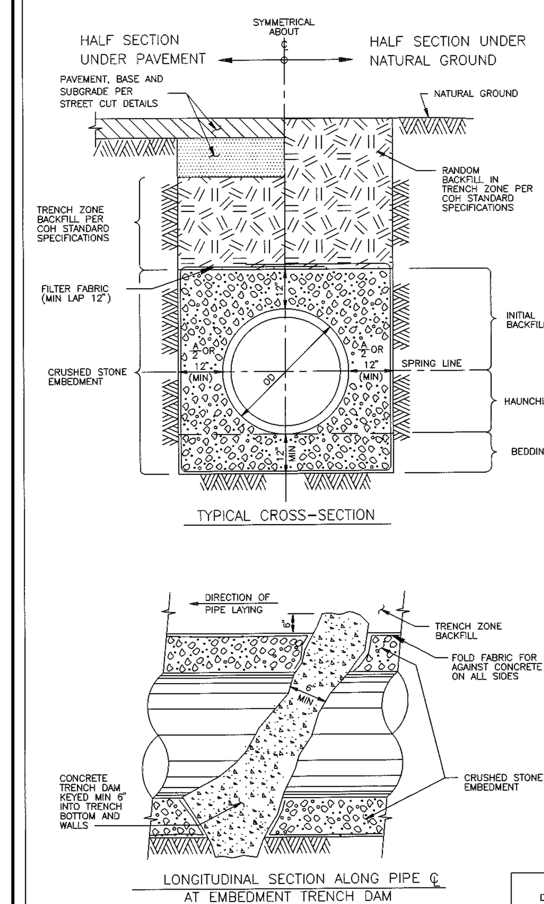
NOTES:
1. SANITARY SEWER MUST BE BELOW WATER LINE WHEREVER POSSIBLE. WHEN WATERLINE IS BELOW THE SANITARY SEWER PROVIDE MINIMUM 2 FT SEPARATION AND INSTALL PIPE SAME AS FOR SEWER BELOW WATER.
2. WHEN PRESSURE-RATED PIPE IS REQUIRED, PROVIDE PIPE WITH MINIMUM 150 psi PRESSURE RATING.
3. ADAPTERS MUST BE FACTORY MOLDED OR FABRICATED, WITH RING STIFFNES AT LEAST EQUAL TO THE ADJOINING SANITARY SEWER PIPE, AND USING RESILIENT GASKET OR SEAL MATERIAL. FLEXIBLE RUBBER "BOOT" TYPE ADAPTERS WILL NOT BE ACCEPTED.
4. INSTALL FORCE MAINS SAME AS FOR GRAVITY SEWER, USING SPECIFIED PRESSURE PIPE.
5. "Y" MUST ALWAYS BE GREATER THAN OR EQUAL 6".
6. "X" MUST BE GREATER THAN OR EQUAL TO 4 FT.
7. ALTERNATIVES MAY BE SHOWN ON THE DRAWINGS OR DESCRIBED IN THE SPECIFICATIONS.
8. SEPARATION REQUIREMENTS SHOWN HERE DO NOT APPLY TO SERVICE CONNECTIONS – REFER TO PLUMBING CODE FOR APPLICABLE REQUIREMENTS.

TABLE 02730-04
SEWER LINE CROSSING BELOW WATER LINE WITHIN 2 FT SEPARATION

GRAVITY SANITARY SEWER PIPE SIZE	PRESSURE-RATED PIPE SIZE & TYPE (NOTE 2)	ADAPTERS REQUIRED
6" TO 12" (ASTM D3034)	SAME SIZE ASTM D2241, SDR 26	ASTM D3034 TO D2665 (SEWER TO D.W.V.) ADAPTER COUPLING
15" (ASTM D3034)	14" LINED DUCTILE IRON OR AWWA C905, DR25	NONE REQUIRED
18" AND 24"	SAME SIZE AWWA C905, PRESSURE-RATED FRP, OR LINED DUCTILE IRON, MANHOLE TO MANHOLE	NONE REQUIRED
21" AND 27"	PRESSURE PIPE NOT AVAILABLE. SEE CASING ALTERNATIVE	NOT APPLICABLE
30" AND LARGER	SAME SIZE PRESSURE-RATED FRP OR LINED DUCTILE IRON, MANHOLE TO MANHOLE	NOT APPLICABLE
CASING ALTERNATIVE:		
ANY SIZE AND TYPE	INSTALL AS CASING PIPE MIN 18 FT JOINT OF PRESSURE PIPE AT LEAST 2 NOMINAL SIZES LARGER THAN SAN. SEWER CARRIER PIPE. GROUT ANNULAR SPACE WITH TUNNEL GROUT	NOT APPLICABLE

