

1. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE MOST CURRENT VERSIONS OF THE FOLLOWING:

- EAST WENATCHEE WATER DISTRICT DEVELOPER EXTENSION AGREEMENT (when applicable).
- EAST WENATCHEE WATER DISTRICT STANDARD DETAILS. IF ANY DETAIL IS REVISED AFTER PLAN APPROVAL, THE DISTRICT WILL DETERMINE IF THE REVISION MUST BE INCORPORATED INTO THE WORK.
- EAST WENATCHEE WATER DISTRICT SERVICE POLICIES AND CONSTRUCTION STANDARDS.
- WA STATE DEPT. OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION.

2. A PRECONSTRUCTION CONFERENCE IS REQUIRED PRIOR TO CONSTRUCTION AND 48 HOURS ADVANCE NOTIFICATION OF THE LOCAL MUNICIPALITY, THE EAST WENATCHEE WATER DISTRICT, AND ALL AFFECTED UTILITY COMPANIES PRIOR TO THE ACTUAL START OF WORK.

3. THE CONTRACTOR SHALL COMPLY WITH THE PROVISIONS OF THE RIGHT-OF-WAY/STREET CONSTRUCTION PERMIT AS ISSUED BY THE DOUGLAS COUNTY DEPT. OF TRANSPORTATION AND LAND SERVICES, CITY OF EAST WENATCHEE, AND/OR WA STATE DOT FRANCHISE FOR THIS PROJECT. TRAFFIC CONTROL SHALL FOLLOW THE ROAD AGENCY'S CODES AND STANDARDS.

4. LOCATIONS OF EXISTING UTILITIES SHOWN ON THE PLANS ARE ESTIMATED UNLESS STATED OTHERWISE. THE CONTRACTOR SHALL VERIFY, LOCATE AND PROTECT ALL UTILITIES WITHIN THE PROJECT AREA. THE CONTRACTOR SHALL REPLACE OR REPAIR ANY UTILITIES DAMAGED DURING CONSTRUCTION. SHOW ALL ENCOUNTERED UTILITIES ON THE AS-BUILTS.

5. LOCATION AND EXTENT OF IRRIGATION PIPELINES WITHIN THE PROJECT LIMITS ARE UNKNOWN. CONTRACTOR SHALL CONTACT PROPERTY OWNERS ADJACENT TO THE PROJECT FOR LOCATING PRIVATE IRRIGATION SYSTEMS. CONTRACTOR IS RESPONSIBLE FOR LOCATING, REPLACING, OR REPAIRING IRRIGATION SYSTEMS DAMAGED DURING CONSTRUCTION. REPAIR IRRIGATION SYSTEMS WITH PRODUCTS OF NO LESSER QUALITY THAN SCH 40 PVC. SHOW IRRIGATION ON THE AS-BUILTS.

6. ALL EXCAVATION SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH THE STANDARD DETAILS AND SECTIONS 7.9.3(10) AND 7.9.3(11) OF THE STANDARD SPECIFICATIONS. COMPACTION TESTING IS REQUIRED DURING BACKFILLING OPERATIONS AT THE DISCRETION OF THE WATER DISTRICT. IF TRENCH BACKFILL DOES NOT MEET COMPACTION REQUIREMENTS, CONTRACTOR SHALL EXCAVATE, RECOMPACT, AND RETEST MATERIAL AT CONTRACTOR'S EXPENSE.

7. RESTORATION OF DAMAGED ROAD SURFACING SHALL BE IN ACCORDANCE WITH THE LOCAL MUNICIPALITY'S REQUIREMENTS. ALL OTHER AREAS SHALL BE RESTORED TO ORIGINAL CONDITION OR AS DIRECTED BY THE DISTRICT. THIS INCLUDES SHOULDERS, LANDSCAPING, WALLS, FENCES AND OTHER IMPROVEMENTS.

8. ALL WATER SERVICES, FIRE HYDRANTS, AND THRUST BLOCKING SHALL BE INSPECTED BY THE DISTRICT BEFORE BURY.

9. PROVIDE A SANITARY GAP BETWEEN THE EXISTING AND NEW WATER SYSTEMS. CONNECTION TO THE EXISTING WATER SYSTEM SHALL BE PERFORMED BY THE CONTRACTOR ONLY AFTER COMPLETING AN ACCEPTABLE PRESSURE TEST AND THE PIPELINE IS DISINFECTED, FLUSHED, AND RECEIPT OF ACCEPTABLE WATER QUALITY TEST RESULTS FROM THE HEALTH DISTRICT OR LAB. SEE DETAIL W-09.

10. PERFORM PRESSURE TEST AT 250psi. THE DISTRICT INSPECTOR HAS DISCRETION TO MODIFY THE TESTING REQUIREMENTS.

- PRESSURE WASHERS ARE NOT ALLOWED FOR PRESSURE TESTING. DISTRICT HAS THE RIGHT TO REJECT ANY PUMP SYSTEM THAT IN THE DISTRICT'S SOLE OPINION MAY BE UNSAFE OR UNSATISFACTORY.
- PRESSURE TEST INCLUDES MAINLINE, HYDRANTS, SERVICE LINES, SETTERS, AND CUSTOMER SERVICE SIDE TAILPIPE.
- TEST MAINLINE IN SECTIONS OF NO MORE THAN 1,000 FEET. PRESSURE DROP SHALL NOT EXCEED 5 PSI IN 120 MINUTES.
- ASSEMBLE AND TEST VALVE CLUSTERS OUTSIDE OF THE TRENCH PRIOR TO INSTALLATION.
- TEST GAUGE RANGE SHALL NOT EXCEED 160% OF TEST PRESSURE (400 PSI MAX FOR 250 PSI TEST).

11. AN INFLATABLE PIPE PLUG SHALL BE USED ON EACH JOINT DURING INSTALLATION TO PROTECT AGAINST SOIL INTRUSION AND FLOODING OF THE PIPE. OPEN ENDS OF VALVES SHALL BE PLUGGED OR BAGGED UNTIL EXTENDED WITH PIPE.

12. CONTRACTOR SHALL POthOLE A SUFFICIENT DISTANCE AHEAD OF PIPELAYING TO VERIFY DEPTH OF EXISTING WATER MAINS AND CROSSING UTILITIES AND TO ANTICIPATE ANY NECESSARY CHANGES IN FITTINGS OR ALIGNMENT.

13. AN AS-BUILT RECORD MUST BE SUBMITTED TO THE DISTRICT BEFORE WATER SERVICE BE PROVIDED.

14. DEFLECTION AT PIPE AND FITTING JOINTS WILL BE ALLOWED UP TO 3.0" PER JOINT OR AS RECOMMENDED BY MANUFACTURER, WHICHEVER IS LESS. 3.0" IS 11" PER 18" PIPE STICK, WHICH IS 350' RADIUS.

15. CONTRACTOR SHALL ONLY DISPOSE OF WASTE MATERIAL AT SITES APPROVED BY DOUGLAS COUNTY TRANSPORTATION AND LAND SERVICES. STOCKPILE MATERIALS ONLY ON DISTRICT APPROVED SITES.

16. CONTRACTORS WORKING WITHIN RIGHT OF WAY OR ON EXISTING DISTRICT INFRASTRUCTURE SHALL BE LICENSED, BONDED, AND HAVE EXPERIENCE INSTALLING PUBLIC DOMESTIC WATER SYSTEMS. BE PREPARED TO PRESENT EXAMPLES OF 5 SUCH PROJECTS UPON REQUEST.

17. CONTRACTOR TO PROVIDE NO LESS THAN 48 HOURS NOR MORE THAN 72 HOURS NOTICE TO THE DISTRICT PRIOR TO ANY OUTAGES SHUTDOWN OR CUSTOMER OUTAGE. DISTRICT WILL PROVIDE NOTICE TO CUSTOMERS 24 HOURS IN ADVANCE OF OUTAGE. NO OUTAGES ARE ALLOWED ON MONDAYS OR FRIDAYS.

18. CONTRACTOR SHALL MAINTAIN AND RETURN ANY TEMPORARY EQUIPMENT PROVIDED BY THE DISTRICT. CONTRACTOR SHALL REIMBURSE THE DISTRICT FOR ANY DAMAGE OR LOSS OF EQUIPMENT.

19. STAKE LOCATIONS OF WATERMAIN, BENDS, TEES, HYDRANTS, AND VALVETS PRIOR TO EXCAVATION. AT THE DISTRICT'S DISCRETION, THE CONTRACTOR MAY PROVIDE A GPS ROVER WITH LOCATIONS PRE-LOADED.

20. NO WORK THAT REQUIRES INSPECTION, OVSIGHT, OR INPUT FROM THE DISTRICT, THE DISTRICT'S INSPECTOR OR ENGINEER WILL BE ALLOWED ON FRIDAYS, SATURDAYS, SUNDAYS, OR ON DISTRICT RECOGNIZED HOLIDAYS NOR THE PRECEDING DAY.

**MATERIALS REQUIREMENTS**

- ALL PIPE, VALVES, AND FITTINGS MUST BE RATED FOR NO LESS THAN 175 PSI WORKING PRESSURE AND 250 PSI TEST PRESSURE UNLESS STATED OTHERWISE.
- METAL PRODUCTS & METAL ACCESSORIES (e.g. M.J.T-BOLTS KITS, GLANDS, ETC) SHALL BE OF DOMESTIC FABRICATION & CONSTRUCTION. THIS REQUIREMENT EXCLUDES: TEMPORARY MATERIALS NOT PART OF THE PERMANENT FACILITY, FLANGE BOLT KITS, VALVE BOXES, & CASING PIPES. THIS REQUIREMENT MAY BE SUPERCEDED BY CONTRACT REQUIREMENTS FOR STATE OR FEDERALLY FUNDED PROJECTS.
- ALL PIPE 3" AND LARGER SHALL BE DUCTILE IRON WITH A WALL THICKNESS NO LESS THAN CLASS 50 EXCEPT WHERE TRENCH BACKFILL OR LOADING DICTATE A STRONGER PIPE. USE CLASS 52 FOR HYDRANT RUNS AND WHERE PRESSURE EXCEEDS 150 PSI.
- HDPE SERVICE PIPE SHALL BE 250 psi RATED (DR9) CTS (Copper Tube Size), ONLY FOR "QUICK-JOINT", MUELLER "110 CONDUCTIVE COMPRESSION", OR EQUAL FITTINGS ALLOWED FOR HDPE OR COPPER PIPE CONNECTIONS, NO PAACK JOINTS.
- ONLY FORD, MCDONALD, & MUELLER PRODUCTS ARE APPROVED FOR SERVICE BRASS, UNLESS OTHERWISE NOTED IN THESE DETAILS.
- METER VAULT LID NOTE: FOR ALL TAPER-TOP STYLE VAULTS FOR WATER SERVICES, AIR VALVES, PERMANENT BLOW-OFFS, AND OTHER PURPOSES, CONTRACTOR TO PURCHASE LID AND FRAME EQUAL TO EAST JORDAN IRONWORKS' EAST WENATCHEE WATER DISTRICT SPECIFICATION, FRAME IJD 3620Z/3620C FOR NON-TRAFFIC AREAS, AND 3619Z/3619C FOR DRIVEWAYS AND TRAFFIC AREAS.
  - ANCHOR FRAME TO VAULT USING NON-SHRINK GROUT, FRAME AND LID TO BE RATED FOR TRAFFIC LOADING IN TRAFFIC AREAS.
  - WATER SERVICE VAULT LIDS TO INCLUDE ONE 2-3/16" DIAMETER HOLE WITH 4-1/4" DIAMETER X 9/16" DEEP RECESS FOR RADIO.
  - FOR AIR VALVES AND BLOW-OFFS, DO NOT DRILL HOLE IN LIDS, NOR PROVIDE "METER" TEXT ON FRAME.
  - LID SURFACE TO HAVE A STATIC COEFFICIENT OF FRICTION NO LESS THAN 0.60 AS DETERMINED BY ASTM C-1028.
- FLANGE GASKETS: MINIMUM 1/8" THICK, AND RATED FOR EITHER THE TEST PRESSURE OR 150% OF WORKING PRESSURE, WHICHEVER IS GREATER. BOTH RING TOP AND FULL FACE ARE ALLOWED. DO NOT USE FULL FACE GASKETS ON RAISED SEAT FLANGES. GASKETS MAY NOT BE REUSED ONCE ASSEMBLED.
- FLANGE BOLTS ASTM A307 GRADE A OR B- ALL BOLTS, NUTS AND WASHERS TO BE ZINC PLATED STEEL OR COR-TEN MATERIALS.
- BURIED VALVES 2" AND SMALLER TO BE CURB STOP OR CURB STOP PER DETAILS, OR STYLE AT THE DISCRETION OF THE DISTRICT.
  - CORB STOP: MUELLER 300 BALL CORP (B-25028N), FORD FB1100-0-NL, OR APPROVED EQUAL.
  - CURB STOP: MUELLER 300 BALL CURB (B-25122N), FORD B41-0-NL, OR APPROVED EQUAL.
- 3" BURIED VALVES ONLY ALLOWED WITH DISTRICT APPROVAL. IF ALLOWED, THE DISTRICT WILL DETERMINE THE TYPE OF VALVE.
- ALL CONCRETE VAULTS AND CHAMBERS MUST BE PRECAST. CAST-IN-PLACE ARE NOT ALLOWED.
- TAPPING TEES: FUSION BONDED EPOXY LINED AND COATED STEEL WITH 1/4" MIN. WALL THICKNESS OUTLET BRANCH, OR STAINLESS STEEL WITH FULL PERIMETER CONTINUOUS INTERNAL RUBBER LINER. WORKING PRESSURE RATING OF 200 PSI, OR 50 PSI ABOVE SYSTEM PRESSURE, WHICHEVER IS HIGHER. 1/2" MIN. THREADED TEST PLUG IN BRANCH. 2-PIECE STYLE FOR 6" AND LARGER MAINS. ROMAC FT5420, SST-11, OR APPROVED EQUAL.
- BURIED MARKING TAPE SHALL BE NON-METALLIC WHEN A LOCATE WIRE IS PRESENT, OR METALLIC WHEN THERE IS NO LOCATE WIRE.

