1. CONSTRUCTION OF IMPROVEMENTS SHALL BE IN ACCORDANCE WITH THE MOST CURRENT VERSIONS OF THE FOLLOWING:
   1.1. EAST WENATCHEE WATER DISTRICT DEVELOPER EXTENSION AGREEMENT (when applicable).
   1.2. EAST WENATCHEE WATER DISTRICT STANDARD DETAILS (INCLUDING REVISIONS AFTER PLAN APPROVAL).
   1.3. EAST WENATCHEE WATER DISTRICT POLICIES AND CONSTRUCTION STANDARDS.
   1.4. WA. STATE DEPT. OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION.

2. ALL METAL PRODUCTS (VALVE BOXES AND CASING PIPES EXCLUDED) AND FITTING COMPONENTS (e.g. BOLTS, GLANDS, ETC) ARE TO BE OF DOMESTIC FABRICATION & CONSTRUCTION.

3. ONLY FORD, MCDONALD AND MUELLER PRODUCTS ARE APPROVED FOR USE AS SERVICE BRASS, EXCEPT WHERE OTHERWISE NOTED IN THESE STANDARD DETAILS.

4. 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.

5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING 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.

6. LOCATIONS OF EXISTING UTILITIES SHOWN ON THE PLANS ARE ESTIMATED UNLESS STATED OTHERWISE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY, LOCATE AND PROTECT ALL UTILITIES WITHIN THE PROJECT AREA. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING OR REPAIRING ANY UTILITIES DAMAGED DURING CONSTRUCTION. SHOW ENCOUNTERED UTILITIES ON THE AS-BUILTS.

7. 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 IRRIGATION MAINS AND REPLACING OR REPAIRING PIPELINES DAMAGED DURING CONSTRUCTION. SHOW THESE PIPELINES ON THE AS-BUILTS.

8. WATER MAIN TRENCH SECTION AND ALL EXCAVATED AREAS SHALL BE BACKFILLED AND COMPACTED IN ACCORDANCE WITH THE STANDARD DETAILS AND WITH 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.

9. 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.

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

11. DISTRICT APPROVED THRUST RESTRAINTS ARE REQUIRED FOR ALL UNRESTRAINED FITTINGS. RESTRAINED JOINTS ARE ALLOWED FOR VERTICAL BENDS, WHERE BLOCKING IS NOT PRACTICAL OR INEFFECTIVE, AND ARE REQUIRED FOR MAINS THAT WILL BE EXTENDED.

12. A SANITARY GAP MUST BE PROVIDED BETWEEN THE EXISTING AND NEW WATER SYSTEMS. CONNECTION TO THE EXISTING WATER SYSTEM SHALL BE PERFORMED BY THE CONTRACTOR ONLY AFTER COMPLETING AN ACCEPTABLE HYDROSTATIC PRESSURE TEST AND THE PIPELINE IS DISINFECTED, FLUSHED AND RECEIPT OF APPROVAL OF WATER QUALITY TEST RESULTS FROM THE HEALTH DISTRICT OR LAB.

13. PERFORM PRESSURE TEST AT 250psi. THE DISTRICT INSPECTOR HAS DISCRETION TO MODIFY THE TESTING REQUIREMENTS.
   13.1. PRESSURE TEST INCLUDES MAINLINE, HYDRANTS, SERVICE LINES, SETTERS, AND CUSTOMER SERVICE SIDE TAILPIPE.
   13.2. TEST MAINLINE IN SECTIONS OF NO MORE THAN 1,500 FEET. PRESSURE DROP SHALL NOT EXCEED 5psi IN 60 MINUTES.
   13.3. ASSEMBLE AND TEST VALVE CLUSTERS OUTSIDE OF THE TRENCH PRIOR TO INSTALLATION.

14. 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.

15. NO OTHER PARALLEL UTILITIES SHALL BE INSTALLED WITHIN 36" HORIZONTALLY OF ANY ACTIVE WATER LINE UNLESS OTHERWISE PRE-APPROVED BY THE DISTRICT.

