



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



ENGINEERING STANDARDS 2022			
REVISIONS		ENGINEERING DIVISION CITY OF POMPANO BEACH	TF550 INSTALLATION AND SPECIFICATION
BY	DATE		
S.S.	FEB. 2008		
T.W.	11-2007		
T.W.	07-2006		
SCALE: N.T.S.			DATE: MAY 2022 DWG. NO. 117-2



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

PVC 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 DEAD END TEE/WYE	
	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 <sup>L</sup> (MINIMUM DISTANCE IN FEET FROM FITTING – EACH WAY)				
PIPE SIZE (IN.)	BENDS				CROSS WITH PLUG DEAD END TEE/WYE
	90°	45°	22.5°	11.25°	
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 CITY OF POMPANO BEACH	RESTRAINED JOINT INFORMATION
BY	DATE		
SCALE: N.T.S.		DATE: MAY 2022 DWG. NO.	118-2

MIN. LENGTH OF PIPE (FEET) TO BE RESTRAINED (SOURCES: EBAA IRON RESTRAINT LENGTH CALCULATION PROGRAM FOR P&P PIPE, RELEASE 3.1, AND DPMR THRUST RESTRAINT FOR DUCTILE IRON PIPE, RELEASE 3.2.)												
FITTING TYPE	PIPE SIZE (INCHES)											
	4"	6"	8"	10"	12"	14"	16"	20"	24"	30"	36"	48"
90° HORIZ. BEND	14	20	25	30	35	45	54	62	98	41	124	135
45° HORIZ. BEND	6	8	11	13	15	19	22	26	41	56	51	58
22.5° HORIZ. BEND	3	4	5	6	7	9	11	12	19	22	25	26
11.25° HORIZ. BEND	2	3	3	4	4	5	5	6	10	11	12	12
90° VERT. OFFSET	UPPER BEND	29	41	53	64	74	85	115	134	214	246	276
	LOWER BEND	7	10	13	16	19	23	30	57	66	74	83
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56	80	101	114
	LOWER BEND	3	4	6	7	8	10	12	15	23	27	31
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27	43	48	55
	LOWER BEND	1	2	4	4	5	6	7	11	13	15	16
11.25° VERT. OFFSET	UPPER BEND	3	4	6	7	8	9	11	13	21	24	27
	LOWER BEND	1	1	2	2	2	2	3	4	6	7	8
PLUG (END OF PIPE)	30	45	58	70	82	107	129	151	240	268	298	334
W-LINE VALVE	30	45	58	70	82	107	129	151	240	268	298	334
TEE (BRANCH RESTRAINT)	4" x 6"	23	-	-	-	-	-	-	-	-	-	-
	6" x 6"	21	35	-	-	-	-	-	-	-	-	-
	8" x 8"	18	34	47	-	-	-	-	-	-	-	-
	10" x 10"	16	32	58	58	-	-	-	-	-	-	-
	12" x 12"	13	30	45	57	59	-	-	-	-	-	-
	14" x 14"	11	27	40	52	65	80	88	-	-	-	-
	16" x 16"	7	28	41	55	67	80	98	109	-	-	-
	20" x 20"	1	31	38	52	65	85	109	128	179	-	-
	24" x 24"	1	16	24	34	43	54	67	84	106	129	179
	30" x 30"	1	8	24	34	56	83	104	127	206	-	-
REDUCER (LARGER PIPE RESTRAINT)	36" x 48"	1	1	22	39	50	80	103	124	206	240	-
	48" x 60"	1	1	15	33	48	77	102	125	203	238	270
	60" x 72"	1	1	7	27	44	73	97	120	205	238	269
	72" x 84"	1	1	7	27	44	73	97	120	205	238	269
	84" x 96"	1	1	7	27	44	73	97	120	205	238	269
	96" x 108"	1	1	7	27	44	73	97	120	205	238	269
	108" x 120"	1	1	7	27	44	73	97	120	205	238	269
	120" x 132"	1	1	7	27	44	73	97	120	205	238	269
	132" x 144"	1	1	7	27	44	73	97	120	205	238	269
	144" x 156"	1	1	7	27	44	73	97	120	205	238	269
200psi	2" x 4"	146	130	132	131	111	80	45	-	-	-	-
	3" x 6"	209	204	207	188	177	153	116	75	-	-	-
	4" x 6"	243	236	233	216	207	186	148	134	-	-	-
	6" x 8"	273	270	265	259	254	231	181	153	72	-	-
	8" x 10"	294	294	284	289	283	268	216	183	131	71	-
	10" x 12"	303	303	294	299	293	278	226	193	143	101	71
	12" x 14"	312	312	303	308	302	287	235	202	152	110	71
	14" x 16"	321	321	312	317	311	296	244	211	161	119	71
	16" x 18"	330	330	321	326	320	305	253	220	170	128	71
	18" x 20"	339	339	330	335	329	314	262	229	179	137	71

NOTES:

1. THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:  
SOIL TYPE-SAND TEST PRESSURE-150 PSI/200 PSI DEPTH OF BURY-3'  
TRENCH TYPE-3 SAFETY FACTOR-1.5 VERTICAL OFFSET-3'  
MINIMUM PIPE LENGTH ALONG THE RUN-5'
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 CITY OF POMPAÑO BEACH	RESTRAINED JOINT INFORMATION
BY	DATE		
SCALE: N.T.S.		DATE: MAY 2022 DWG. NO.	118-3



