

RECLAIMED WATER SYSTEM DESIGN AND CONSTRUCTION

1. RECLAIMED WATER SYSTEM DESIGN

Design standards for reclaimed water piping shall be as shown herein. There shall be no physical connection between a reclaimed water distribution system and any other utility system including Potable Water supply, Wastewater or storm sewage system, which would allow unsafe water to enter or backflow into the reclaimed water system by direct pressure, vacuum, gravity or any other means.

The design and sizing of service connection shall correspond to the values of the Water Use Permit issued by SFWMD. The total amount of reclaimed water used by a customer shall not exceed the limits stated in the Water Use Permit. The Department does not guarantee the availability of reuse water or continuity of service or minimum line pressure in the reuse water distribution system. In order to maximize the available capacity of reuse water, the Department reserves the right to regulate the timing and frequency of reuse water availability at each service connection. Upon request for reclaimed water for irrigation purposes, the Department shall evaluate the demand and revise water supply. If capacities are available, the Department may concur to provide reclaimed water service connections as follows:

(1) “Direct” reuse water service consists of a continuous piping system connection through a meter from the utilities distribution system to the private irrigation system. There shall be no other water supply connected to the “direct” system. The “direct” system may require additional privately owned pumping facility in order to increase and stabilize line pressure. The installation of a pressure control valve, flow rate control and time monitoring devices may be required.

(2) “Lake Discharge” reuse water service shall deliver reuse water at a predetermined rate of flow and at reduced pressure into a lake system for a future withdrawal for landscape irrigation purposes. The point of discharge into the lake shall be located as far as possible from:

- Point of withdrawal
- Point of control structure overflow into receiving bodies of water

The connection design shall include a lake water level monitoring assembly acting as a shut off valve at a preset lake water elevation. The “Lake Discharge” service shall require the acknowledgement from the appropriate drainage authority and an NPDES permit from DEP. A groundwater monitoring well may be required by DEP. The NPDES permit may include further irrigation system operating conditions, including frequent lake water level checking and various reporting requirements. The property owner shall not modify or tamper with the installed facilities without expressed approval by the Department. The property owner shall maintain the irrigation system and keep it in good working order at all times. Pipe breaks and sprinkler adjustments shall be performed without delay. If necessary, all or portions of the irrigation system shall be turned off for service and repairs. The Department shall have the right to temporarily disconnect the reclaimed water service if reuse water is not discharged or applied in accordance with rules and regulations. The property owner shall comply with all reporting requirements to appropriate agencies, including pre-connection water sampling, daily lake water elevation data, the data of total water used for irrigation and total reuse water received through meter(s).

Potable Water services for properties with proposed or existing reclaimed water supply shall have a dual check valve assembly or a reduced pressure principle backflow prevention assembly installed at the discharge side of the Potable Water meter. (See PBCWUD cross connection prevention requirements).

The following items shall be included in plan submittal to the Department:

- Two sets of reclaimed water distribution system plans (24" x 36" sheets, signed and sealed, max. scale 1" = 40') The Design shall generally follow the standards for potable water mains. The plans shall list the overall property size, area to be irrigated with reuse water, and the SFWMD/DEP water use permit data (yearly, monthly withdrawal rates).
- Two sets of irrigation plans showing the backbone of the irrigation system, pumping station (with flow data), location and elevation of all positive outfalls (for "lake discharge" connections), location of monitoring wells (if applicable), calibrated lake level gauges (for data collection required for reporting), irrigation zones with maximum flow demands for each zone, pipe sizes, in-line valves, reclaimed water irrigation signs, and reclaimed water meters. The irrigation system shall be designed to comply with wellfield protection regulations (if applicable). Specifically, no reclaimed water shall be used for irrigation within 75 feet of a utility-owned potable water supply well site. If necessary, potable water may be used to irrigate the landscape within the protection zone. No Connection Fees or Guaranteed Revenues shall be charged for this potable water irrigation meter. However, property owner shall pay for the installation of the service, the backflow preventer and any on-line consumption fees as stated in PBCWUD UPAP. "Water Only" type of service shall apply.
- Permit applications (NPDES, Utility Permit)
- Approvals from applicable
- Standard Development Agreement
- Copies of resolutions of HOA, MUPD authorizing the reuse water application (if applicable)
- Plan review fee
- The following information shall be included on the design plan sheets:
 1. Amount of reclaimed water to be provided (based on Water Use Permit and/or Agreement with WUD)
 2. Acreage to be irrigated, total project Acreage
 3. Location of Reclaimed Water Discharge Point into Lake and point(s) of withdrawal (lake discharge only)
 4. Location of Control Structures and receiving water body(ies) (lake discharge only)
 5. Control Water Elevation of lakes(s) (lake discharge only)
 6. Information on control structure(s) (lake discharge only)
 - Weir length
 - Control Elevation
 - Crest Elevation

