

II. FISCAL IMPACT ANALYSIS

A. Five Year Summary of Fiscal Impact:

Fiscal Years	2007	2008	2009	2010	2011
Capital Expenditures	0	0	0	0	0
Operating Revenues	0	0	0	0	0
Guaranteed Revenues	0	0	0	0	0
Connection Fee	0	0	0	0	0
NET FISCAL IMPACT (Additional Revenues)	0	0	0	0	0
# ADDITIONAL FTE POSITIONS (Cumulative)	0	0	0	0	0

Is Item Included in Current Budget? Yes N/A No Reporting Category N/A

B. Recommended Sources of Funds/Summary of Fiscal Impact:

This item has no fiscal impact.

C. Department Fiscal Review: *Sy Eaton*

III. REVIEW COMMENTS

A. OFMB Fiscal and/or Contract Development and Control Comments:
Fiscal impact from the installation of one inch meters is undetermined at this time.

Elizabeth Blaser *3/22/07*
OFMB
amw 3/22/07 *amw 3/11* *(10) 3/21/07*

Ann-J. Javelle *3/20/07*
Contract and Development Control

B. Legal Sufficiency:

WOW *3/27/07*
Assistant County Attorney

C. Other Department Review:

Department Director

This summary is not to be used as a basis for payment.

RESOLUTION NO. R-2007-

RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF PALM BEACH COUNTY, FLORIDA, REVISING THE WATER UTILITIES DEPARTMENT'S UNIFORM POLICIES AND PROCEDURES MANUAL (UPAP).

WHEREAS, the Board of County Commissioners of Palm Beach County, Florida, has adopted the "Water Utilities Uniform Policies and Procedures" Ordinance, which provides for a Uniform Policies and Procedures ("UPAP") Manual to establish fees, standards, legal documents, and policies and procedures for the Water Utilities Department (Department); and

WHEREAS, the Department has recently completed a review of the UPAP; and

WHEREAS, the Department is proposing various revisions to the UPAP including, but not limited to, a revised gallons per day value for Equivalent Residential Connections, a provision to require a 1" meter for residential fire lines to insure sufficient pressure for proper operation, and revisions to the design standards relative to residential fire lines; and

WHEREAS, the Board of County Commissioners of Palm Beach County desires to adopt this Resolution revising the UPAP and deems adoption of same to be in the public interest.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF PALM BEACH COUNTY, FLORIDA, that:

1. The foregoing recitals are true and correct and incorporated as if fully set forth herein.
2. The revisions to the UPAP as set forth in Attachment "A", attached hereto and incorporated herein, are hereby adopted for inclusion in the UPAP.
3. Each and every other term and condition of the UPAP shall remain in full force and effect and the UPAP is reaffirmed as revised herein.

4. The provisions of this Resolution shall become effective upon adoption.

The foregoing resolution was offered by Commissioner _____ who moved its adoption. The motion was seconded by Commissioner _____, and upon being put to a vote, the motion passed as follows:

Commissioner Addie L. Greene, Chairperson
Commissioner Karen T. Marcus
Commissioner Jeff Koons, Vice Chair
Commissioner Warren H. Newell
Commissioner Mary McCarty
Commissioner Burt Aaronson
Commissioner Jess R. Santamaria

The Chair thereupon declared the resolution duly passed and adopted this _____ day of _____, 2007.

PALM BEACH COUNTY, FLORIDA,
BY ITS BOARD OF COUNTY COMMISSIONERS

Sharon R. Bock, Clerk and Comptroller

By _____
Deputy Clerk

APPROVED AS TO FORM AND
LEGAL SUFFICIENCY

By  _____
County Attorney

**BLACK-LINED VERSION OF UPAP SECTIONS
RECOMMENDED FOR CHANGE**

1.2.35 FIRE LINES

A dedicated Potable Water service line utilized to provide water for fire suppression systems:

(1) Residential Fire Lines:

(a) Single family home or duplex residential fire line as defined further in NFPA 13d. The Fire Marshall non-monitored system is connected to the Department's Potable Water System on the customer side of the primary potable water meter serving a dwelling unit. Single family homes with a NFPA 13d fire sprinkler system which would normally qualify for a 5/8" meter shall instead require a 1" meter, but will charged connection fees and guaranteed revenue fees in accordance with the rates established for a 5/8" meter. However, installation fees at the rate for a 1" meter will be assessed.

(b) Multi-Family fire lines are defined further in NFPR 13r. The Fire Marshall monitored system serving multiple residential units is connected to the Department's Potable Water System through a separate tie-in and properly sized, approved, testable above ground backflow prevention device.

(2) Non-Residential Fire Lines:

Fire lines serving any other structures as defined further in NFPA 13. The Fire Marshall monitored system serving non-residential structures is connected to the Department's Potable Water System through a separate tie-in and properly sized, approved, testable, above ground backflow prevention device.

2.3.1 ALL POTABLE WATER AND RECLAIMED WATER THROUGH METERS

Meters are required on all Potable Water and Reclaimed Water service connections irrespective of the size or nature of service. No property shall have access to or use of Potable or Reclaimed Water without delivery through a meter.

Meter sizes are 5/8" x 3/4", 1", 1 1/2", 2", 3", 4", 6" and larger as necessary. Many of the Department's fees are dependent upon meter size. It is the responsibility of the Customer to select the meter size that is appropriate for his expected demand. The Department will advise Customers regarding meter selection. However, the Department reserves the right to over-rule the Customer's selection if that selection is not compatible with the UPAP and/or reasonable expectations of service demand for the connection. Duplex or similar meter schemes (two one-inch meters in lieu of one two-inch meter) will not be permitted. Differing types of uses (i.e., single family residential, non-residential, multi-family) shall require separate meters. A separate water meter, however, is not required for laundry facilities serving only on-site multi-family tenants through a master-metered connection.

4.4.1 POTABLE WATER DESIGN

There shall be no physical connection between an active Potable Water supply and an unapproved water supply, or any reclaimed water, Wastewater or storm water system, which would allow unsafe water to enter, or backflow into the active Potable Water system by direct pressure, vacuum, gravity or any other means. All Potable Water services shall be in compliance with all applicable cross connection control regulations.

Design standards for Potable Water mains (WM) are as follows (Raw water mains shall be designed and constructed to Potable Water main standards):

(a) Minimum Cover: Finished grade over WM shall be 36" minimum and 60" maximum. All Potable Water transmission mains within major thoroughfare rights of way shall have full plan and profiles shown. Pipes shall be designed to be as level as possible to avoid high points. Reduced minimum cover requires prior approval.

(b) Horizontal Separation (Wall to Wall):

(1) 10' to buildings, exfiltration trenches, roof overhangs, canopies, walls, fountains, and other structures.

(2) 10' to Wastewater lines (Min. 6' may be approved in special cases)

(3) 10' to drainage pipes (Min. 3' may be approved in special cases).

(4) 4' to power poles, light poles and other public utility lines

(5) 3' to drainage structures and reclaimed water lines

(c) Vertical Separation:

(1) 12" separation between all pipes should be maintained. A minimum of 6" vertical separation is acceptable, however, if it is not possible to maintain 12" and if the water main crosses over a storm or Wastewater gravity main. When there is no alternative to the water main passing under a Wastewater main, and when the water main crosses over or under a reclaimed water main, or force main, a minimum of 12" vertical clearance shall be maintained.

(2) WM shall cross over other pipes unless not feasible.

(d) Layout:

(1) The Potable Water mains shall be looped unless otherwise not feasible. Multiple feed lines may be required at discretion of the Department. Dead ends shall be equipped with a blow-off for flushing purposes unless the Department determines that a nearby hydrant is sufficient.

(2) WM should be placed in ROWs whenever possible. Placement of WM on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable or when necessary for looping. Water mains shall not be placed in ditches, landscape buffers, wetlands, or storm water management areas unless specifically approved by the Department.

(3) Details of connections to existing facilities must be shown. A reverse tap due to pre-existing conditions is acceptable only if approved by the Department (detail drawing required).

(4) In order to facilitate Potable Water service for all properties within the service area, Potable Water mains shall be extended along the full length of all fronting boundaries of a property by the Developer/Owner requesting Potable Water service and may be required to be extended through the property if another is to be served in the future.

(5) Loop Potable Water main to existing Potable Water mains or leave provisions for looping or extension whenever possible. The mains in such instances shall end with a valve and plug. Water mains 16" and larger shall end with a teed off fire hydrant, inline valve and plug. The valve shall be mechanically restrained.

(6) Sample points as required by the Health Department must be shown on plans.