INSTALLING SANITARY SEWERS CROSSING OR PARALLEL TO WATER LINES

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
SANITARY SEWER INSTALLING SANITARY SEWERS CROSSING OR PARALLEL TO WATER LINES
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02531-05

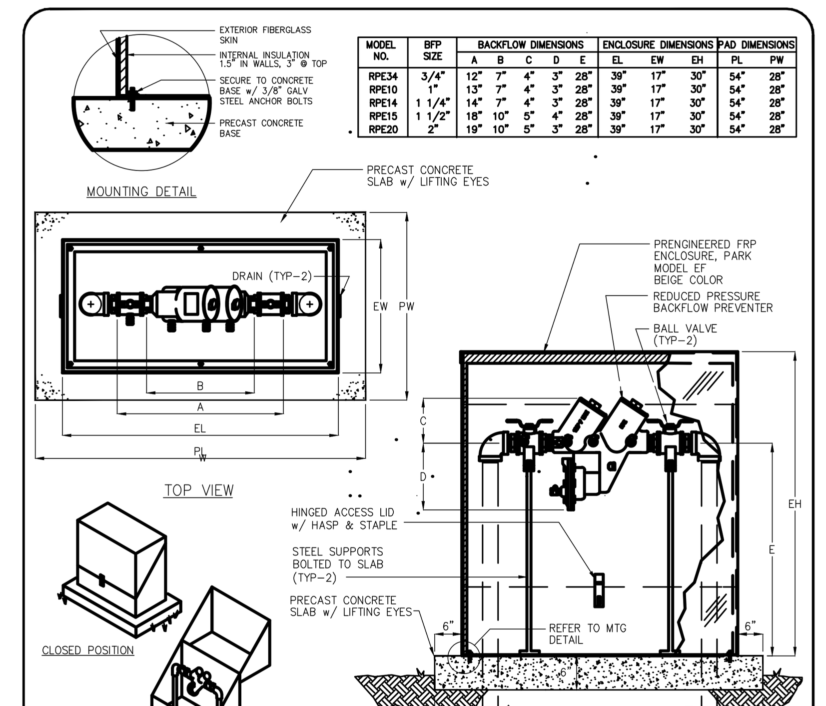


NOTES:
1. MIN TRENCH WIDTH SHALL BE PIPE OD PLUS AN ALLOWANCE "A" FOR THE NOMINAL PIPE SIZE:

NOMINAL PIPE SIZE	"A"
18" TO 30"	24"
OVER 30"	36"

2. MAX TRENCH WIDTH SHALL BE NOT GREATER THAN MIN TRENCH WIDTH PLUS 24 INCHES, UNLESS OTHERWISE NOTED.
3. TRENCH DAM MAY BE FORMED OR UNFORMED.ACTUAL SHAPE OF CONCRETE TRENCH DAM CROSS SECTION MAY BE DETERMINED BY CONTRACTOR IN FIELD, MEETING MINIMUM THICKNESS AND KEY DEPTH REQUIREMENTS.
4. TRENCH DAM SHALL BE PLACED AT LEAST 5 FT AWAY FROM ANY PIPELINE STRUCTURE.SEE SPECIFICATIONS FOR OTHER REQUIREMENTS.
5. PLACE TRENCH DAMS IN CLASS I EMBEDMENTS AT THE MIDPOINT OF LINE SEGMENTS LONGER THAN 100 FEET BETWEEN MANHOLES.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
SANITARY SEWER EMBEDMENT AND TRENCH ZONE BACKFILL FOR DRY OR WET STABLE TRENCH
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02317-01



MODEL NO.	BFP SIZE	BACKFLOW DIMENSIONS A	B	C	D	E	ENCLOSURE DIMENSIONS EL	EW	EH	PAD DIMENSIONS PL	PW
RPE34	3/4"	12"	7"	4"	3"	28"	39"	17"	30"	54"	28"
RPE10	1"	13"	7"	4"	3"	28"	39"	17"	30"	54"	28"
RPE14	1 1/4"	14"	7"	4"	3"	28"	39"	17"	30"	54"	28"
RPE15	1 1/2"	18"	10"	5"	4"	28"	39"	17"	30"	54"	28"
RPE20	2"	19"	10"	5"	3"	28"	39"	17"	30"	54"	28"

Specifications
CONCRETE : Class 1 concrete with design strength of 4500 PSI at 28 days.
REINFORCEMENT: Grade 60 reinforced. Steel rebar conforming to ASTM A615 on required centers or equal.