7. Permit or letter of approval from LWDD and/or SFWMD that lakes can function as stormwater system and reclaimed water storage, in accordance with 62-610.830 FAC (lake discharge only).
8. Proposed location of monitor well and easement (if applicable)
9. Groundwater monitoring plan (if applicable)
10. Irrigation water demand through reuse water meter (peak flow water demand for "direct" reuse water service; calculated rate through meter based on a 12 hour per day flow supply for "lake discharge" reuse water service).

(a) Identification for Reclaimed Water System Components:

The reclaimed water system shall be appropriately tagged or labeled to warn the public and employees that the water is not intended for drinking. All new piping, pipelines, valves, and outlets shall be color coded, or otherwise marked, to differentiate reclaimed water system components from potable or other water. All new PVC pipe and fittings are to be infused during manufacture with a permanent purple color. Ductile iron piping, casings and fittings shall be painted prior to installation with two (2) min. 4" wide stripes of purple paint along the full length at approximately 2 and 10 O'clock considering pipe diameter. Department-supplied signs are required for landscaped areas irrigated with reclaimed water. For lake discharge systems the property owner shall provide and install "No Swimming" and "Catch and Release" fishing signs. The signs shall be installed at all potential lakes access points. Reclaimed water flushing hydrants shall be identified with tags stating in English and Spanish languages, "Do Not Drink", together with the equivalent international symbol. Flushing hydrants and above ground pipe must be coated with two coats of approved purple paint (minimum 8 mils thickness each coat). Purple meter box lids are required. New and replaced irrigation system valve box lids and sprinkler heads shall be color-coded. The acceptable color is Pantone 522 C or approved equal. Additionally, reclaimed water mains shall be marked with one continuous strip of 6" wide detectable purple tape imprinted with two (2) inch high lettering reading "Caution - Reclaimed Water Buried Below", and located approximately 12" above the crown of pipe. The wording shall occur once every three (3) feet. Service line valves, meter box lids, valve box lids and vault covers shall be permanently identified (cast-in letters) with "Reclaimed Water" system components.

Meter box lids shall be permanently identified with "Reclaimed Water -- Do Not Drink." All valves and hydrants require identification tags. A pressure-control valve located on the Customer's side of the meter is required for meters 1-1/2" and larger and for all lake discharge connections. All new installed components of a reclaimed water irrigation system shall be color coded as stated above. The conversion to a reclaimed water irrigation system is the responsibility of the owner, and the irrigation system must be inspected by the Department prior to Service Activation. Any corrections must be completed prior to Service Activation. The property owner is responsible for proper sizing, design and installation of the irrigation system. Special attention shall be paid

to thrust restraint, design and operating pressures, min. cover over pipe and pipe joint design in order to account for possible pressure changes in the reuse water distribution system.

A Remote Telemetry Unit (RTU) is required for all "Lake Discharge" reuse water services, and may be required for "direct" reuse water services, connections to monitor and control (flow rate, availability) through the meter.

- (b) Minimum Cover: Minimum design cover to finished grade over Reclaimed Water mains shall be 36" (30" is acceptable with DIP except for pipes under proposed/existing pavement in public rights-of way). Mains installed at depths more than 5 feet without justification will not be accepted. All transmission mains within major thoroughfare rights of way shall have full plan and profiles shown. Pipe depth shall be designed to be as level as possible and to avoid high points. Reduced cover requires advance approval.
- (c) Horizontal Separation: Minimum 10' separation of reclaimed water lines and other utility lines is required unless otherwise approved by the Department. A minimum horizontal separation of three feet (outside to outside) shall be maintained between reclaimed water lines and either Potable Water mains or Wastewater or storm water lines, and minimum 3 feet from storm structures, power poles and light poles, and minimum 10 feet from the edge of drainage fabric in exfiltration trenches.
- (d) Vertical Separation:
 - (1) Reclaimed water pipes shall cross under Potable Water mains and over other piping unless otherwise approved. All conflicts shall be identified on plans with elevations.
 - (2) A minimum of 12" separation between all pipes shall be maintained. A minimum of 6" vertical separation may be acceptable, however, if it is not possible to maintain 12" and the conflict is designed in accordance with the "Pipe Separation Standard" details.
- (e) Layout:
 - (1) The reclaimed water system distribution mains shall be looped unless otherwise not feasible. Multiple feed lines may be required at discretion of Palm Beach County Water Utilities Department (Department). Temporary and permanent dead ends shall be equipped with a flushing hydrant per Department's standard detail.
 - (2) In order to reclaimed water service for all properties within the service area, reclaimed water mains shall be extended along the full length of all fronting boundaries of a property by the Developer/Owner receiving reclaimed water service, and may be required to be extended through the property if another is to be serviced in the future. Property Owners who are retrofitting existing in-ground irrigation systems to use reclaimed water shall be required to extend reclaimed water mains only up to the Point of Service.