(e) Potable Water Main Material: Pressure Class Rated or Special Thickness Class Rated Cement Lined Ductile Iron Pipe (DIP) or C-900 Class 150 DR 18 PVC pipe (Color: Blue) shall be allowed for WM 12" diameter or smaller. The lining for DIP shall be factory applied in accordance with the manufacturer's specifications and shall be warranted by the pipe manufacturers. Unless specific approval is granted, no water main shall be encased in concrete. Potable Water mains shall be marked with one continuous strip of 6" wide magnetic blue coded tape imprinted with two (2) inch high lettering reading "Caution -

Potable Water Line Buried Below", and located approximately twelve (12) inches above the crown of the pipe. The wording shall occur every three (3) feet. Buried DIP smaller than 24" shall be painted with a 4" wide continuous blue line parallel to the axis of the pipe and that is located on top of pipe. Buried DIP 24" and larger shall have a 4" wide continuous blue line applied along each side of pipe as well as along the top of pipe. The coating shall be minimum 8 mils WFT, and minimum 3 mils DFT.

DIP shall be required in the following circumstances:

- (1) WM 16" in diameter or larger.
- (2) WM smaller than 6".
- (3) Within 10' of Wastewater/ storm/reclaimed water pipes.
- (4) Within 15' of structures, (near side of concrete footing), and top of bank of canals or lakes.
- (5) Crossings over Wastewater, reclaimed water and storm pipes with less than 12" separation with no joint within 10' of each other; crossings under any Wastewater, reclaimed water or storm pipe.
- (6) Jack and bores (mechanical joints with "Megalugs" or equal).
- (7) Potable Water mains for fire sprinkler system connections up to point of service.
- (8) Fire hydrant branches.
- (9) 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 in private property away from dedicated ROWs.
- (10) Flanged ductile iron pipe is required for exposed (not buried) installation.
- (11) Ductile iron pipe shall be polywrapped if buried closer than 10' to other underground iron/steel pipes if no other protection is provided.
- (12) Where required for locations with substandard separations to other piping systems.

(f) Potable Water Main Size: The WM shall be sized by the developer's engineer as required. The Department's Master Planning may require a greater diameter. An oversizing credit as defined in Chapter 3 may apply. Use the "Friction Coefficient Factor" $C=120$ for flow calculations and a peak instantaneous flow velocity of 3 feet per second to determine applicable credits. The minimum size of WM shall be 6". Four-inch (4") mains may be proposed for non-fire hydrant lines serving cul-de-sacs where additional development will not occur. The engineer may be required to demonstrate the adequacy of such sizing. In cases where the completion of gaps in the Potable Water systems to meet flow requirements of the development is necessary, the developer shall construct the required improvements. Delivered flows shall meet peak domestic requirements as mandated by State DEP plus fire flow as mandated by the Fire Marshall. Domestic average flows shall be based on ~~270~~ 250 gpd per Equivalent Residential Connection single-family dwelling unit, which is the Department's equivalent of one ERC hydraulically with a 2.5 peaking factor. The residual pressure under these conditions shall not be less than 20 psi. Potable Water Main sizes shall conform to the latest Department Potable Water Master Plan.

g. 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 have mechanical joint or flanged ends and be of resilient seat design with 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.

Inline valves shall be installed for mains 16" and smaller near each side of a canal crossing and/or major road crossing.

In-line valves shall generally be installed at intervals no greater than 1,000 feet on transmission mains, at intervals of no greater than 700 LF on main distribution loops and

feeders, and on all primary branches connected to these lines. In high-density areas, valves shall be installed as necessary to minimize the number of persons affected by a break. In all instances, effectiveness of placement shall be primary criteria in determining valve location. Valves placed in curbs will not be accepted. All valves require lids and must be marked "water". All valves shall be numerically identified on construction drawings. Clearance of 18" or one pipe diameter, whichever is greater, shall be maintained between all fittings (bells, valves, saddles, 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 and caps shall have mechanical joint or flanged ends unless an approved flexible joint restraint system is used.

h. 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 for connections to existing un-restrained piping. 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 larger than 24" shall be restrained and pressure tested to 200 psi. If the restraint pipe length on a design deviates from the standard length listed herein in 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:

- The installation of flexible joint restraints must be witnessed by a Construction Coordinator.
- A copy of the material invoice must be available on the job site for review to confirm the shipment of restraining gaskets, etc.

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 #	23	-	-	-	-	-	-	-	-	-	-	
	6" X #	21	35	-	-	-	-	-	-	-	-	-	
	8" X #	18	34	47	-	-	-	-	-	-	-	-	
	10" X #	16	32	46	58	-	-	-	-	-	-	-	
	12" X #	13	30	44	57	69	-	-	-	-	-	-	
	16" X #	7	26	41	55	67	90	-	-	-	-	-	
	20" X #	1	21	38	52	65	88	109	-	-	-	-	
	24" X #	1	16	34	49	62	86	108	129	-	-	-	
	30" X #	1	8	28	44	58	83	106	127	208	-	-	
	36" X #	1	1	22	39	54	80	103	124	208	240	-	
	42" X #	1	1	15	33	49	77	100	122	205	239	270	
	48" X #	1	1	7	27	44	73	97	120	203	238	269	298
REDUCER (LARGER PIPE RESTRAINT)	6" X #	23	-	-	-	-	-	-	-	-	-	-	
	8" X #	38	25	-	-	-	-	-	-	-	-	-	
	10" X #	57	43	24	-	-	-	-	-	-	-	-	
	12" X #	72	60	44	41	-	-	-	-	-	-	-	
	16" X #	99	90	78	75	45	-	-	-	-	-	-	
	20" X #	123	116	107	105	81	45	-	-	-	-	-	
24" X #	146	140	132	131	111	82	45	-	-	-	-		
200psi	30" X #	209	204	197	188	177	153	116	75	-	-	-	
	36" X #	243	236	233	226	217	196	168	135	74	-	-	
	42" X #	273	270	265	259	252	234	211	183	133	72	-	
	48" X #	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.

Notes:

- The data in the above table are based upon the following installation conditions:
 Soil Type – Sand
 Test Pressure – 150 psi up to 24", 200 psi for pipes larger than 24".
 Depth of Bury – 3'
 Trench Type – 3
 Safety Factor – 1.5
 Vertical Off-Set – 3'
 Minimum pipe length along tee run – 5'
- The restrained pipe lengths apply to PVC pipe and DIP without polyethylene encasement.
- 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 and construction guide only. It is the Engineer's responsibility to justify and document any deviations from the pipe lengths specified in the above table.

(i) Fire Hydrants and Fire Sprinkler Systems: The appropriate Fire Marshall has final jurisdiction on all hydrant and fire sprinkler line requirements. A Fire Marshall approved plan is required with each first plan submission and with any revision that relocates a hydrant or a fire line connection. A University of Southern California (USC) approved above ground Double Check Detector Valve Assembly (DCDA) or Reduced Pressure Principle Detector Assembly (RPDA) shall be installed prior to Service Activation on all dedicated fire lines.

(1) Fire Hydrants - Fire hydrants shall be provided in all Potable Water distribution systems and shall have a 5-1/4" main valve. Fire hydrants shall be spaced such that the radius of protection will not be more than 300', or as approved by the Fire Marshall. Each hydrant shall be capable of delivering a minimum flow of 500 gallons per minute for residential areas, and 1500 gpm for non-residential areas (or a higher flow as required by the Fire Marshall), with a residual pressure of not less than 20 psi. Multiple fire hydrants with looped mains and/or larger main sizes may be required to provide water for higher flow demand. Flow tests shall be performed to verify the specified fire flow demand prior to final DEP certification.

Fire hydrant branches (from main to hydrant) shall not be less than 6" ID and be as short as possible to minimize any potential for a Potable Water main with no flow. Each branch shall be provided with a gate valve located as close as possible and restrained to the main. Hydrants shall be located minimum five feet from edge of road pavement with raised curbing and no less than three (3') feet from driveways with the pumper discharge nozzle facing the roadway. Hydrants shall be located so as to minimize their vulnerability to traffic. Bollards shall be shown on the design plans and installed where minimum distances cannot be met.

Fire hydrants shall be placed in an accessible, unobstructed location with 10' clearance in all directions. Fire hydrants shall be numerically identified on construction drawings. New private fire hydrants are not allowed and all new fire hydrants shall be owned and maintained by the Department. Existing privately owned dedicated fire hydrant lines shall be separated from Department owned water mains by a privately owned DCDA.

(2) Fire Sprinkler System Connections

(a) Residential fire sprinkler systems (NFPA type 13d). There shall be no separate service connection to the potable water system. The sprinkler system shall be connected to the domestic water service line on the customer side of the water meter. A minimum 1" water service line and a minimum 1" meter are required to assure adequate flow rate. As a minimum, an in-line check valve is required at the Point of Connection of the fire line into the domestic service line to prevent backflow. It is the property owner's responsibility to obtain any necessary permits and certifications for the fire sprinkler system.