16. 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.

17. ALL PE PIPE SHALL BE MIN 200psi RATED CTS (Copper Tube Size).

CONTINUED ON W-30 . . .

East Wenatchee Water District

WATER SYSTEM STANDARD DETAIL
CONSTRUCTION NOTES PAGE 1 of 2

File:EWDTW12 | Revised: Mar 1, 2019 | Printed: Mar 1, 2019 | DRAWING NO. W-01 | SHEET NO. 1

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

19. DEFLECTION AT PIPE AND FITTING JOINTS WILL BE ALLOWED UP TO 3.0' (11" OVER 18') OR AS RECOMMENDED BY MANUFACTURER, WHICHEVER IS LESS.

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

21. ALL PIPE 3" AND LARGER SHALL BE DUCTILE IRON. PIPE SHALL BE MINIMUM CLASS 50 EXCEPT WHERE TRENCH BACKFILL AND LOADING DICTATE A STRONGER CLASS PIPE. CLASS 52 SHALL BE USED FOR HYDRANT RUNS AND IN AREAS WHERE PRESSURE EXCEEDS 150 PSI.

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

23. 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 3619Z, LID 3619C (TRAFFIC) 3620C (NONTRAFFIC).
   23.1. ANCHOR FRAME TO VAULT USING NON-SHRINK GROUT. FRAME AND LID TO BE RATED FOR TRAFFIC LOADING IN TRAFFIC AREAS.
   23.2. WATER SERVICE VAULT LIDS TO INCLUDE ONE INTEGRAL 2-3/16" DIAMETER HOLE WITH 4-1/4" DIAMETER x 9/16" DEEP RECESS FOR RADIO.
   23.3. FOR AIR VALVES AND BLOW-OFFS, DO NOT DRILL HOLE IN LIDS, NOR PROVIDE "METER" TEXT ON FRAME.
   23.4. LID SURFACE TO HAVE A STATIC COEFFICIENT OF FRICTION NO LESS THAN 0.60 AS DETERMINED BY ASTM C-1028.

24. REPAIR OF EXISTING IRRIGATION SYSTEMS DAMAGED DURING CONSTRUCTION MUST USE PRODUCTS OF NO LESSER QUALITY THAN SCH 40 PVC.

25. CONTRACTOR TO PROVIDE NO LESS THAN 48 HOURS NOR MORE THAN 72 HOURS NOTICE TO THE DISTRICT PRIOR TO ANY REQUESTED SHUTDOWN OR CUSTOMER SERVICE OUTAGE. DISTRICT WILL PROVIDE NOTICE TO CUSTOMERS 24 HOURS IN ADVANCE OF OUTAGE.

26. NO RESTRAINTS, GASKETS, OR RESTRAINED PIPES (PORTIONS AFFECTED BY RESTRAINTS) MAY BE REUSED ONCE ASSEMBLED.

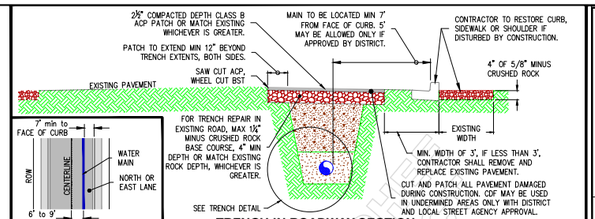
27. FLANGE GASKETS MUST BE RING TYPE (NOT FULL FACE) AND MINIMUM 1/8" THICK. FLANGE BOLTS MUST BE ASTM A307 GRADE A OR B. STEEL BOLTS, NUTS AND WASHERS TO BE ZINC PLATED.

28. BURIED VALVES SMALLER THAN 4" DIAMETER TO BE CURB STOP OR CORP STOP PER DETAILS, OR STYLE AT THE DISCRETION OF THE DISTRICT. BURIED VALVES SMALLER THAN 4" SHALL NOT BE GATE VALVES.

