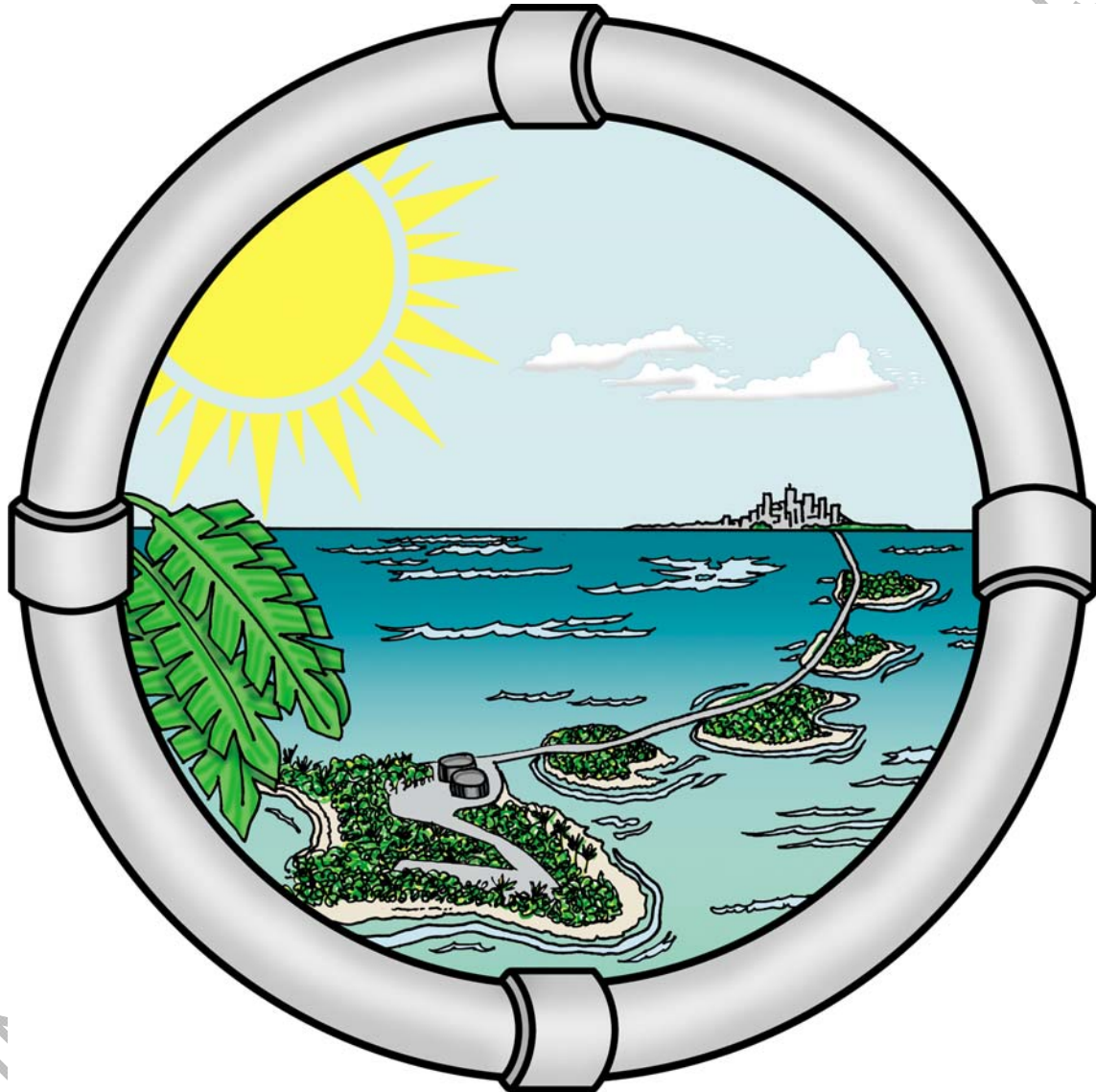


# FLORIDA KEYS AQUEDUCT AUTHORITY

## MINIMUM DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS



## ENGINEERING DEPARTMENT

Revised: 3/07/2011

**FLORIDA KEYS AQUEDUCT AUTHORITY**  
**MINIMUM CONSTRUCTION STANDARDS AND SPECIFICATIONS**

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IN THE PROCESS OF REVISIONS

## FLORIDA KEYS AQUEDUCT AUTHORITY

### MINIMUM CONSTRUCTION STANDARDS AND SPECIFICATIONS

#### I. FORMAT FOR WATER MAIN DRAWINGS

- A. All drawings shall be done on 24" x 36" or 11"x17" sheet with standard title block and border. Lettering shall be 1/8" or larger to permit photographic reduction. Line quality shall be uniform and heavy enough to permit legible copies to be made from original tracings.
- B. Drawings shall include:
1. Cover sheet with location map, legend, sheet index, and general construction notes.
  2. Plan views of proposed water mains.
  3. Profile views as may be required.
  4. Construction details. –indicate conflicts/separation with utilities
  5. Locations of all existing utilities including existing water mains and valves.
  6. Minimum scale shall be 1:40; maximum shall be 1:20.
  7. Digital Copy-Auto Cad 2007 or newer
  8. Signed and Sealed by a Florida Licensed P.E.
- C. Location map shall show Key, mile marker and roads from U. S. 1 (reference DOT station #) leading to location of work at a scale appropriate to clearly indicate all such information. Legend shall include all symbols used on drawings. Sheet index shall reference all sheets included with plans by name and number.
- D. General construction notes shall be as follows:
1. The Contractor shall notify all utilities with facilities in proximity to the proposed water main 72 hours prior to starting work and shall coordinate his work with utility representatives.
  2. The Contractor shall notify the FKAA Contract Office 72 hours prior to starting work so that inspection may be scheduled. Inspections will be

made between 8:00 a.m. and 5:00 p.m. Monday through Friday excluding legal holidays. When inspections are required after 5:00 pm or on weekends and holidays the contractor shall reimburse FKAA for all costs incurred to perform the inspections.