(b) NFPA type 13r fire sprinkler systems. Fire sprinkler system branches shall be minimum 4" ductile iron pipe up to Point of Service. Closed dedicated fire sprinkler connections shall require as minimum backflow prevention device a double check detector assembly (DCDA). Sprinkler systems with pressure/storage tanks, booster pumps, chemical additive injection systems, and/or auxiliary water supply connections shall require reduced pressure principle detector assembly. Pressure testing and inspection of the Department's water distribution system shall be performed as a minimum up to the valve designated as the Point of Service (see Standard Detail). The Department shall perform the initial testing and certification of the backflow prevention assembly prior to Service Activation. All subsequent tests and certifications are the responsibility of the Property Owner. There shall be no pipe joints or any service connections between the point of fire service valve and first 90° bend leading up to the backflow prevention assembly. The design shall minimize any potential for Potable Water main with no flow.

The design and construction of privately owned fire lines shall conform to the applicable Fire Marshall standards pertaining to dedicated fire sprinkler systems (i.e., the installation of tamper switches and post indicator valves may be required).

(j) Potable Water Service Lines and Taps: Potable Water service taps on the main shall be spaced at a minimum distance of 18" apart. All service lines (pipe Schedule 40 PVC with Schedule 80 fittings) shall be installed in accordance with the construction details of this manual and shall have corporation stops. 1½" 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. The threaded area of a corporation stop shall be spiral wrapped with two wraps of Teflon tape. The corporation stop shall not be bottomed out (1-3 threads remain showing). A valve box shall be installed over all 2" corporation stops when located in paved areas. Compression (pack joint) style adapters shall be used for transition from brass valves and fittings to PVC pipes. No PVC male/female adapters shall be used. Services shall not exceed 100' to the meter. Services crossing under parking tracts shall have their meters placed prior to the crossing so that the Department is not responsible for these lines.

In developments where the property line is not clearly defined (condominiums and commercial), the meter shall be placed in a readily accessible location. Service lines under driveways and roadways shall be encased in minimum three (3) inch casing (black iron, PVC Schedule 40 or HDPE Pipe). Service taps under driveways and roadways shall be avoided 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.

Private services shall not cross Potable Water mains unless specifically identified on plans and approved by the Department. The Developer shall coordinate the installation of private service lines with location of meters to deliver Potable Water to the correct multi-family dwelling unit or bay and shall identify each to the Department. The water meter location shall match the site plan layout to eliminate service line crossings.

Wet Taps equal or larger than one half the pipe's diameter require a restrained ductile iron mechanical joint tapping sleeve. No size on size taps are permitted.

(k) Potable Water Meter Installation:

General requirement - Construction plans shall include a typical meter installation detail for each size meter to be installed. Service line and meter sizes must be shown on the plans. Dual metering of a single building service (i.e., two 1" meters instead of one 2" meter) shall not be permitted. The proper sizing of meters and service lines is the responsibility of the developer's engineer. Meters will be available in the following sizes only: 5/8" X 3/4", 1", 1-1/2", 2", 3", 4" and larger sizes as necessary. Meter boxes for 4" and smaller meters are standard. A bypass will be required for meters 1-1/2" and larger (see details).

All meter installation charges must be paid to the Department prior to installation, and all meters will be installed by the Department. All service piping, valves, lids, boxes and required backflow prevention assemblies/devices must be built in accordance to these standards prior to meter installation. Generally, the Department will not install services for meters 3" and larger.

The number of metered connections shall match the number of connections reserved. The meter location and layout shall be determined prior to plan approval. Commercial establishments with Grease Traps, Oil/Grease Interceptors and/or sand/oil interceptors shall be individually metered through the Department. Consideration shall be given to the plumbing system in master metered projects, so water and sewer service can be provided individually in the future, if so desired or required.

Water meter boxes:

- All meter boxes and lids shall display the manufacturer's name.
- All meter boxes shall display the date of manufacture.

- Ductile iron lids are required for all nonresidential 5/8" and 1" meter boxes, and all 5/8" and 1" meter boxes in non-grass area.
- Meter boxes shall have no "mouseholes"

Location requirement - Meters shall generally be set in grassy area generally at or near a common property line unless shown otherwise on approved plans.

Meter boxes for "zero lot line" properties shall be set in grass area as close as possible to a common property line. An installation detail shall be added to each plan sheet.

When no alternative is available, a meter will be allowed in paved area and:

- Top of box shall be flush with surface located outside of drainage flow lines (i.e., dry surface area).
- Meter box shall be placed out of a common traffic area. Bollards may be required under certain conditions.
- Meter box and lid shall meet the requirements for incidental traffic H-10 loading as established by AASHTO.
- A 12" thick compacted rock base (3/4" washed rock) shall be required under the meter box to prevent settlement. The base shall extend minimum 12" beyond the perimeter of the meter box.

Locations for meter boxes and control valves shall be selected to be accessible and provide the "minimum unobstructed space" shown on applicable details. Meter boxes shall be installed in grass areas whenever possible and shall not be installed in pedestrian walkways, driveways or inaccessible areas.

- Minimum 12" horizontal separation is required between front edge of electrical transformer pad or its projection and back edge of water meter box.
- The Developer and/or his representative shall be responsible for coordination of locations of services.
- Meter/service will not be installed/activated until:
 - (1) Driveway, sidewalk and/or form boards for same are in place.
 - (2) A Wastewater lateral connection inspection was conducted.
 - (3) "Minimum unobstructed space" is provided as shown on applicable details.
 - (4) The required backflow prevention assembly/device is installed and has passed the initial testing (if applicable).
 - (5) A signoff from the applicable Building Department has been obtained for a residential fire line (NFPA Type 13d).
- Minimum 5' horizontal separation is required between Potable Water service line and Wastewater lateral.
- Please note that 1" meters are required for services with NFPA Type 13d residential fire lines.

Meters shall not be placed in areas that can be fenced, such as backyards, under any circumstances.

Double boxes shall be used whenever possible for 5/8" X 3/4" meters with 3/4" fittings on or as close as possible to a common property line.

In cases where Potable Water, reclaimed water and Wastewater lines have been constructed and a developer replatted the development or relocated structures, the Department shall require that 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 3 feet laterally. Any adjustments/reconstruction shall be regarded as having to meet all new construction requirements.

(I) Backflow Prevention Assemblies/Devices for New Potable Water Services: Backflow Prevention Assemblies/Devices shall be provided on all projects for prevention and control of cross-connections. All nonresidential services, services for buildings with more than three stories, and services with 1-1/2" meters or larger shall have a Reduced Pressure Principle Backflow Prevention Assembly. Residential Dual Check Valves (rdc) are required as a minimum for all new residential Potable Water meters 1" and smaller and for existing residential Potable Water services with master metered reclaimed water service. All Potable Water services with individually metered reclaimed water service shall have a Reduced Pressure Principle Backflow Prevention Assembly. There shall be no service connection between the Backflow Prevention Assembly/Device and meter assembly.

All applicable Backflow Prevention Assemblies/Devices must be installed by the Developer/Customer prior to Potable Water meter installation. The installation of the assembly/device must follow the manufacturer's guidelines. The assembly/device must be easily accessible and have a minimum of 3' clear space around it. The assembly/device shall be located as close as possible to the Point of Service. The testable Reduced Pressure Principle Backflow Prevention Assembly will remain the property of the Customer, who shall also be responsible for installation, operation, maintenance, and testing of the assembly following Service Activation. Multiple parallel installed backflow prevention devices shall be designed for potable water connections where service continuity is of utmost importance (for example: schools, treatment plants, etc). For additional information about application and acceptable Backflow Prevention Assemblies/Devices see Chapter 7 of the Department's Uniform Policies and Procedures Manual. In cases where a Reduced Pressure Principle Assembly or Double Check Valve Detector Assembly type backflow preventer is required, the Department shall perform the initial testing of the assembly and certify the installation for compliance.

4.5.1 WASTEWATER SYSTEM DESIGN

Department and privately owned gravity Wastewater collection systems, pump stations, and force mains shall be designed to deliver peak flows under the following conditions:

(a) Flow: Wastewater systems shall be designed on the basis of an average per capita daily flow of not less than 100 gallons and an average domestic flow of no less than 200 gpd per Equivalent Residential Connection ~~single family dwelling unit, which equals 1.0 ERC hydraulically~~. On that basis, lateral Wastewater piping shall be designed with capacities when running full of not less than four times the average flow. Trunk lines shall have capacities under the same conditions of not less than 2.5 times the average flow. Special flow assumptions shall be made in each case for Wastewater from commercial and industrial sites. For proposed projects connecting to existing gravity sewer system, the Department may require the Property Owner to design and construct, at no cost to Department, upgrades to existing lift station(s) serving the gravity system. The upgrades may include new pumps, control panel, valves, RTU, an emergency generator, corrosion barrier system, driveway and fence replacement, etc.

No person shall connect or cause to connect any roof downspout, exterior foundation drain, areaway drain, or other source of surface runoff or groundwater to a building Wastewater service line or building drain which in turn is connected directly or indirectly to the PBCWUDWWS without prior approval by the Department. Floor Drains in rooms with Generators or other equipment with a possibility of a fuel spill shall not be connected directly into the sanitary sewer system. Dumpster pads or can wash pads with floor drains connecting to the Department's Wastewater collection system shall be designed to minimize surface runoff and to minimize solids to enter into the drain. The pad shall consist of a small-elevated area with the surrounding area to drain away from the pad. The drain shall be equipped with a removable cap or plug. The drain shall be connected to a Department approved Grease Trap or Oil/Grease Interceptor (OGI) for pretreatment prior to discharge into the Department's Wastewater collection system.