1. WATER TO BE TEST OPTIMUM MOISTURE CONTENT AS DETERMINED BY COMPACTION TESTING PROCTOR.

2. ALL TRENCHING TO BE DONE IN ACCORDANCE WITH OSHA AND WSHA STANDARDS.

3. POLY PIPE FOR WATER SERVICES, AIR VALVES, ETC. SHALL BE BEDDED IN SAND A MINIMUM OF 6" ABOVE AND BELOW THE PIPE.

APPROVED WSDOT SPECIFICATION BEDDING MATERIALS. WSDOT AGGREGATE SOURCE APPROVAL DOCUMENTATION MUST BE PROVIDED.

**WATER MAIN BEDDING**

9-03.4(2) Aggregate for BST: 3/4"-3/8", 5/8"-No. 4, 1/2"-No. 4, 9-03.8(6) HMA Proportions of Materials: 3/4"-inch (Only allowed for poly-bagged ID pipe. See Note 1)

9-03.12(4) Gravel Baskets for Drains

Sieve Size	Pipe >= 4"	Pipe < 4"	Pipe >= 4"	Pipe < 4"
1"	99-100	99-100	99-100	99-100
3/4"	80-100	99-100	75-100	99-100
5/8"	70-100	99-100	50-100	99-100
No. 4	30-100	30-100	20-100	20-100
No. 10	15-85	15-85	10-85	10-85
No. 40	2-25	2-25	3-50	3-50
No. 200	5 max	5 max	10 max	10 max
Coarse Expan.	50 min	50 min	35 min	35 min

NOTE 1: If either No. 40 sieve exceeds 25% or No. 200 sieve exceeds 5% then additional restrained joint pipe lengths may be required unless the restrained lengths were calculated using silt-sand or finer material.

**HDPE SERVICE PIPE BEDDING**

9-03.4(2) Aggregate for BST: 3/4"-No. 4 (HDPE service pipe)

9-03.8(4) Maintenance Rock (HDPE service pipe)

9-03.13 Backfill for Sand Drains (HDPE service pipe)

FOR NON WSDOT BEDDING MATERIALS, SIEVE ANALYSIS MUST BE PROVIDED.

Bore water min: Table 1.

Poly-bagged water main: Table 1 or Table 2 (See Note 1).

HDPE service pipe: Table 1 or Table 2.

Table 1

TEST PRESSURE (PSI)	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
3	300	2.3*	2.6	2.3*
4	300	2.3*	3.8	2.3*
6	300	5.6	7.9	4.3
8	300	9.6	13.6	7.4
10	300	14.5	20.5	11.1
12	300	20.5	29.0	15.7
14	300	27.6	39.0	21.1
16	300	35.7	50.4	27.3
18	300	44.8	63.4	34.3
20	300	55.0	77.7	42.1
24	300	78.4	111.0	60.0

\* 2.3 BASED ON GEOMETRIC FACTORS

Figure 1: TYPICAL TRENCH cross-section showing bedding, backfill, and trench details.

**CONSTRAINTS**

- SOIL CONDITIONS AND BEARING CHARACTERISTICS ARE TO BE DETERMINED BY THE DISTRICT.
- THIS STANDARD DETAIL IS FOR HORIZONTAL THRUST RESTRAINT ONLY.
- CONCRETE BLOCKING SHALL BE PER DOT/APWA SPECIFICATION 7-09.3(2), CURRENT EDITION.
- MAINTAIN 18" MINIMUM GROUND COVER OVER THE TOP OF ALL CONCRETE BLOCKING.
- ALL THRUST BLOCKS TO BE FORMED AND FITTINGS COVERED IN PLASTIC.
- ANY TEMPORARY BLOCKING USED TO SUPPORT FITTINGS DURING CONSTRUCTION SHALL BE REMOVED PRIOR TO BACKFILLING.

**PROCEDURE**

- DETERMINE BEARING FACTOR IN TABLE 1 CORRESPONDING TO APPROPRIATE PIPE SIZE AND TYPE OF FITTING.
- MULTIPLY THE BEARING FACTOR DETERMINED IN TABLE 1 BY THE MULTIPLICATION FACTOR IN TABLE 2 FOR THE APPROPRIATE SOIL CLASSIFICATION.
- USING TABLE 3 LOCATE THE MINIMUM DEPTH OF CONCRETE (D<sub>min</sub>) CORRESPONDING TO THE REQUIRED BEARING AREA.
- USING D<sub>min</sub>, THE HEIGHT AND LENGTH OF THE THRUST BLOCKING CAN BE DETERMINED FROM THE DIMENSION RELATIONSHIPS ILLUSTRATED IN FIGURE 1 AND DESCRIBED BELOW:

A. "H" EQUALS "D"  
 B. MAX. "L" EQUALS 2 x "H"  
 C. MIN. "L" EQUALS "H"

**TABLE 1 - BEARING FACTOR**

TEST PRESSURE (PSI)	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
3	300	2.3*	2.6	2.3*
4	300	2.3*	3.8	2.3*
6	300	5.6	7.9	4.3
8	300	9.6	13.6	7.4
10	300	14.5	20.5	11.1
12	300	20.5	29.0	15.7
14	300	27.6	39.0	21.1
16	300	35.7	50.4	27.3
18	300	44.8	63.4	34.3
20	300	55.0	77.7	42.1
24	300	78.4	111.0	60.0

**TABLE 2 - MULTIPLICATION FACTOR**

SOIL CONDITION	MULTIPLICATION FACTOR
MUCK, PEAT, etc.	-
SOFT CLAY	2.0
SILT	1.3
SAND OR SANDY SILT	1.0
SAND AND GRAVEL	0.7
SAND AND GRAVEL CEMENTED W/ CLAY	0.5
HARD SHALE	0.2

**TABLE 3 - BLOCK SHAPE**

REQD BEARING AREA (SQ. FT.)	MINIMUM DEPTH (D <sub>min</sub> )
2.25 MIN - 5.0	1.5'
5.01 - 10.0	2.3'
10.01 - 15.0	3.0'
15.01 - 30.0	4.0'
30.01 - 40.0	4.5'
40.01 - 50.0	5.0'
50.01 - 70.0	6.0'

Figure 1: HORIZONTAL THRUST BLOCKING diagrams showing various configurations and dimensions.

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FILENAME: EWD1W12  
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DRAWING No. W-01  
 SHEET No. 1

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 SHEET No. 2

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DRAWING No. W-03  
 SHEET No. 3

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 SHEET No. 2

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FILENAME: EWD1W19  
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 SHEET No. 3

**VERTICAL THRUST BLOCKING**

1. RESTRAINED JOINTS ARE PREFERRED OVER VERTICAL THRUST BLOCKING UNLESS RESTRAINTS ARE NOT PRACTICAL.

2. CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI.

3. SHACKLE RODS PER STANDARD DETAIL W-07.

**VERTICAL THRUST BLOCKING**

Figure 1: VERTICAL THRUST BLOCKING diagrams showing pipe, turnbuckles, shackle rods, and concrete blocking.

PIPE SIZE (INCH)	TEST PRESSURE (PSI)	VERTICAL BEND (DEGREES)	AMOUNT CONCRETE BLOCKING - CU FT	LENGTH OF SIDE FEET	SHACKLE ROD DIA. INCHES	DEPTH OF ROD IN INCHES	NUMBER OF THE RODS (2 EMBEDDED, RODS PER SET)
3"	300	11 1/4	5.8	1.8	5/8	12"	2
		22 1/2	11.5	2.3	5/8	12"	2
		45	22.6	2.8	5/8	12"	2
4"	300	11 1/4	8.5	2.0	5/8	12"	2
		22 1/2	17.0	2.6	5/8	12"	2
		45	33.2	3.2	5/8	12"	2
6"	300	11 1/4	17.6	2.6	5/8	12"	2
		22 1/2	35.0	3.3	5/8	12"	2
		45	68.7	4.1	5/8	12"	2
8"	300	11 1/4	30.3	3.1	3/4	12"	2
		22 1/2	60.2	3.9	3/4	12"	2
		45	118	4.9	3/4	12"	4
10"	300	11 1/4	45.5	3.6	3/4	12"	2
		22 1/2	90.6	4.5	3/4	12"	2
		45	178	5.6	3/4	24"	4
12"	300	11 1/4	64.4	4.0	3/4	12"	2
		22 1/2	128	5.1	3/4	12"	4
		45	251	6.3	3/4	12"	6
14"	250	11 1/4	86.5	4.4	3/4	12"	2
		22 1/2	172	5.6	3/4	24"	4
		45	338	7.0	1"	24"	6
16"	250	11 1/4	112	4.8	3/4	12"	3
		22 1/2	223	6.1	3/4	12"	6
		45	436	7.6	1"	12"	6
18"	250	11 1/4	141	5.2	3/4	24"	4
		22 1/2	280	6.5	1"	24"	4
		45	549	8.2	1-1/4"	24"	6

**RESTRAINED JOINT PIPE**

1. RESTRAINED JOINTS ARE ACCEPTABLE INSTEAD OF THRUST BLOCKS, WHERE APPROPRIATE. THE DISTRICT WILL BE THE SOLE DETERMINER IF THE APPLICATION IS APPROPRIATE. THE FOLLOWING APPLICATIONS MUST USE RESTRAINED JOINTS UNLESS IMPRACTICAL:

- DEAD ENDS MAINS THAT MAY BE EXTENDED IN THE FUTURE.
- SOFT OR SATURATED SOILS, FITTINGS NEAR TOP OF SLOPE, OR BEARING AGAINST AN ADJACENT UTILITY.
- VERTICAL BENDS WITH FORCE DIRECTION UPWARDS ARE NOT COVERED HERE. MUST BE DESIGNED BY ENGINEER FOR EACH CASE.

2. MECHANICAL JOINT RESTRAINTS SHALL BE COATED WITH FUSION BONDED POLYESTER, OR ZINC & EPOXY COATING. EBAA MEGABOND, ROMAC ROMABOND, FORD ARMORGUARD E-COAT, OR APPROVED EQUAL.

3. THE FOLLOWING PRODUCTS ARE NOT ALLOWED: SET-SCREW RESTRAINTS, TYLER/MWANE TUFGRIP, ALL GRIPPER STYLE GASKETS (FIELD-LOK, SURE-STOP, ETC.) LARGER THAN 12" DIAMETER.

4. RESTRAINTS OR RESTRAINED PIPE (PORTIONS GOUGED BY TOOTH RESTRAINTS) MAY NOT BE REUSED ONCE TIGHTENED.

5. THE FOLLOWING TABLES ARE BASED ON EQUATIONS FROM THE DUCTILE IRON PIPE RESEARCH ASSOCIATION'S 2016 THRUST RESTRAINT FOR DUCTILE IRON PIPE. THE FOLLOWING CONDITIONS MUST BE MET FOR THESE RESULTS TO BE VALID. IF ANY OF THESE CONDITIONS CANNOT BE MET, PROJECT SPECIFIC CALCULATIONS MUST BE PROVIDED:

- THESE TABLES ONLY FOR BARE (UNWRAPPED) DUCTILE IRON OR PVC PIPE.
  - PIPE LAYING CONDITION TYPE 4 or 5, DEFINED AS:
    - 1.1.1. SELECT AN ANGULAR BEDDING MATERIAL BELOW PIPE
    - 1.1.2. PIPE ZONE BEDDING EXTENDING TO TOP OF PIPE MECHANICALLY COMPACTED IN LIFTS.
  - PIPE RESTING DIRECTLY ON NATIVE TRENCH BOTTOM IS NOT ACCEPTABLE.
  - SANDY SILT BEDDING. FOR IMPORT CLEAN SAND OR 5/8" TOP COURSE, LENGTHS MAY BE REDUCED BY 25%.
  - DEPTH OF COVER IS 3.5 FEET MINIMUM AT THE TIME OF PRESSURE TESTING.
  - 250psi TEST PRESSURE MAXIMUM. FOR HIGHER TEST PRESSURE, MULTIPLY "L" BY THE PROPORTIONAL DIFFERENCE.
    - 5.5.1. EXAMPLE: FOR 300psi, 300/250=1.2 THEREFORE, LENGTHS MUST BE MULTIPLIED BY 1.2.

THE LENGTH "L" GIVEN BELOW IS THE DISTANCE THAT PIPE MUST BE RESTRAINED PAST THE FITTING JOINT. ALL JOINTS WITHIN THIS DISTANCE MUST BE RESTRAINED, INCLUDING THE FITTING.

DIA.	RUN DIAMETER					DEAD END	REDUCER
	11 1/4"	22 1/2"	33 3/4"	45"	67 1/2"		
4"	3'	5'	8'	10'	17'	25'	61'
6"	4'	7'	11'	14'	23'	34'	86'
8"	5'	9'	14'	19'	30'	44'	112'
10"	6'	11'	16'	22'	36'	53'	135'
12"	7'	13'	19'	26'	41'	62'	156'
16"	8'	16'	24'	33'	53'	78'	203'
18"	9'	18'	27'	36'	58'	86'	224'
PVC**	1.2x	1.2x	1.2x	1.2x	1.2x	1.4x	1.4x

\*\* Assumes reducer down 2 sizes. (example 12"x8"). Larger reductions shall be treated as a tee.

\*\* For PVC or poly-bagged pipe, multiply the lengths by the value shown in the PVC row.

Figure 1: RESTRAINED JOINT PIPE diagrams showing typical bend and restrained joint details.

**PIPE CASING**

1. CASING TO BE USED WHEN:

- WATERMAIN CROSSES UNDER SANITARY SEWER OR IRRIGATION.
- WATERMAIN CROSSES OVER SANITARY SEWER OR IRRIGATION WITH LESS THAN 18" CLEARANCE.
- AT THE DISCRETION OF THE DISTRICT.
- ALTERNATELY, SANITARY SEWER OR IRRIGATION MAY BE CASED OR CONSTRUCTED OF WATERMAIN CLASS MATERIALS (I.D. C900 PVC, ETC.).

2. CASINGS SHALL BE NEW 0.25" THICK STEEL, DL 50 DL, DR17 HDPE, OR DR21 C900 PVC; MATERIAL AND WALL THICKNESS AT THE DISCRETION OF THE DISTRICT.