The FKAA observes the following holidays: New Years Day, Martin Luther King Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Columbus Day, Thanksgiving Day, Day After Thanksgiving, Christmas Day, and/or as otherwise directed by FKAA.

3. The Contractor shall be responsible for locating all the utilities in the proposed area of work prior to proceeding by calling Sunshine at 1-800-432-4770. All excavation work must comply with applicable State and Federal (OSHA) requirements, including the Florida Trench Safety Act.
4. The Contractor shall not interrupt water service to customers while making connection to existing water mains without the presence of a FKAA Representative. Such tie-ins shall be scheduled with the FKAA 48 hours in advance. The Contractor may be required in certain instances to schedule his tie-in work at off-peak hours. Shut-downs shall be kept to a maximum of 2 hours, unless previously approved by the FKAA, pending extenuating circumstances.
5. The Contractor shall utilize an approved reduced pressure zone backflow preventer, and meter all water taken from FKAA water mains for flushing, pigging, testing, and disinfection of mains. Meters must be obtained from FKAA. All water metered during construction, will be billed for construction.
6. The Contractor shall have a supervisor present on the jobsite at all times who is capable of speaking, reading and writing in the English language.
7. No revisions shall be made to the plans without the written approval of the FKAA Engineering Department.
8. Information shown on the drawings as to the location of existing utilities has been prepared from the most reliable data available to the Engineer. However, this information is not guaranteed and it shall be the responsibility of the contractor to determine the location, character and depth of any existing utilities, at no additional cost to the FKAA. Extreme caution shall be exercised to prevent damage to existing utilities. Repairs to existing utilities necessitated because of damage caused by contractor's activities shall be at the expense of the Contractor. Any actions by the Contractor necessitating repair to FKAA facilities will require that the

Contractor notify the FKAA Maintenance Department immediately and adhere to FKAA main break procedures. Repairs to existing water lines will be made before construction continues.

9. No excavation shall be permitted in the area of the transmission pipeline without a FKAA representative at the site. Contractor must excavate by hand when within 24" of an existing utility.
10. Construction shall be performed in such a manner as to provide a minimum of inconvenience to the residents of the area. At no time shall roadways or pathways be blocked without providing a well marked and easily accessible alternative route. Signs and markings shall be provided in accordance with the Florida Department of Transportation Roadway and Traffic Design Standards. Contractor shall submit to the FKAA a maintenance of traffic (M.O.T.) plan that shows the scheme(s) that is intended for use on site. This shall include barricades, signing and/or temporary striping. A 24 hour/day contact name and phone number shall be provided to the FKAA Engineering Department. Both the M.O.T. Plan and contact shall be updated as needed. For projects involving state roads, the M.O.T. must also be submitted to F.D.O.T. for approval. For projects not within FDOT right-of-way, MOT shall be in accordance with Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), latest edition. Contractor shall assist in public notification efforts.
11. The Contractor shall not operate any water main valve or make a tap on any water main unless an FKAA representative is present. All existing system valves are to be operated by FKAA personnel only. Contractor must provide three (3) business days notification prior to scheduled shut downs.
12. Five (5) working days prior to the preconstruction meeting with the FKAA, the Contractor shall submit a project schedule to the FKAA Engineering Department in an approved format that details all construction activities throughout the term of the contract. This schedule shall indicate those activities considered to be on the critical path for satisfactory completion within the time limits of the contract. It will be submitted for approval to the FKAA, and must be approved, or revised and resubmitted in an acceptable form prior to commencement of any construction activity on the project.

The FKAA shall require a resubmittal of this schedule if the Contractor falls more than 5% behind (dollar value of contract items versus contract time, excluding material advances), showing how the Contractor, at no

further cost or expense to the FKAA will mitigate the delay and complete this project within the contract duration as specified.

Deviation from the approved schedule will be by written permission of the FKAA. This schedule will be reflective of the Contractor's M.O.T. plan.

Failure to submit the initial schedule may result in the suspension of all construction activity. Failure to submit schedule revisions within ten (10) calendar days of written notice by the FKAA shall result in withholding of all progress payments until an acceptable schedule is delivered and approved by the FKAA.

This will not preclude further construction activities on this project and does not constitute grounds for delay claims or time extensions to contract duration. No extension of contract time is allowed for submittal of schedule revisions.

13. The Contractor's Operation should be compliant with Florida Trench Safety Act. Submit applicable State Form.

E. Plan reviews shall be prepared in the following manner:

Location of proposed water mains, valves, flush-outs, hydrants, and services shall be referenced to existing right-of-way lines, street centerlines, lot lines, and/or other permanent structures. All existing utilities and other structures in proximity to the proposed water mains shall be shown and referenced in a similar manner. Size and type of all existing water mains to be tapped and size, type and lengths of proposed water mains shall be indicated. The location and limits of all easements to be granted to the FKAA shall be indicated. Width of existing pavement, distance from right-of-way and right-of-way shall be indicated. Drawings shall indicate location, size, and type of all driveways to be crossed by the proposed water mains shall be indicated. Pavement cuts and paved driveway cuts shall be indicated. All water mains to be conveyed to the FKAA shall be indicated. The location and elevation of a 1929 NGVD Benchmark shall be indicated. Elevations of existing and proposed roads referenced to said benchmark shall be indicated when necessary to insure proper cover over water mains. Scale shall be appropriate for the level of detail on the drawing but in no case shall be smaller than one inch = forty feet and not larger than one inch = twenty feet.

