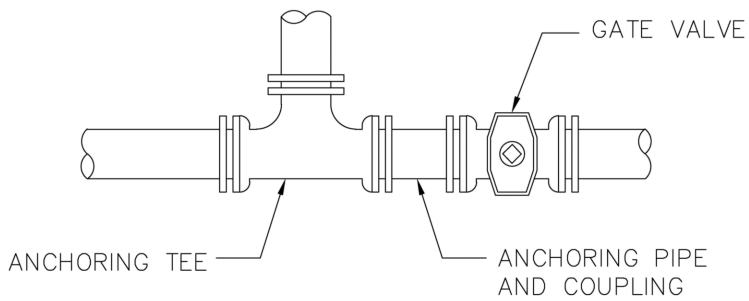


RESTRAINED VALVE AT TEE
(BRANCH)



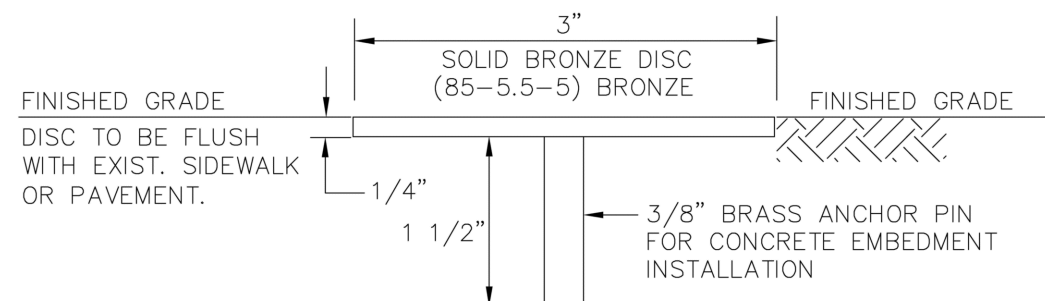
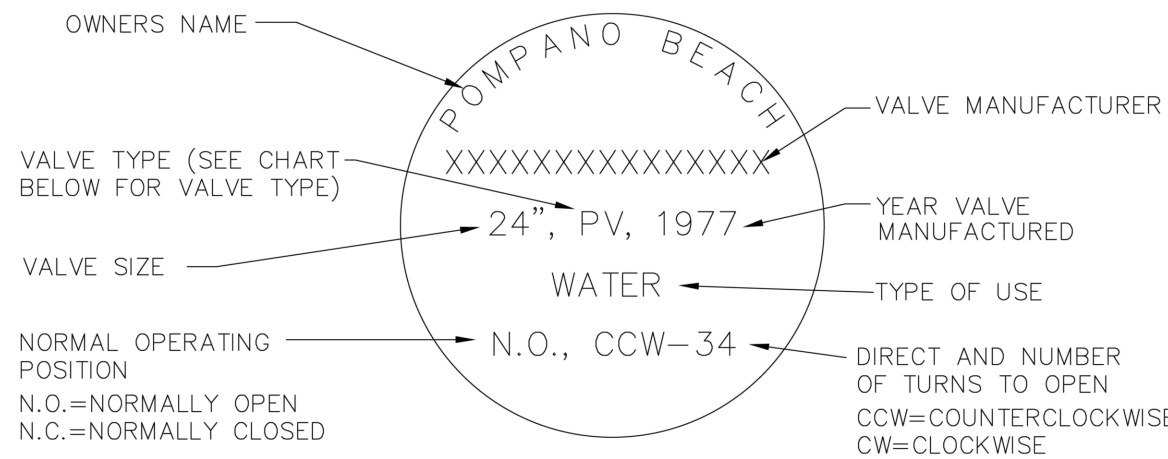
RESTRAINED VALVE AT TEE
(IN LINE)

USE MEGALUGS AT ALL PIPE JOINTS

ALL D.I.P. TO BE PAINTED BLUE
ON THE TOP HALF OF PIPE.