(3) Reclaimed water distribution mains should be placed in rights-of-way whenever possible. Placement on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable or when necessary for looping. Reclaimed water mains shall not be placed in ditches, wetlands, or storm water management areas unless specifically approved.

(4) Utility easements are required for lines outside of dedicated rights-of-way.

(f) Reclaimed Water Main Materials:

Cement lined ductile iron pipe (all sizes) or C-900 Class 150 DR 18 PVC pipe (up to 12" diameter) shall be allowed for reclaimed water distribution system pipes. The lining for ductile iron pipe shall be factory applied in accordance with the manufacturer's specifications and shall be warranted by the pipe manufacturer. Unless specific approval is granted, no reclaimed water main shall be encased in concrete.

DIP shall be required in the following circumstances:

- (1) Mains smaller than 6" and larger than 12" in diameter.
- (2) Within 3' (wall-to-wall horizontal separation) of Wastewater pipes or Potable Water mains.
- (3) Within 15' of structures, top of bank of canals or lakes.
- (4) Crossings over Potable Water, and over or under pipes with less than 12" separation with no joint within 10' of each other.
- (5) Jack and bores (mechanical joints with Megalugs or equal).
- (6) The right is reserved to mandate DIP in any instances of off-site or on-site construction where future damage to the line is possible due to location or circumstances, or outside of dedicated Rights-of-way.
- (7) Flanged ductile iron pipe is required for exposed (not buried) installation.
- (8) Less than 36" cover over pipe, subject to pipe material limitations and subject to special permit requirements for road restoration.

(g) Reclaimed Water Pipe Sizing:

Unless permitted otherwise by water use regulatory agencies, the max. weekly water irrigation rate used to determine meter sizes and flow demands shall be 1.5 inches. Reclaimed Water piping shall be sized based on a Hazen/Williams coefficient of $C=120$ and shall allow not more than 4.0 FPS ultimate design flow velocity. Minimum service line size is 1-1/2". Minimum size for reclaimed water distribution mains is 4". The engineer may be required to demonstrate the adequacy of pipe sizing. In cases where the completion of gaps in the reclaimed water systems is necessary to meet flow requirements of the development, the developer shall construct the required improvements. The Developer may be required to construct oversized piping subject to oversizing credits and reimbursements as defined in the UPAP. Use the friction coefficient factor $C=120$ for flow calculations and a maximum flow velocity of 3.0 FPS

to determine pipe sizes. The pipe sizing shall conform to the latest Department's Master Plan.

(h) Valves and Appurtenances:

- (1) Valves - Valving of all systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the grid system. Generally, the number of valves at an intersection shall be one less than the number of pipes forming the intersection. All valves shall be resilient seat gate valves with mechanical joint or flanged ends and right hand closed operation; valves 12" or greater shall be butterfly valves unless another type of valve is approved in writing by the Department. Butterfly valves larger than 16" shall have worm gears. Valves shall be certified for buried service if applicable. Valves 24" and smaller shall be rated min. 150 psi. Larger valves shall be rated min. 200 psi. In-line valves shall generally be installed at intervals of no greater than 2,500 LF on transmission mains, at intervals of no greater than 1000 LF on main distribution loops and feeders, and on all primary branches connected to these lines. In-line valves shall be installed for mains 16" and smaller near each side of a canal crossing and/or major road crossings. In all instances, effectiveness of placement shall be the primary criteria in determining valve location. Valves placed in curbs will not be accepted. Valve box covers for reclaimed water system valves shall be square with the words "Reclaimed Water" cast in raised letters on the cover. Clearance of 18" or one pipe diameter, whichever is greater, shall be maintained between all fittings (bells, valves, flanges, etc.).
- (2) Air Release Valves - Air release valves shall be installed at all canal crossings and at high points. Air release valves shall be sized per manufacturer's recommendations.
- (3) All fittings, bends, crosses, caps shall have mechanical joint or flanged ends unless an approved flexible joint restraint system is used.
- (4) Flushing Hydrants: Flushing hydrants coated with approved purple paint shall be provided in all reclaimed water distribution systems. Hydrants shall be located at all permanent and temporary dead-ends and spaced at not more than 1500 feet. Hydrants shall be located 10 feet minimum from edge of pavement and no less than 4 feet from driveways with nozzle facing the roadway. Flushing hydrants shall be located so as to minimize their vulnerability to traffic. Bollards and a 6" raised curb for traffic protection may be required where minimum distances cannot be met. Flushing hydrants shall be placed in an accessible, unobstructed location with minimum 5' feet clearance in all directions.