- F. Profile views shall clearly indicate all utilities in areas of potential conflict of proposed water mains. Plan and profile sheet should be used to indicate both plan and profile when profile views are required. Elevations should be referenced to a

1929 NGVD Benchmark. Vertical scale shall be one inch = two feet or less. Horizontal scale shall be same as plan view.

**II. GENERAL DESIGN CRITERIA**

A. All water mains 4" through 12" shall be AWWA C-900 DR-18 PVC pipe. All larger water mains shall be cement lined, polyethylene wrapped ductile iron pipe. Ductile iron pipe shall also be used when extra strength is required, standard depth of cover cannot be realized, or in areas near abandoned or existing gas stations that may have introduced hydrocarbons into the subsurface (see paragraph II.D). All ductile iron fittings shall be polyethylene encased.

B. Service lines shall be as follows:

<u>SIZES TO BE USED</u>	<u>MATERIAL</u>	<u>MAXIMUM NO. OF METERS SERVED</u>
1"	BLUE CTS-POLYETHYLENE TUBING or 1 EA 1"	2 EA 5/8"x3/4"(SDR9)
2"	BLUE CTS-POLYETHYLENE TUBING or 4 EA 1" or 1 EA 1.5 or 1 EA 2"	6 EA 5/8"x3/4"(SDR9)
4"	AWWA C-900 PVC PIPE (DR18) or	1 EA 3" METER 1 EA 4" METER
6"	AWWA C-900 PVC PIPE (DR18)	1 EA 6" METER

C. Minimum size of water mains shall be 4" unless otherwise approved by the FKAA Director of Engineering.

D. Ductile iron pipe shall be installed along the entire frontage of existing and abandoned gas stations (or other sources of subsurface hydrocarbon contamination) plus 200 L.F. distance on each side. Nitrile gaskets shall be used in areas of subsurface hydrocarbon contamination.

- E. Water mains and service lines shall be installed in public right-of-way (R\W). When easements are necessary, permission must be obtained from the FKAA Engineering Department before incorporation into the design. Easement shall be a minimum of 20 feet wide. Any new easement must be dedicated and recorded using the form prepared by the FKAA prior to FKAA accepting the main.
- F. Minimum depth of cover shall be 36" under pavement, 30" cover under non-pavement within FDOT R/W and 30" outside FDOT R/W unless otherwise approved by the FKAA Engineering Department. Maximum depth of cover shall be 5 feet.
- G. Restrained joint pipe and fittings shall be used to mechanically restrain pipe against thrust forces at all bends and dead ends. The length of required restrained joint pipe shall be clearly indicated on the plans.
- H. Flush-out assemblies shall be installed on all dead end lines. Taps on end caps shall be eccentrically located at the bottom of the main.
- I. Valves shall be located at street intersections such that no more than three valves have to be operated to isolate a water main.
- J. Valves on long lines shall be spaced approximately 1000 feet apart and shall be located at a permanent point of reference (property line, etc.).
- K. Water mains shall be laid with an approved detectable warning tape and 12 gage solid Copper tracer wire so its location can be determined at a later date with a metal detector (see Paragraph IV.N.) (Research)
- L. Resilient seat gate valves shall be used with all water mains up through 16" diameter unless otherwise specified.
- M. Maximum deflection allowed at each straight push-on pipe joint shall be 3 degrees or in accordance with manufacturers specifications.
- N. Whenever a water main is to cross a secondary underground electric line, it shall cross with a minimum clearance of 6" and the electric line shall be encased in 6-inch thick concrete mixed with red identifying pigment per NEC standards from 10 feet on either side of the water main. Crossings involving primary (high voltage) underground electric lines involve more stringent requirements and should be coordinated with the appropriate electric authority.
- O. Installation of water mains in proximity with sewer lines shall adhere to requirements outlined in FDEP Section 62-555.314 (1), (2), (3), and (4).

**Parallel installation:**

Water mains shall be laid in accordance with FDEP F.A.C. Rule 62-555.314 from any existing or proposed sewer. The distance shall be measured pipewall to pipewall. In cases where it is not practical to maintain a minimum separation, the FDEP may allow deviation on a case-by-case basis, if supported by data from the design engineer.

**Crossings:**

Water mains crossing sewer mains shall be laid in accordance with FDEP F.A.C. Rule 62-555.314 from any existing or proposed sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. The Contractor is responsible to GPS all crossings with required coordinate plane, and must use compatible software to that of the FKAA's.

**Exception:**

The FKAA and FDEP must specifically approve any variance from the above requirements when it is impossible to obtain the specified separation distances. Where sewers are being installed and specified separation distances cannot be met, the sewer materials shall be water main pipe or equivalent and shall be pressure tested to FDEP specifications to ensure water tightness.

