PART 2: UTILITY DESIGN CRITERIA AND CONSTRUCTION STANDARDS

I. UTILITY EXTENSIONS

A. GENERAL

The following provides a means by which the City of Bartow's utility systems may be connected to or extended. In general, developers are responsible for all cost and installation of utility systems within and adjacent to the proposed development, except for portions of individually metered service installations. Developments connecting to the City's utility systems that are not within the incorporated limits of the City of Bartow shall be designed in accordance with the provisions of the City's Infrastructure Development Standards.

B. PROCEDURES FOR REQUESTING UTILITY SERVICE

The extension of City of Bartow utility services to properties lying outside and either contiguous or non-contiguous to the corporate limits of the City of Bartow shall be considered by the City Manager. The following procedure shall be utilized in all applications for utility service:

1. In order to initiate the request, the petitioner should contact the Public Works Director and provide the following information in order for the City Administration to properly evaluate the request:

    a. A project location map and complete legal description of the subject property.

    b. Proof of ownership (e.g. a copy of deed to property site).

    c. A comprehensive, itemized breakdown of the proposed land use intended for the subject site.

    d. An estimate of the daily water and wastewater demands of the subject property. Unit consumption/generation rates shall be in accordance with City standards unless the developer can provide evidence that other consumption/generation rates would be more appropriate.

2. The Public Works Director will require at least ten (10) working days to consider the request for utility service for noncontiguous properties.

3. The petitioner must execute a "Petition for Utility Service" before the City Manager, will consider the request. The execution of a "Petition for Utility Service" obligates the developer to construct the utility system in compliance with certain conditions:

    a. All utilities construction within the subject property shall be in conformance with all applicable City codes, specifications, and requirements.

    b. All costs associated with the extension of City of Bartow utility services to the subject property are to be made at no expense to the City of Bartow, except as provided below for over-sizing.

4. Prior to the City's approval of any application to provide water and/or sewer utility services to a location outside the city limits, the owner(s) of property to be served shall:

   a. Properly execute at the time of application for utility service, a nonrevocable, recordable petition to annex into the city at such time as the property becomes eligible for annexation pursuant to Florida Statutes.

   b. If the property is contiguous to current City limits, pay to the city at the time of such application the prevailing fees charged by the city relating to annexation which shall include, without limitation, fees to amend the future land use and zoning maps. The city clerk shall have the petition to annex duly recorded in the public records of Polk County, Florida, whereupon the petition shall constitute public notice of the matters reflected therein and bind all future owners to terms of the petition.

C. RESPONSIBILITY FOR INSTALLATION:

1. The developer shall be totally responsible for all installation costs within and/or adjacent to his property and all costs incurred except for that cost previously agreed upon by the City as the City's oversizing cost (See Section D) and except as noted below.

2. The City may elect to install any extension of the utility system required from existing facilities to the development on a joint participation agreement, requiring the developer to reimburse the City for the cost incurred by the City or may require the developer to provide the entire installation at his expense. Any portion of the facilities to be installed or materials supplied by the City must be labeled as such on the plans.

3. Where an extension will benefit other property owners and/or developments, the City may consider the following options for line extensions:

   a. The developer may prepay the entire cost of the extension. The developer will be reimbursed using line extension fees collected from other users connecting to the line within a ten-year period. Such reimbursement shall be up to 100% of the certified cost of the extension less the developer's proportionate share of the cost of the extension. A Development Agreement shall be executed between the City of Bartow and the development to address the procedure for which the reimbursement shall occur. The City Manager shall have the authority to execute the Development Agreement on behalf of the City of Bartow provided that the terms and conditions of the agreement do not deviate from other City codes or regulations that may apply.

   b. The City may pay the cost of the extension if a letter of credit or other acceptable collateral is provided by the developer guaranteeing the City reimbursement of the entire cost of the extension over the subsequent ten-year period.

4. Ninety percent of all line extension fees (excluding the developer's proportionate share of the cost of the extension) will be credited to the developer's debt for a ~~five~~

ten-year period. Said ten-year period commences at the time of final acceptance of the extension by the City. These extension fees are in addition to usual impact fees and connection fees as provided for in the Code of Ordinances of the City of Bartow.

5. All line extensions will be of the City's minimum size or greater if needed by the developer.

6. Where it is deemed by the City to be more feasible to serve a development with a new water or wastewater facility rather than by extending existing City utilities, developer shall be responsible for the cost of constructing the required facilities. Water and/or wastewater treatment plants may be designed by the Developer's Engineer in accordance with City standard details and specifications and requirements of the City. Where desired, the City may require over sizing of the facility and reimburse the developer in accordance with the following procedures.

D. OVERSIZING OF UTILITIES EXTENSIONS

1. The City may, at its discretion, require the oversizing of utility lines, lift stations, and/or other utility facilities to benefit the overall utility system.

2. Where the City elects to oversize any utility line, lift station, or other utility facility, the City shall reimburse the developer for the documented cost differential directly attributable to oversizing or additional facilities of benefit only to the City. The determination of that portion of the extension cost paid by the City shall be made from a minimum of three (3) bids, submitted for evaluation by the City.

II. SANITARY SEWERAGE

A. Where the City determines that public sanitary sewers are feasible, such sewers shall be installed by the City or its agents at the expense of the developer or by the developer to City specifications and design standards and under City supervision.

B. Where the City is unable to provide public sanitary sewers, private septic tanks will be permitted only if approved by the Department of Health. Where a private sewerage plant is proposed, it must be approved by the FDEP and the City. Any such private sewerage plant shall be designed as an extended aeration facility in accordance with FDEP and Ten State standards. Plants shall be sized according to the below sewerage flows:

SEWAGE FLOW ESTIMATE TABLE
AVERAGE DAILY FLOW (ADF)

TYPE OF ESTABLISHMENT	ESTIMATED SEWAGE FLOW
Single Family Residences	350 GPD/residence
Apartments, Condominiums & Mobile Home Parks (includes all types of permanent dwelling units):	
1 bedroom	150 GPD/unit
2 bedrooms & duplex	250 GPD/unit
3 & more bedrooms	350 GPD/unit
Car Washes	4.78 GPD/sq. ft.
Service Stations	1000 GPD/first bay & 500 GPD each additional bay
Laundromats	400 GPD/machine
Restaurants:	
Drive In (Parking only)	20 GPD/car space
Drive In (Parking & seating)	40 GPD/car space & seat
Conventional Restaurant	70 GPD/seat
24 Hour Restaurant	100 GPD/seat
Clubs:	
Country or Golf Clubs	66 GPD/member
Swimming Club or Pools	17 GPD/member
Boating Club	11 GPD/member
Barber Shops	55 GPD/chair
Beauty Salons	270 GPD/chair
Tourist Campgrounds & Recreational Vehicle Parks:	
With Central Facilities	100 GPD/space
With Individual Facilities	150 GPD/space
Motels (no food service)	100 GPD/unit
Cocktail Lounges	40 GPD/seat
Elementary Schools	15 GPD/pupil
High Schools	20 GPD/pupil
Hospitals (no resident personnel)	200 GPD/bed
Nursing & Rest Homes	100 GPD/person

TYPE OF ESTABLISHMENT	ESTIMATED SEWAGE FLOW
Institutions (resident)	100 GPD/person
Factories (no showers – no industrial waste)	25 GPD/employee/shift
Factories (with showers - no industrial waste)	35 GPD/employee/shift
Youth & Recreation Camps	50 GPD/camper
Assembly Hall, Auditoriums (no food service)	3 GPD/seat
Vacation Cottage	50 GPD/person
Churches	3-5 GPD/seat
Shopping Centers including Department Stores without food service or laundries	0.16 GPD/sq. ft.
Office Building:	
General Offices	0.14 GPD/sq. ft.
Medical Offices	0.62 GPD/sq. ft.
Warehouse (without showers)	100 GPD/water closet
Warehouse (with showers)	200 GPD/water closet
Bowling Alleys (no food service)	75 GPD/lane
Light Industrial Parks	3000 GPD/acre
Heavy Industry Flow to be based on type of facilities	
Stadiums, Frontons, Ball Parks, etc.	3 GPD/seat
Theaters:	
Drive-in	5 GPD/car space
Indoor	5 GPD/seat
Boarding Schools	75 GPD/pupil

C. In the event that septic tanks or private sewerage plants are permitted in areas where public sanitary sewers are planned for later extension, such systems shall be located in such a manner as to facilitate later connection with public systems. All such private systems shall be required to connect to the City public system when the public system is within 600 feet, measured along public rights-of-way, of the private system.

D. All improvements as stated above shall be subject to approval of appropriate State agencies regarding minimum standards for guidance on sewerage and subdivision development.

III. WATER: DOMESTIC AND FIRE PROTECTION.

A. All residential and nonresidential structures in subdivisions shall be connected to a public water supply.

B. The City's latest standard details shall be minimum standards for guidance on constructing water lines. Fire hydrants shall be not more than 700 feet apart and no home shall be more than 350 feet from a fire hydrant measured along public rights-of-way in residential areas, or as may be determined by the Fire Chief. Fire hydrant spacing shall be decreased to 600 feet or a radius of not more than 300 feet apart along public rights-of-way or private drives within residential developments other than single family detached dwellings. All fire hydrants shall be serviced by not less than 6 inch water mains or lines.

C. For nonresidential construction and development orders, all development shall be required to provide at developers expense, fire hydrants at a maximum of 300 feet separation, measured along the public right-of-way.

PART 3: LIFT STATION POLICY

I. MAINTENANCE RESPONSIBILITY

A. INTENT

1. To better manage the expansion of the City's wastewater service area, the City has established a policy relevant to the maintenance responsibility for wastewater pump stations. This policy is intended to encourage developers to plan the expansion of wastewater systems in an orderly fashion and to limit the number of pump stations that are to be maintained by the City.

2. In order for the City to consider accepting the maintenance responsibility for a wastewater pump station, the following minimum requirements must be met:

   a. The pump station site must be accessible by a paved road (minimum 12' wide).

   b. The pump station site and force main easements, as required, must be dedicated to the City.

   c. The pump station pumps and motors must be of a make, size, and specification approved by the City Utilities Department.

   d. The development must generate a minimum average wastewater flow of 5,000 gallons per day.

   e. Where the sizing of the pump station pumps and motors is dependent upon the pump station serving future phases of development, either on or off-site, then the developer must sufficiently document this future flow and provide a reasonable time frame for this additional capacity to be required of the station.

   f. The design and construction of the pump station and the wastewater force main shall be approved by the City Water/Wastewater Director and Public Works Director.

   g. If required, the lift station shall be provided with either of the following:

      (1) An emergency generator, permanently installed, of sufficient size to operate all pumps and equipment. The generator shall be of a make and model approved by the City, and shall be provided with a UL approved fuel tank (belly tanks preferred) and a sound-attenuating enclosure. Fuel tank shall be large enough to provide a minimum operating time of 60 hours at 75% load. Residential grade or quieter mufflers shall be utilized. Generator shall be sized based on "standby" criteria. Automatic transfer switches shall be provided, with an auto exercise feature.

      (2) A diesel-powered, self-priming standby pump, permanently installed, with permanent connections to both the wet well and the discharge piping. Pump shall be sized for the peak design flow

rate for the lift station. The pump shall be as manufactured by Godwin Pumps, Acme Dynamics, or City-approved equal. Fuel tanks shall be UL approved and shall be sized to provide a minimum operating time of 60 hours. Residential grade or quieter mufflers shall be utilized, and a sound-attenuating enclosure provided. Provide auto-start controller.

3. If the above conditions can not be met, then the maintenance responsibility for the operation of the pump station shall remain private.

4. The pumping rate of any pump station, whether privately- or publicly-maintained, shall be restricted, as nearly as possible, to the theoretical peak flow of the gravity collection system which drains to the pump station.

5. Manifolded force mains, where multiple lift stations pump into a common force main, shall not be allowed unless approved by the City. The City may request hydraulic analyses from the developer documenting the effect of the manifolded pump stations. Such analyses shall be performed using KYPIPE, or other approved program, and shall include all potential scenarios of pump operation.

PART 6: DETAILED SPECIFICATIONS - WATER SYSTEMS

I. GENERAL

A. Contractor shall furnish all labor, equipment, and materials and shall perform all operations in connection with installation of a complete water distribution system ready for use in accordance with the specifications and the City's requirements, either specific or implied. This includes any and all restoration required to duplicate original site conditions prior to the commencement of construction. All excavation, trenching, and backfill for the installation of underground piping systems shall be conducted as specified hereunder.

II. SUBMITTALS

A. Two (2) copies of shop drawings shall be submitted to the City for review on any materials which are requested as a substitute for previously approved materials. The City retains the right to refuse any proposed substitution.

III. MINIMUM LINE SIZE

A. All new water mains shall be a minimum of eight (8) inches in diameter. Where there is no possibility of a future extension, the water main size may be reduced, at the City Public Works Director's discretion.

IV. LOOPING OF DISTRIBUTION SYSTEM

A. It is the City's policy that all new water lines shall be looped to minimize dead-end conditions and the need for flushing of the system. Wherever possible, lines shall be looped to provide at least two points of connection to the existing system. Where this is not feasible, as determined by the City staff, then easements and/or rights-of-way shall be provided to facilitate looping as future construction allows.

V. PRODUCTS

A. All materials shall be new, of first quality, manufactured in the United States, and shall conform to the appropriate AWWA standard, latest revision.

B. All components in contact with potable water shall conform to NSF Standard 61, and shall be appropriately certified.

C. All fittings and materials shall be inspected by the City Public Works Department after delivery and prior to being installed.

D. Ductile Iron Pipe

1. Shall comply with the requirements of ANSI A21.50-81 (AWWA C150-81).

2. All underground pipe shall be a minimum of Pressure Class 150 with push-on or mechanical joints, unless otherwise indicated. Where cover exceeds 4.5', the pipe manufacturer shall determine the additional wall thickness required, if any. All aboveground pipe to be Class 53 with flanged joints.

3. Bolts for all flanged and mechanical joints shall be high strength, low allow steel bolts only, meeting the current provisions of AWWA C111. Bolt manufacturer's certification of compliance must accompany each shipment, with copy to City.

4. Pipe manufacturing shall be in accordance with ANSI A21.51-81 (AWWA C151-81).

5. Pipe shall be cement lined/bituminous coated in accordance with ANSI A21.4-71 (AWWA C104-71).

E. Polyvinyl Chloride (PVC) Pipe

1. Six (6) inches diameter to twelve (12) inches diameter shall be Class 150 pipe meeting the requirements of AWWA C-900 with a DR of 18.

2. PVC pipe larger than 12 inches shall meet the requirements of AWWA C-905, with a cast iron pipe outside diameter. Pipe shall have a pressure rating of 165 psi, and shall have a DR of 25.

3. Each length shall be clearly labeled so as to allow identification and specification conformance. Pipe shall bear the National Sanitation Foundation Seal for potable water pipe.

4. All PVC pipe shall be blue in color or bear an acceptable indelible blue marking in three (3) locations for the length of the pipe.

5. Connection for PVC water pipe two (2) inches and larger shall be rubber compression ring type. Bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM D-1869.

6. PVC water pipe two (2) inches diameter and smaller shall conform to ASTM-2241 with an SDR of 21.

7. Trace wire shall be 14-gauge UF wire with joint seal and blue insulation.

F. Fittings

1. All fittings shall be rated for not less than 150 psi working pressure.

2. Grade for ductile-iron fittings shall conform with ANSI/AWWA Standard C110-77 or ANSI/AWWA C111/A21.11-80, and shall be cement lined inside and bituminous coated outside. Mechanical joint ductile-iron fittings complying with AWWA C153 are acceptable.

3. Bolts for all flanged and mechanical joints shall be high strength, low allow steel bolts only, meeting the current provisions of AWWA C11. Bolt manufacturer's certification of compliance must accompany each shipment, with copy to City.

4. Malleable iron fittings shall be galvanized conforming to the applicable provision of Federal Specification WW-P-521D, Type II, and may be used in sizes two (2) inches and under only.

5. Polyvinyl chloride (PVC) fittings shall be minimum Schedule 40 and may be used in size two (2) inches and under only.

G. Gate Valves

1. Gate valves larger than two (2) inches shall be of the resilient wedge type and shall be in accordance with ANSI/AWWA C509 (latest edition) with O-ring type stem seal and two (2) inch square operating nut for buried services. Gate valves for above-ground service shall be outside screw and yoke (OS&Y), rising stem type with cast iron hand wheels. Valves shall be mechanical joint unless otherwise noted and open left (counter clockwise). Valves shall have a fusion-bonded epoxy lining complying with AWWA C-550.

2. Gate valves two (2) inches and under shall conform with Federal Specifications WW-V-54, Type II, solid wedge disc, rising stem, secured joints and of bronze construction. Valves shall have malleable iron hand wheels.

3. All valves shall be American made, minimum 150 psi cold water rated and shall be cast with manufacturer's name and pressure rating. All exposed studs, bolts, nuts and fasteners shall be stainless steel.

H. Valve Boxes

1. Boxes shall be cast iron of standard design with adjustable drop section to fit disc or cover over valve. Interior diameter shall be not less than five (5) inches, with cast iron cover marked "WATER" and set in 24" square or round concrete pad 8" thick. Top of the pad shall be flush with finish grade.