Industrial Wastewater from service station wash-racks, lubrication racks, car wash, repair shops or other commercial facility and shop floor drains shall not be connected into the

Wastewater collection system without pre-treatment through an adequately-sized Sand/Oil Interceptor (SOI) specifically approved by the Department. The residual Wastewater shall be disposed of separately by the owner. No toxic, hazardous or discharge deleterious to the Wastewater system shall be allowed to be discharged without a WUD approved pre-treatment program. Generally, no cooling tower water shall be discharged into the sanitary sewer system. This will also include any diluting of discharge other than that which meets pre-treatment standards. Wastewater dumping stations are not allowed to be connected (directly or indirectly) to the Department's Wastewater Collection System.

Each commercial facility where foods are prepared, processed or served and which generate grease laden waste such as restaurants, hotel kitchens, hospitals, school kitchens, bars, factory cafeterias, clubs, clubhouses, food take out places, bakeries, stores with food departments, etc., must include in the plumbing system design a pretreatment assembly. The assembly shall conform to the applicable Plumbing Code and may consist of a flow control device, a Solids Interceptor and a Grease Trap or Oil/Grease Interceptor capable to limit the grease discharge to approximately 100 ppm.

The design, sizing and installation of Grease Traps shall conform to the Standard PDI-G101 published by the Plumbing and Drainage Institute, and all other applicable rules and regulations. For the purpose of installation of Grease Traps within PBCWUD Service Area, the device shall be PDI certified as a "PDI Size 50" and utilized for a Maximum Flow Rate of 25 gpm. The Maximum Total Flow Rate for each commercial facility shall be determined using the "PDI Sizing Method". The Grease Trap shall be gas and water tight with non-skid heavy duty cover (minimum 10,000 lbs. load rating). If the "Maximum Flow Rate" exceeds 25 gpm, a full size Oil/Grease Interceptor (minimum capacity 750 Gallon) will be required. The Oil/Grease Interceptor shall be sized, designed and constructed in accordance with this Standard and all applicable State, Building Code and Health Department regulations, including but not limited to FAC Chapter 10D-6.

The Design of the pretreatment assembly shall be the responsibility of the Owner. The Owner shall submit a signed and sealed copy of the flow calculations prior to Service Initiation.

The Model number, capacity and the manufacturer's name of the Grease Trap or Interceptors shall be shown on the utility record drawings. The Grease Trap Interceptor shall be located outside of buildings, preferably in grass areas, minimum 10' from any Department owned facility, but not in traffic areas, parking spaces, walkways or storm retention areas. The rim elevation of the access point shall be designed to prevent any storm water inflow.

The Owner shall operate and maintain the devices as required to insure optimum performance and to comply with the Department's discharge parameters.

(b) Size and Layout: The minimum allowable size for any Wastewater gravity main other than house service connection shall be 8" in diameter. See detail sheets for service laterals. Upsizing of Wastewater lines to reduce slopes will not be permitted unless justified by calculated flow. In order to facilitate Wastewater service for all properties within the service area, Wastewater gravity mains and force mains shall generally be extended along the full length of all fronting boundaries of a property by the Developer/Owner requesting Wastewater service, and may be required to be extended through the property if another is to be served in the future.

The cost associated with upsizing or additional depth beyond the development required sizes may be subject to a credit as defined in Chapter 3. Wastewater gravity mains shall not be placed in ditches, wetlands or stormwater management areas unless specifically approved.

(c) Slopes: All gravity Wastewater lines shall be designed with hydraulic slopes sufficient to give mean velocities, when flowing full or half full, of not less than 2 feet per second nor more than 5 feet per second, based on an acceptable equation. Slopes shall be calculated using the distance from centerline of manhole to centerline of manhole.

The following minimum grades will be used for design:

- 8" gravity mains 0.42%
- 10" gravity mains 0.28%
- 12" gravity mains 0.22%

A 0.1 foot drop inside the manholes may be used to reduce the minimum slope for an 8" gravity Wastewater from 0.42% to 0.40%. Note: Maximum 2% slope is allowed for 8" pipe.

(d) Increasing Size: When Wastewater collection lines are increased in size, or when a smaller line joins a larger one, the invert of the larger pipe should be lowered sufficiently to maintain the same energy gradient.

(e) Alignment: Wastewater collection lines of all sizes shall be designed with uniform slope and alignment between manholes. A 15' distance shall be maintained from top of bank of canals, lakes and structures, unless unavoidable, in which case 10' shall be maintained with DIP. A minimum 10 feet horizontal separation is required to the edge of drainage fabric in exfiltration trenches.

(f) Pipe Material: Polyvinyl Chloride (PVC) ASTM 3034 SDR 26 with PVC SDR 35 fittings and epoxy lined Ductile Iron Pipe (DIP) shall be acceptable pipe material for gravity Wastewater lines. Unless specific approval is granted, no gravity Wastewater line shall be encased in concrete. PVC gravity lines within Wellfield Zones 1 and 2 shall be C900, DR-18. The lining for DIP shall be factory applied in accordance with the manufacturer's recommendations and shall be warranted by the pipe manufacturer. DIP shall be specified in the following circumstances:

(1) Anytime a Wastewater line passes under any other pipe with less than 18" clearance. (No joint within 10' of crossing Potable Water/reclaimed water/storm water lines.)

(2) When a Wastewater line passes over any potable/reclaimed water main regardless of separation and over other pipe with less than 18" clearance. (No joint within 10' of crossing potable/reclaimed water/storm water lines.)

(3) When there is less than 4' from finish surface to the invert of the pipe. Four and one half (4 1/2) feet to invert shall be the standard design depth. Less depth will not be accepted unless it is unavoidable and has prior Department approval.

(4) Any time the Wastewater line is separated horizontally (wall to wall) from a Potable Water main by less than 10' or Department owned reclaimed water main by less than 5'.

(5) When the Wastewater line is placed out of a right-of-way, between buildings, along property lines, or in extensive areas potentially subject to landscaping, or is not under pavement. (PVC pipe will be considered on a case-by-case basis.)

(6) The last run of gravity from manhole into a wet well.

(7) Ductile iron pipe shall be polywrapped if buried closer than 10' to other underground iron/steel pipes and if no other protection is provided.

(8) Minimum 5' length of DIP from each cored invert (i.e., not precasted by manhole manufacturer). See Standard Manhole Detail.

(g) Wastewater Lines in Wellfields: New or replacement installation of gravity Wastewater lines in protected zones of a public drinking water wellfield shall be constructed to force main standards. See Part C of this section for specific construction materials and testing requirements.

(h) Manholes:

(1) Location - Manholes shall be installed at the end of each Wastewater system, at every change in grade, size or alignment, at all gravity Wastewater main intersections, and at distances not greater than 400' apart unless prior approval is obtained from the Department for a distance greater than 400'. Gravity Wastewater mains shall have no less than a 90° angle to direction of flow between runs. Manholes shall be placed in accessible locations, preferably in pavement, always flush to the surface. Manholes in roadway pavement shall not be located in wheel paths (i.e. structures shall be located centered in the travel lane, crown of road, paved shoulder or off the pavement). Manholes in designated parking spaces or other inaccessible locations will not be approved. A concrete collar shall be placed around manholes in grassed areas. The design depth of the manhole from rim elevation to invert elevation shall be no less than 4.5' and no more than 16', unless specifically approved by the Department prior to initial plan submittal. The Developer/Property Owner shall videotape gravity mains deeper than 16' and corresponding laterals prior to Wastewater system certification. All Wastewater mains (including stub-outs) shall end with a manhole. In "phased" projects pavement must be in place over stub-out runs minimum 5' past the end manhole.

(2) Drop Manholes - An exterior drop pipe shall be provided for a Wastewater run designed to enter a manhole at an invert elevation of 2.4' or more above the outgoing manhole channel invert. There is no limit on the length of an exterior drop pipe. No drop invert shall be in cone section of manhole. In cases where the elevation difference between the inverts is less than 1.8', a drop pipe is not required, but an interior drop channel shall be constructed to guide the flow into the outgoing channel. Manholes with a change in direction of flow of over 45 degrees and manholes with more than two (2) inverts shall have no greater than a 0.5' inside drop. No design should be submitted showing an incoming invert between 1.8 and 2.4' above the outgoing invert.

(3) Flow Channel - The manhole floor shall have a flow channel made to conform in shape and carrying capacity to that of the Wastewater pipes.

(4) Approved inflow protectors are required for all Wastewater manholes (Department and/or privately owned).