**Force mains:**

Water mains shall be laid in accordance with FDEP F.A.C. Rule 62-555.314 from any existing or proposed sewer force mains

- P. Water meters shall be located at the frontage of the property to be served, generally within an existing City, County or State right-of way. Whenever two or more meters are utilized to supply a premise, such meters shall be grouped and installed at a location designated by the Authority. Meters for adjacent properties shall be grouped, or paired, at a common property line, whenever possible. Water meters will not be installed within ten (10) feet of an existing or proposed septic tank and/or drainfield. Water meters shall not be installed in a driveway. The Contractor is responsible to GPS all water meters with required coordinate plane and distance from the property line, and must use compatible software to that of the FKAA's.
- Q. The Contractor shall maintain on a daily basis at the jobsite, and make available to the FKAA on request, one current record set of the Drawings which have been neatly and accurately marked up to indicate all modifications in the completed work that differ from the design information shown on the drawings. Upon substantial completion and, prior to final payment of the work, the Contractor

shall give the FCAA one complete set of neatly marked up Record Drawings which shall consist of the following at a minimum:

1. **Valves:**

Valves shall have measurements from the centerline of paralleling and closest intersecting streets and property lines. Type of valve (make, model, size, type - gate valve or butterfly valve), the number of turns to open valve, and the direction to open shall be indicated. The Contractor is responsible to GPS all valves with required coordinate plane, and must use compatible software to that of the FCAA's.

2. **Bends:**

Both horizontal and vertical bends shall have measurements from the centerline of paralleling and closest intersecting streets and property lines measurement to nearest valve. Degree of bend and method of restraint shall be indicated. The Contractor is responsible to GPS all bends, required coordinate plane, and must use compatible software to that of the FCAA's.

3. **Fittings and Specials:**

Fittings shall have measurements from the centerline of paralleling and closest intersecting streets and property lines. Method of restraint and measurement to nearest valve shall be indicated. The Contractor is responsible to GPS all fittings with required coordinate plane, and must use compatible software to that of the FCAA's

4. **Flush-Out Assembly:**

Flush-outs shall have measurements from the centerline of paralleling and closest intersecting streets and property lines. Make and model shall be indicated measurement to nearest valve. The Contractor is responsible to GPS all flush outs, required coordinate plane, and must use compatible software to that of the FCAA's.

5. **Connection to Existing Water Mains:**

Connections shall have measurements from the centerline of paralleling and closest intersecting streets and property lines. Type of material of existing water main being connected to and the type of connection (i.e., tapping sleeve and valve, tee, etc.), shall be indicated. The Contractor is responsible to GPS all connections with required coordinate plane, and must use compatible software to that of the FCAA's

6. **Utilities:**

Locations of any existing utilities including drainage pipe shall be indicated.

7. **Service Connections:**

Service connections shall indicate meter numbers and any change of connection (i.e., D, E, F, G, or H) from original design and locations of service shall be GPS located. The Contractor is responsible to GPS all service connections with required coordinate plane, and must use compatible software to that of the FKAA's

**III. FIRE FLOW SERVICE CONSIDERATIONS**

The provision of adequate fire flow service to a new development by the FKAA is not always possible. In many instances, adequate fire flow service must be provided by the construction of on-site facilities by the developer.

The amount of fire flow service to be provided will be determined by Florida Building Code, Monroe County Fire Department requirements, and the developer's Design Engineer prior to construction and shall be in accordance with applicable insurance requirements. It is the responsibility of the developer's design engineer to determine the fire flow service requirements. The FKAA Engineering Department will determine in each instance the adequacy of the FKAA water system to provide the needed fire flow as determined by the developer's design engineer. FKAA water system is considered to be adequate to handle the required fire flow and the fire line is allowed to be connected to the FKAA system without the use of a booster pump, storage tank, or pump suction control valve. The use of a DCDA or RPDA is still required. If the FKAA determines that the FKAA system cannot provide required fire flow, the Design Engineer shall select one of the methods below to provide fire protection.

**METHOD 1:**

The fire sprinkler system, fire standpipes or fire hydrants are served by a fire booster pump drawing water from a storage tank or swimming pool which is isolated from the FKAA water system. The tank fill line is connected to the domestic plumbing after the domestic meter and reduced pressure zone backflow preventer. All water used for fire purposes is metered through the domestic meter. The domestic plumbing lines and the fire lines after the storage tank are not connected at any point. No full flow fire meter, detection check valve assembly, or reduced pressure detection assembly (DCDA or RPDA) is required. No pump suction control valve is required. The storage capacity of the tank and the size of the booster pump may be adjusted as required so as to provide the optimum degree of fire flow dictated by the use of the premises. This method does not depend upon the instantaneous availability of adequate pressures and quantities from the FKAA and is the only method which the FKAA will accept in all instances.

**METHOD 2:**

In this approach the storage tank and air gap are eliminated and a pump suction control (PSC) valve and Detection Check Valve Assembly (DCDA or RPDA) are installed in a "fire line". The PSC valve prevents the fire booster pump from reducing FCAA water main pressure below 20 psi. The DCDA or RPDA will detect both the unauthorized use of water and leaks through the "fire line". This method protects the FCAA water system from backflow but provides only a limited degree of fire flow.