I. Fire Hydrants - Shall be in compliance with ANSI/AWWA C502 and the following requirements:

1. Dry barrel compression type.

2. O-ring seal at operating nut stem and means for lubrication.

3. Traffic model with frangible sections at ground line.

4. Open left (counter clockwise).

5. Two 2-1/2 inch hose nozzles and one 4-1/2 inch pump nozzle with National Standard threads.

6. Main valve openings shall be not less than 5-1/4 inches.
7. Paint shall be one (1) coat primer and two (2) coats finish to match City standard.

8. Pipe outlet shall be six (6) inch mechanical joint.

9. Operating nut shall be pentagonal measuring 1-1/2 inch point to flat.

10. Hydrant interior shall be fusion-bond lined in accordance with AWWA C-550.

11. All exposed bolts, nuts and fasteners shall be stainless steel.

12. All hydrant leads shall be valved.

13. All hydrants shall be installed plumb and in true alignment with the connection pipe to the water main. A minimum of 18" clearance shall be provided between hose nozzles and finish grade. Pump nozzle shall face roadway.

J. Steel Pipe Sleeves and Carrier Pipe - Steel casing pipe shall conform to AWWA C-200 and shall be coated inside and out with coal tar epoxy. All construction projects requiring steel sleeves shall conform to the minimum D.O.T. requirements for roadway crossings. Railroad crossings shall conform to railroad requirements. The following casing sizes shall be used for the corresponding carrier pipes:

CARRIER PIPE (Normal O.D.)	STEEL CASING (Required Dia.)
4"	10"
6"	12"
8"	16"
10"	18"
12"	24"
16"	30"
20"	36"

K. Air-Vacuum Valves - shall be approved on a case-by-case basis.

L. Tapping Saddles & Tapping Valve - All connections to the existing City system shall be made by the developer at his expense.

M. All meter boxes shall be supplied and installed by the developer. Meter boxes 3" and larger shall be installed by the contractor and shall conform to approved City standards. All meters on commercial accounts shall be installed on risers along with City approved backflow devices. All shop drawings shall be reviewed and approved by the City's Public Works Director.

N. Thrust Restraints

1. All mechanical joint fittings shall be restrained with retainer glands and pre-cast thrust blocks in accordance with City requirements. Where indicated, pipe joints shall be restrained.

2. Retainer Glands for Fittings on PVC Pipe: Where PVC pipe is being connected to mechanical joint fittings, retainer glands shall be Ebaa Megalug Series 2000PV. Retainer glands shall be designed to meet Uni-Bell Standard "Uni-B-13". The restraint mechanism shall consist of a plurality of individually activated gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to AWWA C-111 and C-153. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuation of restraining devices. The retaining gland shall have a pressure rating equal to that of the PVC pipe on which it is used.

3. Retainer Glands for Fittings on Ductile Iron Pipe: Where ductile iron pipe is being connected to mechanical joint fittings, retainer glands shall be Ebaa Megalug Series 1100. Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts a multiple wedging action against the pipe, increasing its resistance as pressure increases. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron, heat-treated to a minimum Brinnell hardness of 370. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to AWWA C-111 and C-153. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuation of restraining devices. The retaining gland shall have a pressure rating of at least 250 psi with a minimum safety factor of 2.

4. Retainers for PVC Pipe: Where PVC pipe is required to be restrained, retainers shall be Ebaa Series 1500PV. Retainers shall be manufactured of 60-42-10 ductile iron. The retainer shall have sufficient number of ductile tie bolts to restrain working and test pressures as stated by the manufacturer. Each ductile clamp shall have serrations on the I.D. sufficient to hold working and test pressures.

5. Retainers for Mechanical Joint Ductile Iron Pipe: Where mechanical joint ductile iron pipe is required to be restrained, retainer glands shall be as specified for mechanical joint fittings above.

VI. INSTALLATION

A. Preparation - Remove scale and dirt, on inside and outside, before assembly.

B. Pipe and Fittings

1. Trenches shall be maintained in a dry condition at all times unless otherwise approved by the City's Inspector.

2. Maintain 10' minimum horizontal or 18" minimum vertical separation of water main from sewer piping in accordance with State requirements.

3. Install pipe to indicated elevation to within tolerance of 5/8 inches. Minimum cover shall 36" unless otherwise stipulated or authorized by the City.

4. Install ductile iron piping and fittings to comply with requirements of ANSI/AWWA C600. Install PVC Piping to comply with AWWA C605 recommended practices.

5. Route pipe in straight line, except as noted. Deflections from a straight line or grade are not allowed, except with fittings.

6. Install pipe to allow for expansion and contraction without stressing pipe or joints.

7. Install access fittings to permit disinfection of water system.

8. All fittings and valves shall be restrained with retainer glands in accordance with the City's standard details. All stubs shall be restrained with a minimum of 60 lineal feet of pipe beyond the valve. Where this is not possible, utilize City-approved retaining glands.

9. A blue-coated #14 gauge UF solid tracer wire and joint seal shall be installed along all pipe and service. Trace wire shall be taped to the pipe and stubbed up at all hydrants and valves.

10. Pipe shall be laid in a level trench. Hand trim excavation for accurate placement of pipe to elevations indicated. The width of trenches for installation of all lines shall be in accordance with the pipe manufacturer's recommendations, OSHA safety requirements, and all applicable codes. Trench widths shall not be less than necessary for safe and proper construction. Where required, excavation support systems shall be provided.

11. Contractor shall place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 8 inches compacted depth, compacted to 95 percent.

12. Contractor shall backfill around sides and to top of pipe with fill, tamped in place and compacted to 95 percent. Maintain optimum moisture content of bedding material to attain required compaction density.

13. Installation and restoration operation under roads, shoulders or other level areas shall be performed in compliance with any City, County or State requirement which may apply.

14. Every effort shall be made to cover pipe ends during installation and a watertight plug or other approved seal must be used when installation is not in progress.

15. Length of open trench on existing roads may be limited by the inspector to minimize public inconvenience or danger to life or property.

C. Valves and Hydrants

1. Set valves on solid bearing.

2. Center and plumb valve box over valve. Set box cover flush with finished grade. Pour concrete pad around valve box in accordance with standard details. Sod 10' in all directions.

3. Set hydrants plumb and locate pumper nozzle perpendicular to roadway.

4. Hydrants shall be set at the bury line with a minimum of 18" clearance from the hose connection to finish grade.

5. The control valve shall be attached directly to the water main by a gland, swivel tee, or a tapping saddle as approved by the City. Restraining rods shall be at least 3/4" stock and shall be galvanized or stainless steel.

6. Hydrants shall be painted in accordance with City requirements.

D. Service Lines

1. Water installation shall include service stubs at alternate lot lines or other locations as required by the City Public Works Department.

2. In all cases, a gate valve shall immediately adjoin the main connection and a second gate valve, equivalent in size to the service crossing, shall be provided at termination adjacent to the property line or other specified point. This valve should be approximately 12" deep, buried and staked. City approved valve boxes shall be required on all valves.

E. Connections to Existing Lines

1. All connections to existing City water mains shall be performed by the developer/contractor. The developer/contractor shall also provide all materials at no expense to the City.

2. Where connections are required to be made between new mains and existing water mains, the connection shall be made in a thorough and workmanlike manner using proper materials, fittings, and labor practices to suit the actual materials and conditions.

3. Where a connection is made to an existing fitting, the contractor shall schedule his work so that the excavation and location of this existing fitting can be completed prior to starting trench work on the line.

4. Cut-ins to existing lines shall be done by the Contractor under the direction of the City unless otherwise approved.

5. Whenever it is required to interrupt existing water supplies to residences or businesses, the contractor shall notify all concerned parties or agencies at least 48 hours in advance of such cut-off. Contractor must first obtain approval from the Director of Utilities.

F. Terminations - No distribution line shall be terminated without a hydrant or a blow-off. Blow-offs shall be one-half the size of the distribution main and shall be constructed with galvanized or ductile iron pipe and fittings and enclosed in a meter box in accordance with the City's standard details.

VII. TESTING

A. A 24-hour notice must be provided to the City prior to testing. After installation is completed, the system shall be filled with water and flushed at the highest obtainable velocity and at the furthest points. Velocity must be at least 2.5 feet per second. All air must be expelled. A pressure at least equal to the City's existing system should be maintained for a period of one (1) hours. Flushing of the system and control of the connecting valve shall be under the direct control of the City's inspector. All connections and pipe for fire service shall be flushed prior to entering the structure. No flushing shall take place through backflow preventers. Should the system appear tight, the leakage test may begin.

B. The contractor will pump his lines to a pressure equal to or greater than 150 psi. Should pressure fall below 150 psi during the test period, it shall be voided and restarted. Test period shall be two hours. Allowable leakage shall be computed on the basis of applicable

tables in AWWA C600 or AWWA C605, latest revision, or the applicable formula for installed pipe lengths other than eighteen (18) feet.

C. The following table approximates the above for a 1,000 foot segment of ductile iron pipe at 150 psi and may be used in lieu thereof:

ALLOWABLE LEAKAGE PER 1,000 FEET OF PIPELINE

Pipe Size (inches)	Allowable Leakage (Gallons)
2"	0.38
4"	0.74
6"	1.10
8"	1.48
10"	1.84
12"	2.20

VIII. DISINFECTION

A. Before any portion of the newly installed system can be placed in service, all mains and appurtenances shall be thoroughly disinfected and tested.

B. Procedures to be used shall conform to AWWA Standard C651. Pertinent requirements are as follow:

1. Chlorine solution shall be added to ensure a 50 ppm residual in all portions of the system. Inspectors may designate points where residual is measured.

2. Retention time shall be not less than 24 hours.

3. A minimum 25 ppm chlorine residual must remain at the end of the 24 hour period.

4. Chlorine may be used in the following forms:

   a. Liquid chlorine as gas/water mixture through an approved solution feeding device.

   b. Sodium Hypochlorite in a packaged liquid form with 5% to 15% available chlorine.

   c. Calcium Hypochlorite in a dry form (powder or tablets) with 80% available solution such as HTH or Perchloron.

C. After the disinfection process has been completed, all lines shall be thoroughly flushed to a condition equal to the normal base residual.

D. A minimum of 2 bacteriological samples shall be drawn from the newly installed system at remote points. Samples shall be taken on two acceptable techniques using a suitable sterile container.

E. Proof of satisfactory results will be required from the Polk County Health Department before service will be provided by the City.

IX. WARRANTY

All portions of the installed water system and site restoration shall be fully warrantied against material defects of improper workmanship for a period of one year from acceptance by the City. During this time, repairs will be made by the developer at no cost to the City. Any repairs made on the newly installed system by the City during this period will be charged to the developer. A warranty bond with a value of 25% of cost of improvements will be provided to the City. The bond will be for a period of one year from acceptance.

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PART 7: DETAILED SPECIFICATIONS - WASTEWATER SYSTEMS

SANITARY SEWER FORCE MAIN

PART 1 - GENERAL

I WORK INCLUDED

A. Pipe

B. Fittings

C. Valves

D. Valve Boxes

E. Air Release Valves

F. Thrust Restraints

II REFERENCE STANDARDS

A. Materials manufactured in United States of America

B. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb. (4.54 kg) Rammer and an 18-in. (457 mm) Drop

C. ANSI/AWWA C104 - Epoxy Lining for Ductile-Iron Pipe and Fittings for Water

D. ANSI/AWWA C111 - Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

E. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

F. ANSI/AWWA C600 - Installation of Ductile-Iron Water mains and Appurtenances

G. ANSI/AWWA C900 - Standard for Polyvinyl Chloride (PVC) Pressure Pipe, four (4) inches through twelve (12) inches, for Water

H. ANSI/AWWA C905 - Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 in. through 36 in.

I. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

J. Uni-B-3 - Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe

K. Uni-B-13 - Recommended Standard Performance Specifications for Joint Restraint Devices for Use with Polyvinyl Chloride (PVC) Pipe

III SUBMITTALS

A. Submit under provisions of Section 01330

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements

IV PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01770

B. Accurately record actual locations of piping mains, valves, and fittings relative to fixed surface features. Record actual installed elevations of pipe and fittings.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

D. Accurately record vertical and horizontal clearance between force main and all water lines within 10 feet and all other utilities encountered.

V OPERATIONS AND MAINTENANCE DATA

A. Submit under provisions of Section 01770

B. Provide data on valves, check valves and operators

VI QUALITY ASSURANCE

A. Perform Work in accordance with Owner’s requirements

B. Valves: Manufacturer's name and pressure rating marked on valve body

VII DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01600.

B. Deliver and store valves in shipping containers with labeling in place

PART 2 - PRODUCTS

I PIPE

A. Ductile-Iron
   1. ANSI A21.50-81 (AWWA C150-81).
   2. All ductile iron pipe to be a minimum Pressure Class 150 with push-on or mechanical joints, unless otherwise indicated on the Drawings. All aboveground pipe shall have flanged joints.
   3. Bolts for all flanged and mechanical joints shall be high strength, low alloy steel bolts only, meeting the current provisions of AWWA C111. Bolt manufacturer's certification of compliance must accompany each shipment, with copy to Engineer.
   4. Pipe manufacturing in accordance with ANSI A21.51-81 (AWWA C151-81).
   5. Pipe shall be epoxy-lined or poly-lined. Epoxy lining shall be Protecto 401 ceramic epoxy, 40 mil dry film minimum thickness. Poly lining shall be manufacturer's standard, factory applied, fusion bonded polyethylene product, 60 mil nominal thickness. Linings applied by individuals other than the manufacturer shall not be acceptable. Cement mortar lined pipe shall not be acceptable.

B. Polyvinyl Chloride (PVC)
   1. Four (4) inches diameter to twelve (12) inches diameter - Class 100 pipe meeting AWWA C900 and DR25.
   2. Larger than twelve (12) inches diameter - Class 125 C.I. outside diameter pipe meeting AWWA C905, DR 32.5.
   3. Each length should be clearly labeled so as to allow identification and verification of specification conformance. Blue pipe shall not be used for force main. PVC force main pipe shall be dyed brown or shall have brown identification markings at 120 degree intervals around the pipe circumference.
   4. Connection for PVC pipe two (2) inches and larger shall be rubber compression ring type. Bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM D-1869.
   5. Two (2) inches diameter and smaller - ASTM-2241 with an SDR of 21, unless otherwise noted on Drawings.
   6. Trace wire shall be 14-gauge UF wire with joint seal placed directly on top of the pipe and taped at off intervals. Tracer wire shall be connected to provide electrical continuity between all valve stems and air relief valves. Contractor shall demonstrate electrical continuity after installation is complete.

II FITTINGS

A. All fittings shall be rated for not less than 150 psi working pressure.

B. Grade for ductile-iron fittings shall conform with ANSI/AWWA Standard C110-77 or ANSI/AWWA C111/A21.11-80, and shall be epoxy-lined inside and bituminous coated outside. Mechanical joint ductile-iron fittings complying with AWWA C153 are acceptable.

C. Bolts for all flanged and mechanical joints shall be high strength, low alloy steel bolts only, meeting the current provisions of AWWA C111. Bolt manufacturer's certification of compliance must accompany each shipment, with copy to Engineer.

D. Malleable iron fittings shall be galvanized conforming to the applicable provision of Federal Specification WW-P-521D, Type II, and may be used in sizes two (2) inches and under only.

E. Polyvinyl chloride (PVC) fittings shall be minimum Schedule 40 and may be used in size two (2) inches and under only.

III VALVES AND BOXES, GENERAL

A. Valves, valve boxes, operators, etc., shall be furnished and installed as shown on the drawings.

B. All valves shall be manufacturer's standard of the design which the manufacturer recommends for the service intended. Each valve shall bear the maker's name or trademark and reference symbol to indicate the service conditions for which it is guaranteed.

C. Valve boxes shall be cast iron of standard design with adjustable drop section to fit disc or cover over valve. Interior diameter shall be not less than five (5) inches, with cast iron cover marked "SEWER" and set in 24 inch square concrete pad 8-inches thick. Top of pad shall be flush with finish grade.

D. A 3-in. diameter bronze identification marker shall be set into the concrete at each valve and air-release device. The disc shall be imprinted with information about the pipe line and the valve. A table of valve numbering and other information to be stamped on the disc will be provided by the City of Bartow.

E. Precast concrete vaults for air relief valves shall conform to the City of Bartow's standard details.

F. All valves for underground service shall be provided with 2-in. AWWA operating nut. Valves shall open counter clockwise. All valves for above-ground service shall be provided with lever or handwheel actuator. All necessary handwheels, electric operators, chainwheels, operating stems, floor stands, operating nuts, worm and gear operators, chains, and wrenches required for proper completion and operation shall be provided with the valves.

G. All interior ferrous surfaces shall be provided with a fusion- bonded epoxy protective coating. Coating shall be nontoxic, shall have a satin finish, and shall be suitable for field over-coating and touch-up without sanding or special surface preparation or application of heat in excess of room temperature. Coating shall meet requirements of AWWA C-550.