Typical Applications
RP devices are used to protect against high hazard (toxic) fluids in water services to industrial plants, hospital facilities, morgues, mortuaries, and chemical plants. They are also used in irrigation systems, boiler feed, water lines and other installations requiring maximum protection.

Engineering Data
The backflow assembly shall be factory assembled on pad & hydrostatically tested prior to delivery. Field excavation & preparation shall be complete prior to delivery. Pipe, valves and fittings of the assembly shall be approved by one or more of the following associations:
AWWA, UL, UPC, FM

PROJECT :
CUSTOMER :
ARCHITECT :
ENGINEER :
ORDER # :
DATE :

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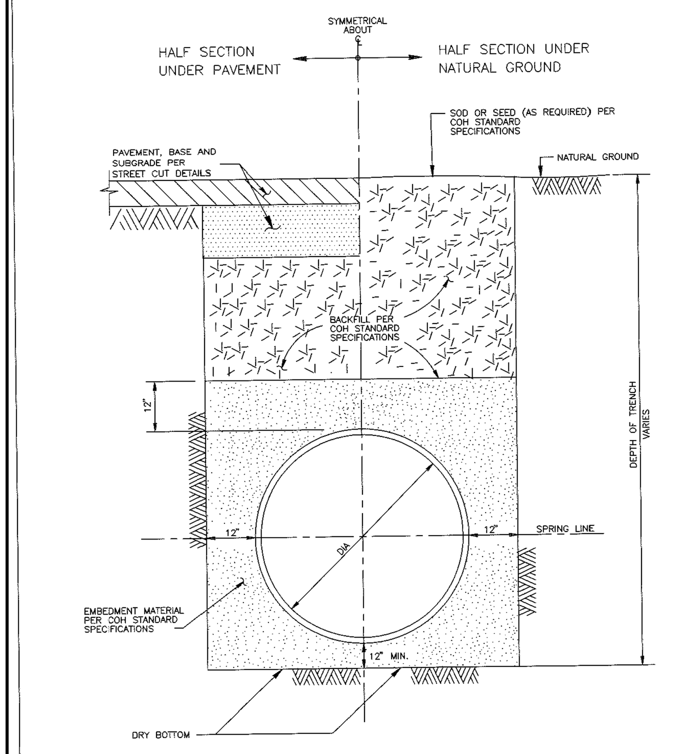
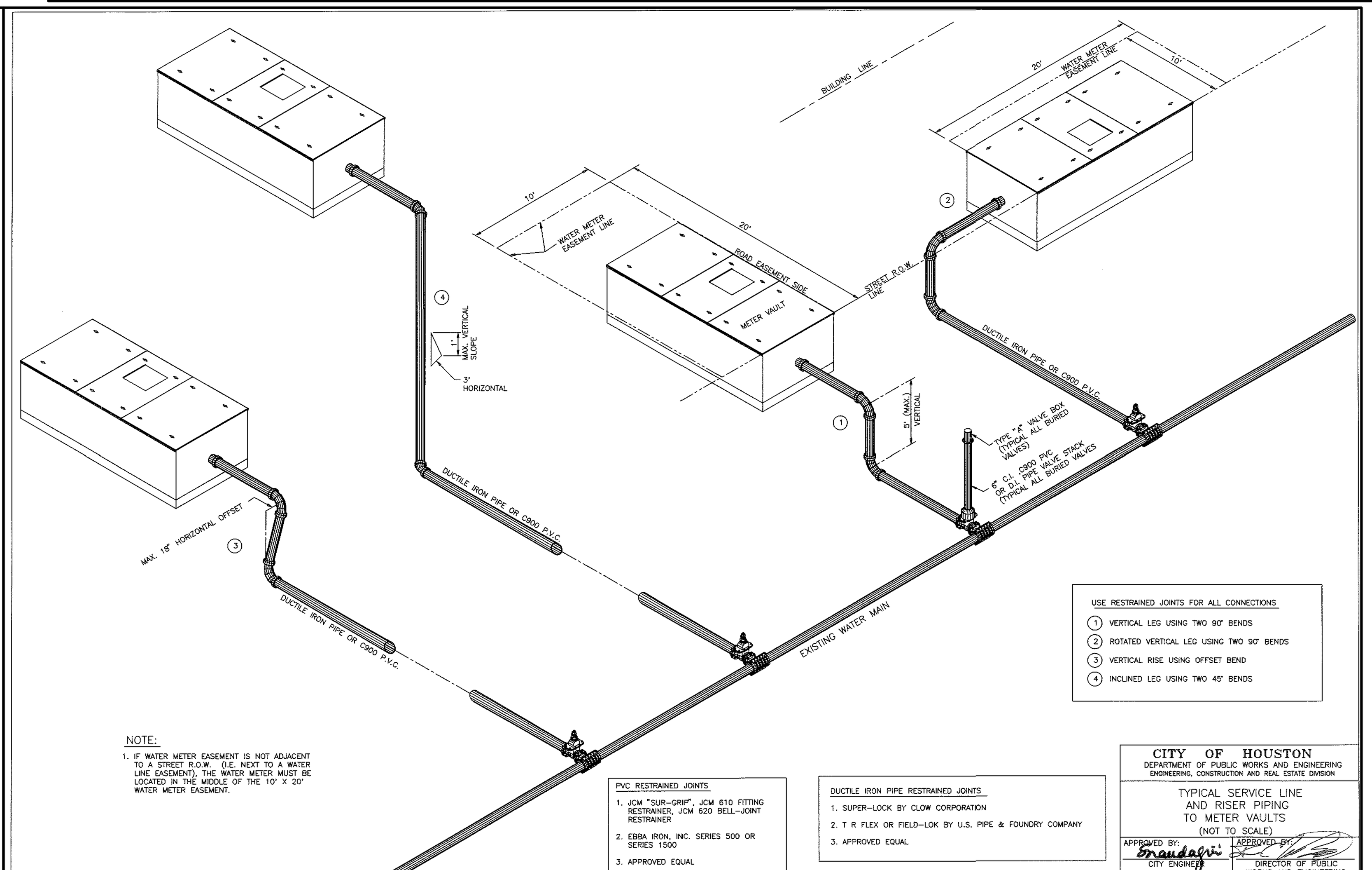
"Expect the Best"
REDUCED PRESSURE BACKFLOW PREVENTER ON PRECAST CONCRETE PAD
SCALE NONE | DWG. NO. RPE1-S | REV. A
DATE 01/02