3. PIPE THROUGH CASINGS SHALL BE SUPPORTED WITH RUNNERS SPACED MEETING THE FOLLOWING REQUIREMENTS:

- NO FARTHER THAN 8 FEET BETWEEN RUNNERS.
- A RUNNER NO FARTHER THAN 3 FEET FROM EACH END OF THE CASING.
- A RUNNER NO FARTHER THAN 2 FEET FROM EACH CARRIER PIPE PUSH-ON JOINT.

4. RUNNERS SHALL BE MANUFACTURED PRODUCTS (APS, CALPICO, OR APPROVED EQUAL), NO BLOCKS AND STRAPS. CASING ENDS SHALL BE CAPPED WITH MANUFACTURED CASING END SEALS.

5. CASING LENGTH AS NECESSARY TO EXTEND 10 FEET PAST THE UTILITY CROSSING, BOTH SIDES, OR AS DIRECTED BY THE DISTRICT.

6. CASING RUNNERS TO BE SELECTED SO CLEARANCE BETWEEN TOP RUNNER LEG AND CASING DOES NOT EXCEED 1".

7. MINIMUM INSIDE DIAMETER OF CASING TO BE THE LARGER OF 3" MORE THAN PIPE BELL OR 5" MORE THAN PIPE BARREL, O.D.

ASSUMING STANDARD PUSH-ON JOINT OF CARRIER PIPE:

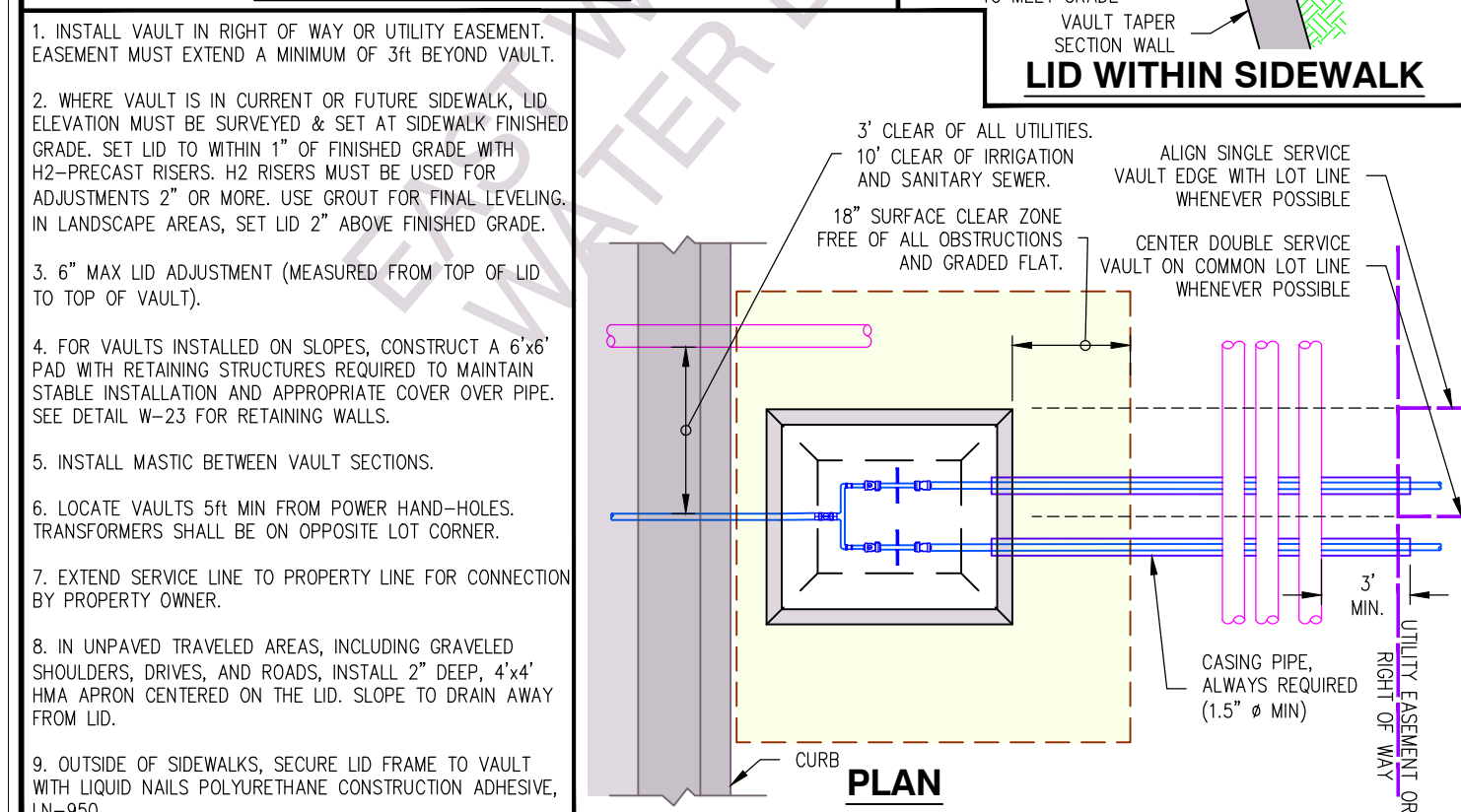
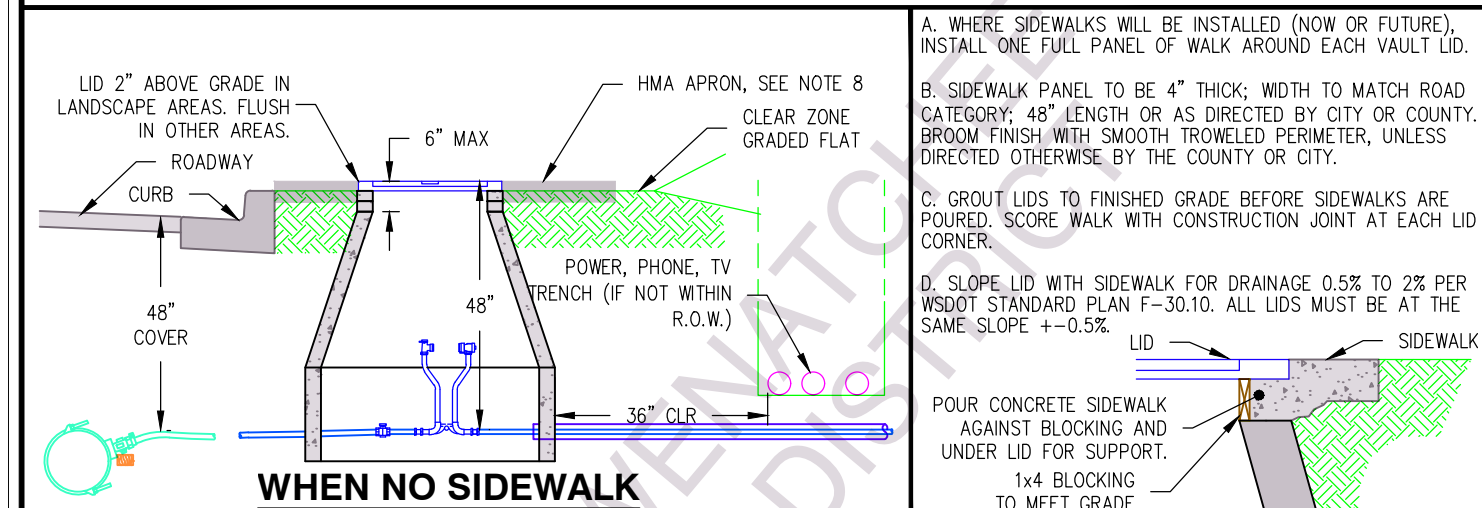
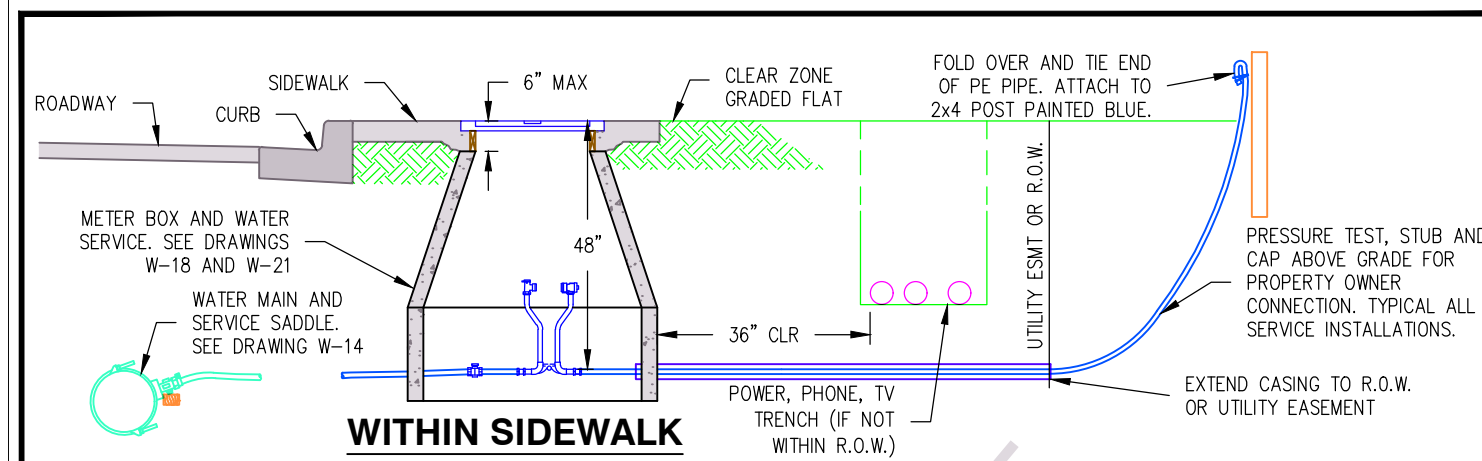
- 6" PIPE (8.7" BELL) - 12" CASING I.D.
- 8" PIPE (10.9" BELL) - 14" CASING I.D.
- 12" PIPE (15.1" BELL) - 18" CASING I.D.
- 16" PIPE (20.0" BELL) - 24" CASING I.D.
- 18" PIPE (22.0" BELL) - 26" CASING I.D.
- OTHER SIZES OR TYPES OF CARRIER PIPE, CONFIRM WITH DISTRICT.

Figure 1: PIPE CASING diagrams showing casing pipe longer than 20' detail and 20' casing pipe detail.