(5) Suppliers shall certify that calcareous aggregate is used in the manhole concrete mix (minimum CaCO₃ content: 65% in large aggregate, 50% in concrete screenings). Certification on the submitted shop drawings is acceptable.

(6) All new manholes, existing "tie-in" manholes and modified existing manholes shall be lined with an approved corrosion barrier system with inside manhole chimney sealant.

(7) A Fall Protection Device is required for the wet well top opening. The device must be installed by the manufacturer or by a Contractor licensed by the manufacturer.

(8) External Manhole Joint Seals must be applied between all precast manhole sections.

(i) Service Connections: A collector service connection may not be directed into a manhole, unless approved on the construction plans. This is permissible only if it is treated as a Wastewater main, i.e. provide elevation, precast hole and flow channel, and no reasonable alternative is available. No service connection shall be made within 5' of any manhole. Wastewater laterals shall be located a minimum of 5' from water services, hydrants, blow-offs, light poles, power poles, catch basins, walls, fountains or other structures. The allowable length of Department owned service laterals shall be kept to a minimum (generally, less than 75'). All service connections must be leak-free using same methods and materials as for main lines. Cleanouts shall be shown on plans at the property/right-of-way line or other required locations to limit the Department's maintenance and ownership responsibility. Cleanouts ending the Department's maintenance responsibility shall be installed a minimum of 3' from back of curb, edge of driveway/pavement. For cleanout installations within a non-exclusive utility easement paralleling a road right-of-way, the cleanout shall be located a maximum of 18" from the right-of-way line.

Unless otherwise specified, one cleanout at the property line is required for each Wastewater service main connection. An inspection of connection into the Department's Wastewater lateral is required prior to Service Activation.

At the time of gravity Wastewater main construction and inspection, the cleanout connection shall be marked with a wooden stake. The required cleanout shall be constructed per the Department's Typical Cleanout Installation Detail prior to water meter installation. Service connections shall be typically one size smaller than the wastewater main.

**REVISED VERSION OF UPAP SECTIONS
RECOMMENDED FOR CHANGE**

1.2.35 FIRE LINES

A dedicated Potable Water service line utilized to provide water for fire suppression systems:

(1) Residential Fire Lines:

(a) Single family home or duplex residential fire line as defined further in NFPA 13d. The Fire Marshall non-monitored system is connected to the Department's Potable Water System on the customer side of the primary potable water meter serving a dwelling unit. Single family homes with a NFPA 13d fire sprinkler system which would normally qualify for a 5/8" meter shall instead require a 1" meter, but will charged connection fees and guaranteed revenue fees in accordance with the rates established for a 5/8" meter. However, installation fees at the rate for a 1" meter will be assessed.

(b) Multi-Family fire lines are defined further in NFPR 13r. The Fire Marshall monitored system serving multiple residential units is connected to the Department's Potable Water System through a separate tie-in and properly sized, approved, testable above ground backflow prevention device.

(2) Non-Residential Fire Lines:

Fire lines serving any other structures as defined further in NFPA 13. The Fire Marshall monitored system serving non-residential structures is connected to the Department's Potable Water System through a separate tie-in and properly sized, approved, testable, above ground backflow prevention device.

2.3.1 ALL POTABLE WATER AND RECLAIMED WATER THROUGH METERS

Meters are required on all Potable Water and Reclaimed Water service connections irrespective of the size or nature of service. No property shall have access to or use of Potable or Reclaimed Water without delivery through a meter.

Meter sizes are 5/8" x 3/4", 1", 1 1/2", 2", 3", 4", 6" and larger as necessary. Many of the Department's fees are dependent upon meter size. It is the responsibility of the Customer to select the meter size that is appropriate for his expected demand. The Department will advise Customers regarding meter selection. However, the Department reserves the right to over-rule the Customer's selection if that selection is not compatible with the UPAP and/or reasonable expectations of service demand for the connection. Duplex or similar meter schemes (two one-inch meters in lieu of one two-inch meter) will not be permitted. Differing types of uses (i.e., single family residential, non-residential, multi-family) shall require separate meters. A separate water meter, however, is not required for laundry facilities serving only on-site multi-family tenants through a master-metered connection.

4.4.1 POTABLE WATER DESIGN

There shall be no physical connection between an active Potable Water supply and an unapproved water supply, or any reclaimed water, Wastewater or storm water system, which would allow unsafe water to enter, or backflow into the active Potable Water system by direct pressure, vacuum, gravity or any other means. All Potable Water services shall be in compliance with all applicable cross connection control regulations.

Design standards for Potable Water mains (WM) are as follows (Raw water mains shall be designed and constructed to Potable Water main standards):

(a) Minimum Cover: Finished grade over WM shall be 36" minimum and 60" maximum. All Potable Water transmission mains within major thoroughfare rights of way shall have full plan and profiles shown. Pipes shall be designed to be as level as possible to avoid high points. Reduced minimum cover requires prior approval.

(b) Horizontal Separation (Wall to Wall):

(1) 10' to buildings, exfiltration trenches, roof overhangs, canopies, walls, fountains, and other structures.

(2) 10' to Wastewater lines (Min. 6' may be approved in special cases)

(3) 10' to drainage pipes (Min. 3' may be approved in special cases).

(4) 4' to power poles, light poles and other public utility lines

(5) 3' to drainage structures and reclaimed water lines

(c) Vertical Separation:

(1) 12" separation between all pipes should be maintained. A minimum of 6" vertical separation is acceptable, however, if it is not possible to maintain 12" and if the water main crosses over a storm or Wastewater gravity main. When there is no alternative to the water main passing under a Wastewater main, and when the water main crosses over or under a reclaimed water main, or force main, a minimum of 12" vertical clearance shall be maintained.

(2) WM shall cross over other pipes unless not feasible.

(d) Layout:

(1) The Potable Water mains shall be looped unless otherwise not feasible. Multiple feed lines may be required at discretion of the Department. Dead ends shall be equipped with a blow-off for flushing purposes unless the Department determines that a nearby hydrant is sufficient.

(2) WM should be placed in ROWs whenever possible. Placement of WM on or adjacent to interior property lines or between structures is discouraged and will be approved only when unavoidable or when necessary for looping. Water mains shall not be placed in ditches, landscape buffers, wetlands, or storm water management areas unless specifically approved by the Department.

(3) Details of connections to existing facilities must be shown. A reverse tap due to pre-existing conditions is acceptable only if approved by the Department (detail drawing required).

(4) In order to facilitate Potable Water service for all properties within the service area, Potable Water mains shall be extended along the full length of all fronting boundaries of a property by the Developer/Owner requesting Potable Water service and may be required to be extended through the property if another is to be served in the future.

(5) Loop Potable Water main to existing Potable Water mains or leave provisions for looping or extension whenever possible. The mains in such instances shall end with a valve and plug. Water mains 16" and larger shall end with a teed off fire hydrant, inline valve and plug. The valve shall be mechanically restrained.

(6) Sample points as required by the Health Department must be shown on plans.

(e) Potable Water Main Material: Pressure Class Rated or Special Thickness Class Rated Cement Lined Ductile Iron Pipe (DIP) or C-900 Class 150 DR 18 PVC pipe (Color: Blue) shall be allowed for WM 12" diameter or smaller. The lining for DIP shall be factory applied in accordance with the manufacturer's specifications and shall be warranted by the pipe manufacturers. Unless specific approval is granted, no water main shall be encased in concrete. Potable Water mains shall be marked with one continuous strip of 6" wide magnetic blue coded tape imprinted with two (2) inch high lettering reading "Caution -

Potable Water Line Buried Below", and located approximately twelve (12) inches above the crown of the pipe. The wording shall occur every three (3) feet. Buried DIP smaller than 24" shall be painted with a 4" wide continuous blue line parallel to the axis of the pipe and that is located on top of pipe. Buried DIP 24" and larger shall have a 4" wide continuous blue line applied along each side of pipe as well as along the top of pipe. The coating shall be minimum 8 mils WFT, and minimum 3 mils DFT.

DIP shall be required in the following circumstances:

- (1) WM 16" in diameter or larger.
- (2) WM smaller than 6".
- (3) Within 10' of Wastewater/ storm/reclaimed water pipes.
- (4) Within 15' of structures, (near side of concrete footing), and top of bank of canals or lakes.
- (5) Crossings over Wastewater, reclaimed water and storm pipes with less than 12" separation with no joint within 10' of each other; crossings under any Wastewater, reclaimed water or storm pipe.
- (6) Jack and bores (mechanical joints with "Megalugs" or equal).
- (7) Potable Water mains for fire sprinkler system connections up to point of service.
- (8) Fire hydrant branches.
- (9) 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 in private property away from dedicated ROWs.
- (10) Flanged ductile iron pipe is required for exposed (not buried) installation.
- (11) Ductile iron pipe shall be polywrapped if buried closer than 10' to other underground iron/steel pipes if no other protection is provided.
- (12) Where required for locations with substandard separations to other piping systems.