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
WATER DISTRIBUTION MAIN BEDDING AND BACKFILL FOR OPEN CUT TRENCHES
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02317-04



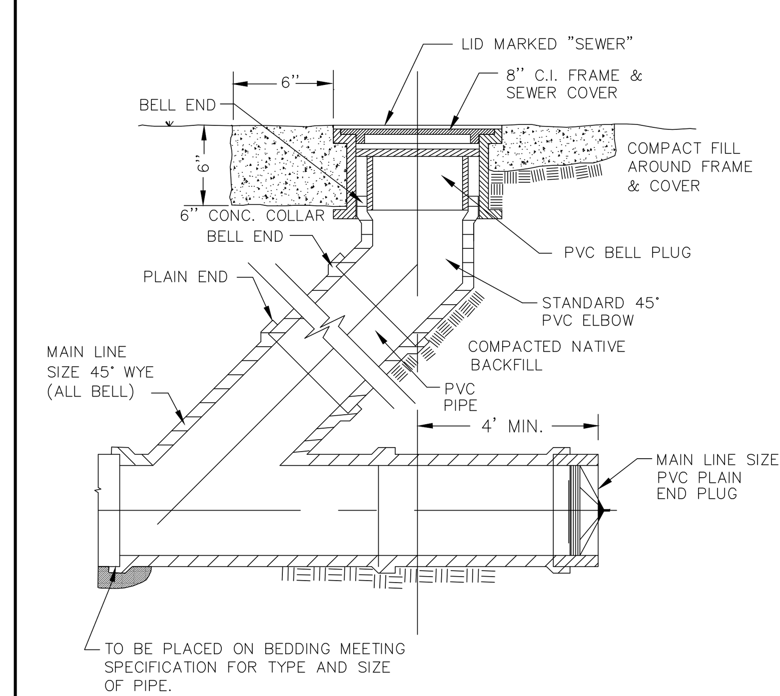
USE RESTRAINED JOINTS FOR ALL CONNECTIONS
1. VERTICAL LEG USING TWO 90° BENDS
2. ROTATED VERTICAL LEG USING TWO 90° BENDS
3. VERTICAL RISE USING OFFSET BEND
4. INCLINED LEG USING TWO 45° BENDS