ENGINEERING STANDARDS 2022

REVISIONS	ENGINEERING DIVISION	RESTRAINED VALVE AT TEE
BY DATE	CITY OF POMPANO BEACH	
S.S. JUNE 2005		
	SCALE: N.T.S.	DATE: MAY 2022 DWG. NO. 111-1



VALVE TYPES:

BALL VALVE--BALLY
RESILIENT WEDGE GATE VALVE--RWGV
BUTTERFLY VALVE--BY
PLUG VALVE--PV

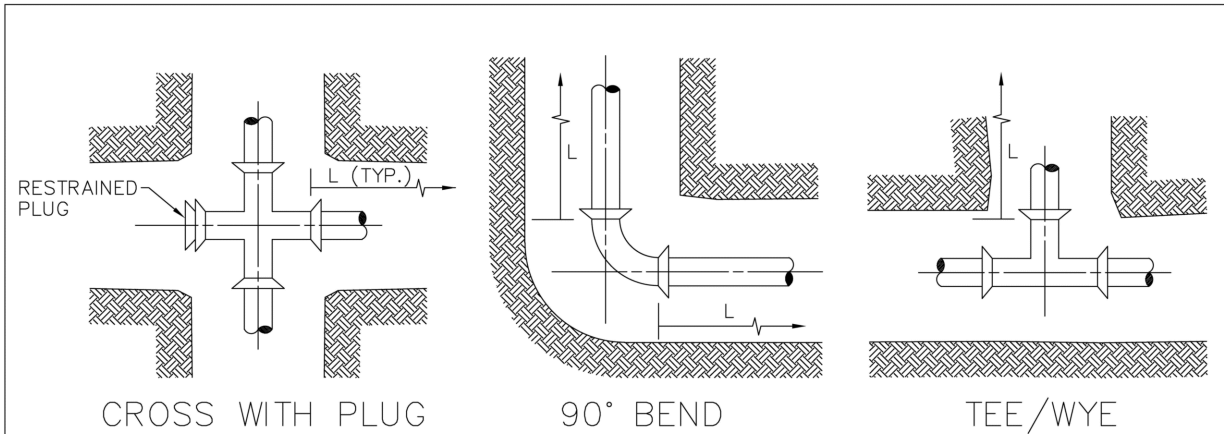
NOTES:

1. VALVE INFORMATION TO BE TRIPLE ENGRAVED INTO TOP SURFACE WITH 1/4" CAPITAL LETTERS.
2. ENTIRE MARKER TO BE COATED WITH CLEAR EPOXY TO PREVENT TARNISHING.
3. VALVE INFORMATION TO BE APPROVED BY CITY OF POMPANO BEACH UTILITIES DEPARTMENT.
4. MARKERS SHALL BE MANUFACTURED BY RG WRENCH, OR APPROVED EQUAL.

UNDERGROUND VALVE
IDENTIFICATION MARKER

ENGINEERING STANDARDS 2022

REVISIONS	ENGINEERING DIVISION	UNDERGROUND VALVE IDENTIFICATION MARKER
BY DATE	CITY OF POMPANO BEACH	
S.S. JUNE 2005		
T.W. 11-2007		
T.W. 02-2008		
S.S. 1-24-12	SCALE: N.T.S.	DATE: FEB. 2022 DWG. NO. 115-1



GENERAL NOTES:

1. VALUES IN TABLE ARE BASED ON 3" OF COVER, 100 PSI INTERNAL PRESSURE, FOR FORCE MAINS, 150 PSI REUSE WATER LINES, ANSI/AWWA C605 & C150/A21.50 LAYING CONDITION 3, ASTM D2487 SAND-SILT SP SOIL TYPE, AND SAFETY FACTOR OF 2.0. RESTRAINED LENGTHS WERE COMPUTED PER DIPRA "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" AND "PVC PIPE THRUST RESTRAINT DESIGN HANDBOOK," EBAA IRON, INC.
2. CONFIRM THE EXACT LENGTH OF RESTRAINING REQUIRED FOR REDUCERS, PIPE ENCASED IN POLYETHYLENE AND ENCRORACHING RESTRAINED LENGTHS WITH THE DESIGN ENGINEER.
3. THE CONTRACTOR IS RESPONSIBLE FOR PROPER INSTALLATION OF THE RESTRAINED JOINTS TO PREVENT MOVEMENT OF THE PIPE & FITTINGS.
4. IN THE EVENT OF A CONFLICT BETWEEN RESTRAINED LENGTHS SHOWN ON THE TABLE AND RESTRAINED LENGTHS SHOWN ON THE DRAWINGS, THE LONGEST RESTRAINED LENGTH SHALL BE USED.

