- 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:
- 1.1. DEAD END MAINS THAT MAY BE EXTENDED IN THE FUTURE.
- 1.2. SOFT OR SATURATED SOILS, FITTINGS NEAR TOP OF SLOPE, OR BEARING AGAINST AN ADJACENT UTILITY.
- 1.3. 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 <u>NOT</u> ALLOWED: SET-SCREW RESTRAINTS, TYLER/McWANE TUFGRIP, ALL GRIPPER STYLE GASKETS (FIELD-LOK, SURE-STOP, ETC.) LARGER THAN 12" DIAMETER.
- 4. 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:
 - 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 BEDDING EXTENDING TO TOP OF PIPE MECHANICALLY COMPACTED IN LIFTS.
 - 4.2. PIPE RESTING DIRECTLY ON NATIVE TRENCH BOTTOM IS NOT ACCEPTABLE.
- 4.3. SANDY SILT BEDDING. FOR IMPORT CLEAN SAND OR 5/8" TOP COURSE, LENGTHS MAY BE REDUCED BY 25%.
- 4.4. DEPTH OF COVER IS 3.5 FEET MINIMUM AT THE TIME OF PRESSURE TESTING.
- 4.5. 250psi TEST PRESSURE MAXIMUM. FOR HIGHER TEST PRESSURE, MULTIPLY "L" 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.

111/1: 122/5: 333/: 45' 67/5: 90' DEAD REDUGER STANDARD & BRANCH REDUCING TEES (1.4x for PVC) 11 14' 33' 5' 8' 10' 17' 25' 61' 20' 10'' 6'' 11' 16' 22' 36' 53' 13' 13' 13' 1' 1' 10'' 6'' 11' 16' 22' 36' 53' 135' 83' 10'' 12'' 1'' 1'' 1'' 1'' 1'' 16'' 1'' 10'' 12'' 1'' 16'' 1'' 10'' 12'' 1'' 10'' 1'' 10'' 1'' 10'' 1'' 10'' 1'' 10'' 1'' 10'' 1'' 10'' 1'' 10'' 1'' 1'' 10'' 1'' 10'' 1'' 1'' 1'' 1'' 1'' 1'' 10'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' 1'' <t< th=""><th colspan="14"></th><th>,</th></t<>															,	
4" 3' 5' 8' 10' 17' 25' 61'. 20' 6" 4' 7' 11' 14' 23' 34' 86' 58' 8" 5' 9' 14' 19' 30' 44' 112' 81' 10" 6' 11' 16' 22' 36' 53' 135' 83' 12" 7' 13' 19' 26' 41' 62' 158' 84' 16" 8' 16' 24' 33' 53' 78' 203' 86' 18" 9' 18' 27' 36' 58' 86' 22' 12' PVC++1 1.2x 1.2x 1.2x 1.4x 1.4x 4'' 6''' 8''' 10''' 14''' 13''' 133'' PVC++1 1.2x 1.2x 1.4x 1.4x 1.4x 1.4x 1.4x 1.4x 1.4x * Assumes reducer down 2 sizes. (example 12''''''''''''''''''''''''''''''''''''		1/4° 221/2°					REDUCER	ST	ANDARI	D & BR				1.4x for	PVC)	
$\frac{1}{10^{\circ}} \frac{1}{10^{\circ}} \frac{1}{11^{\circ}} \frac{1}{14^{\circ}} \frac{1}{12^{\circ}} \frac{1}{34^{\circ}} \frac{3}{86^{\circ}} \frac{5}{58^{\circ}} \frac{1}{81^{\circ}} \frac{1}{23^{\circ}} \frac{1}{15^{\circ}} \frac{1}{1^{\circ}} \frac{1}{11^{\circ}} \frac{1}{16^{\circ}} \frac{1}{22^{\circ}} \frac{1}{36^{\circ}} \frac{1}{53^{\circ}} \frac{1}{35^{\circ}} \frac{1}{83^{\circ}} \frac{1}{83^{\circ}} \frac{1}{83^{\circ}} \frac{1}{35^{\circ}} \frac{1}{35^{\circ}} \frac{1}{35^{\circ}} \frac{1}{83^{\circ}} \frac{1}{35^{\circ}} \frac{1}{83^{\circ}} \frac{1}{12^{\circ}} \frac{1}{11^{\circ}} \frac{1}{16^{\circ}} \frac{1}{22^{\circ}} \frac{1}{36^{\circ}} \frac{1}{53^{\circ}} \frac{1}{35^{\circ}} \frac{1}{35^{\circ}} \frac{1}{83^{\circ}} \frac{1}{83^{\circ}} \frac{1}{12^{\circ}} \frac{1}{11^{\circ}} \frac{1}{16^{\circ}} \frac{1}{22^{\circ}} \frac{1}{36^{\circ}} \frac{1}{53^{\circ}} \frac{1}{35^{\circ}} \frac{1}{35^{\circ}} \frac{1}{83^{\circ}} \frac{1}{83^{\circ}} \frac{1}{12^{\circ}} \frac{1}$							//*	,		. 11				"	"	