**IV. MATERIALS SPECIFICATIONS**

**A. Ductile Iron Pipe and Fittings**

1. Ductile Iron Pipe: Ductile iron pipe shall conform to AWWA C151 (ANSI A21.51) and shall be pressure Class 350.
2. Lining: Ductile iron pipe for water mains shall have an internal lining of cement mortar in accordance with AWWA C104/A21.4.
3. Coating: Buried ductile iron pipe shall be bituminous coated per AWWA C151/A21.51 and wrapped in a 12 mil polyethylene encasement.
4. Push-On Joints: Bell and spigot ductile iron pipe shall be EPDM gasket compression, push-on type as specified in AWWA C111 (ANSI A21.11). These joints may be U.S. Pipe and Foundry Tyton Joints or approved equal.
5. Restrained Joints: Restrained joint pipe shall be used for changes in elevation or alignment as shown on the plans or as required in the field by the Engineer. Restrained joints may be U.S. Pipe and Foundry TR Flex joints, American Ductile Iron Pipe Lok-Ring, or approved equal. All restrained joints shall have a working pressure of 350 psi.
6. Ductile Iron Fittings: Ductile iron fittings shall be restrained joint type, and shall conform to ANSI/AWWA C153/A21.53, and shall be TR-Flex, Lok-Ring, or mechanical joint with MEGALUGS. All fittings shall have a working pressure rating of 350 psi in sizes 4" through 24", and shall be coated and lined as specified for pipe.
7. All piping valves, meters, etc. within meter or valve vaults shall be flanged. Flanged fittings on high pressure side of transmission main shall be Class 250. All others shall be Class 125. All hardware shall be Type 304 stainless steel.

**B. Polyvinyl Chloride Pipe (PVC)**

1. PVC Pipe: PVC pipe shall meet the requirements of AWWA C900 for pipe 4" to 12" in diameter, and shall be furnished in cast-iron pipe equivalent outside diameters with EPDM gasket joints.
2. Pressure class shall be 150 psi (DR18).
3. Push-On Joints: Pipe shall be furnished with integral bell joints with locked in EPDM gaskets.
4. Restrained Joints: Restrained joint pipe shall be used for changes in elevation or alignment as shown on the plans or as required in the field by the Engineer. Restrained joints may be Certainteed Certa-Lok, EBAA Iron Series 1500 Retainers, or approved equivalent restraint.
5. Fittings: Fittings shall be ductile iron mechanical joint type conforming to AWWA/ANSI C153/A21.53 with MEGALUGS, or approved equivalent restraint.

All fittings shall have a working pressure of 350 psi in size 4" through 12", and shall be coated and lined as specified for ductile iron pipe. Fittings shall be wrapped in a 12 mil polyethylene encasement extending 1 foot from each end of the fitting.

**C. Anchor Couplings/Anchor Tee**

1. All valves located at a tee shall be restrained to the tee by mega lugs or by the use of anchor tees or anchor couplings. Anchor Tees/Anchor Couplings shall meet all applicable requirements of ANSI/AWWA C153/A21.53 and ANSI/AWWA 111/A21.11. Bolts used with anchor tees/anchor couplings must be ductile iron or Cor-Ten as manufactured by NSS Industries, or approved equal.

**D. Polyethylene Pipe for Service Lines**

1. Polyethylene pressure pipe and tubing, 1" through 2" having standard PE code designations blue PE2406, PE3406 and PE3408, shall be in accordance with AWWA Standard C-901, have a standard dimension ratio (SDR) of 9 with a 200 psi working pressure and have copper equivalent (CTS) outside diameters. Polyethylene pipe shall be used for all service connections.

2. PVC C-900 Pipe (DR18) for water service lines 4"-12".

**E. Valves**

1. **General** - All valves shall be furnished with affidavits from the manufacturers that the valves furnished under this Contract comply with all the applicable provisions of the respective AWWA Specifications, cited below. All valves shall be factory tested in accordance with AWWA Standard Leakage and Hydrostatic Tests and a certified test report shall be furnished stating that the valves have met the requirements of the test.

Valves shall be furnished with mechanical joint or flanged ends. Valve ends with mechanical joints or flanged joints shall conform to AWWA Standard C110, "Gray-Iron and Ductile Iron Fittings, 4" for water and other liquids. In addition, mechanical joints shall conform to ANSI/AWWA Standard C111/A21.11. Bolt holes in the flanges of the mechanical joint shall straddle the vertical and horizontal centerline. Flanges shall be ANSI Standard Class 125, plain faced and drilled.

All shut-off valves four inch through 16 inch in diameter, shall be resilient seated or resilient wedge gate valves and all valves 18 inch in diameter and larger, shall be as specified and shown on the drawings. All valves shall be polyethylene encased, from one foot on each side of the valve.

2. **Gate Valves** four inches and larger shall be resilient seated or resilient wedge gate valves for 150 psi working pressure, conforming to AWWA Standard C-509. The gate valves shall have a high strength bronze or 304 stainless non-rising stem. Valves shall have neoprene or equal, but not natural rubber, EPDM O-ring stem seals and be of a design that permits the replacement of the O-ring seals while the valve is in service, without undue leakage. All exposed bolts used with valves shall be AISI Type 304 stainless steel. The valves shall operate in a vertical position with a vertical operating nut shaft and shall be suitable for buried service.

The valves shall open by turning the operating nut counterclockwise. Operating nuts shall be AWWA two inch square nuts with skirts. Valve body, bonnet, and gate shall be ductile iron conforming to ASTM-A536. The gate valves for distribution systems shall be designed for 150 psi working water pressure rating. Gate valves for connection to the high pressure transmission mains and installed between the transmission mains and pressure reducing valves, shall be designed for 250 psi working pressure and 350 psi test pressure and shall be furnished with Class 250

flanges. Gate valves shall be as manufactured by American Flow Control Series 2500, U.S. Pipe Metroseal 250, or an approved equal. Bolts shall meet requirements of Type 304 Stainless Steel.