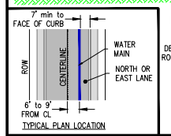
East Wenatchee Water District

WATER SYSTEM STANDARD DETAIL
CONSTRUCTION NOTES PAGE 2 of 2

File:EWDTW19 | Revised: MAR 1, 2019 | Printed: MAR 1, 2019 | DRAWING NO. W-30 | SHEET NO. 2



TRENCH IN ROADWAY SECTION



TYPICAL PLAN LOCATION

1. CONTRACTOR SHALL ADD WATER AS NECESSARY TO OBTAIN OPTIMUM MOISTURE CONTENT AS DETERMINED BY COMPACTION TESTING PROCTOR.

2. SHOULDERS SHALL BE RESTORED WITH 6" OF ⅝" MINUS CRUSHED ROCK IF DISTURBED.

3. ALL DITCHES DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ORIGINAL CONDITION.

4. AT THE END OF EACH WORKING DAY, A TEMPORARY PATCH OVER THE TRENCH CUTS SHALL BE PLACED SO THAT TRAFFIC IS NOT AFFECTED IN ANY WAY. MATERIAL FOR THESE TEMPORARY PATCHES SHALL BE ⅝" MINUS CRUSHED ROCK. COLD MIX MAY BE REQUIRED BY DOUGLAS CO. TRANSPORTATION AND LAND SERVICES OR THE CITY OF EAST WENATCHEE AS A TEMPORARY PATCH IN SOME AREAS.

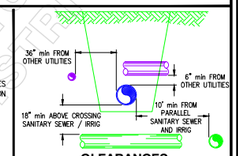
5. ALL TRENCHING TO BE DONE IN ACCORDANCE WITH OSHA AND WISHA STANDARDS.

6. CROSSINGS OF INTERSECTIONS SHALL BE RESTORED BY THE END OF THE DAY EITHER WITH PERMANENT PATCH OR TEMPORARY COLD MIX.

7. NO TRENCH IN PAVED AREAS SHALL BE LEFT UNPAVED FOR MORE THAN 12 CALENDAR DAYS OR BY THE SECOND FRIDAY, WHICHEVER COMES FIRST.

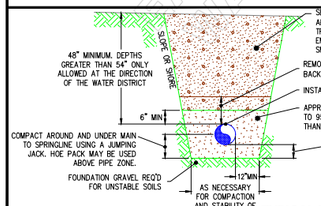
8. POLY PIPE FOR WATER SERVICES, AIR VALVES, ETC. SHALL BE BEDDED IN SAND A MINIMUM OF 6" ABOVE AND BELOW THE PIPE.

9. CITY OR COUNTY RESTORATION STANDARDS SHALL GOVERN IF MORE STRINGENT THAN SHOWN HERE.



CLEARANCES

IF 18" VERTICAL CLEARANCE IS AVAILABLE ABOVE PARALLEL SEWER/IRRIG, SEPARATION MAY BE REDUCED TO 5 FT HORIZONTAL WALL TO WALL ONLY IF APPROVED BY THE DISTRICT. D.O.H. *WATER SYSTEM DESIGN MANUAL* SECTION 8.4 AND D.O.E. *CRITERIA FOR SEWAGE WORKS DESIGN* SECTION C1-9 SHALL BE ADHERED TO FOR CLEARANCES AND FOR MITIGATION METHODS.



TYPICAL TRENCH DETAIL

SELECT BACKFILL OR NATIVE MATERIAL SUBJECT TO ENGINEER APPROVAL, COMPACTED IN 12" MAX. LIFTS TO 95% DENSITY UNDER TRAVELED AREAS AND SHOULDERS. 90% IN UNTRAVELED AREAS, EMBANKMENTS AND DITCHES BEYOND SHOULDER. COMPACTION IN SMALL LIFTS IS CRITICAL AND SHALL BE ADHERED TO.

REMOVE ALL ROCKS LARGER THAN 4" DIA FROM BACKFILL FOR A MINIMUM OF 12" ABOVE THE PIPE.

INSTALL TRACER WIRE PER DETAIL W31.