H. Exterior portions of buried service valves shall have two coats of asphalt varnish in accordance with Federal Specification TTC494-A. Valves for above-ground service shall be painted in accordance with the appropriate coating system specified elsewhere.

IV PLUG VALVES

A. Plug valves shall be of the resilient plug, eccentric type with flow area equivalent to 100% of pipe area. Minimum pressure rating shall be 150 psi. Ends shall be flanged for above-ground service and mechanical joint for underground service.

B. Valve shall have cast iron body, ASTM A126, Class B. Plug shall be cast iron with neoprene facing and shall be of the single piece design. Plug shall be of same configuration for all valves and shall require no stiffening member opposite the plug for balance or support.

C. Valve body seats shall have a welded in overlay not less than 90% nickel. Packing shall be nitrile-butadiene, and shall be adjustable and replaceable without removing the valve from service, depressurizing the line, or removing the valve operator.

D. Bushings in both upper and lower journals to be type 316 stainless steel. Valves shall be drip tight in both directions to the full pressure rating. All exposed nuts, bolts, springs, and washers shall be stainless steel.

E. All plug valves larger than 6-in. shall have a geared activator with a handwheel operator if exposed service or with a 2-in. operating nut if buried service. All smaller valves shall be provided with 2-in. operating nuts. Furnish a lever operator for the 2-in. operating nut on each non-buried valve.

F. Coat valve exterior with two (2) coats of Devtar 5A, or City approved equal, epoxy high build coating, twelve (12) miles each coat, in accordance with manufacturer's directions.

G. Plug valves shall be DeZurik Figure 118 or equal.

V GATE VALVES

A. Gate valves 2-in. and under shall conform to Federal Specifications WW-V-54, Type II, solid wedge disc, rising stem, secured joints and of bronze construction. Valves shall have malleable iron handwheels.

B. All gate valves 3-in. through 12-in. shall be of the resilient wedge type with iron body, bronze-mounted, non-rising stem with operating wheel or nut in accordance with AWWA C509 requirements. Valves shall have a clear waterway opening of full diameter of the valve. The operating nut or wheel shall have cast thereon an arrow indicating the direction of opening. Valves shall be set plumb.

C. All gate valves larger than 12-in. shall be of the double-disc type having iron body, bronze-mounted parallel seats and shall conform to AWWA requirements. Valves shall be provided with bypass valves. Valves shall have a clear water way opening of full diameter of the valve. The operating nut or wheel shall have cast thereon an arrow indicating the direction of opening. Valves shall be set plumb.

VI AIR RELEASE VALVES

A. Air release valves shall be APCO Model 400 as manufactured by Valve & Primer Corporation, or City approved equal.

B. The air release valve shall have a 2" NPT inlet with a ½" NPT outlet, inlet and blow off valves, and a minimum of five (5) feet of rubber hose with quick disconnects for backflushings.

C. Isolation valves shall be bronze gate valves and shall have phenolic red oxide primer. Isolation valves shall be coated with two (2) coats Koppers Torex 800, or equal, chlorinated rubber base coating to a minimum dry film thickness of 2.0 mils.

VII THRUST RESTRAINTS

A. All mechanical joint fittings shall be restrained with retainer glands and pre-cast thrust blocks in accordance with City of Bartow requirements. Where indicated, pipe joints shall be restrained.

B. Retainer Glands for Fittings on PVC Pipe: Where PVC pipe is being connected to mechanical joint fittings, retainer glands shall be Ebaa Megalug Series 2000PV. Retainer glands shall be designed to meet Uni-Bell Standard "Uni-B-13". The restraint mechanism shall consist of a plurality of individually activated gripping surfaces to maximize restraint capability. Glands shall be manufactured of ductile iron conforming to ASTM A536. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to AWWA C-111 and C-153. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuation of restraining devices. The retaining gland shall have a pressure rating equal to that of the PVC pipe on which it is used.

C. Retainer Glands for Fittings on Ductile Iron Pipe: Where ductile iron pipe is being connected to mechanical joint fittings, retainer glands shall be Ebaa Megalug Series 100. Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts a multiple wedging action against the pipe, increasing its resistance as pressure increases. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron, heat treated to a minimum Brinnell hardness of 370. The gland shall be such that it can replace the standardized mechanical joint gland and can be used with the standardized mechanical joint bell conforming to AWWA C-111 and C-153. Twist-off nuts, sized same as tee-head bolts, shall be used to insure proper actuation of restraining devices. The retaining gland shall have a pressure rating of at least 250 psi with a minimum safety factor of 2.

D. Retainers for PVC Pipe: Where PVC push-joint pipe is required to be restrained, retainers shall be Ebaa Series 1500PV. Retainers shall be manufactured of 60-42-10 ductile iron. The retainer shall have sufficient number of ductile tie bolts to restrain working and test pressures as stated by the manufacturer. Each ductile clamp shall have serrations on the I.D. sufficient to hold working and test pressures.

E. Retainers for Mechanical Joint Ductile Iron Pipe: Where mechanical joint ductile iron pipe is required to be restrained, retainer glands shall be as specified for mechanical joint fittings above.

VIII MISCELLANEOUS

A. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction. PVC ball valves shall be as manufactured by Wallace and Tiernan, Inc.

B. Ball valves for metal pipe shall be Jamesbury Fig. 21-3600TT-3, or equal. Valves shall be of two-piece construction, with 316SS body and ball and 300 series stainless steel body bolts. Seat shall be TFE. Actuating handles shall be 300 series stainless steel. Provide locking device for all actuators.

C. Hose bibbs shall be bronze body with renewable composition disc, screw-in bonnet, and threaded inlet. Hose bibbs shall be 1-in. with vacuum breaker.

PART 3 - EXECUTION

I PREPARATION OF TRENCH FOUNDATION

A. Trench preparation shall follow the requirements of Section 02320 - Trenching.

B. Pipe foundation area shall be dewatered sufficiently to provide a solid bearing support for the pipe. Any required dewatering shall be kept in place until trench is backfilled and compacted. Water removed from trench shall be directed to an approved storm water system.

C. If trench foundation is of unsuitable material, the Engineer shall determine the extent of over-excavation that will be required to remove unsuitable soil material. Foundations that are over-excavated shall be restored to design line and grade using compacted suitable material or structural fill material. Only quantities of over-excavation and backfill that are not already identified on the plans and are field ordered by the Engineer will be paid for at pre-determined unit prices. The pay limits for over-excavated unsuitable foundation and backfill shall be based on the volume of the trench taken as the pipe diameter plus 2 feet wide, unless a more precise method of measurement is agreed to and observed by the Engineer.

II BEDDING AND INITIAL BACKFILL

A. Excavate pipe trench in accordance with Section 02320 for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to 100 percent.

C. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 100 percent. Initial backfill, compacted to 100 percent shall extend to 12 inches above pipe.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

III INSTALLATION - PIPE

A. Maintain 10-ft. minimum horizontal or 18-in. minimum vertical separation of water main from sewer piping in accordance with State requirements.

B. Install pipe to indicated elevation to within tolerance of 5/8-in.

C. Install ductile iron piping and fittings to ANSI/AWWA C600. Install PVC Piping in accordance with AWWA C605.

D. Route pipe in straight line, except as noted.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

F. Install access fittings to permit pressure testing.

G. All fittings shall be restrained with thrust blocks and retainer glands in accordance with City of Bartow's standard details.

H. Establish elevations of buried piping to ensure not less than 36 inches of cover, unless otherwise shown on the drawings.

I. Install continuous trace wire directly on the top of non-metallic pipe. Tape wire at 10-ft. intervals during installation to prevent shifting during backfilling. Wire joints shall be sealed.

J. Backfill trench in accordance with Section 02320.

K. Installation and restoration operation under roads, shoulders or other level areas shall be performed in compliance with any City, County or State requirement which may apply.

L. Every effort shall be made to cover pipe ends during installation and a watertight plug or other approved seal must be used when installation is not in progress.

M. All stubbed valves shall be installed with retaining glands.

N. Allowable deflection shall be no greater than stated in the applicable AWWA standard.

O. No pipe shall be laid when, in the opinion of the inspector, trench conditions are unsuitable. Pipe shall be laid in a dry trench unless otherwise authorized by the Owner.

P. Length of open trench on existing roads may be limited by the inspector to minimize public inconvenience or danger to life or property.

IV PIPE IDENTIFICATION

A. A plastic dig-warning tape shall be buried 24 inches above the top, but no shallower than 12 inches from the top of the final grade, for the pipe's full length. The tape shall be at least 6 inches wide. The tape shall have colored lettering or background color and worded to indicate the presence and the contents of the pipeline. Colors shall be as follows:

1. Force main: brown
2. Gravity sewer: green
3. Water: blue
4. Reclaimed water: purple

B. Install 14-gauge UF (Underground Feeder per National Electric Code Article 339) solid tracer wire and joint seal (Kearney Aquaseal, Bishop, or approved equal) along all non-metallic pipe. The wire shall be taped below the spring line of the pipe and shall be stubbed up at all valves and hydrants. At each valve the wire shall be installed along the outside of the valve box. Sections of wire shall be spliced together using a Buchanon tool or wirenut. Splicing by twisting the wire together is not acceptable. The wire shall have a plastic insulation, colored as follows:

1. Force main: brown
2. Gravity sewer: green
3. Water: blue

4. Reclaimed water: purple

C. Each segment of tracer wire shall be demonstrated to be electrically continuous between turn-ups after backfilling and before the pipe is accepted as complete.

V INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade. Pour concrete pad around valve box in accordance with standard details. Sod 10-inches in all directions.

C. Valves shall be installed on all subsidiary force mains at the point of connection to the primary force main. Where force mains are to be extended, valves shall be installed at that location. These valves shall be restrained by methods other than thrust blocking.

VI CONNECTIONS TO EXISTING LINES

A. When existing service cannot be disrupted, connection must be made with a hot-tap using a split tapping saddle and a tapping gate valve that will both remain in place after the "hot-tap" is complete. Hot taps shall only be installed by an experienced and qualified tapping subcontractor approved by the Engineer. Contractor shall notify the City of Bartow within 48 hours of a tapping operation. Materials and procedures shall in no way harm the integrity of the existing system.

B. When connection to existing force main is to be accomplished during a temporary shut-down of service, Contractor shall be responsible to provide all materials, equipment, and labor necessary to complete the connection and restore service within the time frame agreed upon by the Owner. No wastewater shall be discharged to surface waters. The schedule and procedural plan for connecting to an existing force main during a shut-down shall be presented to the Engineer in writing for review and approval by the Owner.

VII TESTING

A. The pressure test must be done in the presence of the City Inspector. A 24-hour notice must be provided to the City prior to testing.

B. Each valved section of force main shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test, and corrected to the elevation of the test gauge. Pressure shall be applied by means of a gasoline driven test pump connected to the pipe in a manner satisfactory to the City. The Contractor shall make arrangements for metering the amount of water used during the test.

C. Before pressure testing the force main, place a minimum cover of six (6) inches above the top of the pipe, but leave all joints exposed. If joints become covered, they shall be re-dug. If the trench is wet, each joint shall be pumped dry for inspection of loose bolts and leaks. Sufficient manpower shall be employed to insure the inspection of each joint during the test

period. After pressure testing, joints should be covered with same select backfill as used for pipe.

D. All exposed pipes, fittings, and joints will be carefully examined during the open trench test. Any cracked or defective pipes or fittings discovered in consequence of this pressure test shall be removed and replaced with sound material and the test shall be repeated until satisfactory to the Engineer.

E. Before applying the specified test pressure, all air shall be expelled from the pipe. Taps at points of highest elevation shall be made before the test is made and plugs inserted after the line has been flooded.

F. The Contractor will pump the lines to a pressure equal to or greater than 150 psi. Should pressure fall below 150 psi during the test period, it shall be voided and restarted. Test period shall be one (1) hour. Allowable leakage shall be computed on the basis of Table 6, Section 4, AWWA C600, latest revision, or the applicable formula for installed pipe lengths greater than eighteen (18) feet.

G. Leakage shall not exceed the following:

$$L = \frac{SD\,(P)^{1/2}}{133{,}200}$$

Where:
- L = Allowable leakage in gallons per hour
- S = Length of the force main tested in feet
- D = The nominal diameter of the pipe in inches
- P = Average test pressure in psi gauge

Note: For the various diameter pipes listed, the allowable leakage shall be no more than indicated gallons per hour per 1000 feet when tested as specified. The allowable leakage in terms of ounces per hour per 1000 feet at 150 psi test pressure is also given as a more useful unit of measurement in this range.

Pipe Diameter	**Allowable Leakage Per Hour Per 1000 L.F.**
8"	.74 gal (94 oz)
6"	.55 gal (71 oz)
4"	.37 gal (47 oz)
3"	.28 gal (35 oz)
2"	.18 gal (24 oz)

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or in any valved section thereof, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

H. Where any section of main is provided with concrete reaction backing, the hydrostatic pressure test shall not be made until at least five (5) days have elapsed after the concrete reaction backing was installed. If high early strength cement is used in the concrete reaction backing, the hydrostatic pressure test shall not be made until at least two (2) days have elapsed.

I. Tracer wire shall be tested for electrical continuity between each valve box, or air relief vault along the entire length of the force main. Any line segment that does not have tracer continuity will not be accepted for final payment until tracer is repaired.

VIII FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01450.

B. Compaction testing will be performed in accordance with AASHTO T99.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

PART 8: DETAILED SPECIFICATIONS - WASTEWATER PUMPING STATIONS

SEWAGE LIFT STATION

PART 1 - GENERAL

I WORK INCLUDED

A. Lift Station

B. Access Covers and Accessories

C. Piping

D. Valves

E. Pump-Out Connections

F. Pressure Gauges

II REFERENCES

A. ASTM C478 - Precast Reinforced Concrete Manhole Sections.

B. ANSI/AWWA C110 - Standard for Ductile-Iron and Gray-Iron Fittings, three (3) inches through forty-eight (48) inches, for Water and Other Liquids.

C. ANSI/AWWA C115 - Standard for Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges.

D. ANSI/AWWA C151 - Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

III SUBMITTALS

A. Provide shop drawings for all components, including wet well, under provisions of Section 01330.

B. Provide product data for all manufactured components.

C. Provide manufacturer's instructions, six (6) copies, for all manufactured components.

D. Provide manufacturer's certification that all valves meet specification requirements.

IV PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01770.

B. Accurately record actual locations of wet wells, depth, and inverts.

PART 2 - PRODUCTS

I CONCRETE

A. Compressive Strength (28 Days): 4,000 psi.

B. Slump by Vibration: 4".

C. Type II, Acid-Resistant.

II NON-SHRINK GROUT

A. Master Builder - Masterflow 713, or equal.

III WET WELL STRUCTURE

A. Precast lift station sections shall conform to ASTM C478, except that the minimum wall thickness shall be 6-inches. Structure shall be coated outside with two (2) coats Devoe Devtar 5A, epoxy high build coating, or City approved equal.

B. Joints shall be sealed with Ram-nek, or City approved equal, flexible sealer conforming to Federal Specifications SS-S-00210.

C. All section joints of pre-cast structures shall be sealed with an external concrete joint wrap, Rub'r-Nek, as manufactured by Henry Company, or City approved equal.

D. Interior liner shall be "Dura Plate 100" PVC liner as manufactured by A-Loc, Inc., "AGRU Sure Grip" PP-R (Polypropylene Random Copolymer) liner as manufactured by Alois Gruber GmbH, or City approved equal. Liner shall be installed in accordance with the manufacturer's instructions.

E. Provide hooded vent pipe in top slab as shown on the drawings.

F. Backfill shall be made in accordance with applicable sections of these specifications.

IV ACCESS FRAME AND ACCESSORIES

A. Furnish and install aluminum hatch covers and access frame, minimum size as shown on drawings, over lift stations. Assemblies shall be complete with hinged and hasp-equipped cover(s), upper guide holder and level sensor cable holder. Frame shall be anchored securely above the pumps. Each door shall have safety locking handle in operating position. Doors shall be of checkered plate. Hatch shall be for an AASHTO H20 loading.

B. Lower guide rail holders shall be integral with discharge connection; guide bars shall be two (2) inch 304 stainless steel schedule 40 pipe as indicated on drawings.

V PIPING

A. Wet well and valve piping shall be flanged ductile-iron pipe (DIP), minimum thickness class 53.

B. Fittings shall be flanged ductile-iron, short-body, with stainless steel nuts and bolts.

C. All ductile iron piping and fittings shall be coated with two (2) coats Devtar 5A, epoxy high build coating, or City approved equal, to 16 mils minimum DFT.

D. Provide flexible resilient boot pipe adapter on influent pipe, as manufactured by Kor-N-Seal, or City approved equal.

VI VALVES

A. Gate valves 2-in. and under shall conform to Federal Specifications WW-V-54, Type II, solid wedge disc, rising stem, secured joints and of bronze construction. Valves shall have malleable iron handwheels.

B. All gate valves 3-in. through 12-in. shall be of the resilient wedge type with iron body, bronze-mounted, non-rising stem with operating wheel or nut in accordance with AWWA C509 requirements. Valves shall have a clear waterway opening of full diameter of the valve. The operating nut or wheel shall have cast thereon an arrow indicating the direction of opening. Valves shall be set plumb.