NOTE:
1. IF WATER METER EASEMENT IS NOT ADJACENT TO A STREET R.O.W. (I.E. NEXT TO A WATER LINE EASEMENT), THE WATER METER MUST BE LOCATED IN THE MIDDLE OF THE 10' X 20' WATER METER EASEMENT.

PVC RESTRAINED JOINTS
1. JCM "SUR-GRIP", JCM 610 FITTING RESTRAINER, JCM 620 BELL-JOINT RESTRAINER
2. EBBA IRON, INC. SERIES 500 OR SERIES 1500
3. APPROVED EQUAL

DUCTILE IRON PIPE RESTRAINED JOINTS
1. SUPER-LOCK BY CLOW CORPORATION
2. T R FLEX OR FIELD-LOK BY U.S. PIPE & FOUNDRY COMPANY
3. APPROVED EQUAL

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
TYPICAL SERVICE LINE AND RISER PIPING TO METER VAULTS
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02526-10

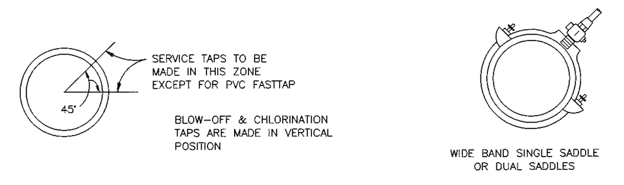


NOTE:
SOLVENT WELDED SLIP ON JOINTS MAY BE USED ON VERTICAL RISING SECTION OF PIPE WITH A MINIMUM OF 4" CONCRETE ENCASEMENT ON ALL SIDES.

TYPICAL THRUST CLEANOUT
NO SCALE

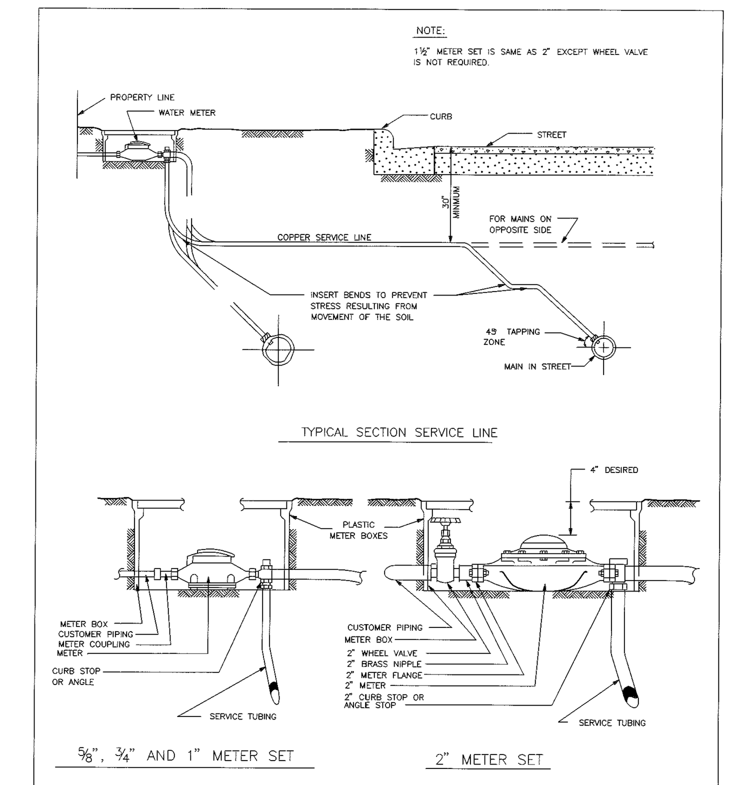
PIPE TAPPING SCHEDULE				
WATER MAIN TYPE AND DIAMETER	SERVICE SIZE ¾"	1"	1½"	2"
4" CAST IRON OR DUCTILE IRON	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
4" ASBESTOS (EXISTING) CEMENT	WBSS	WBSS	DSS, WBSS	DSS, WBSS
4" PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6" AND 8" CAST IRON OR DUCTILE IRON	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6" AND 8" ASBESTOS (EXISTING) CEMENT	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6" AND 8" CAST IRON OR DUCTILE IRON	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
6" AND 8" PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
12" CAST IRON OR DUCTILE IRON	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
12" ASBESTOS (EXISTING) CEMENT	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
12" PVC (AWWA C900)	DSS, WBSS	DSS, WBSS	DSS, WBSS	DSS, WBSS
16" AND UP CAST IRON OR DUCTILE IRON	DWBSS	DWBSS	DWBSS	DWBSS
16" AND UP ASBESTOS (EXISTING) CEMENT	DWBSS	DWBSS	DWBSS	DWBSS
16" AND UP PVC (AWWA C900)	DWBSS	DWBSS	DWBSS	DWBSS