(f) Potable Water Main Size: The WM shall be sized by the developer's engineer as required. The Department's Master Planning may require a greater diameter. An oversizing credit as defined in Chapter 3 may apply. Use the "Friction Coefficient Factor" $C=120$ for flow calculations and a peak instantaneous flow velocity of 3 feet per second to determine applicable credits. The minimum size of WM shall be 6". Four-inch (4") mains may be proposed for non-fire hydrant lines serving cul-de-sacs where additional development will not occur. The engineer may be required to demonstrate the adequacy of such sizing. In cases where the completion of gaps in the Potable Water systems to meet flow requirements of the development is necessary, the developer shall construct the required improvements. Delivered flows shall meet peak domestic requirements as mandated by State DEP plus fire flow as mandated by the Fire Marshall. Domestic average flows shall be based on 250 gpd per Equivalent Residential Connection with a 2.5 peaking factor. The residual pressure under these conditions shall not be less than 20 psi. Potable Water Main sizes shall conform to the latest Department Potable Water Master Plan.

g. 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 have mechanical joint or flanged ends and be of resilient seat design with 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.

Inline valves shall be installed for mains 16" and smaller near each side of a canal crossing and/or major road crossing.

In-line valves shall generally be installed at intervals no greater than 1,000 feet on transmission mains, at intervals of no greater than 700 LF on main distribution loops and feeders, and on all primary branches connected to these lines. In high-density areas, valves

shall be installed as necessary to minimize the number of persons affected by a break. In all instances, effectiveness of placement shall be primary criteria in determining valve location. Valves placed in curbs will not be accepted. All valves require lids and must be marked "water". All valves shall be numerically identified on construction drawings. Clearance of 18" or one pipe diameter, whichever is greater, shall be maintained between all fittings (bells, valves, saddles, 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 and caps shall have mechanical joint or flanged ends unless an approved flexible joint restraint system is used.

h. 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 for connections to existing un-restrained piping. 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 larger than 24" shall be restrained and pressure tested to 200 psi. If the restraint pipe length on a design deviates from the standard length listed herein in 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:

- The installation of flexible joint restraints must be witnessed by a Construction Coordinator.
- A copy of the material invoice must be available on the job site for review to confirm the shipment of restraining gaskets, etc.

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	8	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	48	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	128	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 #	23	-	-	-	-	-	-	-	-	-	-	
	6"X #	21	35	-	-	-	-	-	-	-	-	-	
	8"X #	18	34	47	-	-	-	-	-	-	-	-	
	10"X #	16	32	46	58	-	-	-	-	-	-	-	
	12"X #	13	30	44	57	69	-	-	-	-	-	-	
	16"X #	7	26	41	55	67	90	-	-	-	-	-	
	20"X #	1	21	38	52	65	88	109	-	-	-	-	
	24"X #	1	16	34	49	62	86	108	129	-	-	-	
	30"X #	1	8	28	44	58	83	106	127	208	-	-	
	36"X #	1	1	22	39	54	80	103	124	208	240	-	
	42"X #	1	1	15	33	49	77	100	122	205	239	270	
48"X #	1	1	7	27	44	73	97	120	203	238	269	298	
REDUCER (LARGER PIPE RESTRAINT)	6"X #	23	-	-	-	-	-	-	-	-	-	-	
	8"X #	38	25	-	-	-	-	-	-	-	-	-	
	10"X #	57	43	24	-	-	-	-	-	-	-	-	
	12"X #	72	60	44	41	-	-	-	-	-	-	-	
	16"X #	99	90	78	75	45	-	-	-	-	-	-	
	20"X #	123	116	107	105	81	45	-	-	-	-	-	
200psi	30"X #	209	204	197	188	177	153	116	75	-	-	-	
	36"X #	243	236	233	226	217	196	168	135	74	-	-	
	42"X #	273	270	265	259	252	234	211	183	133	72	-	
	48"X #	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.

Notes:

- The data in the above table are based upon the following installation conditions:
 Soil Type – Sand
 Test Pressure – 150 psi up to 24", 200 psi for pipes larger than 24".
 Depth of Bury – 3'
 Trench Type – 3
 Safety Factor – 1.5
 Vertical Off-Set – 3'
 Minimum pipe length along tee run – 5'
- The restrained pipe lengths apply to PVC pipe and DIP without polyethylene encasement.
- 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 and construction guide only. It is the Engineer's responsibility to justify and document any deviations from the pipe lengths specified in the above table.

(i) Fire Hydrants and Fire Sprinkler Systems: The appropriate Fire Marshall has final jurisdiction on all hydrant and fire sprinkler line requirements. A Fire Marshall approved plan is required with each first plan submission and with any revision that relocates a hydrant or a fire line connection. A University of Southern California (USC) approved above ground Double Check Detector Valve Assembly (DCDA) or Reduced Pressure Principle Detector Assembly (RPDA) shall be installed prior to Service Activation on all dedicated fire lines.

(1) Fire Hydrants - Fire hydrants shall be provided in all Potable Water distribution systems and shall have a 5-1/4" main valve. Fire hydrants shall be spaced such that the radius of protection will not be more than 300', or as approved by the Fire Marshall. Each hydrant shall be capable of delivering a minimum flow of 500 gallons per minute for residential areas, and 1500 gpm for non-residential areas (or a higher flow as required by the Fire Marshall), with a residual pressure of not less than 20 psi. Multiple fire hydrants with looped mains and/or larger main sizes may be required to provide water for higher flow demand. Flow tests shall be performed to verify the specified fire flow demand prior to final DEP certification.

Fire hydrant branches (from main to hydrant) shall not be less than 6" ID and be as short as possible to minimize any potential for a Potable Water main with no flow. Each branch shall be provided with a gate valve located as close as possible and restrained to the main. Hydrants shall be located minimum five feet from edge of road pavement with raised curbing and no less than three (3') feet from driveways with the pumper discharge nozzle facing the roadway. Hydrants shall be located so as to minimize their vulnerability to traffic. Bollards shall be shown on the design plans and installed where minimum distances cannot be met.

Fire hydrants shall be placed in an accessible, unobstructed location with 10' clearance in all directions. Fire hydrants shall be numerically identified on construction drawings. New private fire hydrants are not allowed and all new fire hydrants shall be owned and maintained by the Department. Existing privately owned dedicated fire hydrant lines shall be separated from Department owned water mains by a privately owned DCDA.

(2) Fire Sprinkler System Connections

(a) Residential fire sprinkler systems (NFPA type 13d). There shall be no separate service connection to the potable water system. The sprinkler system shall be connected to the domestic water service line on the customer side of the water meter. A minimum 1" water service line and a minimum 1" meter are required to assure adequate flow rate. As a minimum, an in-line check valve is required at the Point of Connection of the fire line into the domestic service line to prevent backflow. It is the property owner's responsibility to obtain any necessary permits and certifications for the fire sprinkler system.

(b) NFPA type 13r fire sprinkler systems. Fire sprinkler system branches shall be minimum 4" ductile iron pipe up to Point of Service. Closed dedicated fire sprinkler connections shall require as minimum backflow prevention device a double check detector assembly (DCDA). Sprinkler systems with pressure/storage tanks, booster pumps, chemical additive injection systems, and/or auxiliary water supply connections shall require reduced pressure principle detector assembly. Pressure testing and inspection of the Department's water distribution system shall be performed as a minimum up to the valve designated as the Point of Service (see Standard Detail). The Department shall perform the initial testing and certification of the backflow prevention assembly prior to Service Activation. All subsequent tests and certifications are the responsibility of the Property Owner. There shall be no pipe joints or any service connections between the point of fire service valve and first 90° bend leading up to the backflow prevention assembly. The design shall minimize any potential for Potable Water main with no flow.

The design and construction of privately owned fire lines shall conform to the applicable Fire Marshall standards pertaining to dedicated fire sprinkler systems (i.e., the installation of tamper switches and post indicator valves may be required).

(j) Potable Water Service Lines and Taps: Potable Water service taps on the main shall be spaced at a minimum distance of 18" apart. All service lines (pipe Schedule 40 PVC with Schedule 80 fittings) shall be installed in accordance with the construction details of this manual and shall have corporation stops. 1½" 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. The threaded area of a corporation stop shall be spiral wrapped with two wraps of Teflon tape. The corporation stop shall not be bottomed out (1-3 threads remain showing). A valve box shall be installed over all 2" corporation stops when located in paved areas. Compression (pack joint) style adapters shall be used for transition from brass valves and fittings to PVC pipes. No PVC male/female adapters shall be used. Services shall not exceed 100' to the meter. Services crossing under parking tracts shall have their meters placed prior to the crossing so that the Department is not responsible for these lines.

In developments where the property line is not clearly defined (condominiums and commercial), the meter shall be placed in a readily accessible location. Service lines under driveways and roadways shall be encased in minimum three (3) inch casing (black iron, PVC Schedule 40 or HDPE Pipe). Service taps under driveways and roadways shall be avoided 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.