3. **Air Release Valves** shall be installed at relative high points on the installed piping systems and at distances along the pipeline in accordance with manufacturer's recommendations for the given size and flow. ARVs shall be automatic, combination air and vacuum release valves as manufactured by Val-Matic or APCO. Floodsafe attachments shall be provided for valves located below grade. Valves to be made of corrosion resistant metal(s), bronze and 304 stainless steel. Valve assemblies shall in accordance with AWWA standard C512-07.

**F. Ball Valve Curb Stops**

Curb stops shall be Ford Series B-11, Mueller H10283, Mac Donald Curb Stop, or an approved equal. Ball valves shall have locking lugs and 2" square operating nut which opens to the left on 1 2" and 2" valves.

**G. Residential Meter Dual Check Valve**

Meter check valves shall be dual check valve assemblies suitable for installation on 5/8-inch, 3/4-inch, 1-inch, and 1-1/2-inch lines, and shall be Ford HHS31, Mueller H-14242, or an approved equal.

**H. Ball Valve Meter Stops**

Meter stops shall be Ford Series B43 or BF13, or an approved equal. Valves shall have lockable padlock wings, and open to the left.

**I. Tapping Sleeve and Valve**

Tapping sleeves shall be ASTM 285 Grade C Steel or ASTM A-36 Carbon Steel with Fusion bonded epoxy coating (AWWA C213-70). Tapping Sleeves shall utilize AISI Type 304 (ASTM A320 Grade B8) stainless steel bolts and nuts. Tapping Sleeves shall be as manufactured by JCM Industries Model 412, Romac Industries Model FTS420, or approved equal.

Tapping valves shall be as specified for gate valves, hereinabove, and as further specified herein. Tapping valves for use in tapping distribution mains shall be resilient seat gate valves. Inlet shall be Class 125, ANSI B16.1, ductile iron flange with centering ring to match tapping sleeve. Outlet shall be a mechanical joint. Tapping valve shall be compatible for use with drilling machine. Operating

nut shall be 2" square and open to the left. Tapping valves shall be attached to tapping sleeves with heavy hex-head 304 SS ASTM F593 stainless steel bolts. Approved tapping valves include: American Flow Control Series 2500 or approved equal.

**J. Pressure Reducing Valves**

The pressure reducing valve shall be hydraulically operated, diaphragm actuated in globe pattern. The valve shall maintain a constant downstream pressure regardless of inlet pressure variations.

It shall contain a resilient synthetic rubber disc having a rectangular cross section, contained on three and one-half sides by a disc retainer. The seat ring shall be firmly held in place and not pressed into the body. The diaphragm assembly shall be fully guided to assure positive contact with the seat. The diaphragm assembly shall be the only moving part. The diaphragm shall consist of a nylon fabric reinforced EPDM rubber and shall not be used as a seating surface. All necessary repairs shall be possible without removing the valve from the line. All main valve interior components shall be manufactured from non-corrosive materials.

The pilot valve shall be adjustable, direct acting, spring loaded and normally open. The reducing pilot shall be supplied with a stainless steel seat ring.

The valve shall be Cla-Val as manufactured in the U.S.A. by AMES Company, Inc., Woodland, CA, and shall be Pressure Class 300 with Class 150 Flanges Stainless Steel body. The valve shall be piloted in reverse flow for fail-safe operation.

**K. Valve Boxes**

Valve boxes shall be furnished and installed for all valves, air release valves, flushing valve outlets and at other locations shown on the Drawings. Valve boxes shall be U. S. Foundry No. 7615, No. 7630, or an approved equal. Riser pipe shall be either C-900 PVC or ductile iron pipe. The concrete pad for the valve box cover shall have a 3-inch diameter, bronze disc embedded in the surface. The bronze disc shall have the following information stamped on it: size and type of the valve, number of turns to open, direction to open, and year of installation. In paved areas, the bronze disc shall be embedded in the pavement beside the valve box cover.

**L. Saddles**

Saddles shall be Rockwell International, Type 323, style double strap bronze saddles, for PVC and ductile iron pipe, or approved equal. Tapping saddles shall

be used for all taps on 2" PVC pipe 4" PVC pipe or greater shall have a tapping sleeve and valve.

**M. Corporation Stops**

Corporation stops shall be Ford F-1000, FB-1000, or approved equal. The largest corporation stop which can be tapped directly into the pipe is 1-inch.

**N. Detectable Warning Tape & Wire**

Contractor shall install 6-inch detectable warning tapes and 12 gage copper tracer wire for all water mains. Such tape shall be magnetic type, 5 mils thick, 2 mil thick aluminum center core, encased in Mylar. Tape shall be imprinted with the words "Caution: Type of Line Below". Printing shall appear on both sides of the tape. The tape shall be placed between 6 and 12 inches below finish grade.

**O. Pump Suction Control Valves**

Pump suction control valves shall be Cla-Val Model 50B-5KG.

**P. End Seals**

End seals for casings used in jack and bore installations shall be "Link-Seal Model PL" or an approved equal.

**Q. Casing Spacers**

Casing spacers for jack and bore installations shall be as manufactured by Cascade, or approved equal.