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(2)(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

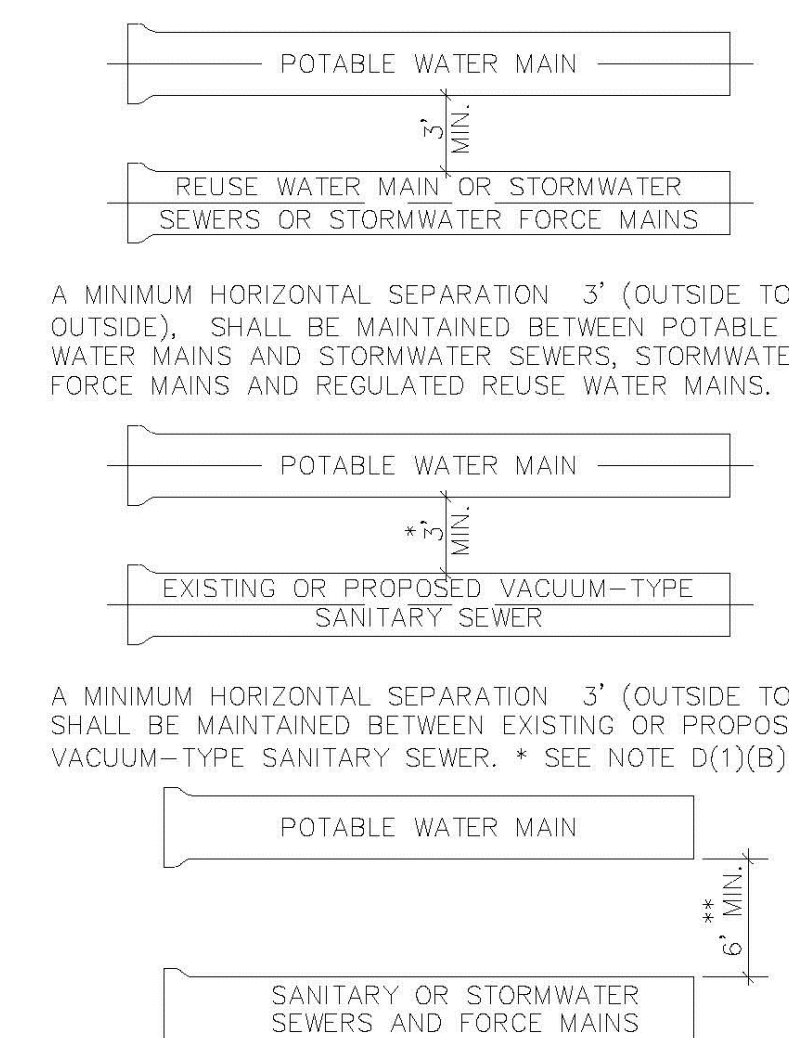
ENGINEERING STANDARDS 2022			
REVISONS		ENGINEERING DIVISION CITY OF POMPANO BEACH	WATER PIPE IDENTIFICATION
BY	DATE		
S.S.	01/12		
S.S.	06/16		
		SCALE: N.T.S.	DATE: JAN. 2022 DWG. NO. <b>119-1</b>



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



A MINIMUM HORIZONTAL SEPARATION OF 6' (OUTSIDE TO OUTSIDE), SHALL BE MAINTAINED BETWEEN POTABLE WATER MAINS AND EXISTING OR PROPOSED GRAVITY-OR PRESSURE TYPE SANITARY SEWER, WASTEWATER FORCE MAIN OR NOT REGULATED REUSE WATER MAIN. \*\* SEE NOTE D(1)(C).

## MINIMUM HORIZONTAL SEPARATION REQUIREMENTS FOR POTABLE WATER, REUSE, STORMWATER AND SEWER LINES

REVISIONS		ENGINEERING DIVISION CITY OF POMPANO BEACH	MIN. HORIZONTAL SEPARATION FOR POTABLE WATER
BY	DATE		
S.S.	01/12		
		SCALE: N.T.S.	DATE: JAN 12 2022 DWG. NO. 12

DRC

PZ23-12000017

07/19/2023



**CAULFIELD & WHEELER, INC.**  
 CIVIL ENGINEERING - LAND PLANNING  
 LANDSCAPE ARCHITECTURE - SURVEYING  
 7900 GLADES ROAD - SUITE 100  
 BOCA RATON, FLORIDA 33434  
 PHONE (561) 392-1991 / FAX (561) 750-1452

**OAKS @ PALM AIRE**  
WATER DISTRIBUTION & SANITARY SEWER DETAILS

DATE	06/12/23
DRAWN BY	RHT
F.B./ PG.	N/A
SCALE	n.t.s.


 Digitally signed by Ryan D. Wheeler  
 Date: 2022.06.13 01:00:04-0400  
 Adobe Acrobat version 2022.001.20085

RYAN D. WHEELER  
 PROFESSIONAL ENGINEER  
 LICENSE NO. 71477  
 STATE OF FLORIDA  
 - FOR THE FIRM -  
 DATE Jun 13, 2023

OB #10326  
HT.NO.  
MS 04