RESTRAINED JOINT INFORMATION

ENGINEERING STANDARDS 2022

REVISIONS	ENGINEERING DIVISION	RESTRAINED JOINT INFORMATION
BY DATE	CITY OF POMPANO BEACH	
		DATE: MAY 2022 DWG. NO. 118-1
	SCALE: N.T.S.	

PVC HORIZONTAL BENDS AND VERTICAL UP BENDS					
PIPE SIZE (IN.)	RESTRAINED JOINT LENGTH L (MINIMUM DISTANCE IN FEET FROM FITTING – EACH WAY)				CROSS WITH PLUG END, END TEE, WYE
	BENDS				
	90°	45°	22.5°	11.25°	
6	26	11	6	3	53
8	33	14	7	4	68
12	46	19	10	5	96

PVC VERTICAL DOWN BEND					
		RESTRAINED JOINT LENGTH L		(MINIMUM DISTANCE IN FEET FROM FITTING - EACH WAY)	
PIPE SIZE (IN.)	BENDS				
	90°	45°	22.5°	11.25°	
	6	26	11	6	3
	8	33	14	7	4
	12	46	19	10	5

DIP HORIZONTAL BENDS AND VERTICAL UP BENDS					
	RESTRAINED JOINT LENGTH L		(MINIMUM DISTANCE IN FEET FROM FITTING - EACH WAY)		
PIPE SIZE (IN.)	BENDS				CROSS WITH PLUG
	90°	45°	22.5°	11.25°	DEAD END TEE / WYE
12"	68	28	14	7	144
24"	119	49	24	12	258

DIP VERTICAL DOWN BEND					
	RESTRAINED JOINT LENGTH L		(MINIMUM DISTANCE IN FEET FROM FITTING - EACH WAY)		
PIPE SIZE (IN.)	BENDS				
	90°	45°	22.5°	11.25°	
	12"	144	60	29	14
24"	258	107	51	25	

RESTRAINED JOINT INFORMATION

ENGINEERING STANDARDS 2022

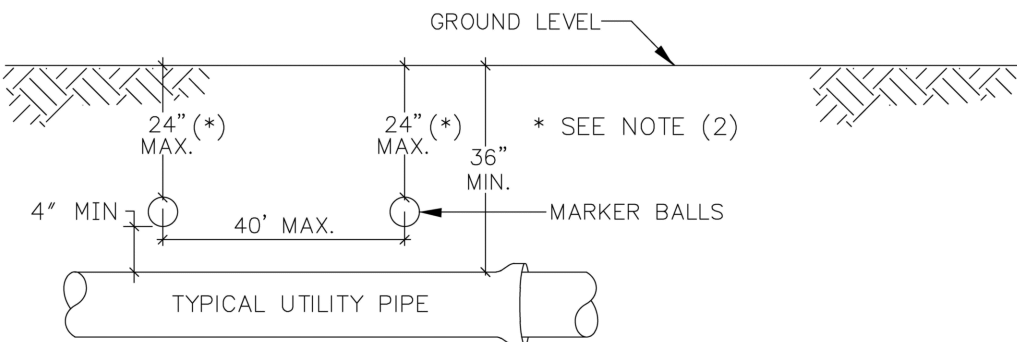
REVISIONS	ENGINEERING DIVISION	RESTRAINED JOINT INFORMATION
BY DATE	CITY OF POMPANO BEACH	
		DATE: MAY 2022 DWG. NO. 118-2
	SCALE: N.T.S.	