C. All gate valves larger than 12-in. shall be of the double-disc type having iron body, bronze-mounted parallel seats and shall conform to AWWA requirements. Valves shall be provided with bypass valves. Valves shall have a clear water way opening of full diameter of the valve. The operating nut or wheel shall have cast thereon an arrow indicating the direction of opening. Valves shall be set plumb.

D. Swing check valves shall have outside lever and weight, as manufactured by Mueller, Kennedy, or City approved equal. Valve body shall be cast iron per AWWA C508 having integral (not wafer) flanged ends. The seat shall be solid bronze with an "O" ring seal and be locked in place with stainless steel lock screws field replaceable without the use of special tools. All internals shall be replaceable in the field without removing the main valve from the pipeline. The disc shall be cast iron, with a resilient rubber facing, connected to a ductile iron disc arm. The disc arm assembly shall be suspended from a stainless steel shaft that passes through a seal retainer on both sides of the valve body. The check valve shall prevent backflow of the media on normal pump shut-off or power failure, at zero velocity and be watertight.

E. Air release valve shall be Model 400, as manufactured by APCO Valve and Primer Corp., or City approved equal, having a 2-inch NPT inlet with a ½-inch NPT outlet, inlet and blow off valves, quick disconnect couplings, and a minimum 5 foot hose for flushing.

F. Ball valves for PVC pipe shall be of PVC Type 1 with union, socket, threaded or flanged ends as required. Ball valves shall be full port, full flow, all plastic construction. PVC ball valves shall be as manufactured by Wallace and Tiernan, Inc.

G. Ball valves for metal pipe shall be Jamesbury Fig. 21-3600TT-3, or equal. Valves shall be of two-piece construction, with 316 stainless steel body and 300 series stainless steel body bolts. Seat shall be TFE. Actuating handles shall be 300 series stainless steel. Provide locking device for all actuators.

H. Coat gate valve, check valve, and air release valve exterior with two (2) coats of Devtar 5A, or City approved equal, epoxy high build coating, twelve (12) mils each coat, in accordance with manufacturer's directions.

VII PUMP-OUT CONNECTION

A. Emergency pump-out connection shall be OPW "Twin-Kam" Model 633 2½" brass body coupler, with dust plug, or City approved equal.

VIII PRESSURE GAUGES

A. A ½-inch nipple and solid brass ball valve shall be provided on each pump discharge pipe ahead of the check valve for attaching a pressure gauge. A single nipple and valve shall be provided on the discharge side of the gate valves at a point of common pressure with the force main.

PART 3 - EXECUTION

I EXCAVATION

A. Lift station area, plus a margin at least 5 feet beyond the perimeter of the excavation area, shall be cleared and grubbed of any vegetation, stumps, tree root systems, and sod. Organic topsoil shall be excavated and removed from the site. Strippings, debris, and organic soils shall be disposed of in accordance with DEP regulations.

B. Dewater the site to lower the ground water table to a depth at least 2 feet below the bottom of the bottom slab subgrade.

C. Install sheet piles, as necessary, or excavate using excavation slopes designed to be in compliance with current OSHA regulations. Excavate the overburden soils and stockpile excavated clean granular soils for re-use as backfill. If Contractor utilizes sheet piles or other mechanical stabilization method, Contractor shall submit excavation design plans, signed and sealed by a registered engineer, indicating compliance with current OSHA regulations.

D. The outside diameter of the bottom slab should be at least 1 foot larger than that of the concrete sections used. Excavate 1 foot below bottom of bottom slab to one foot beyond bottom slab.

E. Install 12 inch leveling course of crushed limerock. Limerock shall extend one foot beyond bottom slab.

II PLACEMENT OF CONCRETE

A. Forms for bottom slabs may be omitted when the soil and workmanship permit accurate excavation to size, and the omission is approved by the Engineer.

B. Removal of forms shall be done in a manner which will assure complete safety of the structure. In no case shall the supporting forms be removed until the members have acquired sufficient strength to support their weight and loads thereon safely.

C. Remove all water and foreign matter from forms and excavations. Unless otherwise directed, wood forms and sand or sandy loam must be thoroughly wetted just prior to placing concrete.

D. Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling of flowing. Conduits, sleeves, hangers and other Work required to be built into concrete shall be inspected and approved by the Engineer.
   1. Retempering: No concrete that has been partially hardened becomes contaminated by foreign materials, or has been retempered, shall be used.
   2. Continuity of Placing: Concrete shall generally be carried on at a continuous operation until the placing joints are necessary. They shall be made and located with the approval of the Engineer. Except for slabs on earth surfaces, concrete shall be placed with the aid of mechanical vibrating equipment. Vibration shall be transmitted directly to the concrete and, in no case, shall it be transmitted through the forms. The frequency of vibration shall be sufficient to cause flow or settlement of the concrete into place. The vibration shall be of sufficient duration to accomplish thorough compaction. Vibration to be supplemented by forking or spading by hand adjacent to the forms on exposed faces in order to secure smooth, dense, even surfaces. The concrete shall be compacted and worked in an approved manner into all corners and angles of the forms and around reinforcement and embedded fixtures. Light hammer tapping will be allowed at lift lines to prevent air bubbles.
   3. Curing: Finished concrete shall be kept damp continuously for one (1) week after it has been poured, or some acceptable curing compound shall be used as directed by the manufacturer. All concrete shall be used as directed by the manufacturer. All concrete shall be adequately protected from injurious action by the sun, heavy rains, flowing water and mechanical injury.

III CONNECTING PIPES

A. Provide connecting holes for the influent pipe, effluent pipe(s), and cable thrulets in accordance with the drawings.

IV BACKFILL

A. Backfill gradually and evenly around station after concrete and joints have hardened. Backfill shall consist of clean sand, free of roots and debris. Place sand in 6-inch to 12-inch lifts and compact to 98 percent of Standard Proctor maximum dry density.

V TOP SLAB WITH ACCESS COVER

A. Size of top slab shall be as shown on plans. It is very important that the access cover is properly installed in the top slab.
   1. With the proper orientation (hinge side as shown on drawing).
   2. Horizontally check with level. Consult individual access cover drawing - especially for heavy duty cover where reinforced cover leaves must rest on concrete shelf - before installation.

VI INTERNAL PIPING AND MANIFOLD

A. Use proper gaskets, tighten bolts gradually and evenly. Install discharge pipe brackets to relieve discharge connections from overload and intermediate guide bar brackets to prevent guide bars from bending when pumps are pulled.

VII INSTALLATION OF PUMP UNITS

A. Lower pump units into place along guide bars. Check visually metal-to-metal contact between volute flange and discharge connection. If necessary, recheck and re-align discharge connection(s) and guide bars with pumps in place.

VIII GROUTING

A. After proper alignment of all components, including metal-to-metal connection of pump flange is established, grout access cover, discharge connection(s) and pipe thrulets. Build up and shape slopes at pump bottom in accordance with drawing.

PART 10: STORMWATER DESIGN STANDARDS

I. INTENT

The design of the stormwater management facilities shall comply with the rules of the Southwest Florida Water Management District (SWFWMD), Florida Department of Environmental Protection (FDEP), and any other statutory requirements that may affect the facility, in addition to the City of Bartow. Whenever a conflict occurs between requirements and different agencies, the more stringent criteria shall apply.

A. Storm drainage facilities shall be installed by the developer which the consulting engineer certifies as adequate to handle a minimum rainfall of 7.5 inches per hour without damage to the facilities and shall be governed by the City drainage plan. When existing off-site drainage facilities would be adversely impacted by the proposed discharge, the developer shall install and pay for such additional improvements as may be required. Where additional capacity is required to handle the needs of the general storm drainage system of the City, costs of such extra capacity shall be prorated between the developer and other interests in a manner acceptable to the City.

B. Stormwater facilities shall be designed so that the peak pre-development discharge rate at the point of stormwater discharge is not exceeded by the peak post-development rate during a 25 year - 24 hour storm event, having a total rainfall of 7.5 inches. This condition applies to all sites, even to those qualifying for a Standard General for Minor Activities Environmental Resource Permit from SWFWMD, which by itself might not require a "pre/post" rate match for small sites. Detention and/or retention with filtration of the first 1/2 inch of runoff or the runoff from the first inch of rainfall, shall be provided as required by SWFWMD and DEP.

C. All installations shall be in conformance with all applicable SWFWMD and FDEP rules. The developer shall furnish the City with approved stormwater permits and/or exemptions prior to commencing any site work, except, that if the developer can produce written evidence to the City Staff demonstrating that an accepted application to either or both of these agencies has been in process for more than 120 days but with no permit issued, and in the opinion of the City Consulting Engineer all of the developers construction plans are in order and meet the requirements of this chapter, then the City Commission may waive this requirement, if in their opinion the public health, safety and welfare would not be impaired by such action.

D. If on-site retention with no positive outfall is to be provided, stormwater facilities shall be designed to retain all runoff from a 100 year - 24 hour storm event without flooding of buildings. In addition, the plat shall indicate that no positive outfall is provided and that if applicable, some lots may flood during extreme storm events. In such "closed" basins, finish floor elevations shall be a minimum of 2.5 feet above the 100-year design high water level.

E. Along with preliminary construction plans, a drainage map and a complete set of drainage calculations shall be provided to the consulting engineer. The drainage map shall include all areas that drain into, or through, the proposed subdivision and the subdivision outfall system. The diameter, types, sizes, and flow lines of all existing and proposed storm sewer and cross-drain pipes shall be shown, along with the inlets and manholes. The drainage areas that drain into each inlet shall be depicted, along with the drainage areas to the nearest 1/10 of an acre and the "C" factor used. In addition, the

drainage map shall indicate flood plain areas as indicated on the FEMA Maps, locations and boundaries of wetlands areas or waters of the state; locations and results of soils borings and percolation tests; and a SCS soil mapping, if available.

F. All retention areas shall be designed based on a SCS Type II Florida modified storm distribution with antecedent moisture condition per SWFWMD regulations.

G. Cross drains shall be designed for a 10 year storm for minor cross drains and collector road culverts and a 25 year storm for arterial road culverts. All culverts and cross drains shall be designed so that under full flow conditions, the hydraulic grade line is at least on foot below the gutter profile. When pipes are sized based on partial depth flows, the depth of flow shall be not more than 2/3 of the pipe diameter at velocities exceeding 15 feet per second. All pipes shall be designed for a minimum velocity of 2.5 feet per second.

H. All construction shall be in accordance with City specifications and standard details and all structures shall be in accordance with DOT specifications. The storm sewer system may empty into an existing storm sewer system or any other outlet approved by the consulting engineer at a rate not to exceed the peak pre-development rate. Overland flow over roadways shall not be permitted.

PART 11 - CROSS-CONNECTION CONTROL

I. CROSS-CONNECTION CONTROL - GENERAL POLICY

A. PURPOSE: The purpose of this Section is:

1. To protect the public potable water supply of Bartow from the possibility of contamination or pollution by isolating within the customer's internal distribution system(s) or the consumer's private water system(s) such contaminants or pollutants which could backflow into the public water systems; and,

2. To promote the elimination or control of existing cross-connections, actual or potential, between the consumer's in-plant potable water system(s) and non-potable water system(s), plumbing fixtures and industrial piping systems; and,

3. To provide for the maintenance of a continuing Program of Cross-Connection Control which will systematically and effectively prevent the contamination or pollution of all potable water systems.

B. RESPONSIBILITY: The Public Works Director shall be responsible for the protection of the public potable water distribution/system from contamination or pollution due to the backflow of contaminants or pollutants through the water service connection. If, in the judgment of the Public Works Director, and approved backflow prevention assembly is required for the safety of the water system, the Public Works Director or his designated agent shall give notice in writing to said customer to install such and approved backflow prevention assembly(s) at specific location(s) on his premises. The consumer shall immediately install such approved assembly(s) at the consumers own expense; and failure, refusal or inability on the part of the customer to install, have tested and maintain said assembly shall constitute a ground for discontinuing water service to the premises until such requirements have been satisfactorily met.

II. DEFINITIONS

A. APPROVED: Accepted by the Public Works Director as meeting an applicable specification stated or cited in this ordinance, or as suitable for the proposed use.

B. AUXILIARY WATER SUPPLY: Any water supply on or available to the premises other than the purveyor's approved public water supply will be considered as an auxiliary water supply. These auxiliary waters may include water from another purveyor's public potable water supply or any natural source(s) such as a well, spring, river, stream, harbor, etc., or "used waters" or "industrial fluids". These waters may be contaminated or polluted or they may be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

C. BACKFLOW: The reversal of the normal flow of water caused by either back-pressure or backsiphonage.

D. BACKPRESSURE: The flow of water or other liquids, mixtures or substances under pressure into the distribution pipes or a potable water supply system from any source or sources other than the intended source.

E. BACKSIPHONAGE: The flow of water or other liquids, mixtures or substances into the distribution pipes of a potable water supply form any source other than its intended source caused by the reduction of pressure in the potable water supply system.

F. BACKFLOW PREVENTER: An assembly or means designed to prevent backflow.

1. Air-Gap: The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing, fixtures, or other device and the flood level rim of said vessel. An approved air-gap shall be at least double the diameter of the supply pipe, measured vertically, above the overflow rim of the vessel; and in no case less than one inch.

2. Reduced Pressure Principle Assembly: An assembly of two independently acting approved check valves together with a hydraulically operating, mechanically independent differential pressure relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located resilient seated test cocks and resilient seated shut-off valves at each end of the assembly. The entire assembly shall meet the design and performance specifications as determined by a laboratory and a field evaluation program resulting in an approval by a recognized and DEP-approved testing agency for backflow prevention assemblies. The assembly shall operate to maintain the pressure in the zone between the two check valves at an acceptable level less than the pressure on the public water supply side of the assembly. At cessation of a normal flow, the pressure between the two check valves shall be less than the pressure on the public water supply side of the assembly. In case of leakage of either of the check valves, the differential relief valve shall operate to maintain the reduced pressure in the zone between the check valves by discharging to the atmosphere. When the inlet pressure is two pounds per square inch or less, the relief valve shall open to the atmosphere. To be approved these assemblies must be readily accessible for in-line testing and maintenance and be installed in location where no part of the assembly will be submerged.

3. Double Check Valve Assembly: An assembly of two independently operating approved check valves with resilient seated shut-off valves on each end of the check valves, plus properly located resilient seated test cocks for the testing of each check valve. The entire assembly shall meet the design and performance specifications as determined by a laboratory and field evaluation program resulting in an approval by recognized and DEP-approved testing agency for backflow prevention assemblies. To be approved, these assemblies must be readily accessible for in-line testing and maintenance.

G. CONTAMINATION: Means an impairment of the quality of the potable water by sewage, industrial fluids or waste liquids, compounds or other materials to a degree which creates an actual or potential hazard to the public health through poisoning or through the spread of disease.

H. CROSS-CONNECTION: Any physical connection or arrangement of piping or fixtures between two otherwise separate piping systems one of which contains potable water ant the other non-potable water or industrial fluids of questionable safety, through which, or because of which, backflow may occur into the potable water system. This would include any temporary connections, such as swing connections, removable sections, four way

plug valves, spools, dummy section of pipe, swivel or change-over devices or sliding multiport tube.

I. CROSS-CONNECTIONS - CONTROLLED: A connection between a potable water system and a non-potable water system with an approved backflow prevention assembly properly installed and maintained so that it will continuously afford the protection commensurate with the degree of hazard.

J. CROSS-CONNECTION CONTROL BY CONTAINMENT: The installation of an approved backflow prevention assembly at the water service connection to any customer's premises where it is physically and economically infeasible to find the permanently eliminate or control all actual or potential cross-connections within the customer's water system; or, it shall mean the installation of an approved backflow prevention assembly on the service line leading to an supplying a portion of a customer's water system where there are actual or potential cross-connections which cannot be effectively eliminated or controlled at the point of the cross-connection.

K. HAZARD, DEGREE OF: The term is derived from an evaluation of the potential risk to public health and the adverse effect of the hazard upon the potable water system.

1. Hazard - Health: Any condition, device, or practice in the water supply system and its operation which could create, or in the judgment of the City, may created a danger to the health and well-being of the water consumer.

2. Hazard - Plumbing: A plumbing type cross-connection in a consumer's potable water system that has not been properly protected by an approved air-gap or approved backflow prevention assembly.

3. Hazard - Pollutional: An actual or potential threat to the physical properties or the water system or to the potability of the public or the consumer's potable water system but which would constitute a nuisance or be aesthetically objectionable or could cause damage t the system or its appurtenances, but would not be dangerous to health.

4. Hazard - System: An actual or potential threat of severe damage to the physical properties of the public potable water system or the consumer's potable water system or of a pollution or contamination which would have a protracted affect on the quality of the potable water in the system.