(i) Thrust Restraint:

- (1) All bends, tees, crosses, reducers, valves and dead ends shall be restrained through an approved means of mechanical or approved flexible joint restraint. Thrust blocks consisting of poured-in-place concrete having a minimum compressive strength of 2,500 psi after 28 days cure may be utilized only if necessary for connections to existing piping system. The design and placement of concrete thrust blocks shall

be prepared by the Engineer of Record prior to installation subject to the approval by the Department. Any line terminated as a construction phase that is a known future extension, shall have a plugged valve placed at the end, and restrained with approved mechanical or flexible joint restraint.

- (2) An adequate number of pipe lengths shall be restrained using approved mechanical joint restraints (MJ pipe), flexible joint restraints (DIP push-on joint pipe) or pressure pipe bell restraints (PVC or DIP push-on joint pipe) to handle 150 psi working pressure and 250 psi surge pressure. Pipes and appurtenances larger than 24" shall be designed and pressure tested to 200 psi. The restrained pipe lengths shall be designed by a registered engineer based upon the soil conditions and shall be shown on the design drawings and record drawings.
- (3) If flexible joint restraints are utilized, the following requirements must be met:
 - (a) The installation of flexible joint restraints must be witnessed by the Department Construction Coordinator and the Engineer of Record.
 - (b) A copy of the material invoice must be available on the job site for review to confirm the shipment of restraining gaskets, etc.
- (4) PVC/DI pipe transitioning from HDPE pipe shall be restrained as a minimum to "in-line valve" condition.

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							200psi				
		4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"
90° HORIZ. BEND		14	20	25	30	35	45	54	62	98	112	124	135
45° HORIZ. BEND		6	8	11	13	15	19	22	26	41	46	51	56
22.5° HORIZ. BEND		3	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	UPPER BEND	29	41	53	64	74	95	115	134	214	246	276	304
	LOWER BEND	7	10	13	16	19	25	30	35	57	66	74	83
45° VERT. OFFSET	UPPER BEND	12	19	24	29	34	39	48	56	89	102	114	126
	LOWER BEND	3	4	6	7	8	10	12	15	23	27	31	34
22.5° VERT. OFFSET	UPPER BEND	6	9	12	14	17	19	23	27	43	49	55	60
	LOWER BEND	1	2	4	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	30
	LOWER BEND	1	1	1	2	2	2	3	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	55	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	38	52	65	88	109	-	-	-	-	-
	24"X Ø	1	16	34	49	62	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	206	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	298	
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	99	90	78	75	45	-	-	-	-	-	-	-
	20"X Ø	123	116	107	105	81	45	-	-	-	-	-	-
	24"X Ø	146	140	132	131	111	82	45	-	-	-	-	-
200psi	30"X Ø	209	204	197	188	177	153	116	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	289	283	268	249	226	183	131	71	-

NOTES:

- 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 TEE RUN—5'
- THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
- ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
- RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.
- MULTIPLY PIPE LENGTH BY 1.4 FOR POLYETHYLENE ENCASED PIPE.
- RESTRAINED PIPE LENGTHS EQUAL TO AN "INLINE VALVE" CONDITION ARE REQUIRED AT EACH END OF A TRANSITION FROM HDPE PIPE TO OTHER PIPE MATERIALS.
- DESIGN ENGINEER IS RESPONSIBLE FOR PROPER SIZING OF RESTRAINT PIPE LENGTHS FOR THE PROJECT.

Notes:

- The data in the above table are based upon the following installation conditions:

Soil Type – Sand

Test Pressure – 150 psi, 200 psi for pipes larger than 24”

Depth of Bury – 3’

Trench Type – 3

Safety Factor – 1.5

Vertical Off-Set – 3’

Minimum pipe lengths along tee run – 5’

The restrained pipe lengths apply to PVC pipe and DIP without polyethylene enca
All joints between upper and lower bends shall be restrained.