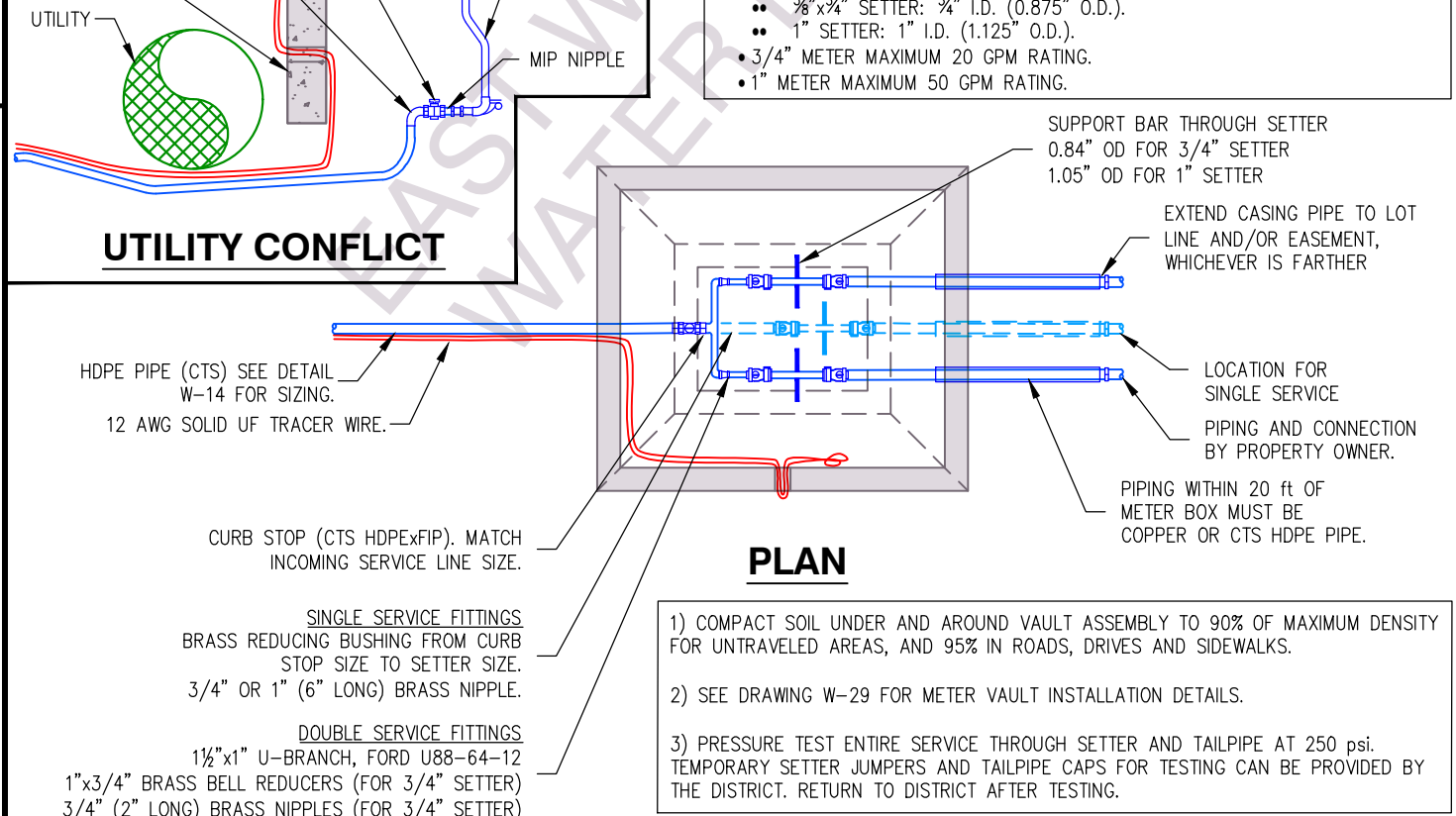
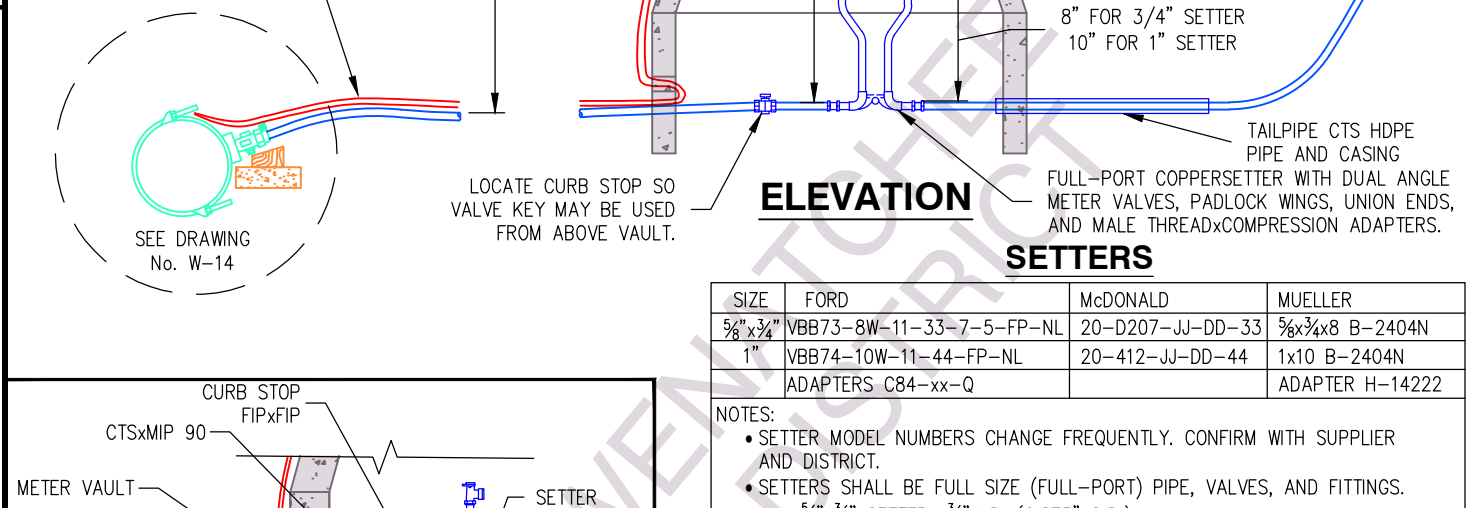
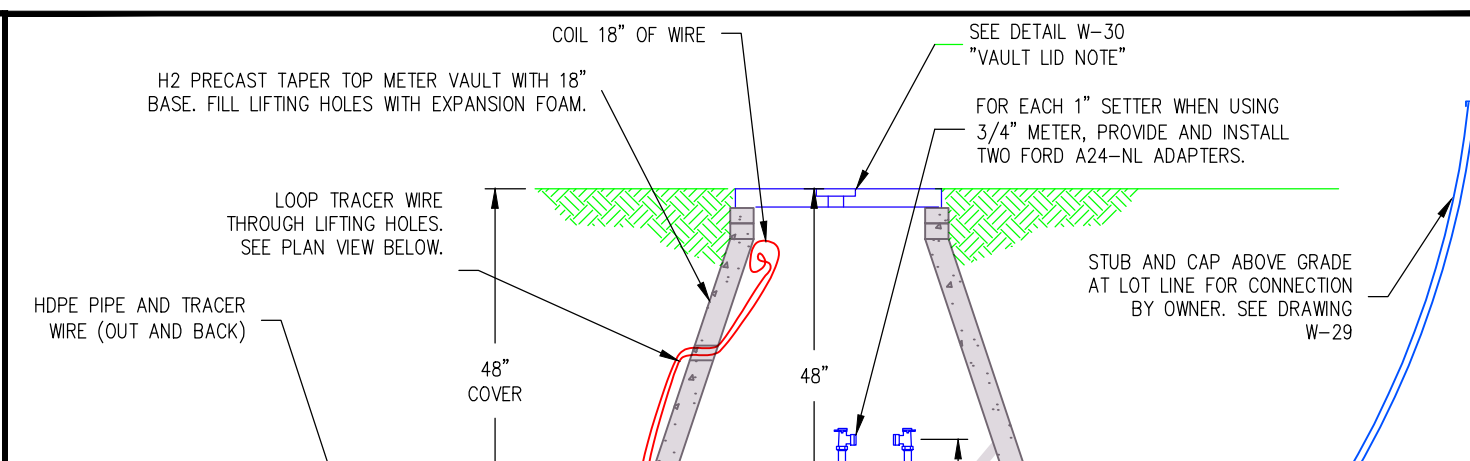
**TIE ROD TABLE**

PIPE DIAMETER (INCH)	NO. OF ANCHORS (MIN. 2)	MIN. NUMBER OF THE RODS		304SS OR OTHER STEELS (90 kpsi yield)		ASTM A242 (COR-TEN OR EQUAL) STEEL (46 kpsi yield)	
		TEE	45° BEND	22 1/2° BEND	11 1/4° BEND	TEE	45° BEND
4	4	2					

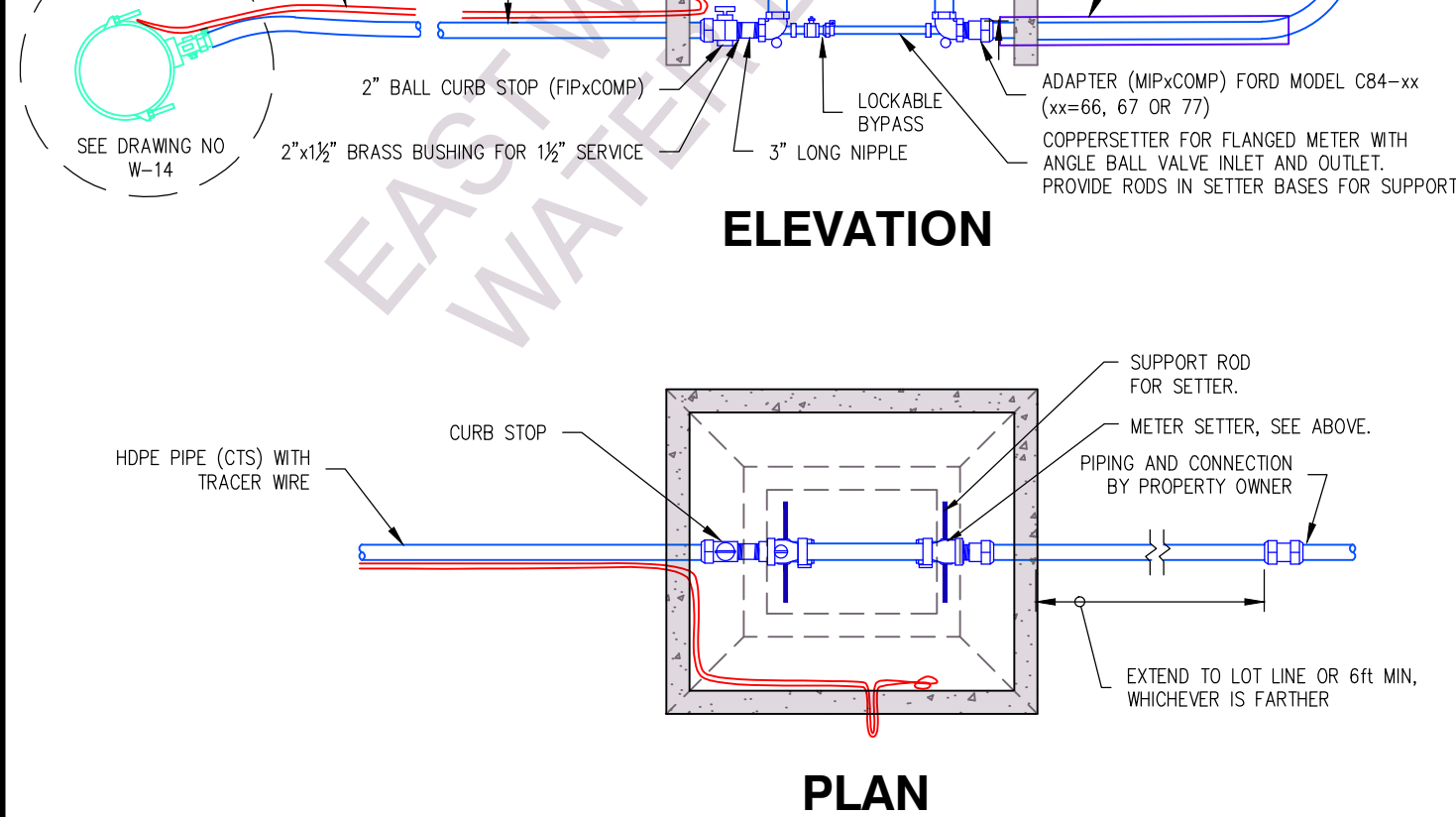
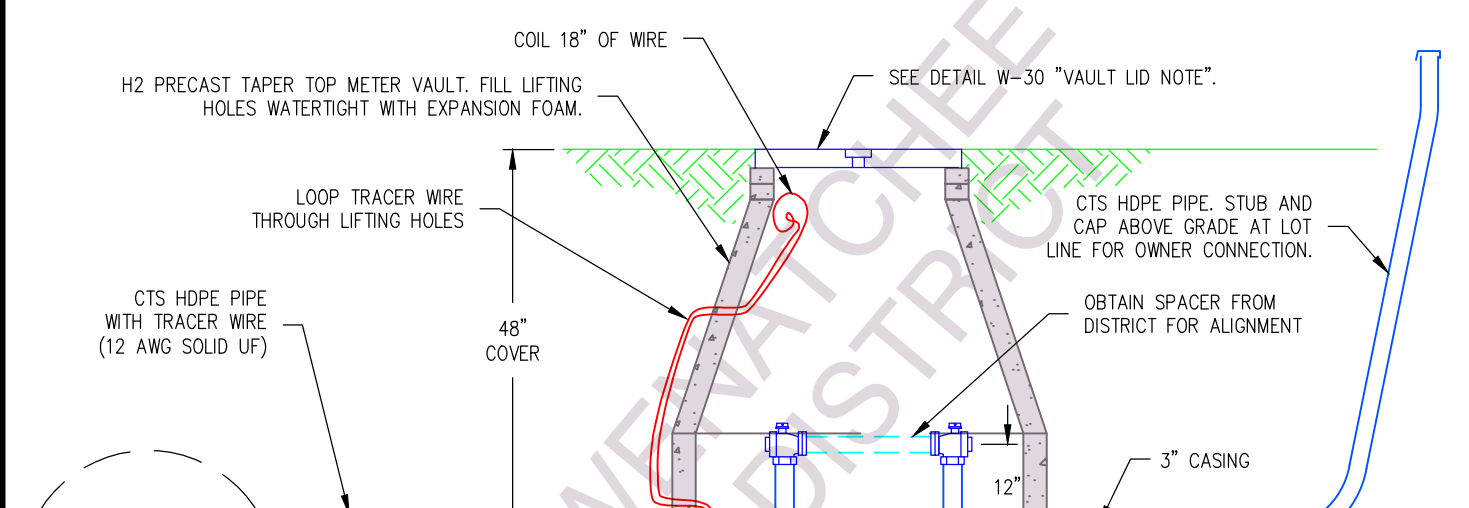
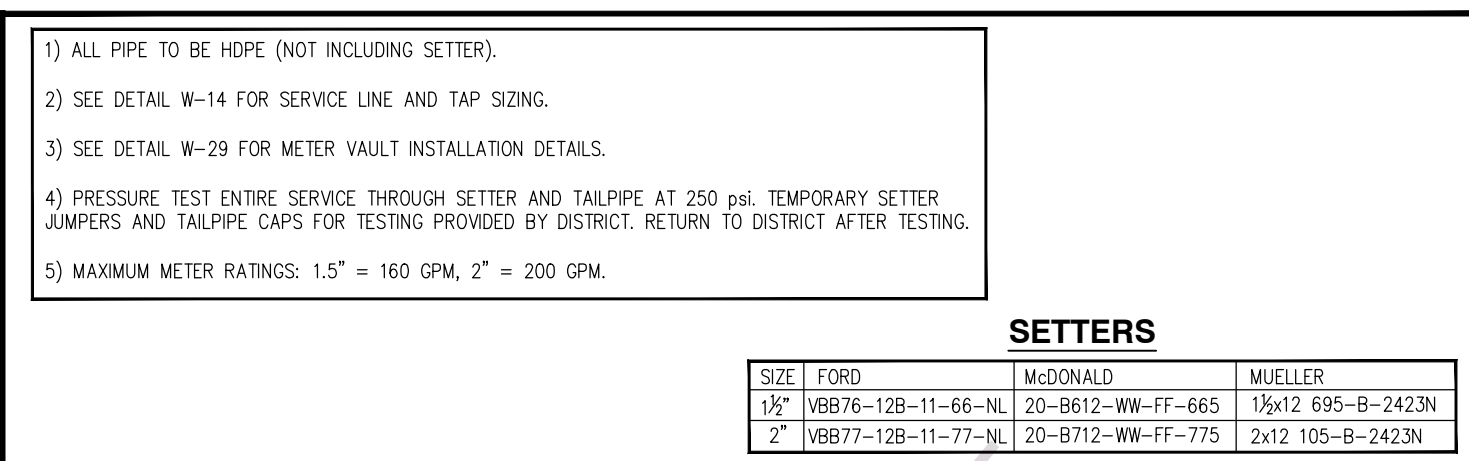