L. INDUSTRIAL FLUIDS SYSTEM: Any system containing a fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a health, system, pollutional or plumbing hazard if introduced into an approved water supply. This may include, but not be limited to: polluted or contaminated waters; al types of process waters and "used waters" originating from the public potable water system which may have deteriorated in sanitary quality; chemicals in fluid form; plating acids and alkalines, circulating cooling waters connected to an open cooling tower and/or cooling towers that are chemically or biologically treated or stabilized with toxic substances; contaminated natural waters such as from well, springs, streams, rivers, bays, harbors, seas, irrigation canals or systems, etc.; oils, gases, glycerine, paraffins, caustic and acid solutions and other liquid and gaseous fluids used in industrial or other purposes or for fire-fighting purposes.

M. POLLUTION: Means the presence of any foreign substance (organic, inorganic, or biological) in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic use.

N. WATER - POTABLE: Any water which, according to recognized standards, is safe for human consumption.

O. WATER - NONPOTABLE: Water which is not safe for human consumption or which is of questionable potability.

P. WATER - SERVICE CONNECTION: The service connection shall mean the downstream end of the meter. There should be not unprotected takeoffs from the service line ahead of any meter or any backflow prevention assembly located at the point of delivery to the customer's water system. Service connection shall also include water service connection from a fire hydrant and all other temporary or emergency water service connections from the public potable water system.

Q. WATER - USED: Any water supplied by a Water Purveyor from a public potable water system to a consumer's water system after it has passed through the point of delivery and is no longer under the sanitary control of the Water Purveyor.

III. REQUIREMENTS

A. WATER SYSTEM

1. The water system shall be considered as made up of two parts: The Utility System and the Customer System.

2. Utility System shall consist of the source facilities and the distribution system; and shall include all those facilities of the water system under the complete control of the utility, up to the point where the customer's system begins.

3. The source shall include all components of the facilities utilized in the production, treatment, storage, and delivery of water to the distribution system.

4. The distribution system shall include the network of conduits used for the delivery of water from the source to the customer's system.

5. The customer's system shall include those parts of the facilities beyond the termination of the utility distribution system which are utilized in conveying utility-delivered domestic water to points of use.

B. POLICY

1. No water service connection to any premises shall be installed or maintained by the City unless the water supply is protected as required by State laws and regulations and this Policy Manual. Service of water to any premises shall be discontinued by the City if a backflow prevention assembly required by this Policy Manual is not installed, tested and maintained, or if it is found that a backflow prevention assembly has been removed, by-passed, or if an unprotected cross-

connection exists on the premises. Service will not be restored until such conditions or defects are corrected.

2. The customer's system shall be open for inspection at all reasonable times to authorized representatives of the City to determine whether cross-connections or other structural or sanitary hazards, including violations of these regulations, exist. When such a condition becomes known, the Public Works Director shall deny or immediately discontinue service to the premises by providing for a physical break in the service line until the customer has corrected the condition(s) in conformance with the State and City statues relating to plumbing and water supplies and the regulations adopted pursuant thereto.

3. An approved backflow prevention assembly shall also be installed on each service line to a customer's water system at or near the property lien or immediately inside the building being served; but, in all cases, before the first branch line leading off the service line wherever the following conditions exist:

    a. In the case of premises having an auxiliary water supply which is not or may not be of safe bacteriological or chemical quality, the public water system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line appropriate to the degree of hazard.

    b. In the case of premises on which any industrial fluids or any other objectionable substance is handled in such a fashion as to create an actual or potential hazard to the public water system, the public system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line appropriate to the degree of hazard. This shall include the handling of process waters and waters originating from the utility system which have been subject to deterioration in quality.

    c. In the case of premises having (1) internal cross-connection that cannot be permanently corrected or controlled, or (1) intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impracticable or impossible t ascertain whether or not dangerous cross-connections exist, the public water system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line.

4. The type of protective assembly required under subsection 3a, b, and c shall depend upon the degree of hazard which exists as follows:

    a. In the case of any premises where there is an auxiliary water supply as stated in subsection 3a of this section and it is not subject to any of the following rules, the public water system shall be protected by an approved air-gap separation or an approved reduced pressure principle backflow prevention assembly.

    b. In the case of any premises where there is water or substance that would be objectionable but not hazardous to health, if introduced into

the public water system, the public water system shall be protected by an approved double check valve assembly.

c. In the case of any premises where there is any material dangerous to health which is handled in such a fashion as to create an actual or potential hazard to the public water system, the public water system shall be protected by an approved air-gap separation or an approved reduced pressure principle backflow prevention assembly. Examples of premises where these conditions will exist include sewage treatment plants, sewage pumping stations, chemical manufacturing plants, hospitals, mortuaries and plating plants.

d. In the case of any premises where there are "uncontrolled" cross-connections, either actual or potential, the public water system shall be protected by an approved air-gap separation or an approved reduced pressure principle backflow prevention assembly at the service connection.

e. In the case of any premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete in-plant cross-connection survey, the public water system shall be protected against backflow from the premises by either an approved air-gap separation or an approved reduced pressure principle backflow prevention assembly on each service to the premises.

5. Any backflow prevention assembly required herein shall be a model and size approved by the Public Works Director. The term "Approved Backflow Prevention Assembly" shall mean an assembly that has been manufactured in full conformance with the standards established by the American Water Works Association entitled:

* AWWA C510-92: Standard for Double Check Valve Backflow - Prevention Assembly

* AWWA C511-89: Standard for Reduced Pressure Principle Backflow Prevention Assembly;

and, have met completely the laboratory and field performance specifications of the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California established by

Specifications of Backflow Prevention Assemblies - Section 10 of the most current issued of the MANUAL OF CROSS-CONNECTION CONTROL.

Said AWWA and FCCC&HR standards and specifications have been adopted by the City of Bartow. Final approval shall be evidenced by a "Certificate of Approval" issued by an approved testing laboratory certifying full compliance with the said AWWA standards and FCCC&HR specifications.

The following testing laboratory has been qualified by the City of Bartow to test the certified backflow preventers:

Foundation for Cross-Connection Control and Hydraulic Research
University of Southern California
University Park
Los Angeles, California 90089

Testing laboratories other than the laboratory listed above will be added to an approved list as they are qualified by the City of Bartow. Backflow preventers which may be subjected to backpressure or back siphonage that have been fully tested and have been granted a Certificate of Approval by said qualified laboratory and are listed on the laboratory's current list of "Approved Backflow Prevention Assemblies" may be used without further test or qualification.

6. Approved Backflow Prevention Assemblies include the following:

a.	Double Detector Check Type	Febco or Wilkins (4", 6", 8")
b.	Reduced Pressure Type	Wilkins (3/4" to 2 1/2")

7. It shall be the duty of the customer-user at any premises where backflow prevention assemblies are installed to have certified inspections and operational tests made upon installation and at least once per year. In those instances where the City deems the hazard to be great enough the Public Works Director may require certified inspections at more frequent intervals. These inspections and tests shall be at the expense of the water user and shall be performed by the assembly manufacturer's representative, Public Works Water Department personnel or by a certified tester approved by the Public Works Director. It shall be the duty of the Public Works Director to see that these tests are made in a timely manner. The customer-user shall notify the Public Works Director in advance when the tests are to be undertaken so that an official representative may witness the tests if so desired. These assemblies shall be repaired, overhauled or replaced at the expense of the customer-user whenever said assemblies are found to be defective. Records of such tests, repairs and overhaul shall be kept and made available to the Public Works Director.

8. All presently installed backflow prevention assemblies which do not meet the requirements of this section but were approved devices for the purposes described herein at the time of installation and which have been properly maintained, shall, except for the inspection and maintenance requirements under subsection 6, be excluded from the requirements of these rules so long as the Public Works Director is assured that they will satisfactorily protect the utility system. Whenever the existing device is moved from the present location or requires more than minimum maintenance or when the City finds that the maintenance constitutes a hazard to health, the unit shall be replaced by an approved backflow prevention assembly meeting the requirements of this section.

IV. TYPICAL FACILITIES, WHICH MAY ENDANGER THE PUBLIC WATER SYSTEM

A. GROUP I: Includes Cross-Connections Typical to Certain Industries or Uses; Hazards normally to be found in connection with the operation of an average water system.

1. Sanitary Sewage System

   a. Cross-connections to sewage or surface water pumps for priming, cleaning, flushing or unclogging purposes.

   b. Water-operated sewage sump ejectors for operational purposes.

   c. Sewers for the purpose of disposing of filter or softener backwash water or water from cooling systems or for the purpose of providing for a quick drain for the building water lines or of flushing or blowing out obstructions in the sewer lines, etc.

   d. Reclaimed water.

2. Reservoirs, Cooling Towers, etc.: Reservoirs, cooling towers and circulating systems which may be heavily contaminated either with bird droppings, vermin, algae, bacterial slimes or with toxic water treatment compounds such as pentachlorophenol, copper, chromates, metallic glucosides, compounds of mercury, quaternary ammonium compounds, etc.

3. Industrial Fluid Systems: Industrial fluid system sand lines containing cutting and hydraulic fluid, coolants, hydrocarbon products, glycerine, paraffin, caustic and acid solutions, etc.

4. Fire Fighting Systems

   a. Fire fighting systems, including storage reservoirs which may be treated for prevention of scale formation, corrosion, algae, slime growths, etc.

   b. Fire systems which may be subject to contamination with anti-freeze solutions, "Foamite" or other chemicals or chemical compounds used in fighting fire.

   c. Fire systems which are subject to contamination with auxiliary or used water supplies or industrial fluids.

5. Plating Facilities

   a. Plating facilities involving the use of highly toxic cyanides, heavy metals in solution (such as copper, cadmium, chrome, nickel, etc.), acids and caustic solutions.

   b. Plating solution filtering equipment with pumps and circulating lines.

   c. Tanks, vats or other vessels used in painting, descaling, anodizing, cleaning, stripping, oxidizing, etching, passivating, pickling, dipping, rinsing operations.

d. Other lines or facilities needed in the preparation or finishing of the products.

6. Steam Generating Facilities: Steam generating facilities and liens which may be contaminated with boiler compounds such as pentachlorophenol, hydrazine, cyclohexylamine, etc. (NOTE: a very particular hazard is the possibility of steam getting back into the domestic system, causing either a system or a health hazard.)

7. Plumbing Hazards

   a. Inadequately protected (improperly installed, improperly maintained or without vacuum breakers) flush valve toilets, urinals, aspirators, retorts, pipe tube washers and similar contaminated and/or sewer-connected facilities.

   b. Laboratory equipment which may be chemically or bacteriologically contaminated such as steam sterilizers, autoclaves, specimen tanks, autopsy and mortuary equipment.

8. Cooling Systems - Single Pass: Compressors, heat exchangers, air-conditioning equipment and other water cooled equipment which may be sewer-connected.

9. Irrigation Systems

   a. Irrigation systems which may be equipped with pumps, injectors, pressurized tanks or vessels, or other facilities for injecting into the irrigation system agricultural chemicals such as fungicides, pesticides, soil conditioning and other similar noxious, toxic or objectionable substances.

   b. Irrigation systems subject to contamination from submerged inlets, auxiliary water supplies, ponds, reservoirs, swimming pools and other sources of stagnant, polluted or contaminated waters.

10. Plumbing - Hospitals: Contaminated or sewer-connected equipment such as bed pan washers, flush valve toilets and urinals, autoclaves, specimen tanks, sterilizers, pipe tube washers, cuspidors, aspirators, autopsy and mortuary equipment, etc.

11. Plumbing - Multi-Storied Buildings: Where the upper floors of multi-storied buildings are above the reach of the water purveyor's system pressure, it will be necessary to use booster pumps. Considerable care must be exercised to prevent the use of the suction side line to these pumps from also being used as the take-off for domestic, sanitary, laboratory or industrial uses on the flower floors. Pollutants or contaminants from equipment supplied by take-offs from the suction side line may be easily pumped throughout the upper floors.

12. Industrial Systems - Chemical Contamination: Tanks, can and bottle washing machines and liens where caustics, acids, detergents and other compounds are used in clanging, sterilizing and flushing.

13. Photo Processing Equipment: Tanks, automatic film processing machines or other facilities used in processing films, which may be contaminated with chemicals such as acetic acid, potassium ferricyanide and/or one of the many different types of aromatic series of organic chemicals.

14. Laundries and Dye Works

    a. Laundry machines having under-rim or bottom inlets.

    b. Dye vats in which are used toxic chemicals and dyes.

    c. Wash water storage tanks equipped with pumps and recirculating systems.

    d. Retention and mixing tanks.

    e. Shrinking, bluing and dyeing machines with direct connections to circulating systems.

15. Industrial Facilities

    a. Tanks, lines, valves, fittings, and other equipment being subjected to hydraulic tests.

    b. Hydraulically operated equipment where the city water pressure is used directly and may be subject to backpressure.

    c. Equipment under hydraulic tests where pumps, rams, pressure cylinders or other hydraulic principles are used to provide pressures for testing purposes.

16. Motion Picture Studios

    a. Open reservoirs, lagoons, tanks or similar facilities, used as props in the making of motion pictures.

    b. Automatic film processing machines, tanks, vats and other facilities, used in processing films.

    c. Special effects equipment in which chemical and other materials may be injected into the water supply for special effects.

17. Petroleum Processing

    a. Steam boilers, steam lines, mud pumps and mud tanks, hydraulically operated Tretolite tanks, oil well casings (for dampening gas pressures)dehydration tanks, outlet lines from storage and dehydration tanks (for purging purposes), oil and gas tanks (to create hydraulic pressures and to hydraulically raise the oil and gas levels), gas and oil lines (for testing, evacuating and slugging purposes).

18. Paper Processing: Pump, bleaching, dyeing and other processing equipment which may be contaminated with toxic chemicals.

19. Cannery Equipment: Pressure cookers, autoclaves, retorts and other similar steam-connected facilities, washers, cookers, tanks, lines, flumes, and other equipment used for storing, washing, cleaning, blanching, cooking, flushing, fluming, or for transmission of foods, fertilizers or wastes.

20. Auxiliary Water Systems: The service connection form an approved water supply must be protected by a suitable backflow prevention assembly where there is an auxiliary water supply system on the premises even though there are no overt cross-connections.

21. Solar Energy Systems: Solar energy systems for domestic hot water heating, space heating or cooling, industrial process water heating, swimming pool heating which may have cross-connections with the domestic water system. The solar energy system may employ anti-freeze solutions or chemical corrosion inhibitors.