**R. Fire Hydrants**

Fire hydrants shall be 6-inch, mechanical joint pipe connection with a minimum 5.25 inch valve opening. Hydrants shall be of AWWA approved type, designed for a 150 psi working pressure. Provisions shall be made for two 2.5 inch hose nozzles and one 4.5 inch pumper nozzle, open left (counter clockwise). All base threads shall conform to the national standard hose coupling thread specifications. Fire hydrants shall have a safety stem coupling to prevent bending of the operating stem, and a safety flange to prevent breaking of the hydrant barrel if hit by a vehicle. The hydrant base (shoe) shall be coated with a two-part thermo-setting epoxy, not less than 4 mils thick. Weather cap shall be metal. The maximum pressure loss allowable for the 5-1/4" valve opening shall be 2.2 psi at 1000 gpm flow based on 5 foot bury with 6" diameter inlet. The hydrant shall be a Mueller Super Centurion or American Darling B-84-B. The drain hole in the

foot of the fire hydrant shall be plugged and buried bolts of the hydrant assembly shall be AISI Type 304 stainless steel super centenarian.

Fire hydrants shall be painted with one coat of rust proof primer and two finish coats of an approved red paint.

**S. Concrete Materials**

Proportions and construction procedures shall be in accordance with the applicable provisions of Chapter 25 of the South Florida Building Code and shall have a minimum compressive strength of 3500 psi at 28 days, as indicated by standard laboratory compressive tests. Contractor shall provide FKAA with submittal of concrete mix and all batch tickets for actual concrete poured for project.

**T. Reinforcing Steel**

Unless otherwise specified, reinforcing steel shall be grade 60 and shall have yield strength of 3600 psi and shall be clean and free of rust.

**U. Miscellaneous**

Materials necessary for a complete installation, not specified, shall be equal in quality to the specified materials suitable for the intended use, and shall conform to the details and notes shown on the Drawings. All minor items implied, usually included

or required for the construction of a complete operating system, shall be installed whether specified or shown on the Drawings, or not.

**V. Tests and Inspection**

All pipes, valves, fittings and specials furnished under this Contract shall be tested and inspected at the plant, by the manufacturer, in accordance with the requirements of the respective specification under which the material is to be furnished. FKAA may request an affidavit that all such materials have been so tested and inspected and that the materials comply with all other applicable requirements for the respective specification.

**V. WATER MAIN CONSTRUCTION PROCEDURES**

**A. General**

In shipping, delivery and installing pipe and accessories, they shall be handled in such manner as to insure a sound, undamaged condition. Particular care shall be

taken not to injure pipe coating and no other pipe or material of any kind shall be placed inside a pipe or fitting after the coating has been applied. Where a defect or crack is discovered, the damaged portion shall be cut off before laying. The cut shall be made at least twelve inches from the break in the sound section of the barrel.

Piping, valves, fittings, and specials shall be accurately installed in a workmanlike manner, true to the lines and grades shown on the Drawings. The interior of the pipe shall be thoroughly cleaned of foreign matter before installation. Restrained joints and fittings shall be used for changes in elevation or alignment as shown on the plans or as required in the field by the Engineer or his representative. At all times when work is not in progress, the exposed ends of all pipes shall be fully protected by an approved stopper to prevent earth or other substances from entering the pipe.

**B. Joints**

- (1) **Fittings** shall be ductile iron mechanical joint type conforming to AWWA/ANSI C153/A21.53 with MEGALUGS, or approved equivalent restraint. All fittings shall have a working pressure of 350 psi in size 4" through 12", and shall be coated and lined as specified for ductile iron pipe. Ductile iron fittings (with 304 SS Bolts) PVC pipe shall be wrapped in a 12 mil polyethylene encasement extending 1 foot from each end of the fitting.
- (2) **Mechanical Joints** are to be made in accordance with manufacturer's recommendations and requirements of pipe joint specifications. Care shall be taken to tighten bolts evenly around circumference of pipe and in no case shall bolts be overstressed.
- (3) **Flanged Joints** - Before making up flanged joints in ductile iron pipe and fittings, the back of each flange under the bolt heads and the face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to insure that bolt stresses are evenly distributed. Contractor shall use FKAA approved thread lubricant to help prevent galling.

**C. Valve Settings**

All valves placed on branch lines or bends shall be restrained via anchor couplings or anchor tees as specified hereinabove. Valves and valve boxes shall be set plumb at the locations indicated, and in accordance with the details shown on the Drawings. After being positioned, backfill shall be carefully placed and hand tamped. Before installation, care shall be taken to see that all foreign matter has been removed from the interior of the barrel. Stuffing boxes shall be tightened and the valves opened and closed to see that all parts are in working condition.

**D. Connection to Existing Mains**

Connection to existing water mains shall be made by the Contractor. The Contractor shall be responsible for making all necessary arrangements with the FKAA for these connections and shall bear any costs incurred at no additional cost to the FKAA.

Prior to commencing the work of connecting to existing facilities, the Contractor shall uncover or expose the point of connection and insure himself that he has all materials, equipment and all other facilities required to complete the installation, and that such connections can be made in accordance with the details shown on the Drawings.

The Contractor shall take every precaution to insure that the alignment or gradient of the existing facilities are not disturbed, or otherwise damaged, as a result of his construction procedures. In the event the existing facilities are damaged or otherwise disturbed, the Contractor will be required to do such necessary repair, re-alignment, or replacement, so as to restore these facilities to water tight, workable, acceptable condition.

No existing valves shall be operated by the Contractor. These valves shall only be operated by personnel of the FKAA. The Contractor shall advise the FKAA Engineering Department, 72 hours in advance of making these connections. This work shall be done under direct supervision of personnel of the FKAA. The valves and fittings to be employed in these connections, shall be thoroughly swabbed with a 300 ppm solution of chlorine and water. The connections shall be made as rapidly as possible, and any water in the excavation shall be kept below the level of pipe and fittings. The Contractor may have to make connections at off-peak hours. Shut-downs shall be kept to a maximum of 2 hours, unless previously approved by the FKAA, pending extenuating circumstances. Once valves are installed, they shall only be operated by FKAA personnel.