APPROVED BEDDING GRAVEL COMPACTED TO 95% DENSITY. ROCKS NOT MORE THAN 5/8" IN LARGEST DIMENSION.

MINIMUM DEPTH OF BEDDING UNDER ANY PORTION OF PIPE: 3" FOR STABLE SOIL 6" FOR ROCK EXCAVATION * 12" FOR CLAY, PEAT, OR OTHER UNSUITABLE MATERIAL

CLAYS, ORGANICS, ROCKS OVER 6", PEAT, WET SILTS AND OTHER SUCH MATERIALS ARE UNSUITABLE FOR TRENCH BACKFILL AND SHALL BE REMOVED AND DISPOSED OF AT THE DIRECTION OF THE DISTRICT.

* ANY ROCK OR GRANULAR MATERIAL OVER 3" DIAMETER

East Wenatchee Water District

WATER SYSTEM STANDARD DETAIL
TRENCH SECTION AND RESTORATION

File:EWDTW22 | Revised: MAY 2, 2018 | Printed: MAY 2, 2018 | DRAWING NO. W-03 | SHEET NO. 3

CONSTRAINTS

1. SOIL CONDITIONS AND BEARING CHARACTERISTICS ARE TO BE DETERMINED BY THE DISTRICT.

2. THIS STANDARD DETAIL IS FOR HORIZONTAL THRUST RESTRAINT ONLY.

3. CONCRETE BLOCKING SHALL BE PER DOT/APWA SPECIFICATION 7-09.3(21), CURRENT EDITION.

4. MAINTAIN 18" MINIMUM GROUND COVER OVER THE TOP OF ALL CONCRETE BLOCKING.

5. ALL THRUST BLOCKS TO BE FORMED AND FITTINGS COVERED IN PLASTIC.

6. ANY TEMPORARY BLOCKING USED TO SUPPORT FITTINGS DURING CONSTRUCTION SHALL BE REMOVED PRIOR TO BACKFILLING.

PROCEDURE

1. DETERMINE BEARING FACTOR IN TABLE 1 CORRESPONDING TO APPROPRIATE PIPE SIZE AND TYPE OF FITTING.

2. MULTIPLY THE BEARING FACTOR DETERMINED IN TABLE 1 BY THE MULTIPLICATION FACTOR IN TABLE 2 FOR THE APPROPRIATE SOIL CLASSIFICATION.

THE RESULT IS THE REQUIRED AREA OF CONCRETE (IN SQ. FT.) WHICH MUST BEAR AGAINST UNDISTURBED SOIL.

3. USING TABLE 3 LOCATE THE MINIMUM DEPTH OF CONCRETE (Dmin) CORRESPONDING TO THE REQUIRED BEARING AREA.

4. USING Dmin, 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"

SIZE	TEST PRESSURE	TEES DEAD ENDS	90° BEND	45° BEND	22½° BEND	11¼° BEND
3	300	2.3	2.3	2.3	2.3	2.3
4	300	2.3	2.6	2.3	2.3	2.3
6	300	3.7	5.3	2.9	2.3	2.3
8	300	6.4	9.1	4.9	2.5	2.3
10	300	9.7	13.7	7.4	3.8	2.3
12	300	13.7	19.4	10.5	5.3	2.7
14	300	18.4	26.0	14.1	7.2	3.6
16	300	23.8	33.6	18.2	9.3	4.7
18	300	29.9	42.2	22.9	11.7	5.9
20	300	36.6	51.8	28.0	14.3	7.2
24	300	52.3	73.9	40.0	20.4	10.2

* 2.3 BASED ON GEOMETRIC FACTORS

TABLE 1 - BEARING FACTOR

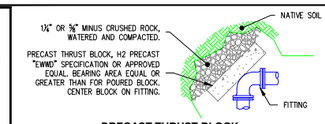
SOIL CONDITION	MULTIPLICATION FACTOR
*MUCK, PEAT, etc.	–
SOFT CLAY	3.0
SILT	2.0
SAND	1.5
SAND AND GRAVEL	1.0
SAND AND GRAVEL CEMENTED W/ CLAY	0.75
HARD SHALE	0.30