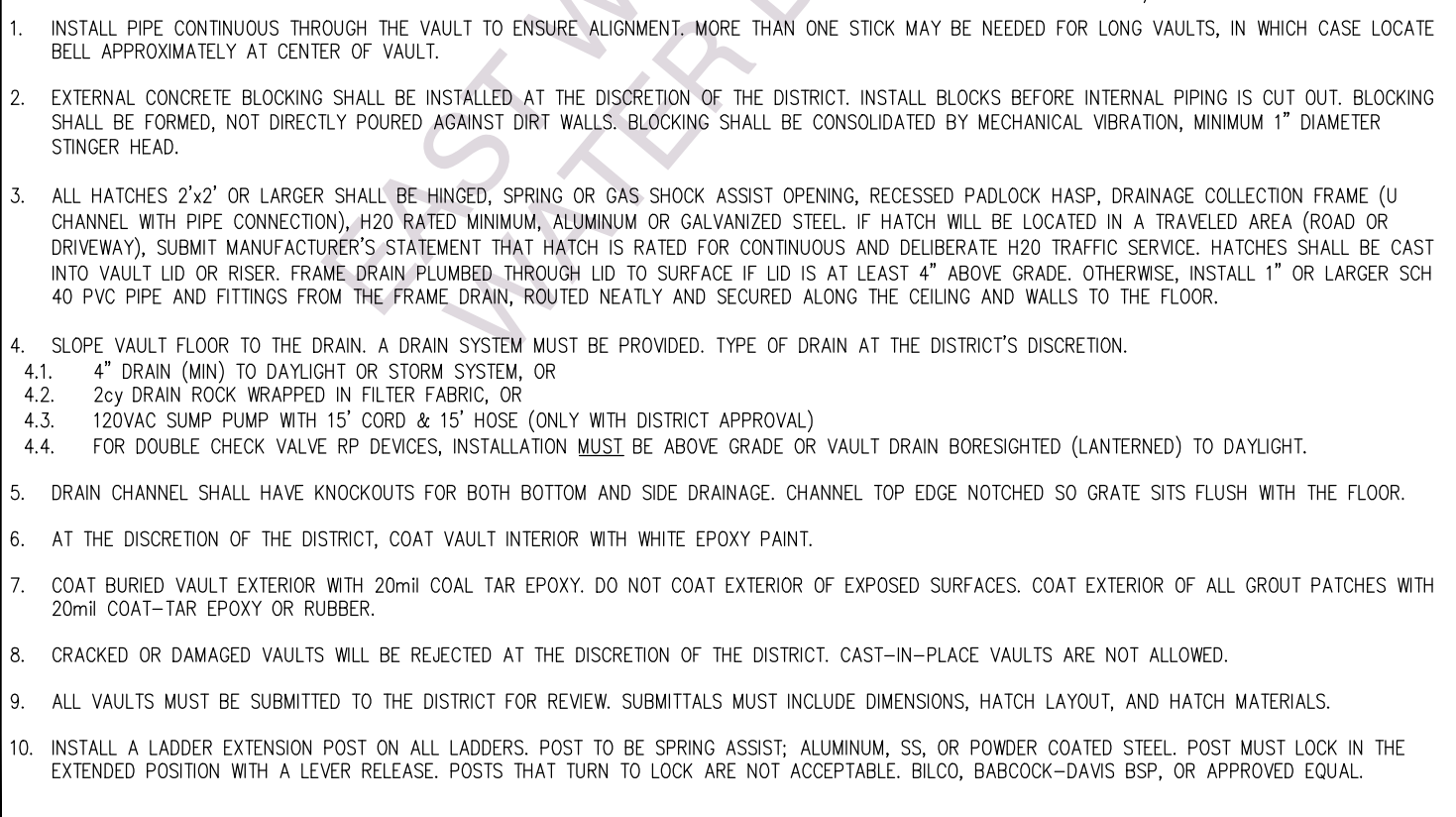
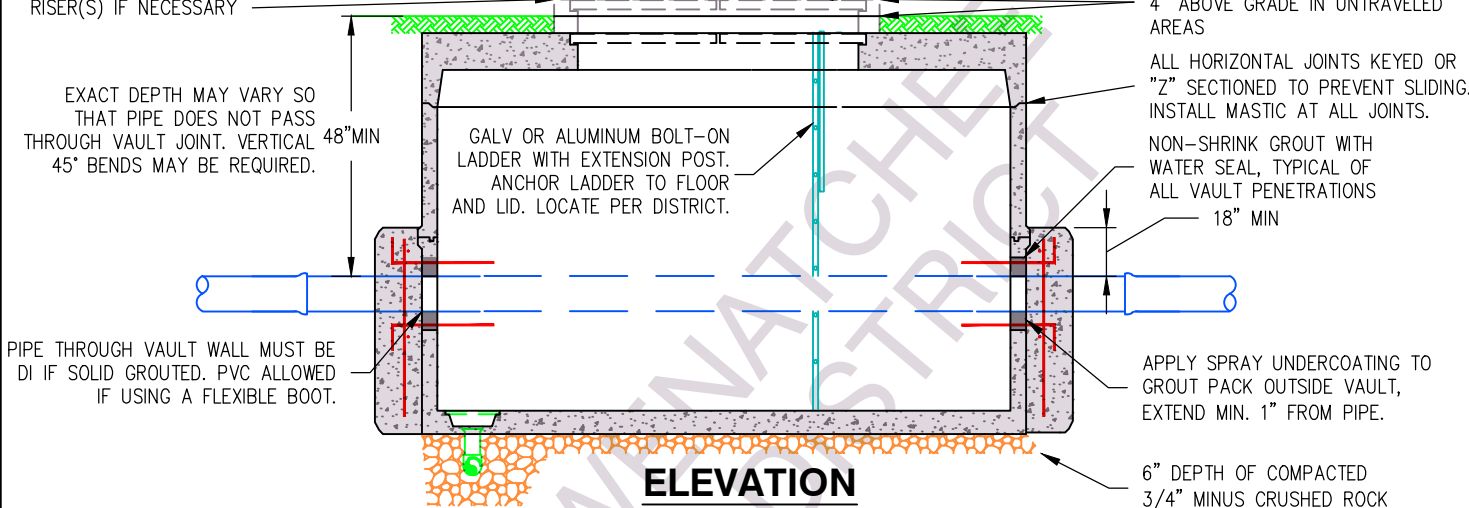
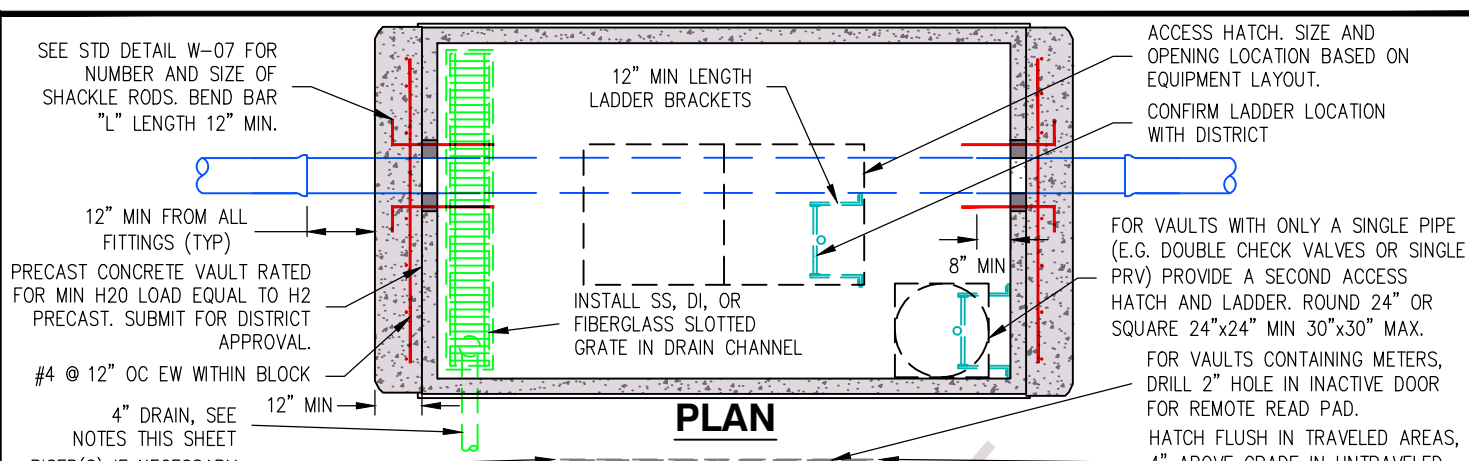
**East Wenatchee Water District**  
WATER SERVICE, AIR VALVE, BLOW OFF VAULT INSTALLATION DETAILS  
FILENAME: EWD1W23  
REVISED: DEC 21, 2021  
DRAWING No. W-29  
SHEET No. 17



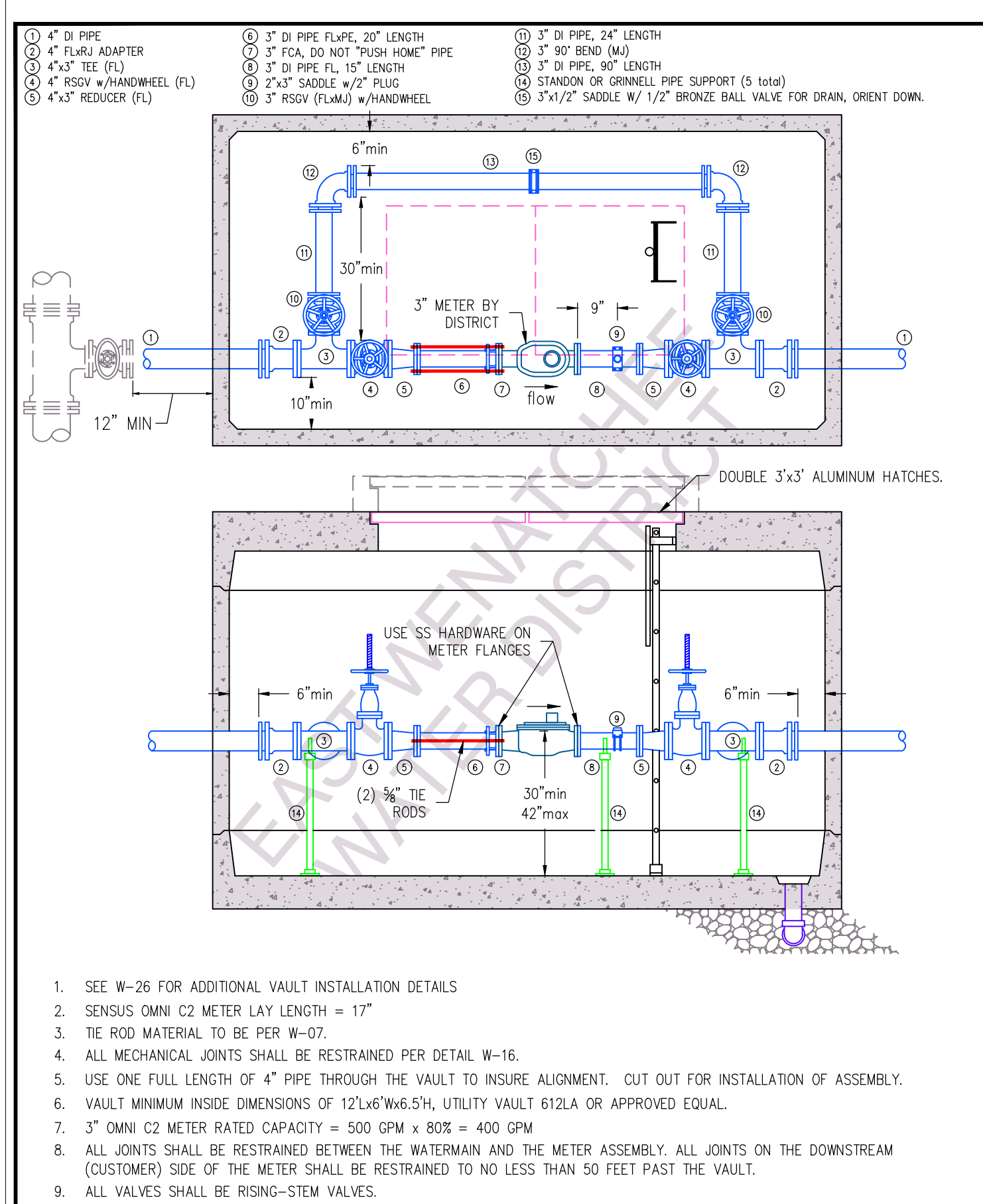
**East Wenatchee Water District**  
3/4\"/>



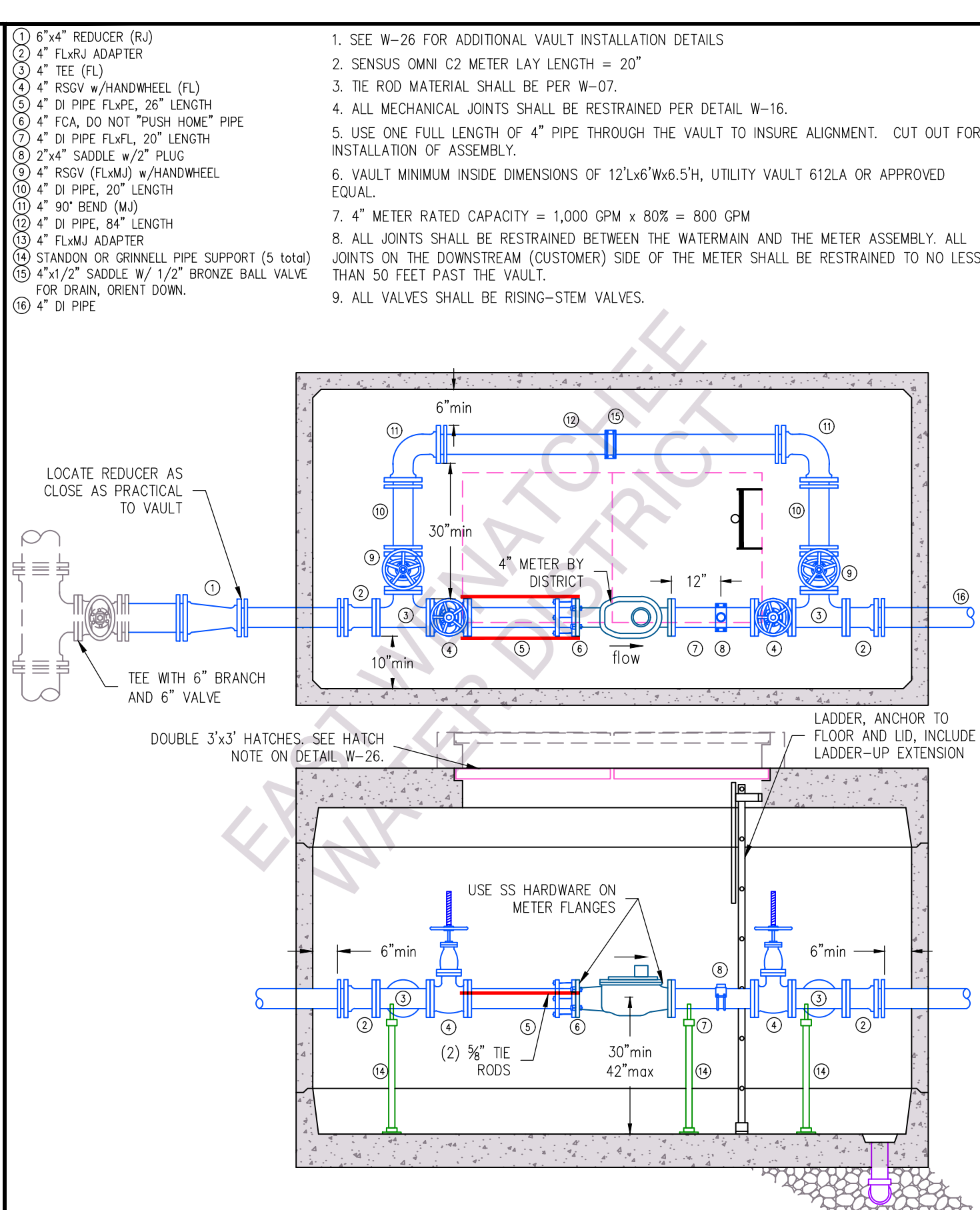
**East Wenatchee Water District**  
1/2\"/>