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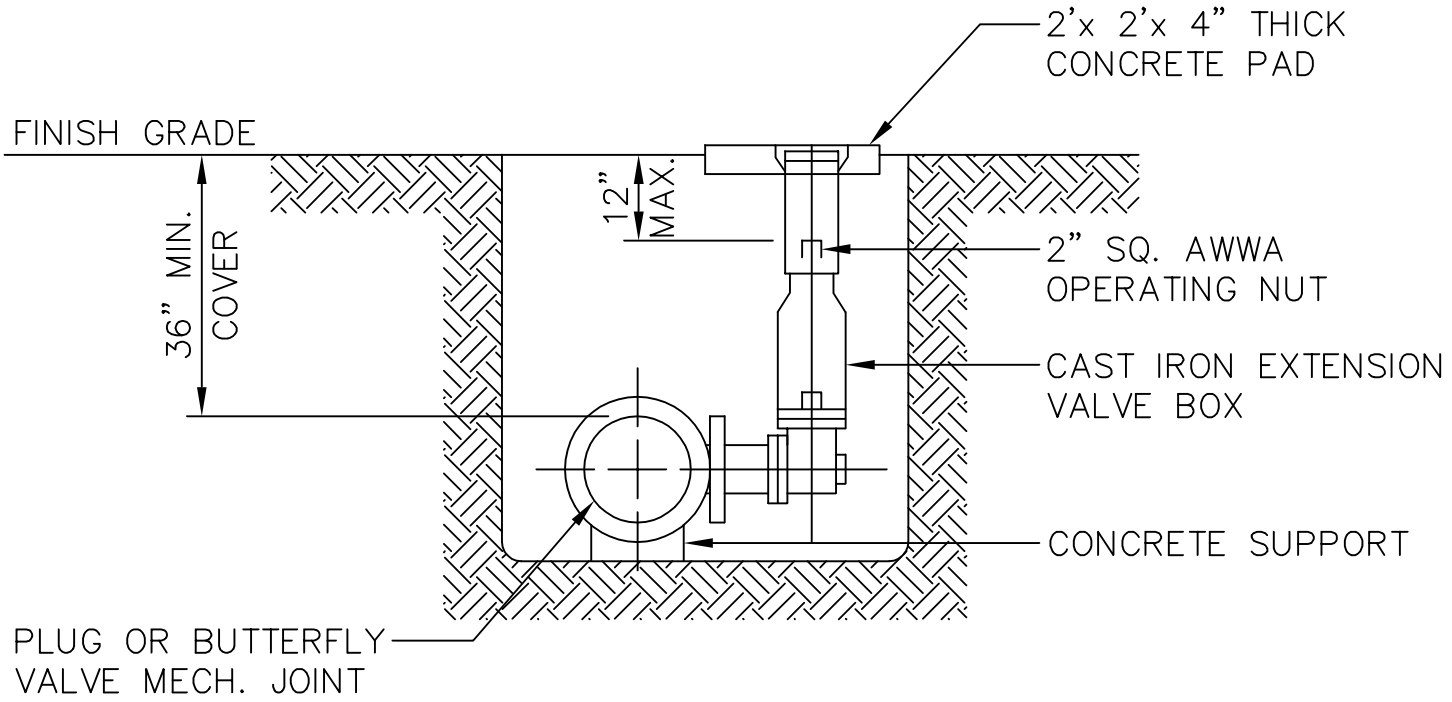
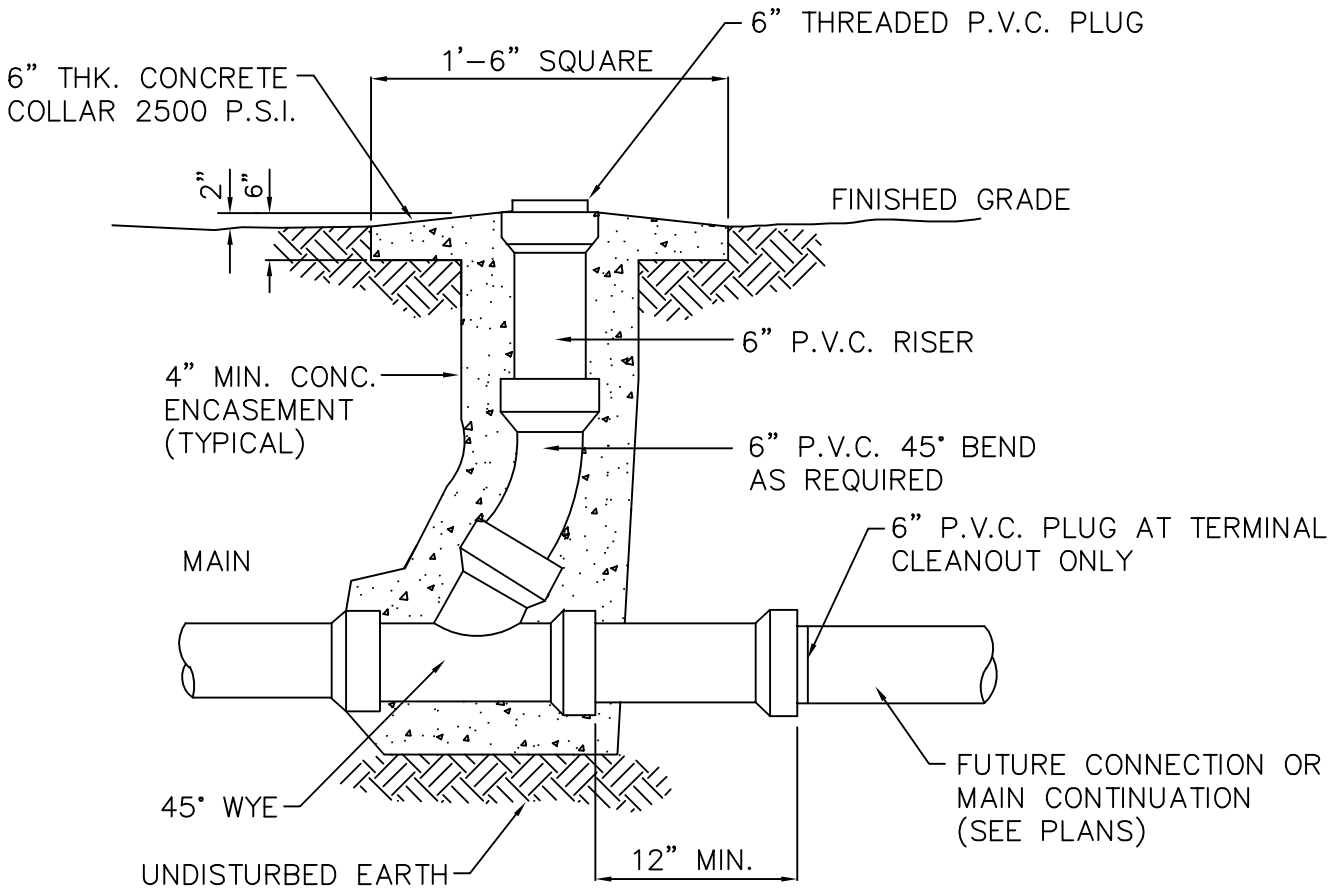


PLUG/BUTTERFLY VALVE BOX DETAIL

N.T.S.

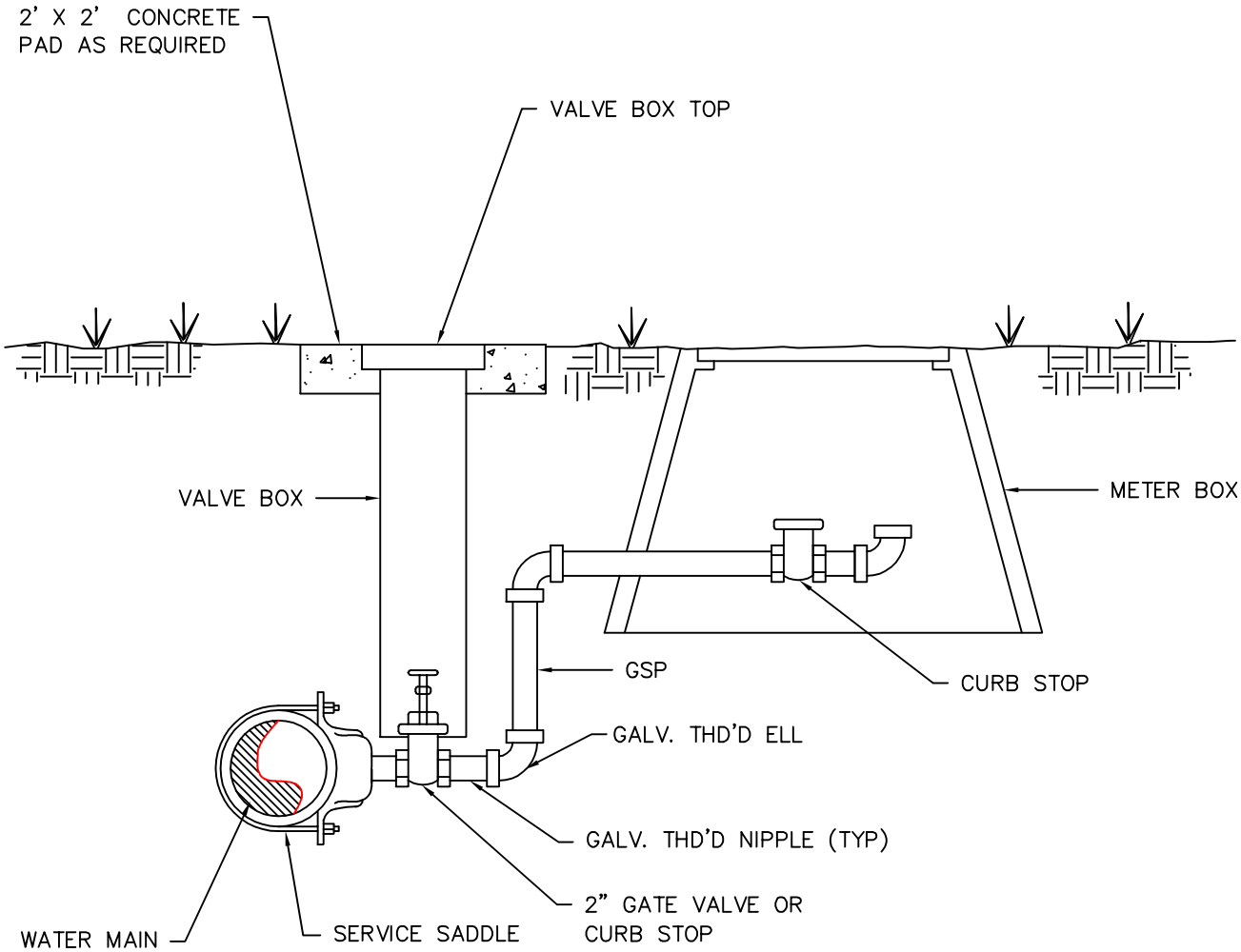
CITY OF BARTOW
STANDARD DETAIL



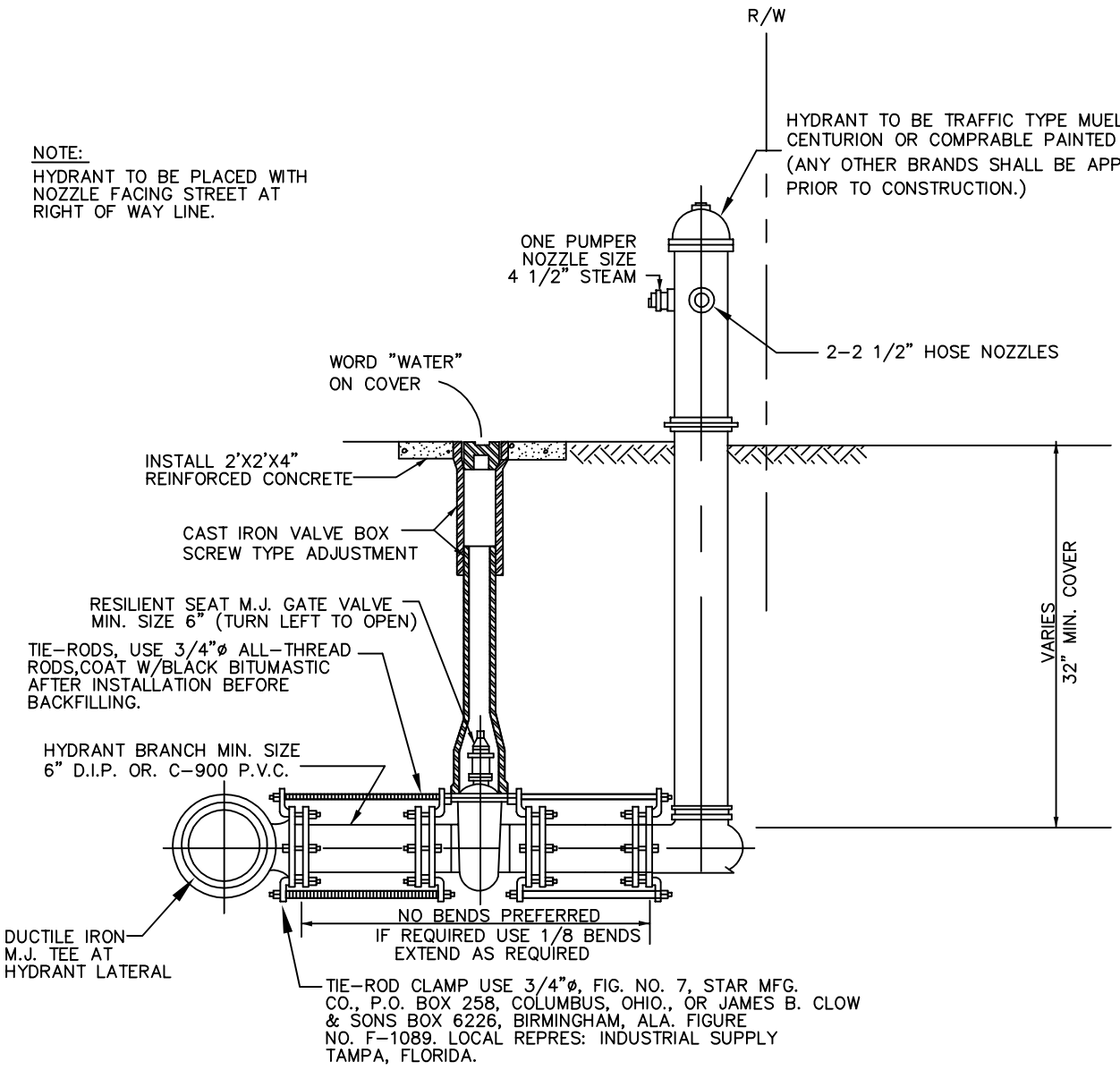
CLEANOUT DETAIL

N.T.S.

CITY OF BARTOW
STANDARD DETAIL



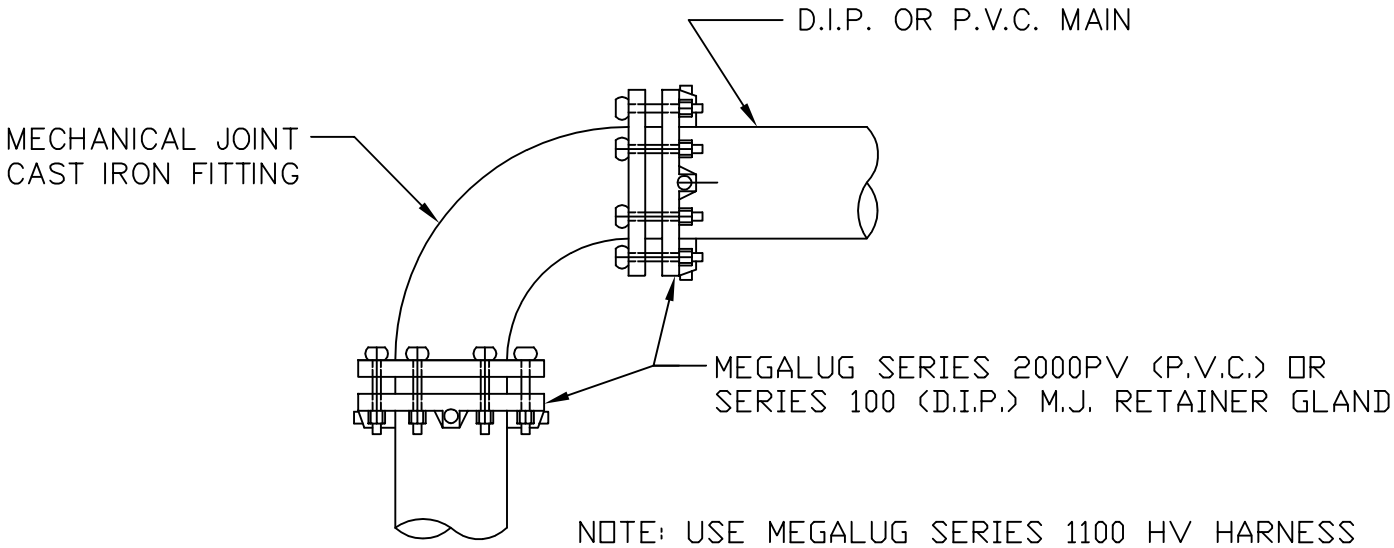
CITY OF BARTOW
STANDARD DETAIL
FLUSHING VALVE



HYDRANT DETAIL

N.T.S.

CITY OF BARTOW
STANDARD DETAIL



RESTRAINED PIPE JOINT DETAIL

N.T.S.

THRUST RESTRAINT:

All force main valves and fittings shall be restrained against thrust from 150 PSI test pressure by using flanged or "megalug" type connectors. All pipe joints lying within the listed minimum distance of any fitting or valve shall also be restrained. When casings fall within the minimum distance from a fitting, restrain all joints inside the casing in addition to the required minimum length of buried pipe.

The following table describes the minimum length of pipe that shall be continuously restrained on both sides of different types and sizes of force main fittings:

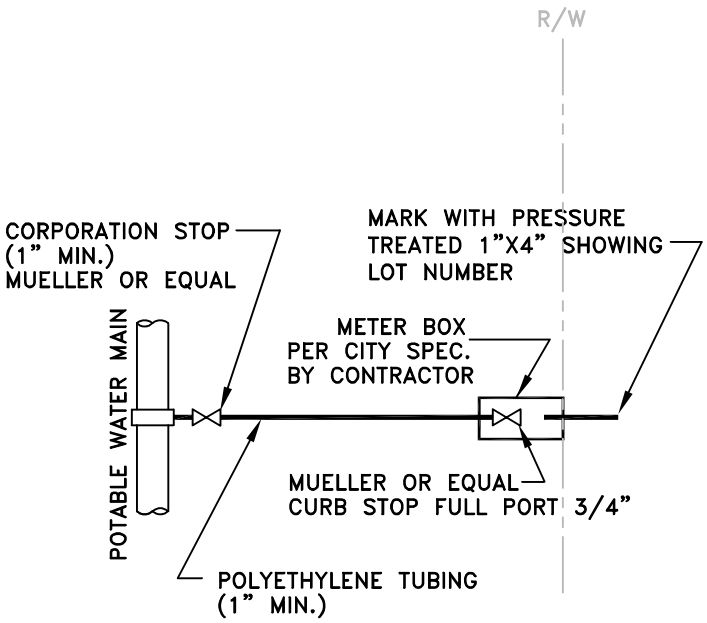
FITTING TYPE	PIPE SIZE									
	4"/LESS	6"	8"	10"	12"	14"	16"	18"	20"	24"
TEE BRANCH LEG	18'	40'	67'	76'	95'	111'	128'	144'	160'	175'
90° ELL	24'	21'	45'	33'	38'	43'	48'	53'	58'	109'
ALL OTHERS	18'	9'	20'	14'	16'	18'	20'	22'	24'	45'

DEAD END VALVES FOR FUTURE EXPANSION WILL BE RESTRAINED BACK TO THE FITTING.