* THRUST BLOCKING SHALL BE DESIGNED BY ENGINEER

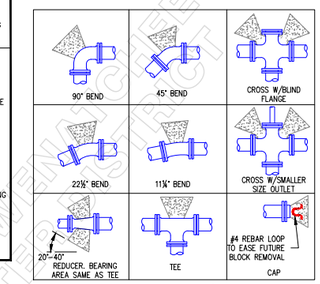
TABLE 2 - MULTIPLICATION FACTOR

REQ'D BEARING AREA (SQ. FT.)	MINIMUM DEPTH Dmin
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'

TABLE 3 - BLOCK SHAPE



PRECAST THRUST BLOCK



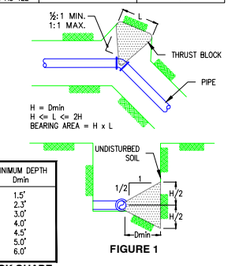


FIGURE 1

East Wenatchee Water District

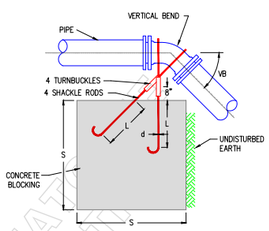
WATER SYSTEM STANDARD DETAIL
HORIZONTAL THRUST BLOCKING

File:EWDTW6 | Revised: MAY 2, 2018 | Printed: MAY 2, 2018 | DRAWING NO. W-04 | SHEET NO. 4

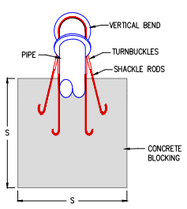
RANDY L. ASPENT — STATE OF WASHINGTON — 22760 — REGISTERED PROFESSIONAL ENGINEER — SIGNED: 06/14/18

RYAN C. PETERSON — STATE OF WASHINGTON — 32739 — REGISTERED PROFESSIONAL ENGINEER — SIGNED: 06/14/18

VERTICAL THRUST BLOCKING FOR 11.25°, 22.5°, AND 45° BENDS							
		VB		S	d	L	
PIPE SIZE NOM. DIAMETER – INCHES	TEST PRESSURE PSI	VERTICAL BEND DEGREES	AMOUNT CONCRETE BLOCKING – CU FT	LENGTH OF SIDE FEET	SHACKLE ROD DIA. INCHES	DEPTH OF ROD IN CONCRETE INCHES	NUMBER OF TIE ROD SETS (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



BLOCKING FOR VERTICAL BENDS



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 SHALL BE PER W-07.

East Wenatchee Water District

WATER SYSTEM STANDARD DETAIL
VERTICAL THRUST BLOCKING

File:EWDTW13 | Revised: APR 13, 2007 | Printed: JUL 18, 2008 | DRAWING NO. W-05 | SHEET NO. 5

1. RESTRAINED JOINT PIPE IS APPROPRIATE TO USE IN MANY SITUATIONS. HOWEVER, THE DISTRICT WILL BE THE SOLE DETERMINER IF THE APPLICATION IS APPROPRIATE ON A GIVEN JOB. TYPICAL APPLICATIONS INCLUDE:
   1.1. DEAD END MAINS THAT MAY BE EXTENDED.
   1.2. SOILS NOT SUPPORTIVE OF THRUST BLOCKING.
   1.3. INSUFFICIENT BEARING SOIL BEHIND FITTINGS.
   1.4. VERTICAL BENDS (not covered here. must be designed by engineer for each job)

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. TYLER TUFGRIP RESTRAINTS ARE NOT ALLOWED. SET-SCREW STYLE RESTRAINTS ARE NOT ALLOWED.