Private services shall not cross Potable Water mains unless specifically identified on plans and approved by the Department. The Developer shall coordinate the installation of private service lines with location of meters to deliver Potable Water to the correct multi-family dwelling unit or bay and shall identify each to the Department. The water meter location shall match the site plan layout to eliminate service line crossings.

Wet Taps equal or larger than one half the pipe's diameter require a restrained ductile iron mechanical joint tapping sleeve. No size on size taps are permitted.

(k) Potable Water Meter Installation:

General requirement - Construction plans shall include a typical meter installation detail for each size meter to be installed. Service line and meter sizes must be shown on the plans. Dual metering of a single building service (i.e., two 1" meters instead of one 2" meter) shall not be permitted. The proper sizing of meters and service lines is the responsibility of the developer's engineer. Meters will be available in the following sizes only: 5/8" X 3/4", 1", 1-1/2", 2", 3", 4" and larger sizes as necessary. Meter boxes for 4" and smaller meters are standard. A bypass will be required for meters 1-1/2" and larger (see details).

All meter installation charges must be paid to the Department prior to installation, and all meters will be installed by the Department. All service piping, valves, lids, boxes and required backflow prevention assemblies/devices must be built in accordance to these standards prior to meter installation. Generally, the Department will not install services for meters 3" and larger.

The number of metered connections shall match the number of connections reserved. The meter location and layout shall be determined prior to plan approval. Commercial establishments with Grease Traps, Oil/Grease Interceptors and/or sand/oil interceptors shall be individually metered through the Department. Consideration shall be given to the plumbing system in master metered projects, so water and sewer service can be provided individually in the future, if so desired or required.

Water meter boxes:

- All meter boxes and lids shall display the manufacturer's name.
- All meter boxes shall display the date of manufacture.

- Ductile iron lids are required for all nonresidential 5/8" and 1" meter boxes, and all 5/8" and 1" meter boxes in non-grass area.
- Meter boxes shall have no "mouseholes"

Location requirement - Meters shall generally be set in grassy area generally at or near a common property line unless shown otherwise on approved plans.

Meter boxes for "zero lot line" properties shall be set in grass area as close as possible to a common property line. An installation detail shall be added to each plan sheet.

When no alternative is available, a meter will be allowed in paved area and:

- Top of box shall be flush with surface located outside of drainage flow lines (i.e., dry surface area).
- Meter box shall be placed out of a common traffic area. Bollards may be required under certain conditions.
- Meter box and lid shall meet the requirements for incidental traffic H-10 loading as established by AASHTO.
- A 12" thick compacted rock base (3/4" washed rock) shall be required under the meter box to prevent settlement. The base shall extend minimum 12" beyond the perimeter of the meter box.

Locations for meter boxes and control valves shall be selected to be accessible and provide the "minimum unobstructed space" shown on applicable details. Meter boxes shall be installed in grass areas whenever possible and shall not be installed in pedestrian walkways, driveways or inaccessible areas.

- Minimum 12" horizontal separation is required between front edge of electrical transformer pad or its projection and back edge of water meter box.
- The Developer and/or his representative shall be responsible for coordination of locations of services.
- Meter/service will not be installed/activated until:
 - (1) Driveway, sidewalk and/or form boards for same are in place.
 - (2) A Wastewater lateral connection inspection was conducted.
 - (3) "Minimum unobstructed space" is provided as shown on applicable details.
 - (4) The required backflow prevention assembly/device is installed and has passed the initial testing (if applicable).
 - (5) A signoff from the applicable Building Department has been obtained for a residential fire line (NFPA Type 13d).
- Minimum 5' horizontal separation is required between Potable Water service line and Wastewater lateral.
- Please note that 1" meters are required for services with NFPA Type 13d residential fire lines.

Meters shall not be placed in areas that can be fenced, such as backyards, under any circumstances.

Double boxes shall be used whenever possible for 5/8" X 3/4" meters with 3/4" fittings on or as close as possible to a common property line.

In cases where Potable Water, reclaimed water and Wastewater lines have been constructed and a developer replatted the development or relocated structures, the Department shall require that 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 3 feet laterally. Any adjustments/reconstruction shall be regarded as having to meet all new construction requirements.

(l) Backflow Prevention Assemblies/Devices for New Potable Water Services: Backflow Prevention Assemblies/Devices shall be provided on all projects for prevention and control of cross-connections. All nonresidential services, services for buildings with more than three stories, and services with 1-1/2" meters or larger shall have a Reduced Pressure Principle Backflow Prevention Assembly. Residential Dual Check Valves (rdc) are required as a minimum for all new residential Potable Water meters 1" and smaller and for existing residential Potable Water services with master metered reclaimed water service. All Potable Water services with individually metered reclaimed water service shall have a Reduced Pressure Principle Backflow Prevention Assembly. There shall be no service connection between the Backflow Prevention Assembly/Device and meter assembly.

All applicable Backflow Prevention Assemblies/Devices must be installed by the Developer/Customer prior to Potable Water meter installation. The installation of the assembly/device must follow the manufacturer's guidelines. The assembly/device must be easily accessible and have a minimum of 3' clear space around it. The assembly/device shall be located as close as possible to the Point of Service. The testable Reduced Pressure Principle Backflow Prevention Assembly will remain the property of the Customer, who shall also be responsible for installation, operation, maintenance, and testing of the assembly following Service Activation. Multiple parallel installed backflow prevention devices shall be designed for potable water connections where service continuity is of utmost importance (for example: schools, treatment plants, etc). For additional information about application and acceptable Backflow Prevention Assemblies/Devices see Chapter 7 of the Department's Uniform Policies and Procedures Manual. In cases where a Reduced Pressure Principle Assembly or Double Check Valve Detector Assembly type backflow preventer is required, the Department shall perform the initial testing of the assembly and certify the installation for compliance.

4.5.1 WASTEWATER SYSTEM DESIGN

Department and privately owned gravity Wastewater collection systems, pump stations, and force mains shall be designed to deliver peak flows under the following conditions:

(a) Flow: Wastewater systems shall be designed on the basis of an average per capita daily flow of not less than 100 gallons and an average domestic flow of no less than 200 gpd per Equivalent Residential Connection. On that basis, lateral Wastewater piping shall be designed with capacities when running full of not less than four times the average flow. Trunk lines shall have capacities under the same conditions of not less than 2.5 times the average flow. Special flow assumptions shall be made in each case for Wastewater from commercial and industrial sites. For proposed projects connecting to existing gravity sewer system, the Department may require the Property Owner to design and construct, at no cost to Department, upgrades to existing lift station(s) serving the gravity system. The upgrades may include new pumps, control panel, valves, RTU, an emergency generator, corrosion barrier system, driveway and fence replacement, etc.

No person shall connect or cause to connect any roof downspout, exterior foundation drain, areaway drain, or other source of surface runoff or groundwater to a building Wastewater service line or building drain which in turn is connected directly or indirectly to the PBCWUDWWS without prior approval by the Department. Floor Drains in rooms with Generators or other equipment with a possibility of a fuel spill shall not be connected directly into the sanitary sewer system. Dumpster pads or can wash pads with floor drains connecting to the Department's Wastewater collection system shall be designed to minimize surface runoff and to minimize solids to enter into the drain. The pad shall consist of a small-elevated area with the surrounding area to drain away from the pad. The drain shall be equipped with a removable cap or plug. The drain shall be connected to a Department approved Grease Trap or Oil/Grease Interceptor (OGI) for pretreatment prior to discharge into the Department's Wastewater collection system.

Industrial Wastewater from service station wash-racks, lubrication racks, car wash, repair shops or other commercial facility and shop floor drains shall not be connected into the

Wastewater collection system without pre-treatment through an adequately-sized Sand/Oil Interceptor (SOI) specifically approved by the Department. The residual Wastewater shall be disposed of separately by the owner. No toxic, hazardous or discharge deleterious to the Wastewater system shall be allowed to be discharged without a WUD approved pre-treatment program. Generally, no cooling tower water shall be discharged into the sanitary sewer system. This will also include any diluting of discharge other than that which meets pre-treatment standards. Wastewater dumping stations are not allowed to be connected (directly or indirectly) to the Department's Wastewater Collection System.

Each commercial facility where foods are prepared, processed or served and which generate grease laden waste such as restaurants, hotel kitchens, hospitals, school kitchens, bars, factory cafeterias, clubs, clubhouses, food take out places, bakeries, stores with food departments, etc., must include in the plumbing system design a pretreatment assembly. The assembly shall conform to the applicable Plumbing Code and may consist of a flow control device, a Solids Interceptor and a Grease Trap or Oil/Grease Interceptor capable to limit the grease discharge to approximately 100 ppm.