DSS – DUAL STRAP SADDLES
WBSS – WIDE BAND STRAP SADDLES
DWBSS – DUAL WIDE BAND STRAP SADDLES

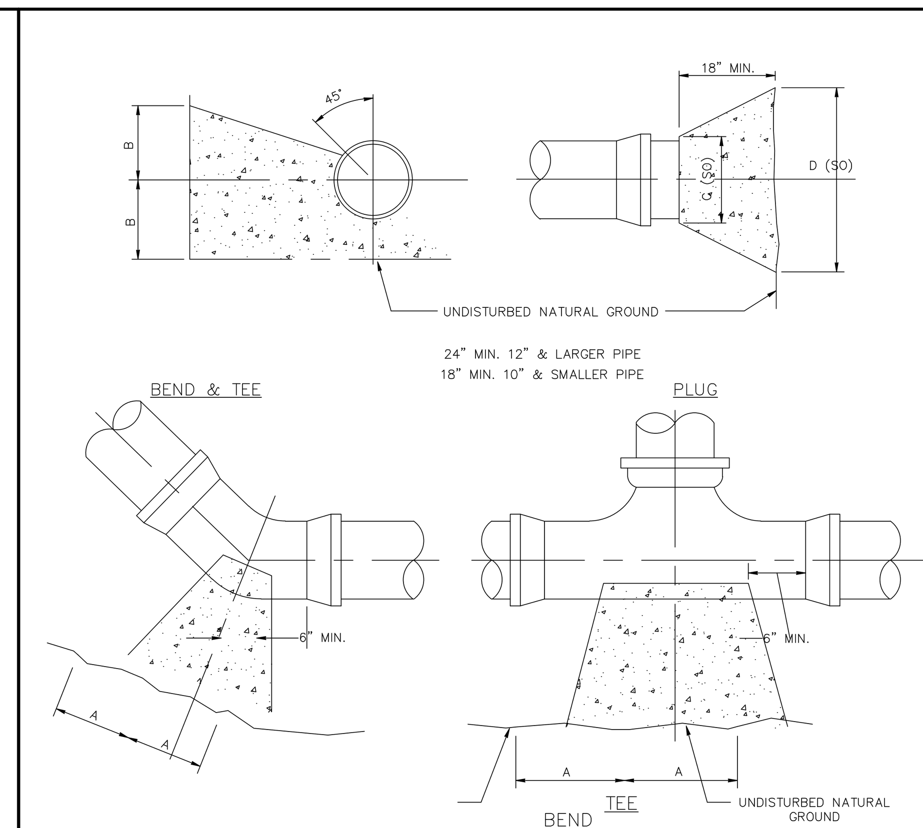


CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
SERVICE TAPS
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02512-02

NOTE:
1½" METER SET IS SAME AS 2" EXCEPT WHEEL VALVE IS NOT REQUIRED.