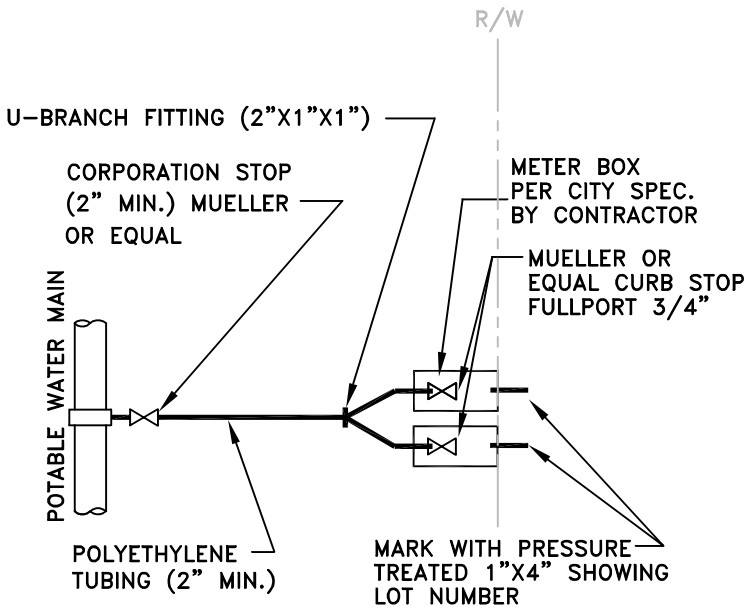
ENGINEER TO SPECIFY RESTRAINT FOR REDUCERS

RESTRAIN THE RUN LEGS OF ALL TEES AT THE FITTING, RESTRAIN BRANCH AS SHOWN.

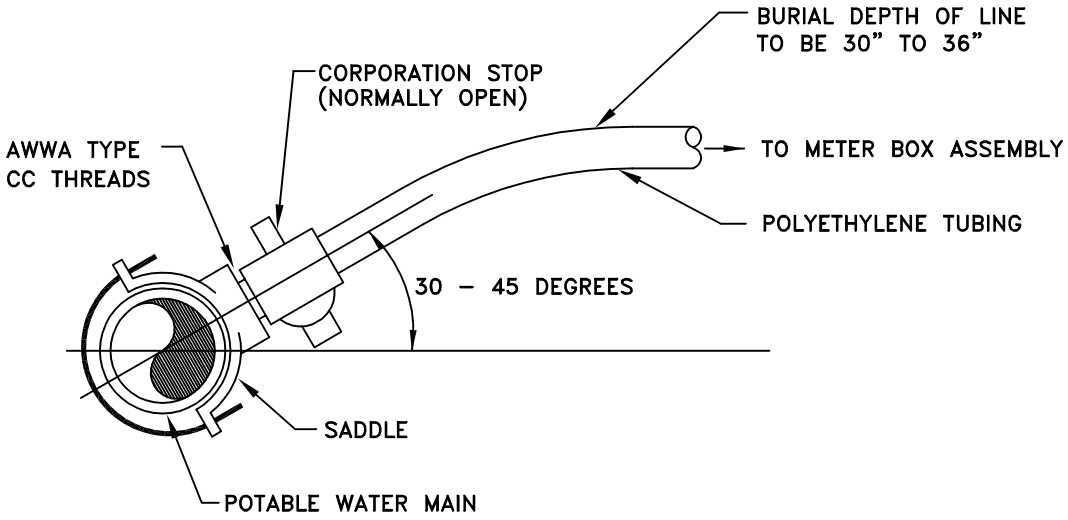
CITY OF BARTOW
STANDARD DETAIL



SINGLE SERVICE



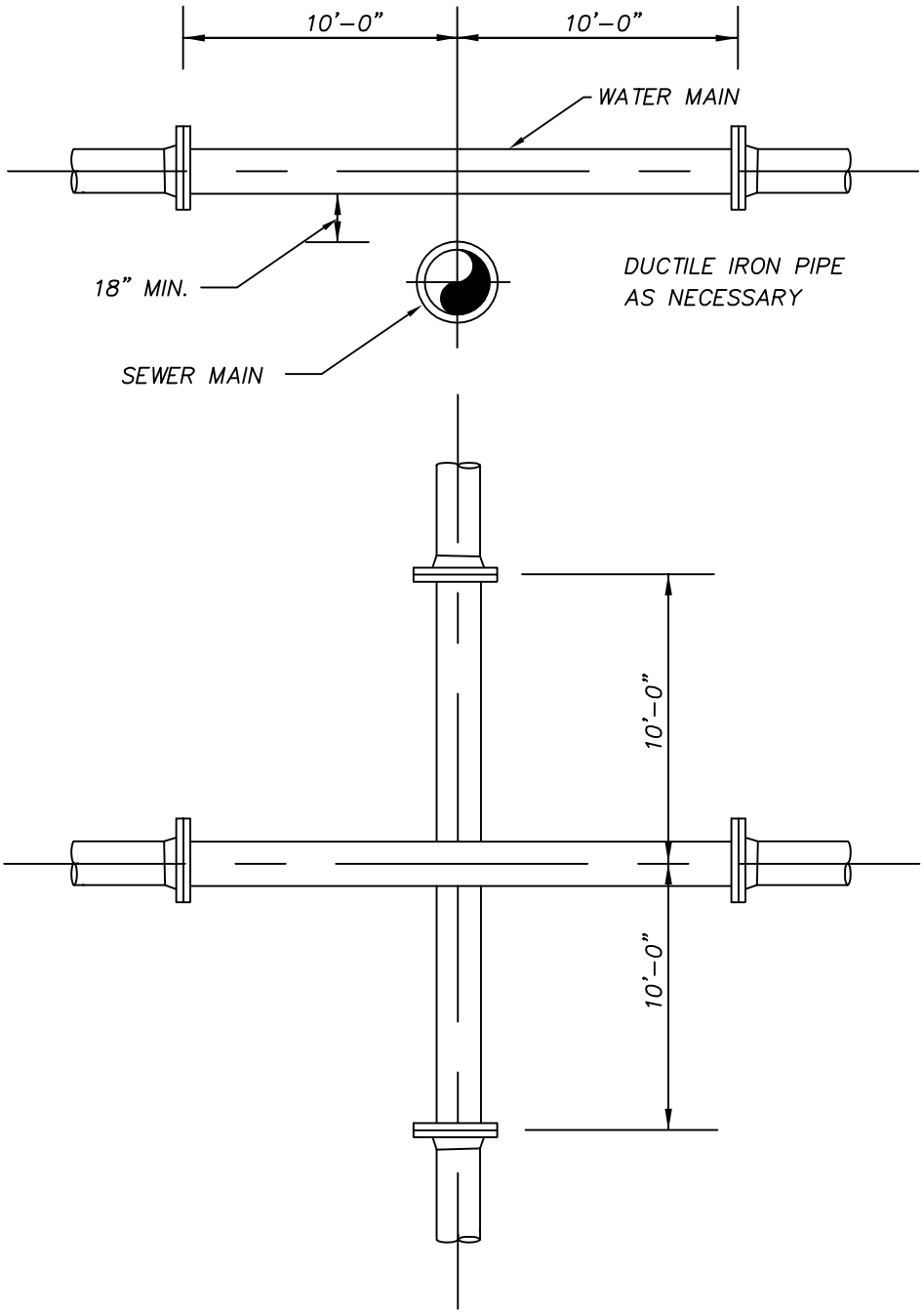
DOUBLE SERVICE



NOTES:

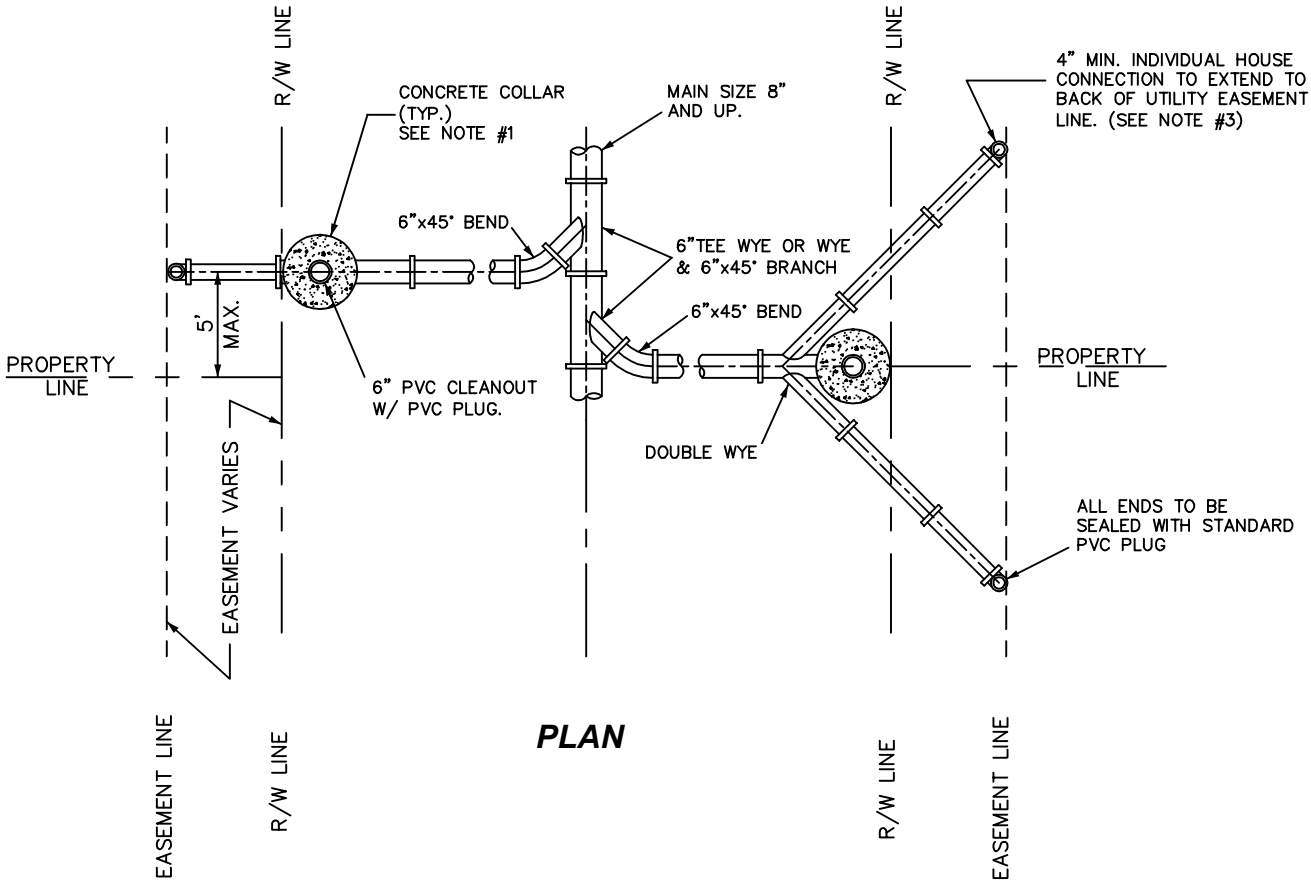
1. ALL FITTINGS SHALL BE BRASS WITH COMPRESSION/PACK JOINT CONNECTIONS.
2. NO SERVICE LINE SHALL CONNECT OR TERMINATE UNDER A DRIVEWAY.
3. 1"X4" WOOD STAKE TO BE 4' LONG WITH 2' BURIED VERTICALLY AND 2' ABOVE GRADE AT CURB STOPS.
4. TUBING SHALL BE HDPE ENDOT ENDOPURE OR VANGUARD PROCORE AND SHALL BE BLUE IN COLOR.
5. CONTRACTOR TO INSTALL SERVICE LINE INTO METER BOX AND TERMINATE WITH CURB STOP AND METER CONNECTOR
6. INSERTS ARE REQUIRED AT ALL POLYETHYLENE TUBING CONNECTIONS.

TYPICAL POLY-TUBING WATER SERVICE CONNECTION

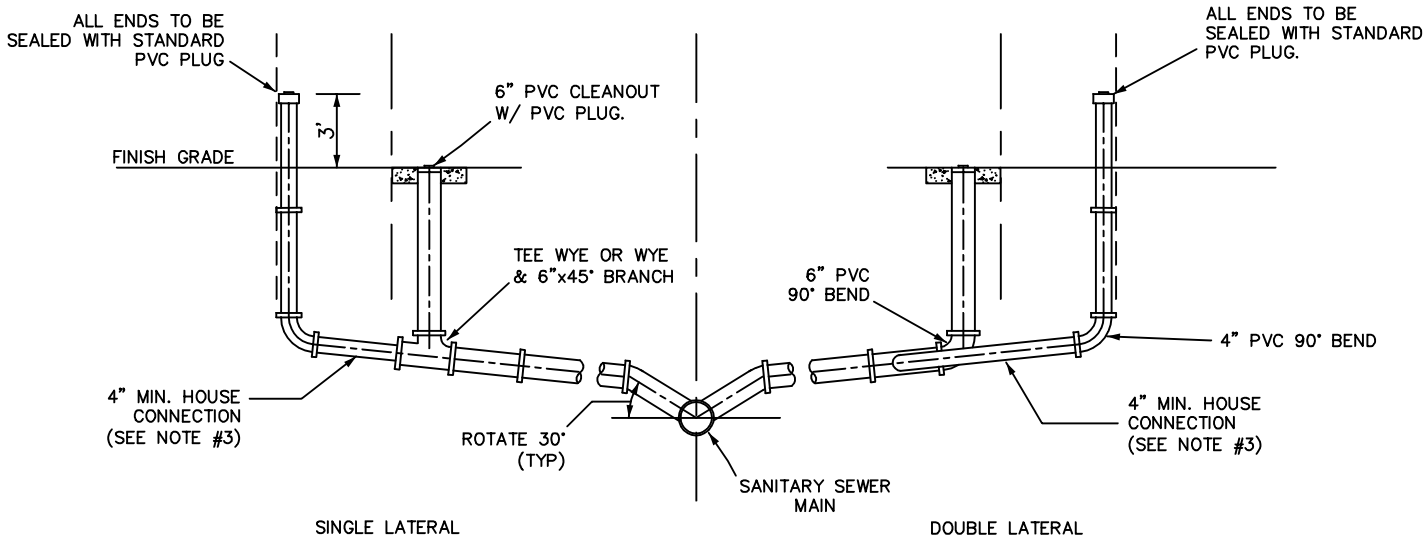


NOTES:
WATER MAIN CROSSING EXISTING FORCE MAIN SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18 INCHES BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE MUST BE USED TO PROVIDE A MINIMUM SEPARATION OF 10 FEET BETWEEN ANY TWO JOINTS. ALL CROSSINGS SHALL BE ARRANGED SO THAT THE SEWER PIPE JOINTS AND THE WATER MAIN PIPE JOINTS ARE EQUAL DISTANCE FROM THE POINT OF CROSSING (PIPES CENTERED ON THE CROSSING). IN ALL CASES A MIN. 18" VERTICAL SEPERATION SHALL BE REQUIRED.

UTILITY CROSSING DETAIL



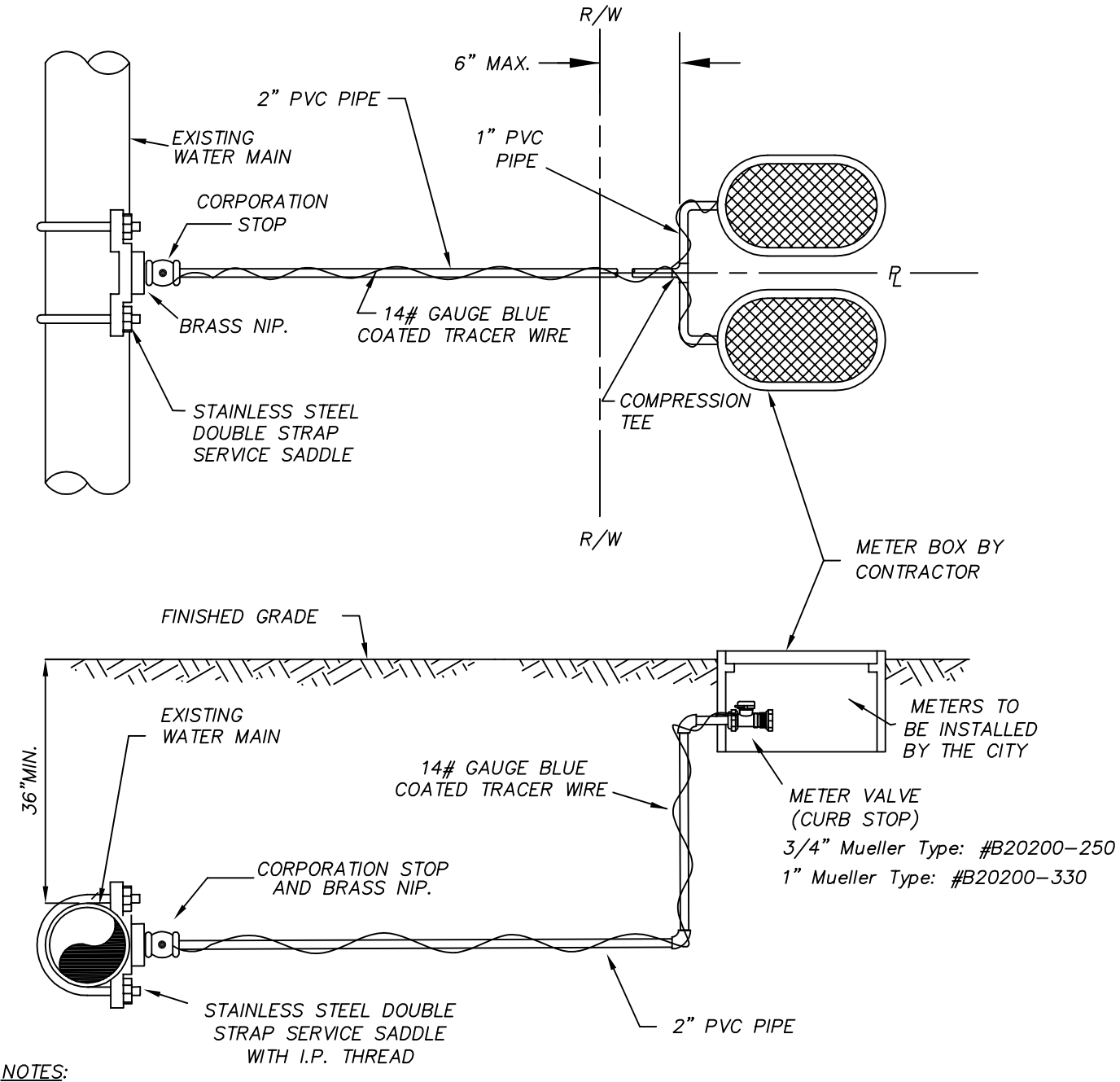
PLAN



PROFILE

NOTES:
1. 24" DIA. X 4" THICK CONCRETE COLLAR CAST IN PLACE
2. 4" INDIVIDUAL HOUSE CONNECTIONS SHALL BE EXTENDED TO THE BACK SIDE OF THE EASEMENT.
3. COMMERCIAL CONNECTIONS SHALL BE 6" MINIMUM.