The design, sizing and installation of Grease Traps shall conform to the Standard PDI-G101 published by the Plumbing and Drainage Institute, and all other applicable rules and regulations. For the purpose of installation of Grease Traps within PBCWUD Service Area, the device shall be PDI certified as a "PDI Size 50" and utilized for a Maximum Flow Rate of 25 gpm. The Maximum Total Flow Rate for each commercial facility shall be determined using the "PDI Sizing Method". The Grease Trap shall be gas and water tight with non-skid heavy duty cover (minimum 10,000 lbs. load rating). If the "Maximum Flow Rate" exceeds 25 gpm, a full size Oil/Grease Interceptor (minimum capacity 750 Gallon) will be required. The Oil/Grease Interceptor shall be sized, designed and constructed in accordance with this Standard and all applicable State, Building Code and Health Department regulations, including but not limited to FAC Chapter 10D-6.

The Design of the pretreatment assembly shall be the responsibility of the Owner. The Owner shall submit a signed and sealed copy of the flow calculations prior to Service Initiation.

The Model number, capacity and the manufacturer's name of the Grease Trap or Interceptors shall be shown on the utility record drawings. The Grease Trap Interceptor shall be located outside of buildings, preferably in grass areas, minimum 10' from any Department owned facility, but not in traffic areas, parking spaces, walkways or storm retention areas. The rim elevation of the access point shall be designed to prevent any storm water inflow.

The Owner shall operate and maintain the devices as required to insure optimum performance and to comply with the Department's discharge parameters.

(b) Size and Layout: The minimum allowable size for any Wastewater gravity main other than house service connection shall be 8" in diameter. See detail sheets for service laterals. Upsizing of Wastewater lines to reduce slopes will not be permitted unless justified by calculated flow. In order to facilitate Wastewater service for all properties within the service area, Wastewater gravity mains and force mains shall generally be extended along the full length of all fronting boundaries of a property by the Developer/Owner requesting Wastewater service, and may be required to be extended through the property if another is to be served in the future.

The cost associated with upsizing or additional depth beyond the development required sizes may be subject to a credit as defined in Chapter 3. Wastewater gravity mains shall not be placed in ditches, wetlands or stormwater management areas unless specifically approved.

(c) Slopes: All gravity Wastewater lines shall be designed with hydraulic slopes sufficient to give mean velocities, when flowing full or half full, of not less than 2 feet per second nor more than 5 feet per second, based on an acceptable equation. Slopes shall be calculated using the distance from centerline of manhole to centerline of manhole.

The following minimum grades will be used for design:

8" gravity mains 0.42%

10" gravity mains 0.28%

12" gravity mains 0.22%

A 0.1 foot drop inside the manholes may be used to reduce the minimum slope for an 8" gravity Wastewater from 0.42% to 0.40%. Note: Maximum 2% slope is allowed for 8" pipe.

(d) Increasing Size: When Wastewater collection lines are increased in size, or when a smaller line joins a larger one, the invert of the larger pipe should be lowered sufficiently to maintain the same energy gradient.

(e) Alignment: Wastewater collection lines of all sizes shall be designed with uniform slope and alignment between manholes. A 15' distance shall be maintained from top of bank of canals, lakes and structures, unless unavoidable, in which case 10' shall be maintained with DIP. A minimum 10 feet horizontal separation is required to the edge of drainage fabric in exfiltration trenches.

(f) Pipe Material: Polyvinyl Chloride (PVC) ASTM 3034 SDR 26 with PVC SDR 35 fittings and epoxy lined Ductile Iron Pipe (DIP) shall be acceptable pipe material for gravity Wastewater lines. Unless specific approval is granted, no gravity Wastewater line shall be encased in concrete. PVC gravity lines within Wellfield Zones 1 and 2 shall be C900, DR-18. The lining for DIP shall be factory applied in accordance with the manufacturer's recommendations and shall be warranted by the pipe manufacturer. DIP shall be specified in the following circumstances:

(1) Anytime a Wastewater line passes under any other pipe with less than 18" clearance. (No joint within 10' of crossing Potable Water/reclaimed water/storm water lines.)

(2) When a Wastewater line passes over any potable/reclaimed water main regardless of separation and over other pipe with less than 18" clearance. (No joint within 10' of crossing potable/reclaimed water/storm water lines.)

(3) When there is less than 4' from finish surface to the invert of the pipe. Four and one half (4 1/2) feet to invert shall be the standard design depth. Less depth will not be accepted unless it is unavoidable and has prior Department approval.

(4) Any time the Wastewater line is separated horizontally (wall to wall) from a Potable Water main by less than 10' or Department owned reclaimed water main by less than 5'.

(5) When the Wastewater line is placed out of a right-of-way, between buildings, along property lines, or in extensive areas potentially subject to landscaping, or is not under pavement. (PVC pipe will be considered on a case-by-case basis.)

(6) The last run of gravity from manhole into a wet well.

(7) Ductile iron pipe shall be polywrapped if buried closer than 10' to other underground iron/steel pipes and if no other protection is provided.

(8) Minimum 5' length of DIP from each cored invert (i.e., not precasted by manhole manufacturer). See Standard Manhole Detail.

(g) Wastewater Lines in Wellfields: New or replacement installation of gravity Wastewater lines in protected zones of a public drinking water wellfield shall be constructed to force main standards. See Part C of this section for specific construction materials and testing requirements.

(h) Manholes:

(1) Location - Manholes shall be installed at the end of each Wastewater system, at every change in grade, size or alignment, at all gravity Wastewater main intersections, and at distances not greater than 400' apart unless prior approval is obtained from the Department for a distance greater than 400'. Gravity Wastewater mains shall have no less than a 90° angle to direction of flow between runs. Manholes shall be placed in accessible locations, preferably in pavement, always flush to the surface. Manholes in roadway pavement shall not be located in wheel paths (i.e. structures shall be located centered in the travel lane, crown of road, paved shoulder or off the pavement). Manholes in designated parking spaces or other inaccessible locations will not be approved. A concrete collar shall be placed around manholes in grassed areas. The design depth of the manhole from rim elevation to invert elevation shall be no less than 4.5' and no more than 16', unless specifically approved by the Department prior to initial plan submittal. The Developer/Property Owner shall videotape gravity mains deeper than 16' and corresponding laterals prior to Wastewater system certification. All Wastewater mains (including stub-outs) shall end with a manhole. In "phased" projects pavement must be in place over stub-out runs minimum 5' past the end manhole.

(2) Drop Manholes - An exterior drop pipe shall be provided for a Wastewater run designed to enter a manhole at an invert elevation of 2.4' or more above the outgoing manhole channel invert. There is no limit on the length of an exterior drop pipe. No drop invert shall be in cone section of manhole. In cases where the elevation difference between the inverts is less than 1.8', a drop pipe is not required, but an interior drop channel shall be constructed to guide the flow into the outgoing channel. Manholes with a change in direction of flow of over 45 degrees and manholes with more than two (2) inverts shall have no greater than a 0.5' inside drop. No design should be submitted showing an incoming invert between 1.8 and 2.4' above the outgoing invert.

(3) Flow Channel - The manhole floor shall have a flow channel made to conform in shape and carrying capacity to that of the Wastewater pipes.

(4) Approved inflow protectors are required for all Wastewater manholes (Department and/or privately owned).

(5) Suppliers shall certify that calcareous aggregate is used in the manhole concrete mix (minimum CaCO₃ content: 65% in large aggregate, 50% in concrete screenings). Certification on the submitted shop drawings is acceptable.

(6) All new manholes, existing "tie-in" manholes and modified existing manholes shall be lined with an approved corrosion barrier system with inside manhole chimney sealant.

(7) A Fall Protection Device is required for the wet well top opening. The device must be installed by the manufacturer or by a Contractor licensed by the manufacturer.

(8) External Manhole Joint Seals must be applied between all precast manhole sections.

(i) Service Connections: A collector service connection may not be directed into a manhole, unless approved on the construction plans. This is permissible only if it is treated as a Wastewater main, i.e. provide elevation, precast hole and flow channel, and no reasonable alternative is available. No service connection shall be made within 5' of any manhole. Wastewater laterals shall be located a minimum of 5' from water services, hydrants, blow-offs, light poles, power poles, catch basins, walls, fountains or other structures. The allowable length of Department owned service laterals shall be kept to a minimum (generally, less than 75'). All service connections must be leak-free using same methods and materials as for main lines. Cleanouts shall be shown on plans at the property/right-of-way line or other required locations to limit the Department's maintenance and ownership responsibility. Cleanouts ending the Department's maintenance responsibility shall be installed a minimum of 3' from back of curb, edge of driveway/pavement. For cleanout installations within a non-exclusive utility easement paralleling a road right-of-way, the cleanout shall be located a maximum of 18" from the right-of-way line.

Unless otherwise specified, one cleanout at the property line is required for each Wastewater service main connection. An inspection of connection into the Department's Wastewater lateral is required prior to Service Activation.

At the time of gravity Wastewater main construction and inspection, the cleanout connection shall be marked with a wooden stake. The required cleanout shall be constructed per the Department's Typical Cleanout Installation Detail prior to water meter installation. Service connections shall be typically one size smaller than the wastewater main.