Restrained pipe lengths apply to pipe on both sides of valves and fittings.

The above table shall serve as a general design guide only. It is the Engineer’s responsibility to justify and document any deviations from the pipe lengths specified in the above table.

(j) Reclaimed Water Service Lines and Taps:

Service pipes shall be Schedule 40 PVC with Schedule 80 PVC fittings. Reclaimed water service taps on the main shall be spaced at a minimum distance of 18" apart. All service lines 2” and smaller shall have corporation stops. Services shall be as short as possible and not exceed 100 feet to meter box. Services under driveways shall be encased in minimum 3” PVC Schedule 40 or HDPE SDR18 purple pipe. Service taps under driveways or roadways shall be avoided whenever possible. Services crossing under parking tracts shall have their meter boxes placed prior to the crossing. In developments where the property line is not clearly defined (condominiums and commercial), the meter box shall be placed within a utility easement in a readily accessible location. Private reclaimed water services shall not cross over any public utility mains unless specifically identified on plans and approved by the Department.

(k) Service Installation:

(1) Construction plans shall include a typical meter or meter box installation detail for each service size to be installed. Service line and meter sizes, if applicable must be shown on the plans. The proper sizing of meters, if applicable and service lines is the responsibility of the developer's engineer. Services will be available in the following sizes only: 5/8", 1", 1-1/2", 2", 3", 4" and larger sizes as necessary. Service sizing for “Direct Service” connections shall be based on expected peak demand and correspond to the standard for maximum continuous operating capacity for a meter: 5/8" X 3/4" - 20 GPM, 1" - 50 GPM, 1-1/2" - 120 GPM, 2" - 160 GPM, 3" - 350 GPM, 4" - 1000 GPM, 6" - 2000 GPM. For “Lake Discharge” services, the meter shall be selected as follows:

Using the maximum monthly withdrawal amount from the Water Use Permit, calculate the gallons per minute rate for a 24-hour and 12-hour per day flow. Flow size rate control appurtenances, pipe sizes and meter size to function under both discharge time scenarios.

The Department reserves the right to install or require the installation of a flow rate control device to regulate peak flow conditions. The installation of a pressure-control valve on the Customer's side of the meter is required for 1-1/2" and larger meters, for all lake discharge connections, and is recommended for smaller services.

All applicable service installation and connection charges must be paid to the Department prior to Service Activation. All meters shall be installed by the Department personnel (see details). All service piping, valves, boxes must be completed in accordance to these standards prior to service initiation. 1 1/2" corporation stops and double strap saddles shall be required for 5/8" X 3/4" and 1" meters. 2" corporation stops and double strap saddles shall be required for 1-1/2" and 2" meters. Threaded area of corporation stops shall be spiral wrapped with two wraps of Teflon tape. The corporation stop shall not be bottomed out (1-3 threads showing). Compression (pack joint) style adapters shall be used for transition from brass valves and fittings to PVC pipe. No PVC male/female adapters shall be used. Generally, the Department will not install services for meters 3" and larger. Meter boxes shall not be installed in pedestrian walkways or driveway areas. All meters and meter box locations must be shown on the drawings prior to approval. Check valves are required for all reclaimed water services. Service lines under driveways and roadways shall be encased in minimum 3" PVC Schedule 40 purple pipe. Service taps under driveways or roadways shall be avoided whenever possible. Meter boxes shall be set in grassy area whenever possible. For water meter installations within nonexclusive utility easement paralleling a road right-of-way, the control valve shall be located a maximum of 18" from the right-of-way line and the meter box shall not extend into the easement by more than 48" from the right-of-way line.

- (2) Meter boxes and control valve locations shall be designed to be accessible and provide the "minimum unobstructed space" shown on applicable details (i.e., clear of buildings, trees, shrubbery, light poles, walled enclosures, hydrants, cable boxes, garbage compactors, etc.).
- (3) Minimum 12" horizontal separation is required between front edge of electrical transformer pad or its projection and back edge of meter box or control valve.
- (4) The developer and/or his representative shall be responsible for coordination of service location.
- (5) Meter/service will not be installed/activated until:
 - Driveway, sidewalk and/or form boards for same are in place.
 - Minimum unobstructed space is provided as shown on applicable details. For services 1-1/2" and larger, the minimum 3' unobstructed space shall begin at the ball/gate valve on the discharge side of the meter.
 - The required backflow prevention assembly/device is installed on the Potable Water service and passes the initial testing (**if applicable**).