MIN. LENGTH OF PIPE (FEET) TO BE RESTRAINED														
(SOURCES: EBAA IRON RESTRAINT LENGTH CALCULATION PROGRAM FOR PVC PIPE, RELEASE 3.1, AND DIPRA THRUST RESTRAINT FOR DUCTILE IRON PIPE, RELEASE 3.2)														
FITTING TYPE	PIPE SIZE													
	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"	200psi	
90° HORIZ. BEND	14	20	25	30	35	45	54	62	86	112	124	135		
45° HORIZ. BEND	6	8	11	13	15	19	22	26	41	46	51	56		
22.5° HORIZ. BEND	2	4	5	6	7	9	11	12	19	22	25	27		
11.25° HORIZ. BEND	1	2	3	3	4	4	5	6	10	11	12	13		
90° VERT. OFFSET	29	41	53	64	74	95	115	134	214	246	276	304		
45° VERT. OFFSET	12	19	24	29	34	39	46	56	89	102	114	126		
22.5° VERT. OFFSET	3	4	6	7	8	10	12	15	23	27	31	34		
11.25° VERT. OFFSET	1	1	1	2	2	2	2	3	6	6	7	8		
PLUG (DEAD END)	32	45	59	70	83	107	129	151	214	246	276	304		
IN-LINE VALVE	32	45	45	45	45	56	65	80	110	125	140	155		
TEE (BRANCH RESTRAINT)	4"x Ø	23	-	-	-	-	-	-	-	-	-	-		
	6"x Ø	21	35	-	-	-	-	-	-	-	-	-		
	8"x Ø	18	34	47	-	-	-	-	-	-	-	-		
	10"x Ø	16	32	46	58	-	-	-	-	-	-	-		
	12"x Ø	13	30	44	57	69	-	-	-	-	-	-		
	16"x Ø	7	26	41	55	67	90	-	-	-	-	-		
	20"x Ø	1	21	36	52	65	88	109	-	-	-	-		
	24"x Ø	1	16	34	49	63	86	108	129	-	-	-		
	30"x Ø	1	8	28	44	58	83	106	127	208	-	-		
	36"x Ø	1	1	22	39	54	80	103	124	208	240	-		
	42"x Ø	1	1	15	33	49	77	100	122	205	239	270		
	48"x Ø	1	1	7	27	44	73	97	120	203	238	269		
REDUCER (LARGER PIPE RESTRAINT)	6"x Ø	23	-	-	-	-	-	-	-	-	-	-		
	8"x Ø	38	25	-	-	-	-	-	-	-	-	-		
	10"x Ø	57	43	24	-	-	-	-	-	-	-	-		
	12"x Ø	72	60	44	41	-	-	-	-	-	-	-		
	16"x Ø	89	80	78	75	45	-	-	-	-	-	-		
	20"x Ø	123	118	107	105	81	45	-	-	-	-	-		
200psi	24"x Ø	148	140	132	131	111	82	45	-	-	-	-		
	30"x Ø	209	204	197	188	177	153	118	75	-	-	-		
	36"x Ø	243	236	233	226	217	196	168	135	74	-	-		
	42"x Ø	273	270	265	259	252	234	211	183	133	72	-		
	48"x Ø	301	298	294	288	283	268	249	226	183	131	71		

- NOTES:
1. THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:
SOL TYPE--SAND TEST PRESSURE--100 PSI/200 PSI DEPTH OF BURY--3"
BEND TYPE--L BEND TYPE--L SAFETY FACTOR--1.5 VERTICAL OFFSET--3"
 2. THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
 3. ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
 4. RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.

RESTRAINED JOINT INFORMATION

ENGINEERING STANDARDS 2022		
REVISIONS	ENGINEERING DIVISION	RESTRAINED JOINT INFORMATION
BY DATE	CITY OF POMPANO BEACH	
		DATE: MAY 2022 DWG. NO. 118-3
	SCALE: N.T.S.	