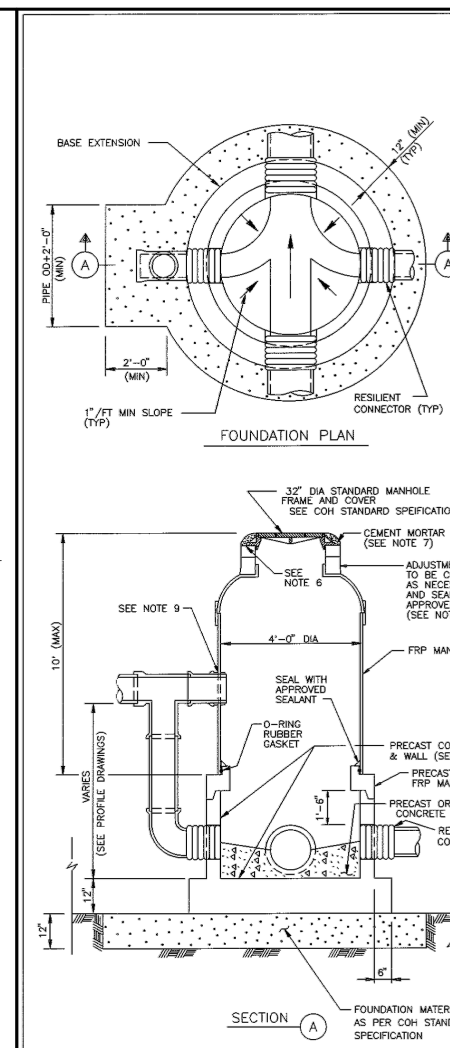
CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
TYPICAL METER SETTINGS
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02526-01



SIZE	90° BEND A	90° BEND B	45° BEND A	45° BEND B	22.5°BEND A	22.5°BEND B	TEES A	TEES B	PLUGS C	PLUGS D
2 1/2"	12"	7"	6"	7"	6"	6"	8"	14"	6"	14"
4"	14"	8"	7"	9"	6"	6"	8"	18"	8"	18"
6'	16"	10"	9"	10"	6"	8"	10"	21"	10"	21"
8'	22"	13"	12"	13"	8"	10"	12"	29"	12"	29"
12'	29"	21"	16"	21"	11"	16"	16"	41"	16"	41"
16"	38"	27"	21"	27"	12"	24"	24"	30"	24"	30"

NOTE:
THRUST BLOCKS AT TRENCH FACE MUST HAVE A MIN. BERING SURFACE OF 10 SQ. FEET AND THE LEAST DIMENSION SHALL BE NO SMALLER THAN 1.5 TIMES PIPE DIAMETER, BUT LESS THAN 10 FT. ALL CONCRETE SHALL BE CLASS "C" CONCRETE

THRUST BLOCK DETAIL
NO SCALE



NOTES:
1. ECCENTRIC FIBERGLASS REINFORCED PLASTIC (FRP) MANHOLE MAY BE USED.
2. PRECAST CONCRETE OR HDPE RINGS SHALL BE PROVIDED FOR A COMBINED ADJUSTMENT HEIGHT OF AT LEAST 12". THE TOTAL HEIGHT OF THE ADJUSTMENT RINGS SHALL NOT EXCEED 1'-6".
3. MANHOLE BASE WALL THICKNESS FOR DEPTH EXCEEDING 12'-0" SHALL BE DESIGNED FOR ACTUAL LOADING CONDITIONS. MIN THICKNESS SHALL BE 5 INCHES.
4. MANHOLE DROP AND INTERSECTING PIPES SHALL BE INSTALLED ONLY WHEN CALLED FOR IN PLAN AND PROFILE DRAWING.
5. PROVIDE CORROSION RESISTANT COATING ON ALL CONCRETE SURFACES ABOVE THE INVERT PER COH STANDARD SPECIFICATION.
6. SEAT MANHOLE FRAME IN SEALANT PER COH STANDARD SPECIFICATION.
7. OMIT CEMENT MORTAR WHEN MANHOLE IS LOCATED IN PAVED AREAS.
8. MIN REINFORCING IN THE PRECAST CONCRETE BASE SHALL BE # 5 @ 8 EW.
9. MANUFACTURED WATER TIGHT CONNECTOR, INSERT-A-TEE OR EQUAL, CORE DRILL HOLE AND INSTALL PER MANUFACTURERS RECOMMENDATIONS.
10. PROVIDE BACKFILL TO MATCH ADJACENT PIPE TRENCH BACKFILL PER COH STANDARD SPECIFICATION.

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
ENGINEERING, CONSTRUCTION AND REAL ESTATE DIVISION
SANITARY SEWER 4'-0" DIAMETER FIBERGLASS MANHOLE
(NOT TO SCALE)
APPROVED BY: CITY ENGINEER | APPROVED BY: DIRECTOR OF PUBLIC WORKS AND ENGINEERING
EFF DATE: OCT-01-2002 | DWG NO: 02083-01

FBC Engineering Approval

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WATER, STORM, AND SANITARY DETAILS

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