Note: Service line and meter assembly repairs, relocation and/or adjustments prior to issuance of a Certificate of Occupancy will be charged At Cost to the Customer.

- (6) Double service meter boxes shall be used for dual services installed on a common property line whenever possible.
- (7) Meter boxes shall not be placed in areas that can be fenced, such as backyards, under any

circumstances.

- (8) Meter boxes shall not be placed in any paved surfaces area (sidewalks, curbs, driveways, roadways, etc.) unless specifically approved by the Department.
- (9) In areas where no alternative is available, meter will be allowed in paved area and:
 - (a) Top of box shall be flush with surface located outside of drainage flow lines (i.e., dry area).
 - (b) Traffic rated box and lid shall be placed out of a common traffic area. Bollards may be required under certain conditions. No Bollards shall be installed in public rights-of-way "Clear Zones"
- (10) In cases where reclaimed water, Potable Water and Wastewater lines have been constructed and a developer replatted the development or relocated structures, the Department will require that reclaimed water services which cannot be reasonably adjusted, be removed and plugged at the main. If the number of services removed is excessive, the entire line may be required to be replaced. A reasonable adjustment is considered to be less than three (3) feet laterally. Any adjustments/reconstruction shall be regarded as having to meet all new construction standards and requirements.
- (11) Monitoring wells (if required) shall be included in design and construction.

2. RECLAIMED WATER SYSTEM CONSTRUCTION

- (a) Installation: Installation of reclaimed water pipe and associated fittings shall be in accordance with current AWWA standards for Potable Water, manufacturers' requirements for their particular products, and FDEP regulations. All Non-DIP mains shall have a minimum of 36" clear cover to finished grade unless specifically approved otherwise, subject to pipe material limitations, with pipe being as level as possible. Approved pipe joints restraint shall be required at each fitting involving a change of direction and as specified in plan details. The contractors shall be responsible to ensure that all safety requirements are met with respect to construction.

All pipes shall be laid in trenches having a dry and stable bottom. Backfill shall be free of boulders and debris. Pipe shall be fully supported along its entire length. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid on line and grade as designed. Changes in pipe alignment may be accomplished using appropriate fittings or through pipe deflection. Pipe deflection at the joint is allowed with ductile iron pipe and with specially designed PVC pipes (see Approved Materials Lists). The deflection shall not exceed 75% of the Manufacturer's recommended maximum joint deflection. No deflection at the joint is allowed for PVC pipe unless allowed by the pipe manufacturer. If joint deflection is not allowed, PVC pipe curvature shall be accomplished by installing appropriate bends.

Flushing hydrants shall be installed plumb with the nozzle minimum 18" above finished grade. Hydrants shall not be placed in sidewalks or driveways. It will be the responsibility of the Developer to move hydrants placed in sidewalks/driveways and to provide protection from traffic damage if necessary, upon PBCWUD request. Flushing hydrants must be ordered purple in color. Hydrants must be clean and have a glossy purple finish when accepted by the utility.

If painting is required, all oil, grease, dirt, salt and other contaminants must be removed. Two coats of approved paint to be applied by brush per manufacturers' specification for a D.F.T. of at least 4 - 8 mils/coat. One repair kit must be provided with every five (5) hydrants (minimum one per project). A set of tools is required with every ten (10) hydrants (one per project).

All valves shall be placed according to plans unless the Department approves relocation. As-built drawings shall reflect the actual location of all mains, services, and valves. All taps must be at least 18" from a fitting or bell. Reclaimed water mains shall not be laid in fuel-contaminated areas. All valves and hydrants require identification tags.

All road crossings and pavement cuttings shall be in accordance with the requirements of the particular authority governing the area.

- (b) Connection to Existing System: All connections to existing mains shall be made under the direct supervision of the Department. Valves on existing mains shall be operated by Department personnel or under direct supervision of the Department. The contractor shall confirm the compliance of the existing facilities with the Standards (especially in regard to joint restraint), and modify the facilities, if required, at no cost to the Department, prior to connection. Tapping sleeve and valve shall be pressure tested prior to tapping. The contractor shall be ready to proceed with as much material preassembled as possible at the site to minimize the length of service interruption. The Department will postpone a tie-in if the contractor is not ready to proceed on schedule. Wet taps equal to or larger than one half the pipe diameters require a ductile iron mechanical joint tapping sleeve. No sizes on size taps are permitted. A reverse tap due to pre-existing conditions is acceptable only if previously approved (detail drawing is required).
- (c) Cleaning and Flushing: Foreign material shall be kept out of the pipe or cleaned from pipe prior to installation. Upon completion of installation, the reclaimed water mains shall be flushed with Potable Water and the water disposed of without creating a nuisance. The use of reclaimed water for flushing will not be permitted. The ends of pipe installed during one day shall be capped at the end of each day with pipe plugs to prevent contamination.
- (d) Testing: All mains shall be pressure-tested with Potable Water to the required pressure, 150 psi, and 200 psi for pipes larger than 24". Mains located in road rights-of-way shall be pressure tested after the rock and "tack coat" is installed in the road right-of-