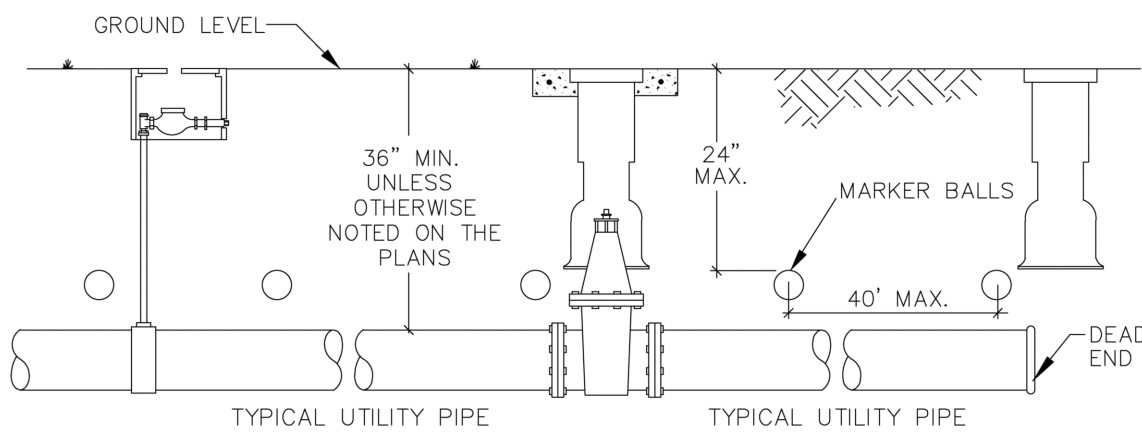
GENERAL NOTES:

1. ALL UTILITY PIPE SHALL BE INSTALLED WITH 4"Ø MARKING BALLS PLACED EVERY 40' AND AT EVERY FITTING, FOR IDENTIFICATION AND WARNING PURPOSES, BURIED ABOVE THE PIPE AT A MAXIMUM DEPTH OF 24 INCHES OR AS APPROVED BY THE OWNER. IT SHALL BE COLOR CODED AND WORDED AS FOLLOWS:
POTABLE WATER:
A. COLOR: BLUE PER 62-555.320(21)(b)(3) F.A.C.
B. LETTERING: WATER
C. FREQUENCY OF MARKER BALLS SHALL BE 145.7 Khz.
D. THE MARKER BALLS CAN BE BURIED IN ANY ORIENTATION.
THE MARKER BALLS SHALL BE DETECTABLE BY STANDARD METAL DETECTION EQUIPMENT AND SHALL BE MANUFACTURED BY TEMPO OR 3M LOCATOR SYSTEM OR EQUIVALENT (FREQUENCY 145.7 Khz)
2. FOR LARGE DIAMETER PIPE INSTALLED AT DEPTHS BELOW 4'-0" MARKER BALLS SHALL BE PLACED AT A MAXIMUM DEPTH OF 4'-0" BELOW GRADE *.

WATER PIPE IDENTIFICATION

ENGINEERING STANDARDS 2022

REVISIONS	ENGINEERING DIVISION	WATER PIPE IDENTIFICATION
BY DATE	CITY OF POMPANO BEACH	
S.S. 01/12		DATE: JAN. 2022 DWG. NO. 119-1
S.S. 06/16	SCALE: N.T.S.	



GENERAL NOTES:

1. ALL NONMETALLIC PIPE SHALL BE INSTALLED WITH 12 THHN SOLID COPPER TRACING WIRE.
2. THE MARKER BALLS MUST BE INSTALLED DIRECTLY ABOVE THE PIPE.
3. MARKER BALLS SHALL BE INSTALLED AT 40' O.C.
4. BALL COLOR CODING:
POTABLE WATER SYSTEM: BLUE PER 62-555.320(21)(b)(3) F.A.C.

UTILITY PIPE AND MARKER BALLS LOCATION

ENGINEERING STANDARDS 2022

REVISIONS	ENGINEERING DIVISION	UTILITY PIPE AND MARKER BALLS LOCATION
BY DATE	CITY OF POMPANO BEACH	
S.S. 01/12		DATE: JAN. 2022 DWG. NO. 120-1
S.S. 06/16	SCALE: N.T.S.	

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