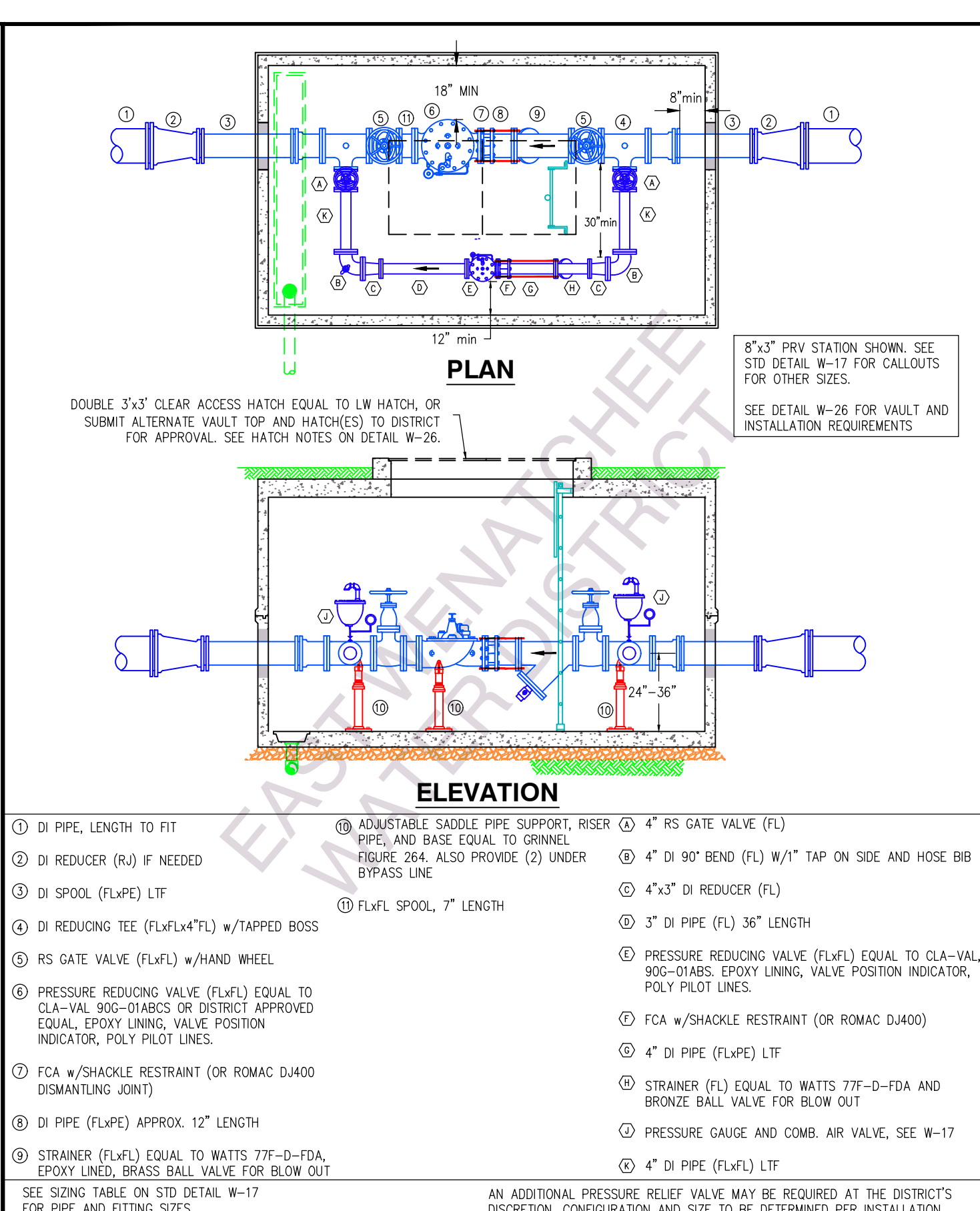
**East Wenatchee Water District**  
LARGE VAULTS  
FILENAME: EWD1W20  
REVISED: MAR 20, 2023  
DRAWING No. W-26  
SHEET No. 20



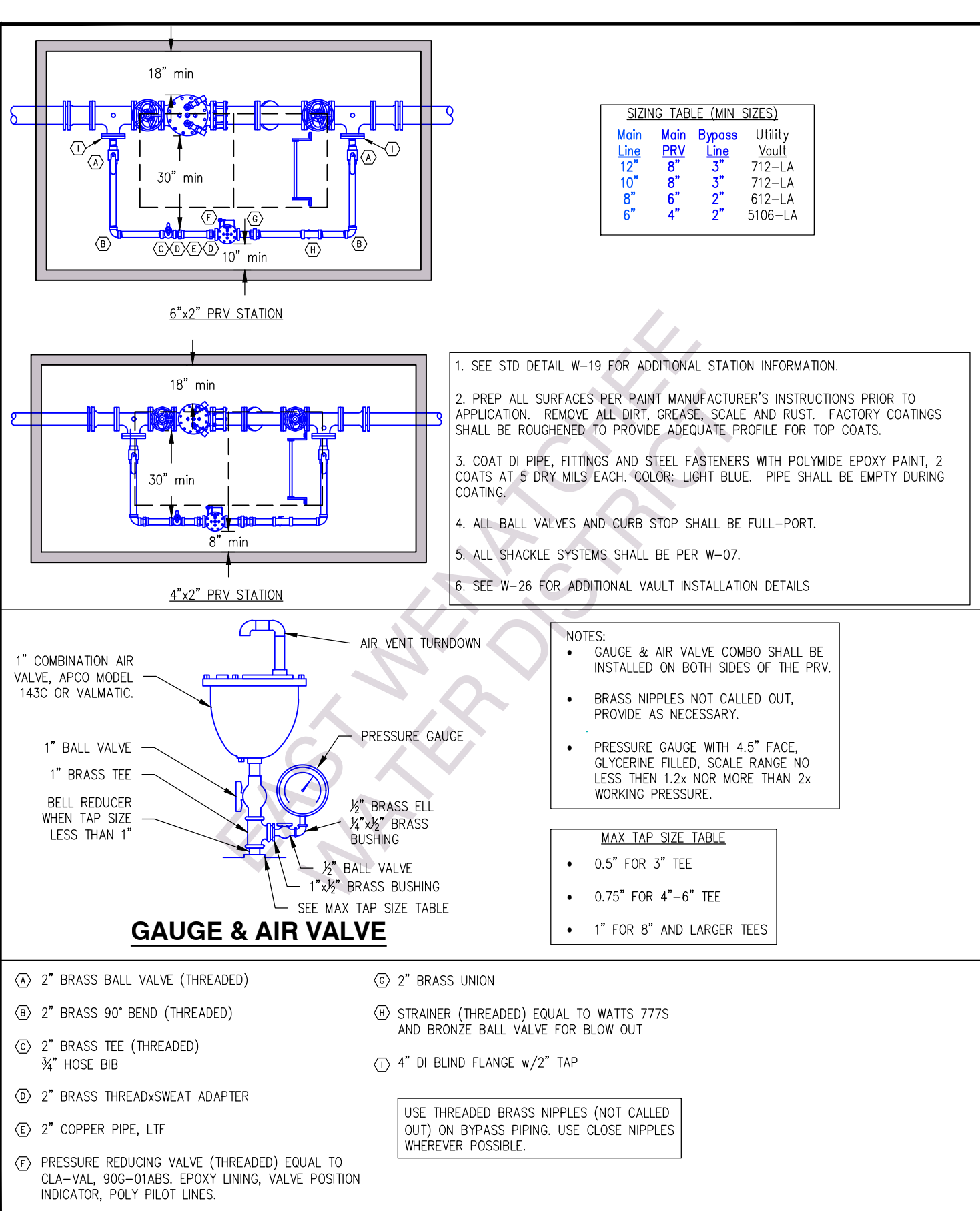
**East Wenatchee Water District**  
3\"/>