$\frac{8^{"}}{10^{"}} \frac{5'}{9} \frac{9'}{14'} \frac{19'}{10'} \frac{30'}{44'} \frac{44'}{112'} \frac{112'}{81'} \frac{81'}{83'} \frac{112''}{12''} \frac{7'}{13'} \frac{13'}{19'} \frac{26'}{24'} \frac{41'}{62'} \frac{62'}{158'} \frac{158'}{84'} \frac{84'}{62'} \frac{158'}{84'} \frac{84'}{62'} \frac{158'}{16''} \frac{84'}{62'} \frac{158'}{12''} \frac{84'}{62'} \frac{158'}{12''} \frac{84'}{62'} \frac{158'}{12''} \frac{84'}{62'} \frac{121'}{12''} \frac{12''}{12''} \frac{12'''}{12''} \frac{12'''}{12''} 12''$	4"							~		<u> </u>				16″	18″	
16" 13 19 20 141 0.2 133 141 0.2 133 137 133' 16" 9' 18' 27' 36' 58' 203' 86' 110' - - - 119' 116' 109' 105' 18" 9' 18' 27' 36' 58' 203' 86' 12'' 12'' - - - 113'' 137'' 133'' 137'' 133'' 16'' 12'' - - - - 16'' 13'' 137'' 133'' 134'' 144'' 14x'' 14x''' 14x''' 14x''' 14x''' 14x'''' 14x''''' 14x'''''''' 14x''''''''''''''''''''''''''''''''''''			<u> </u>					ШЦ	4" 4					<u> </u>	1'	
16" 13 19 20 141 0.2 133 141 0.2 133 137 133' 16" 9' 18' 27' 36' 58' 203' 86' 110' - - - 119' 116' 109' 105' 18" 9' 18' 27' 36' 58' 203' 86' 12'' 12'' - - - 113'' 137'' 133'' 137'' 133'' 16'' 12'' - - - - 16'' 13'' 137'' 133'' 134'' 144'' 14x'' 14x''' 14x''' 14x''' 14x''' 14x'''' 14x''''' 14x'''''''' 14x''''''''''''''''''''''''''''''''''''								Ψ	6"	- 7						
16" 13 19 20 141 0.2 133 141 0.2 133 137 133' 16" 9' 18' 27' 36' 58' 203' 86' 110' - - - 119' 116' 109' 105' 18" 9' 18' 27' 36' 58' 203' 86' 12'' 12'' - - - 113'' 137'' 133'' 137'' 133'' 16'' 12'' - - - - 16'' 13'' 137'' 133'' 134'' 144'' 14x'' 14x''' 14x''' 14x''' 14x''' 14x'''' 14x''''' 14x'''''''' 14x''''''''''''''''''''''''''''''''''''								A		_	<u>- 97'</u>					
* 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.										-		119'				
* 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.						3.0		NS		-		-	143'			
* 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.				36				RA		-		-	-	187′		
reductions shall be treated as a tee. ** For PVC or poly-bagged pipe, multiply the lengths by the value shown in the PVC row. of pipe in each leg (dimension "A"). Branch increasing or "bullhead" tees restrained as a dead-end, length based on largest size.																
** For PVC or poly-bagged pipe, multiply the lengths by the value shown in the PVC row. Branch increasing or "bullhead" tees restrained as a dead-end, length based on largest size. Image: style="text-align: center;">Image: s																
the value shown in the PVC row. He value shown in the PVC row																
Image: Construct of the second of the sec						ie ieng	itns by								as a	
Image: Construct of the system standard detail East Wenatchee Water District	the value shown in the PVC row. dead-end, length based on largest size.															
Water District RESTRAINED JOINT PIPE	RESTRAINED JOINT															
Water District RESTRAINED JOINT PIPE	F	act V	Von	ato	hoo		THICHEE WAT			WATE	R SYST	EM STA	NDAR	D DET	AIL	
File: EWDTW16 Revised: AUG 3, 2022 Printed: AUG 3, 2022									RESTRAINED JOINT PIPE							
	File: EWDTW16	Revised: A	UG 3, 202	22 Print	ted: AUG 3, 20	22	HER FOR GR	NN .	DRA	WING N	0. W–	16	SHEET	NO.	6	