4. THE FOLLOWING TABLES HAVE BEEN DEVELOPED USING THE *DUCTILE IRON PIPE RESEARCH ASSOCIATION* RESTRAINED JOINT CALCULATOR. 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:
   4.1. THESE TABLES ONLY FOR BARE (UNWRAPPED) DUCTILE IRON OR PVC PIPE.
   4.1. PIPE LAYING CONDITION TYPE 4 or 5, DEFINED AS:
      4.1.1. SELECT GRANULAR BEDDING MATERIAL BELOW PIPE.
      4.1.2. PIPE ZONE MATERIAL EXTENDING TO TOP OF PIPE MECHANICALLY COMPACTED.
   4.2. PIPE RESTING DIRECTLY ON NATIVE TRENCH BOTTOM IS NOT ACCEPTABLE.
   4.3. BEDDING MATERIAL IS SANDY SILT. IF USING IMPORT CLEAN SAND OR 5/8" MINUS CRUSHED SURFACING, LENGTHS MAY BE REDUCED BY 25%.
   4.4. DEPTH OF COVER IS 3.5 FEET MINIMUM.
   4.5. 250psi TEST PRESSURE MAXIMUM. FOR HIGHER TEST PRESSURE, TABLE LENGTHS MUST BE MULTIPLIED BY THE PROPORTIONAL DIFFERENCE.
      4.5.1. 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.

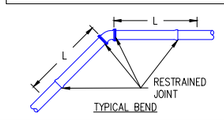
DIAMETER	11¼° BEND	22½° BEND	45° BEND	90° BEND	DEAD END	REDUCER *
4"	3'	5'	10'	25'	61'	20'
6"	4'	7'	14'	34'	86'	58'
8"	5'	9'	19'	44'	112'	81'
10"	6'	11'	22'	53'	135'	83'
12"	7'	13'	26'	62'	158'	84'
16"	8'	16'	33'	78'	203'	86'
18"	9'	18'	36'	86'	224'	121'
PVC **	1.2x	1.2x	1.2x	1.2x	1.4x	1.4x

* Assumes reducer down 2 sizes. (example 12"x8"). Larger reductions shall be treated as a tee.
** For PVC pipe, multiply the lengths by the value shown in the PVC row.

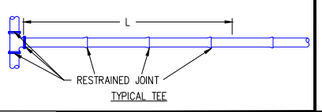
BRANCH REDUCING TEE TABLE (1.4x for PVC)

BRANCH DIAMETER	RUN DIAMETER 4"	6"	8"	10"	12"	16"	18"
4"	46'	39'	31'	23'	15'	1'	1'
6"	–	70'	65'	60'	55'	43'	37'
8"	–	–	97'	93'	89'	80'	75'
10"	–	–	–	119'	116'	109'	105'
12"	–	–	–	–	143'	137'	133'
16"	–	–	–	–	–	187'	184'
18"	–	–	–	–	–	–	207'

Restrain all tee legs with a minimum 5' stick of pipe in each run leg.
Branch increasing or "bullhead" tees restrained as a dead-end length for largest size.



TYPICAL BEND

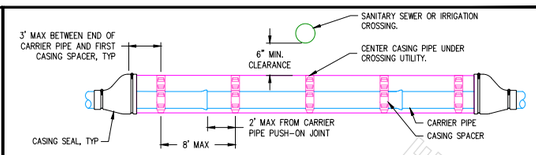


TYPICAL TEE

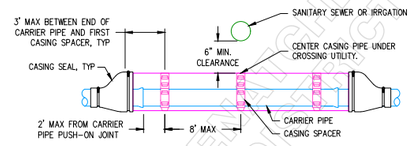
East Wenatchee Water District

WATER SYSTEM STANDARD DETAIL
RESTRAINED JOINT PIPE

File:EWDTW16 | Revised: MAR 1, 2019 | Printed: MAR 1, 2019 | DRAWING NO. W-16 | SHEET NO. 6



CASING PIPE LONGER THAN 20' DETAIL



20' CASING PIPE DETAIL

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 (DI, C900 PVC, ETC.)

2. CASINGS SHALL BE NEW STEEL, DI, HDPE OR C900/C905 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 (PSI, 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 CASING SIZE (INSIDE DIAMETER) ASSUMING PUSH-ON JOINT DI CARRIER PIPE.
   • 6" PIPE – 12" CASING
   • 8" PIPE – 14