way. Potable water shall be used for pressure testing. The maximum length of line to be tested as one section will be 2,500 feet. The test shall be performed as determined in the current AWWA specification. The standard test duration is two (2) hours. HDPE pipe pressure test shall be conducted separately from PVC and D.I. pipes. See Section 4.6.3 for pressure test requirements for HDPE pipe. Certifications of Completion and project releases for service from the FDEP (if applicable) for the reclaimed water distribution and irrigations systems are required prior to any Service Activation. As a minimum, a Certification of Completion from the Engineer of Record is required.

(e) Handling, Abandonment and Disposal of Asbestos/Cement (AC) Pipe:

- (1) AC pipe must be handled in accordance with applicable laws and regulations. Generally, all cutting and disposal of AC pipe must be performed by a Florida licensed Asbestos Abatement Contractor. The Department will make every reasonable effort to identify and quantify the location of known AC pipe prior to onset of work. If the Contractor during the course of work observes, uncovers, or otherwise becomes aware of the existence of any asbestos-cement pipe, pieces, or material at the site to which the Contractor or any subcontractor, supplier, or other person may be exposed, the Contractor shall immediately notify the Project Engineer and the Department.
- (2) On projects designed and/or constructed by the Department, the Contractor shall notify the County's Risk Management and Water Utilities Departments. The Risk Management Department shall promptly consult with the Project Engineer concerning such condition and determine the necessity of the County retaining special consultants or qualified experts. The contractor shall not perform any work near or in connection with the suspect material until receipt of special written instructions from the Risk Management Department. The Contractor will ensure that all subcontractors follow these procedures.
- (3) Abandonment– Grouting and/or abandonment in place is not permitted otherwise authorized by the County project coordinator/engineer. Written approval is required. AC pipe to be abandoned in place shall be filled with grout. Abandoned A/C pipe is to be shown on the as-built drawings. The grout mix shall be:

Type	Pounds	Cubic Feet
Cement	340	.73
Sand	2840	17.91
Stone		00
Water	374	6.00
Admix/Type b	13 oz.	
Air	170 + 5.0%	1.35

The slump shall be 6" + 1 inch, Admix 1 shall meet ASTM C-494 type BD.

Alternative mixes will be considered.

3. CONSTRUCTION USING HORIZONTAL DIRECTIONAL DRILLING (HDD)

(a) General.

Potable Water design and construction standards (Section 4.6.1, 4.6.2, 4.6.4) shall apply unless noted otherwise. The Department reserves the right to disapprove a horizontal directional drilling installation if the conventional open trench or jack and bore type installation is preferred by the Department, because:

- Excessive number of high/low points
- Excessive depth of pipe is of concern
- A casing is required by the Department to protect the utility pipe
- Future service and main connections to the utility pipe will be negatively impacted by a horizontal directional drilling

(b) Pipe sizes, pipe material.

The horizontal directional drilled utility main pipe shall be manufacturer approved restraint joint DI pipe PVC pipe AWWA C-900 DR14, 200 psi, NSF 61 (4"-12") or HDPE pipe (SDR 11). If the directional-drilled pipe is to be used as a casing for a small diameter service line (up to 2" diameter), PVC DR18 or HDPE DR17 pipe is acceptable.

Pipe and system components shall be free from voids, cracks, inclusions, and other defects and shall be uniform in color throughout the installation.

(c) Design Requirements.