**East Wenatchee Water District**  
4\"/>

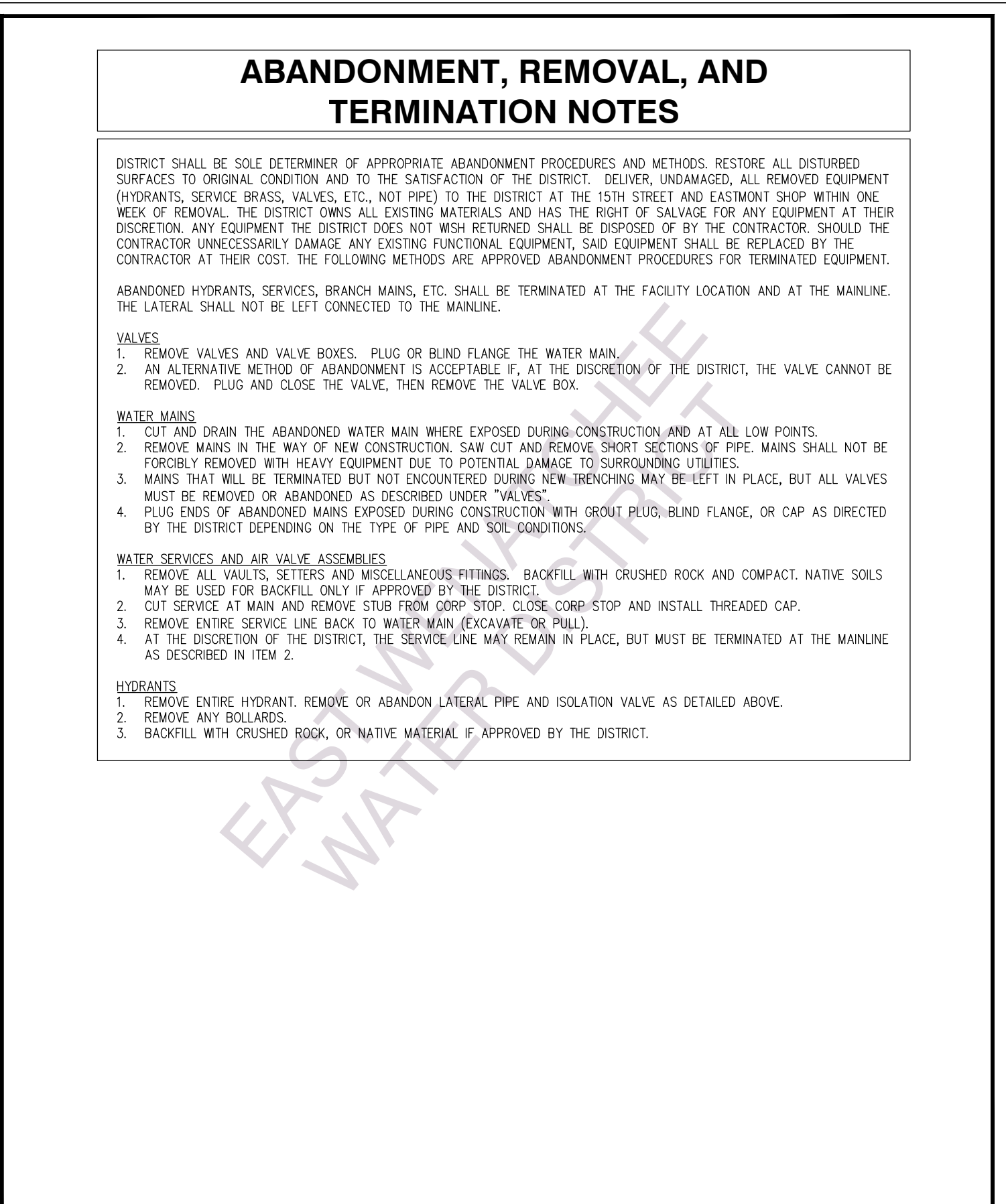
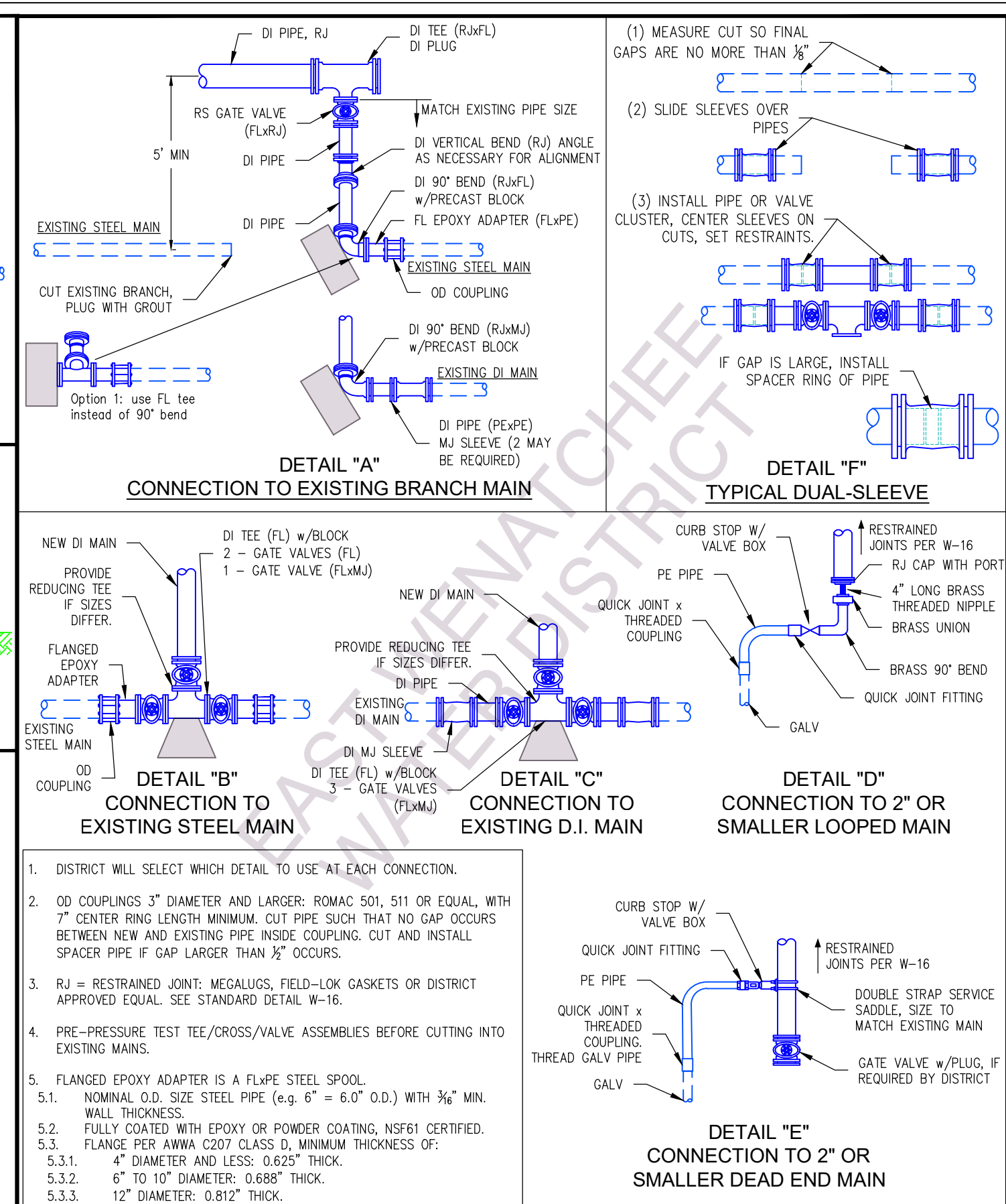
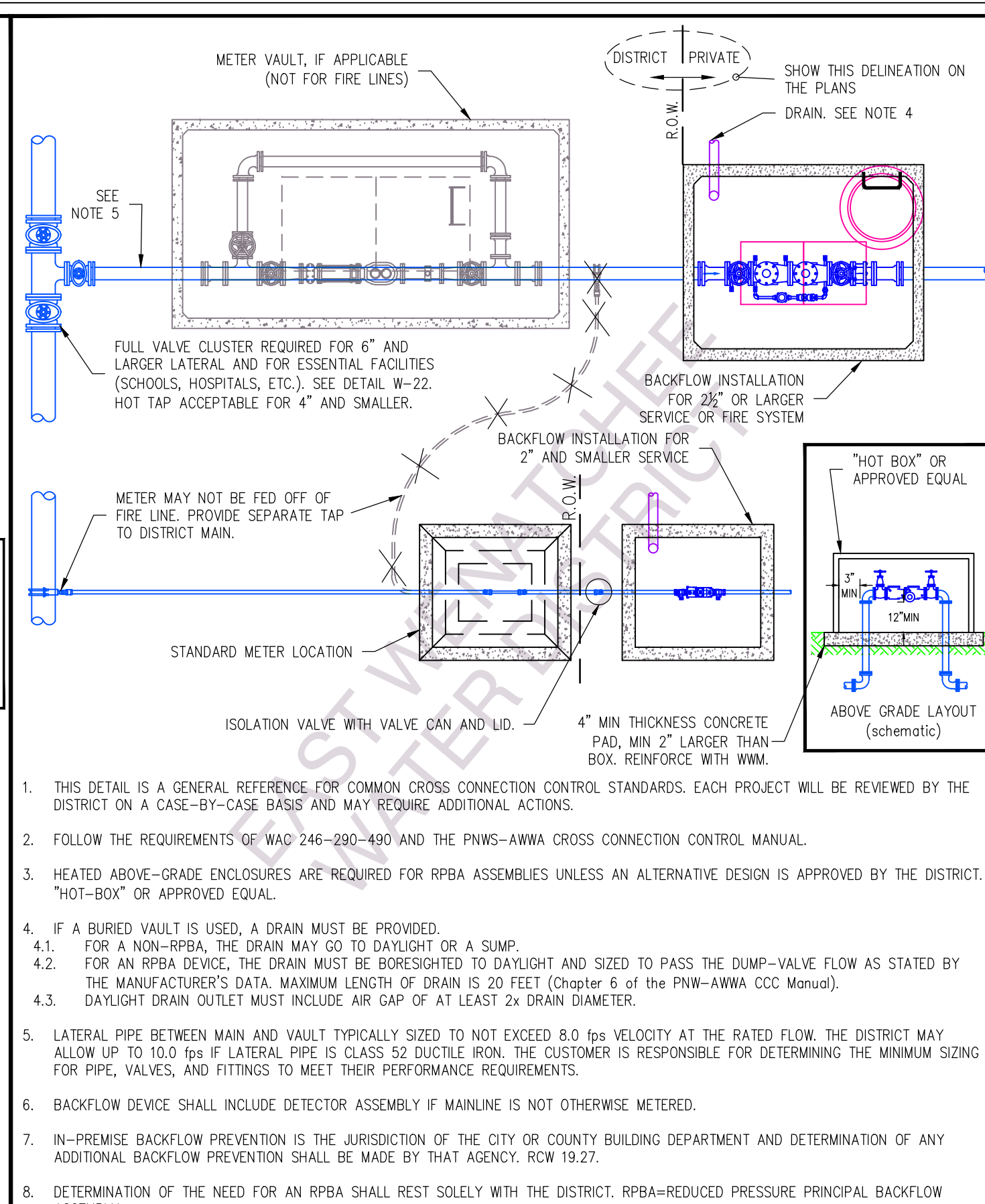
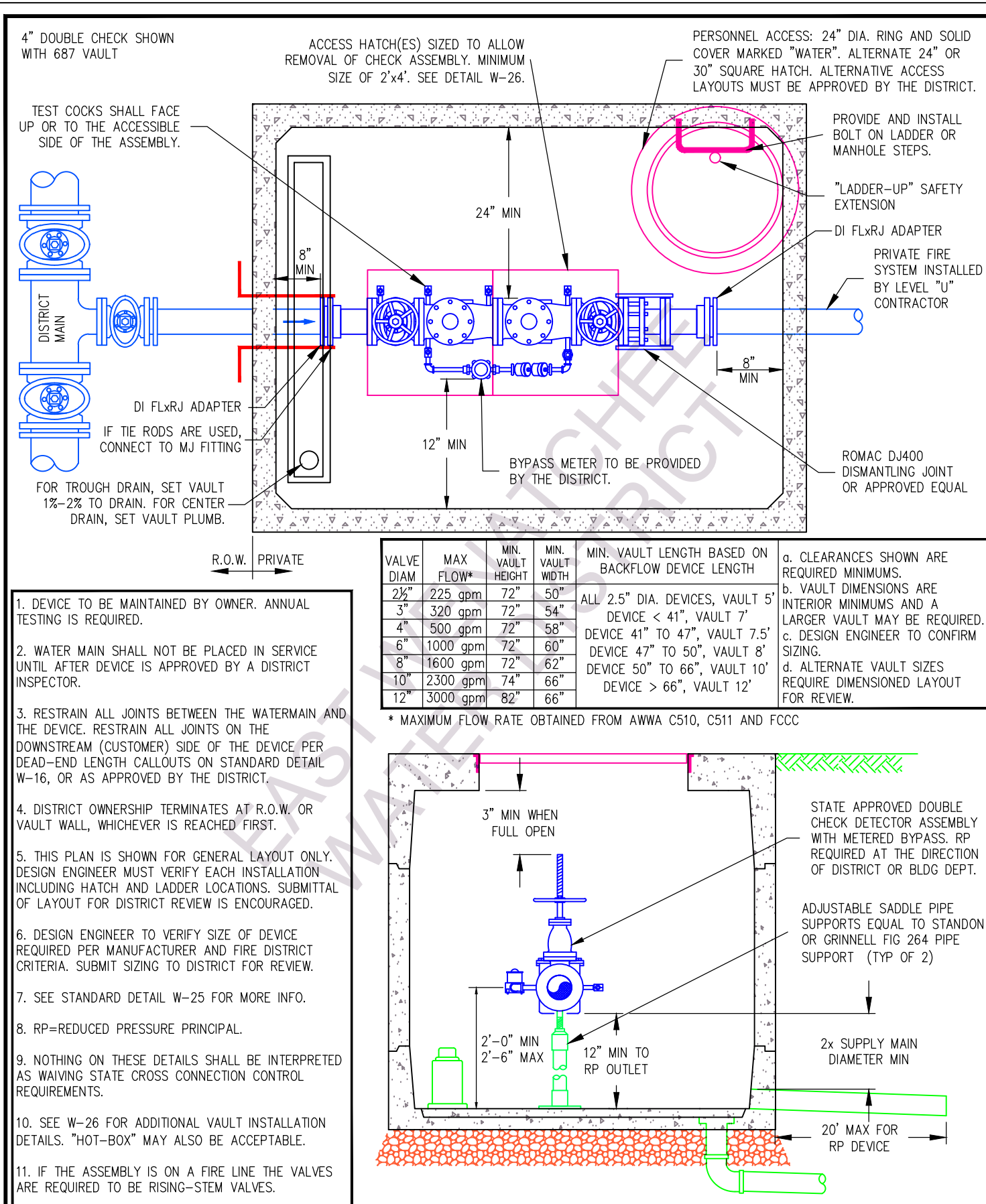


**East Wenatchee Water District**  
PRESSURE REDUCING STATION  
FILENAME: EWD1W24  
REVISED: MAY 5, 2021  
DRAWING No. W-19  
SHEET No. 23



**East Wenatchee Water District**  
PRESSURE REDUCING STATION  
FILENAME: EWD1W25  
REVISED: MAR 30, 2023  
DRAWING No. W-20  
SHEET No. 21





**East Wenatchee Water District**  
WATER SYSTEM STANDARD DETAIL

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FILENAME: E:WDWTW3  
REVISED: MAR 30, 2023

**BACKFLOW PREVENTION ASSEMBLY**

DRAWING No. W-13  
SHEET No. 25

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FILENAME: E:WDWTW3  
REVISED: MAR 30, 2023

**BACKFLOW ASSEMBLY INSTALLATION**

DRAWING No. W-25  
SHEET No. 26

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FILENAME: E:WDWTW8  
REVISED: JUN 11, 2025