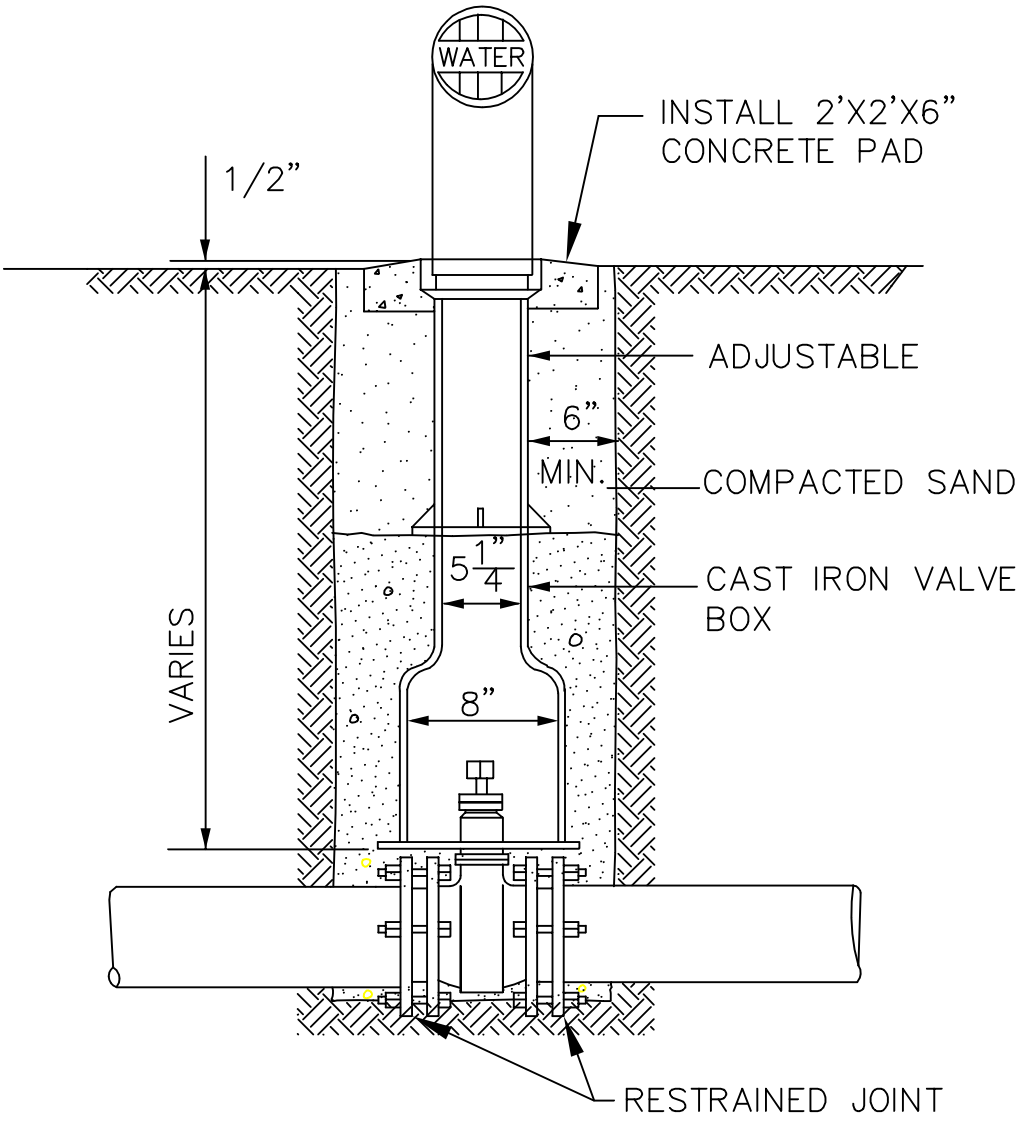
CITY OF BARTOW
SANITARY SEWER SERVICE DETAIL



NOTES:

1. BLUE 14 GAUGE TRACER WIRE SHALL BE ATTACHED TO THE SERVICE LINE.
2. ALL SERVICES SHALL BE SCH 40 PVC UNLESS SPECIFIED BY CITY ENGINEER.
3. 1" & 3/4" METER SIZES SHALL REQUIRE LOCKABLE METER VALVE. (CURB STOP)
4. MINIMUM COVER IN UNPAVED AREAS IS 18", IN PAVED AREAS OR PLANNED ROADWAYS OR SWALES MINIMUM COVER SHALL BE 36".
5. ALL FITTINGS SHALL BE PVC OR BRASS. NO GALVANIZED WILL BE ALLOWED.

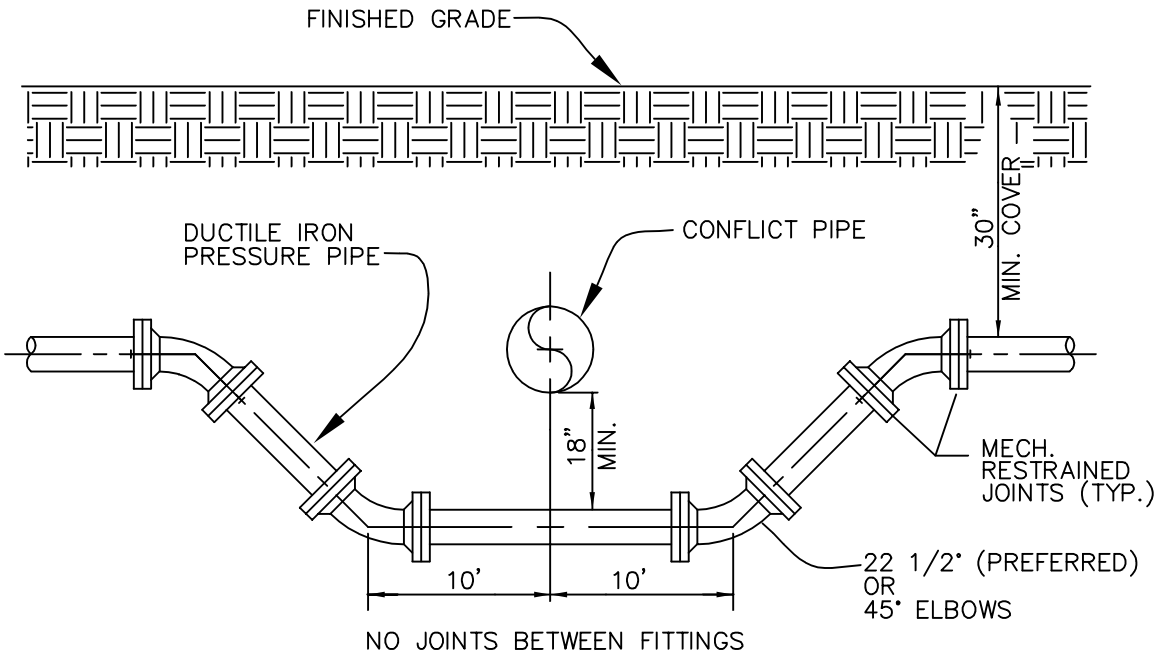
TYPICAL DOUBLE PVC WATER SERVICE CONNECTION



TYPICAL CAST IRON VALVE BOX

NTS

CITY OF BARTOW
STANDARD DETAIL



FITTING TYPE

NOTES:

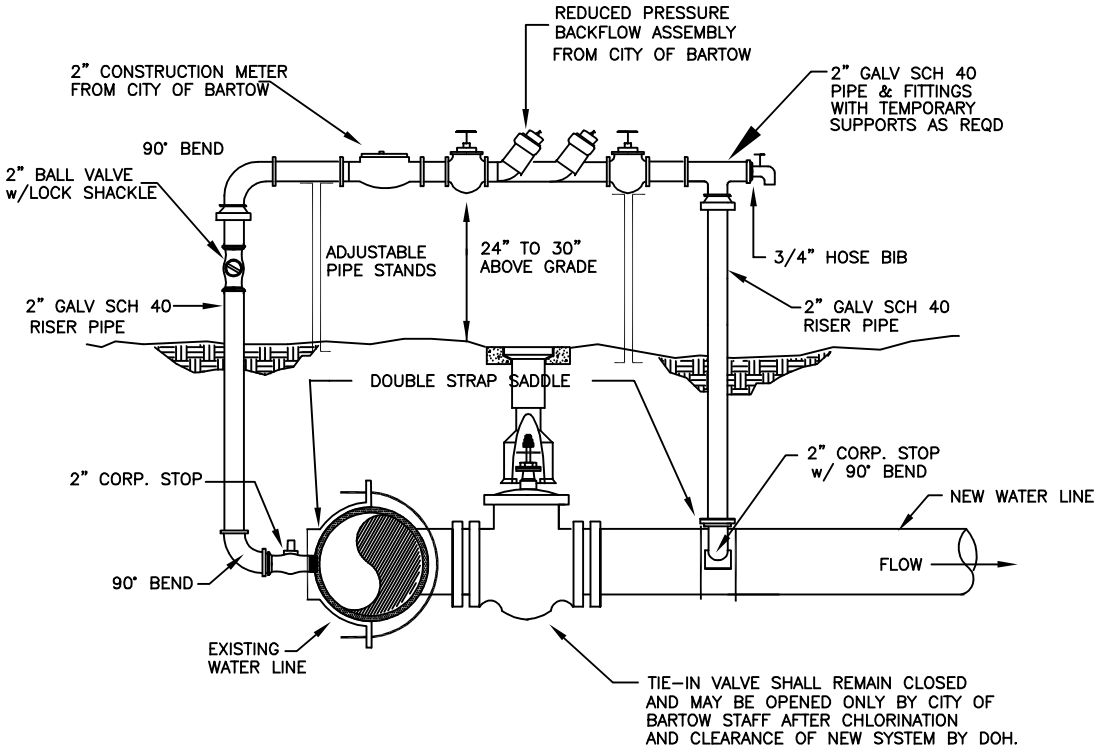
1. *THESE METHODS ARE TO BE USED WHEN INSUFFICIENT COVER EXISTS TO ALLOW PRESSURE PIPE TO CROSS ABOVE CONFLICT PIPE WITH 6" VERTICAL SEPARATION AND MAINTAIN REQUIRED COVER TO FINISHED GRADE.*

2. *FITTINGS SHALL BE RESTRAINED WITH MEGALUGS.*

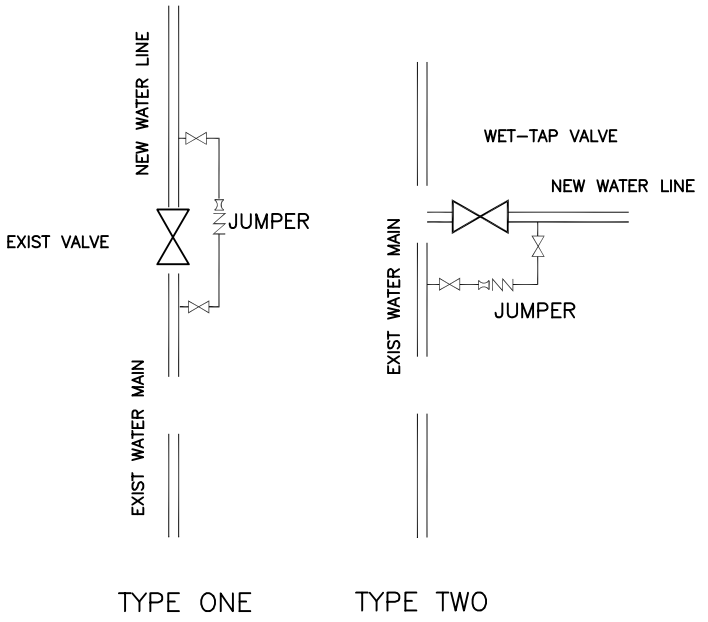
CITY OF BARTOW
PUBLIC WORKS DEPT.

CONSTRUCTION WATER SUPPLY
CONNECTION DETAIL

DWG: Water Jumper Detail
DATE: JULY 2007



SECTION



PLAN VIEW

1. THIS JUMPER CONNECTION IS REQUIRED AT THE PRIMARY POINT OF CONNECTION TO ACTIVE POTABLE WATER MAINS THE METER, BACKFLOW PREVENTER AND ALL PIPE AND FITTINGS USED FOR THE JUMPER CONNECTION SHALL BE DISINFECTED PRIOR TO INSTALLATION IN ACCORDANCE WITH AWWA C651, LATEST EDITION.
2. THE JUMPER CONNECTION MAY NOT BE REMOVED UNTIL FLUSHING, TESTING, AND DISINFECTION OF NEW WATER MAINS IS COMPLETED AND THE SYSTEM CLEARANCE LETTER OBTAINED FROM THE POLK COUNTY HEALTH DEPARTMENT
3. THE JUMPER CONNECTION SHALL BE USED TO FILL OR FLUSH THE NEW WATER MAIN AND TO PROVIDE WATER FOR TESTING AND BACTERIOLOGICAL SAMPLING OF THE NEW MAIN AS REQUIRED.
4. THE JUMPER CONNECTION SHALL REMAIN OPEN TO MAINTAIN MINIMUM PRESSURE (20psi) IN NEW MAINS AFTER DISINFECTION BUT PRIOR TO HEALTH DEPT CLEARANCE LETTER BEING ISSUED.
5. ADEQUATE SUPPORTS, BRACING AND/OR RESTRAINTS SHALL BE PROVIDED AS NEEDED TO RESIST PRESSURE FORCES AND SUPPORT THE ASSEMBLY
6. FLUSHING OF NEW WATER MAINS MAY BE DONE VIA THE TIE–IN VALVE ONLY UNDER THE FOLLOWING CONTROLLED CONDITIONS.
   A. THE TIE–IN VALVES SHALL BE OPERATED AND PRESSURE TESTED IN THE PRESENCE OF CITY OF BARTOW UTILITIES STAFF IN ORDER TO VERIFY WATER TIGHTNESS PRIOR TO TIE–IN. VALVES WHICH ARE NOT WATERTIGHT SHALL BE REPLACED OR A NEW VALVE INSTALLED IMMEDIATELY ADJACENT TO THE LEAKING VALVE.
   B. THE TIE–IN VALVE SHALL BE OPENED ONLY FOR FLUSHING OF NEW NEW MAIN WHICH ARE OPEN TO THE ATMOSPHERE. THE FLUSHING SHALL BE DONE IN THE PRESENCE OF CITY OF BARTOW UTILITIES STAFF.
7. UPON RECEIPT OF CLEARANCE FOR USE FROM D.O.H. AND A REQUEST TO TERMINATE CONSTRUCTION SERVICE, THE CONTRACTOR SHALL REMOVE THE TEMPORARY JUMPER CONNECTION. CORPORATION STOPS SHALL BE CLOSED AND PLUGGED WITH 2" BRASS PLUGS BY THE CONTRACTOR.
8. THE JUMPER CONNECTION SHALL BE PROTECTED FROM DAMAGE BY INSTALLATION OF A PROTECTIVE WARNING FENCE OR SIMILAR BARRICADE, WHICH SHALL BE ERECTED AND MAINTAINED BY THE CONTRACTOR.

CONSTRUCTION JUMPER CONNECTION