The Engineer shall inquire with the Department about approval of a horizontal directional drilling procedure for a pipe installation. With the Department's concurrence, the Engineer shall submit a signed and sealed pilot bore plan for review and approval. The plan shall be submitted on a 24" x 36" sheet to a maximum 1"=20' horizontal and 1"=2' vertical scale (1"=10' horizontal, 1"=10' vertical scale preferred). The plan must show:

- Finished grade and surface improvements
- Locations of drill set-up
- Length of bore
- Deflection and radiuses of the pilot bore
- Field verified locations of existing utilities and underground structures
- Minimum horizontal and vertical clearances from underground structures, conduits, piping systems (the proposed clearances must exceed the Department's standards plus the guidance system accuracy tolerance)

- Pipe size and specifications (including restraining provisions against “pipe shrinkage”)
- Proposed pilot bore pipe deflection limits shall not exceed 75% of the maximum deflection allowed by the pipe manufacturer
- The drill radius of the final HDD pipe shall be minimum 30 pipe diameters, not exceeding 80% of the max. bending radius as recommended by pipe manufacturer
- Limits of directional bore installation
- Limits of pressure testing
- Connection to existing utilities
- Rights-of-way limits, utility easements and temporary construction easements
- Minimum pipe joint restraints at each end of pipe material transition from HDPE pipe
- Trace wires
- Isolation valves and/or transition fittings/adapters

(d) Preconstruction Meeting.

Upon approval of the pilot drill plan by the Department and obtaining all necessary permits for the directional drilling, the Engineer shall schedule a preconstruction meeting with the Department. If the construction requires any field welding/fusion of HDPE pipe and/or fittings, a Certificate of Completion of a pipe fitting manufacturer approved training program is required. The Engineer and the Contractors performing the utility work shall attend the meeting. The licensed HDD Contractor shall provide references certifying a minimum five (5) years HDD experience.

(e) Pilot Bore.

The Engineer shall schedule the beginning of work with the Department a minimum of 3 days in advance. The drill path shall be accurately surveyed and plotted to create an “as-built” drawing (same scale as the pilot drill plan). A high accuracy MGS (Magnetic Guidance System) shall be capable to provide vertical pipe data with a max. $\pm 2\%$ deviation and \pm horizontal pipe location data with max. ± 2 foot deviation. The data shall be collected at max. 25’ intervals.

Deviation of more than ± 2 feet vertically or horizontally from the approved pilot bore plan shall be reported immediately to the project engineer for evaluation. The Engineer shall evaluate the as-built data and confirm the compliance with the design parameters. Deviation beyond approved parameters (depths, deflection radius, separation to other utilities or structures) shall be brought to the attention of the Department. The signed and sealed pilot bore “as-built” drawing shall be submitted to the Department for review and approval if the “as-built” location differs substantially from the design plan.

(f) Pull back of carrier pipe.

Upon approval of the pilot bore location by the Department; the pullback operation of the required carrier pipe shall begin. The Contractor shall select the proper reamer type with the final hole opening to be a maximum of 1.5 times the outside diameter of the largest component system. The open borehole shall be stabilized by means of bentonite drilling slurry. The slurry shall be contained at the entry or the exit side of the bore in

pits or holding tanks.

The pipe sections shall be joined together in accordance with the manufacturer's specifications. The ends of the pipe, gaskets and couplings shall be inspected for cleanliness. Chipped, scratched, scraped, cracked or excessive deformed pipe or couplings shall be rejected. Two approved directional drill tracer wires (APWA color coded) shall be pulled alongside of the product pipe, and extended to nearest valve boxes (coil min. 3' wire near the surface inside valve box). The pipe shall be elevated to the approximate angle of entry and supported by roller arms or equivalent. . Any field welding/fusion of HDPE pipe and fittings may be performed only by personnel certified through a pipe/fitting manufacturer approved training program.

(g) Testing.

Pipe installed using the HDD method shall be flushed and pressure tested using Potable Water. The pressure within the HDPE Pipe test section shall be raised to approx. 160 psi and then allowed to idle for approx. 3 hours in order to allow to stabilize. Additional make-up water/pressure shall be applied during the 3 hour stabilization period only to maintain a minimum 140 psi pressure.

The final phase of the pressure test shall involve applying make-up water/pressure to achieve a test pressure of 150 psi or higher (as required). The test section is then allowed to idle (no make-up water /pressure is added) for a period of 2 hours. After this 2 hour period, make-up water/pressure is applied and measured to reestablish the test pressure. If the measured and added quantity of water is greater than the allowable amount, the pressure test fails. No leakage is acceptable.

Installed services, tees and stub-outs shall be pressure tested together with the main. Pressure test is not required if the installed pipe is intended to be used as a casing. If the pipe successfully passed the pressure test, a connection to the existing pipe system may be performed.

(h) As-Builts:

Certified as-built drawings (Signed and sealed by a professional land surveyor or a professional engineer full size paper copies, mylars and computer disk) must be submitted to the Department for review and approval prior to any final certification.