**CONNECTIONS TO EXISTING MAINS**

DRAWING No. W-22  
SHEET No. 27

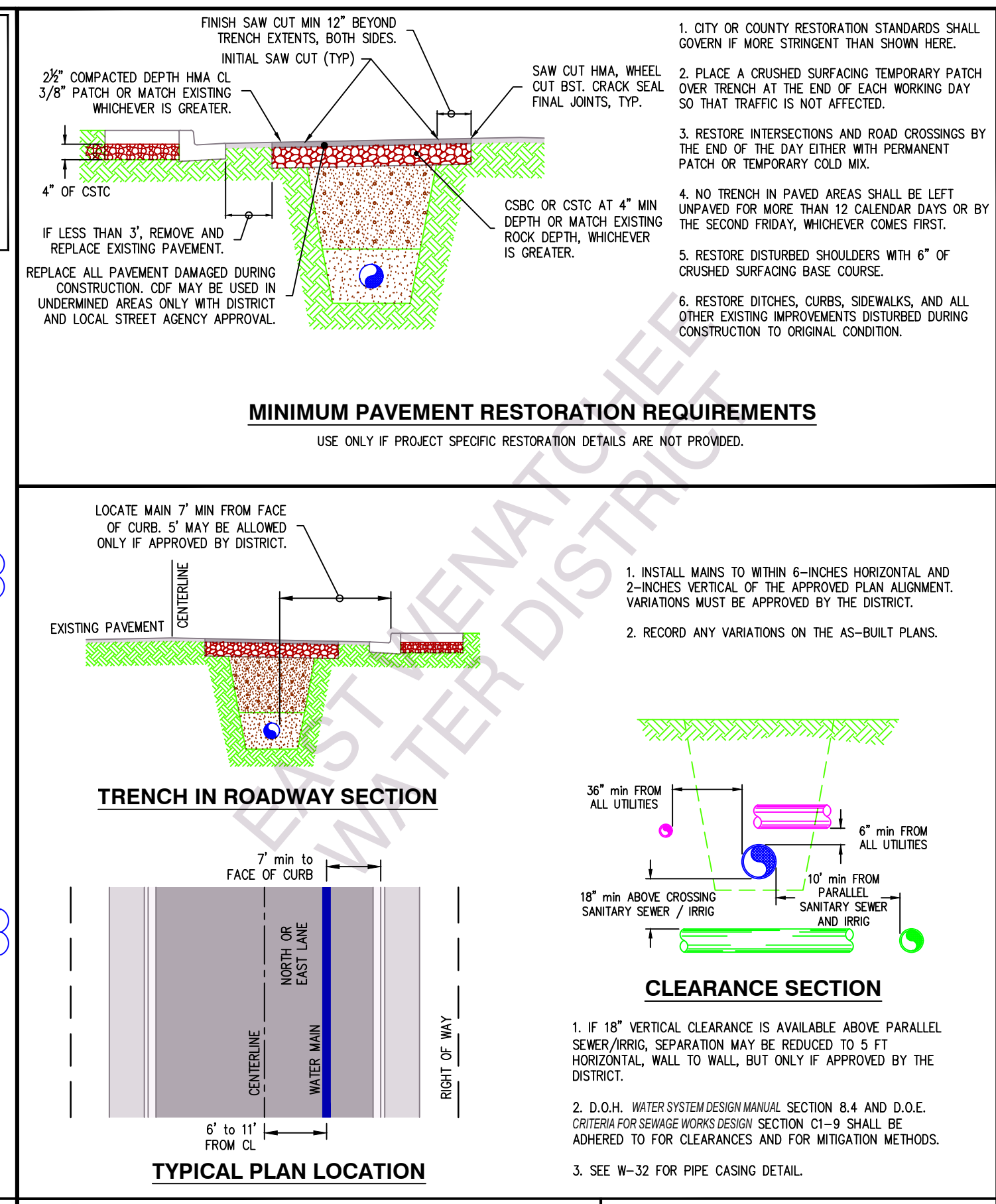
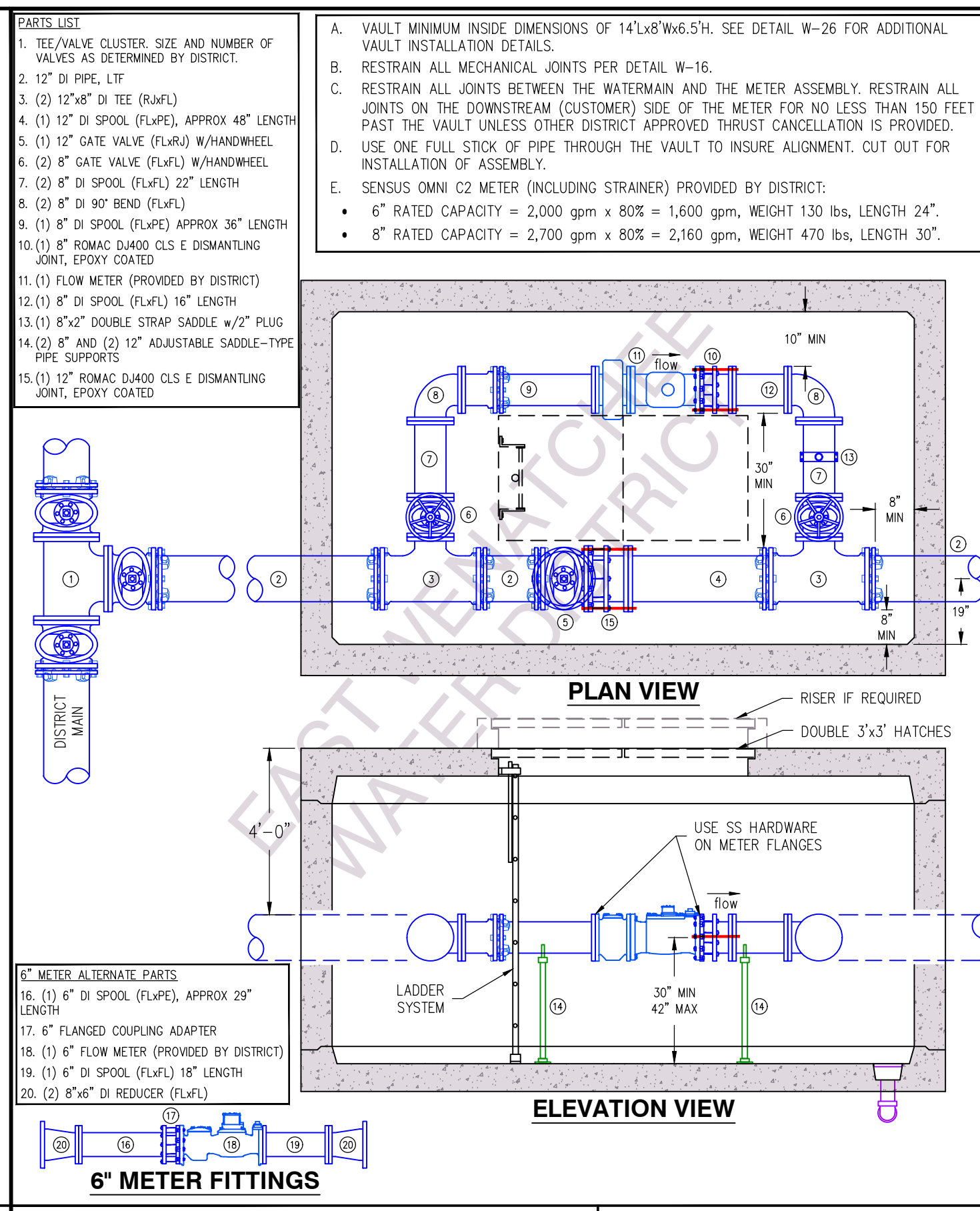
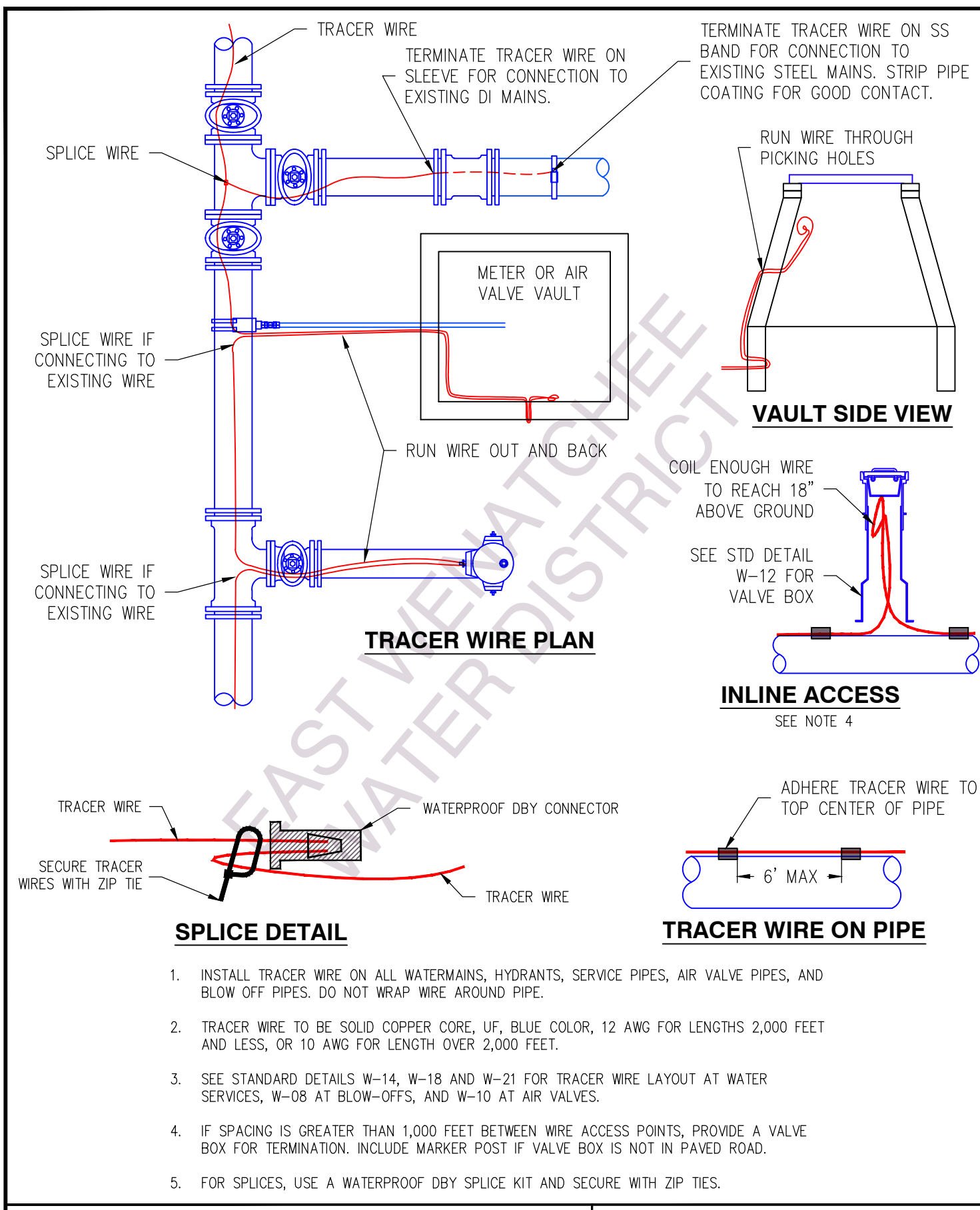
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FILENAME: E:WDWTW9  
REVISED: JAN 7, 2020

**ABANDONMENT AND REMOVAL OF TERMINATED FACILITIES**

DRAWING No. W-15  
SHEET No. 28



DECEMBER 2021

- W-02 CHANGED CLOW MODEL F2500 TO MEDALLION. CHANGED MAXIMUM SHACKLE ROD LENGTH FROM 15 FEET TO 60 FEET.
- W-03 ADDED MARKER TAPE FOR PIPE IN EASEMENTS.
- W-12 ADDED EXTENSION ROD DIMENSION FROM SURFACE.
- W-13, W-26 ADDED/CLARIFIED SECONDARY ACCESS HATCH FOR VAULTS WITH A SINGLE PIPE (NOT FOR THOSE WITH INSIDE BYPASSES). REVISED LADDER LOCATION AND BRACKET REQUIREMENTS.
- W-14, W-18 CHANGED SERVICE PIPE SIZE TO 2" FOR ALL 1.5" WATER SERVICES.
- W-23 REVISED UNOBSTRUCTED SPACE AROUND THE HYDRANT TO 36" CLEAR.
- W-26, W-30 ADDED NOTE THAT CAST-IN-PLACE VAULTS NOT ALLOWED.
- W-29 CLARIFIED SIDEWALK PANEL SIZE AND SLOPE.
- W-30 ADDED NOTE ABOUT CONSTRUCTION STAKING.

2022

- W-01, MOVED MATERIALS SPECS TO W-30.
- W-03, CLARIFIED PIPE ZONE BEDDING COMPACTION METHOD AND MAXIMUM DEPTH OF 6" PER LIFT. ADDED NOTE REQUIRING CRACK SEAL ON ALL ASPHALT JOINTS.
- W-10, CLARIFIED BLUE BOARD INSULATION TO BE 2" THICK WITH A MINIMUM R-10.
- W-12, ADDED LIST OF APPROVED GATE VALVE MODELS AND EAST JORDAN IRONWORKS VALVE BOX MODEL NUMBERS.
- W-13, ADDED VALVES TO BE RISING-STEM FOR FIRE LINES; ALTERNATIVE HATCH LAYOUT TO BE APPROVED BY THE DISTRICT; AND THE BYPASS METER IS TO BE PROVIDED BY THE DISTRICT.
- W-14, CLARIFIED MARKING TAPE TO BE NON-METALLIC WHEN LOCATED ABOVE TRACER WIRE.
- W-16, GRIPPER TYPE RESTRAINT GASKETS NOT APPROVED FOR LARGER THAN 12".
- W-20, CLARIFIED VALVES TO BE RISING STEM.
- W-22, ADDED ROMAC 501 TO APPROVED COUPLINGS.
- W-25, ADDED ISOLATION VALVE BETWEEN THE METER AND BACKFLOW ASSEMBLY AND THAT THE DEVICE WILL BE IN A HOT BOX UNLESS OTHERWISE APPROVED BY THE DISTRICT.
- W-26, CLARIFIED LADDER EXTENSION POST PRODUCT REQUIREMENTS.
- W-30, BROKE OUT MATERIALS SPECS INTO SEPARATE LIST. CLARIFIED VALVES TO BE RISING STEM.

APRIL 2023

- W-03, MOVED WATER MAIN LOCATION NOTES INTO NEW DETAIL W-34.
- W-03, ADDED BEDDING MATERIAL SIEVE GRADATION.
- W-34, NEW DETAIL "WATER MAIN LOCATION"

JUNE 2024

- W-03, ADDED NO MATERIAL LARGER THAN 6" ALLOWED IN TRENCH BACKFILL. CONSISTENT WITH WSDOT 7-08.3(3).
- W-07, REMOVED OBSOLETE STAR NATIONAL BRAND PRODUCTS.
- W-12, ADDED VALVE BODY FASTENERS MUST BE STAINLESS STEEL.
- W-26, ADDED ALL VAULT HORIZONTAL JOINTS MUST BE KEYS.
- W-30, ADDED FLANGE BOLTS AS EXCLUDED FROM DOMESTIC METAL REQUIREMENT. ADDED FLANGE GASKET PRESSURE RATING. ADDED MARKING TAPE NOTE.

OCTOBER 2025

- W-02, INCREASED HYDRANT DRAIN ROCK FROM 7 CF TO 1/2 CY.
- W-09, ADDED FLUSHING, DISINFECTION, AND PURITY TESTING PROCEDURES.
- W-22, ADDED AWWA FLANGE CLASS RATINGS.
- W-30, ADDED THAT FULL FACE FLANGE GASKETS ARE APPROVED, EXCEPT ON RAISED SEAT FLANGES.
- W-34, MOVED RESTORATION DETAIL HERE FROM W-03.

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FILENAME: E:WDWTW1  
REVISED: DEC 21, 2021

**TRACER WIRE**

DRAWING No. W-31  
SHEET No. 29

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WATER SYSTEM STANDARD DETAIL

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FILENAME: E:WDWTW3  
REVISED: FEB 6, 2024

**6" & 8" METER ASSEMBLY**

DRAWING No. W-33  
SHEET No. 30

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WATER SYSTEM STANDARD DETAIL

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FILENAME: E:WDWTW4  
REVISED: OCT 7, 2025

**WATER MAIN LOCATION TRENCH RESTORATION**

DRAWING No. W-34  
SHEET No. 31