**E. Customer Service Connections**

Service connections shall be installed of the type and size and at the locations shown on the Drawings. All materials shall be as shown on the Drawings and as stated in these specifications. All taps to existing distribution mains shall be made with the main under pressure. All new mains can be dry tapped.

**F. Backfill**

**1. General**

All utility trenches shall be backfilled to the level of the bottom of the proposed base course, for utilities to be located in proposed paving areas, to the level of the bottom of temporary paving for utilities to be located in existing paved areas, or to the level of finished grade for utilities to be located in areas to remain unpaved. The Contractor shall provide a sufficient quantity of suitable backfill material for this purpose from trench excavations or from adjacent project areas, or other sources, at no additional cost or expense to the owner.

**2. Materials**

**(a) General Requirements**

All backfill material shall be clean and free from all organic material, clay, marl or unstable materials, debris, lumps or paving materials. No rocks or stones larger than two inches in diameter shall be allowed in any backfill; sharp edges not allowed.

**(b) Select Bedding**

Shall be utilized for 8" thick compacted pipe bedding and within the pipe zone to 8-inches above the pipe. Select bedding, as described in these specifications or required by the drawings, shall be a granular material free of rocks, clay, and organic material. One hundred percent of the select bedding shall pass through a 3/8" sieve.

When excessive water is encountered in the trench and pumping is not practical due to field conditions, the FCAA Field Representative may require a crushed limerock bedding. In such a circumstance, the bedding shall be a uniformly graded 3/8 limerock with a maximum particle size of 3/8 inch. The material shall be washed and free of all fines and silts and shall be used as bedding as described above or to a point above the water table as directed by the FCAA Field Representative whichever is greater.

Bedding above that point shall meet the requirements of select bedding as described previously.

When the specified compaction requirements cannot be met in service line trenches, flowable fill shall be substituted for the trench backfill zone. The flowable fill shall meet the requirements of Section 121, FDOT Specifications and shall be proportioned to produce a 28 day compressive strength of 500 psi.

### **3. Placement**

#### **(a) General**

All pipe shall be installed in dry trenches. Where conditions are such that running or standing water occurs in the trench bottom the water shall be removed by pumps until the pipe and select bedding has been installed and the backfill has been placed over the top of pipe to a depth equal to 1 and 2 pipe diameters. If pumping is not practical, an alternate select bedding of limerock will be required as described in Paragraph 2(b).

Backfill shall be placed in layers as specified herein below, for the particular application, and each layer shall be compacted to the specified density before the next layer is placed. Densities shall be performed in accordance with "Compaction and Densities". Hydraulic methods of settling and compacting backfill may be employed along with specified hand tamping and mechanical compaction as an aid to obtain specified densities. The Contractor shall obtain the approval of the FKAA Engineer for his selected method of backfill.

Any excess excavation below the levels specified shall be backfilled and compacted as specified below for backfill above pipe, at no additional cost to the FKAA.

#### **(b) Bedding Around Pipe**

Select bedding below the pipe shall be a minimum 8" thick to provide a firm, stable, and uniform support for the full length of the pipe and fittings before the pipe is installed. Bell holes shall be provided at each joint to permit proper assembly and pipe support. After pipe placement, backfilling and compacting of select bedding shall proceed uniformly, on each side and 8 inches above the pipe. Particular attention shall be paid in obtaining thorough support for all valves, fittings, water service connections and to preserve the alignment and gradient of the installed pipe.

(c) **Backfill Above Pipe**

After the placement of the select bedding around the pipe, as specified above, the remainder of the backfill shall be placed.

Backfilling shall proceed by placing backfill in depths of uniform layers and thoroughly compacting with mechanical vibrators or other suitable equipment to the densities specified below.

The depth of layers of this backfill shall not exceed the ability of the compacting equipment employed to obtain the specified densities, and in no event shall exceed a depth of 8 inches maximum. The mechanical compacting equipment employed, and its operation shall be such that no displacement of pipe alignment or gradient or damage to installed materials, pipe or pipe linings results from its use. Any installed material so displaced or damaged shall be replaced by the Contractor, at no additional cost to the FKAA.

For pipe lines not located under existing or proposed pavement, backfill over the installed pipe shall be compacted to obtain not less than ninety-five percent (95%) minimum density ASTM modified proctor.

For pipe lines located under existing pavement, for which pavement replacement will be required, or in areas of proposed paving, backfill shall be placed and compacted as specified above, except that the top 12 inches, measured downward from the level of the bottom of the required base course restoration, or proposed base course, shall be Miami Limerock, in accordance with Section 911 D.O. T. Specifications compacted to not less than ninety-eight percent (98%) density ASTM modified proctor. The Contractor is responsible for densities every 200 L.F. and at each road crossing by a certified lab.

Any settlement noted in backfill or within the limits of the excavation within the 1-year warranty period upon final acceptance, will be considered to be attributed to improper compaction methods and shall be corrected at no cost to the FKAA. Pavement or structures damaged by settlement shall be restored to their original condition by the Contractor at no cost to the FKAA.

(d) **Backfill above pipe in service line trenches**

Backfill shall meet the requirements of paragraph 3(c). If these requirements cannot be met, the trench shall be backfilled with flowable fill as specified in paragraph 2(c) at no additional cost to FKAA.

- (e) All excavated material shall be stockpiled in a manner that will not hinder the work or obstruct sidewalks, roadways, and driveways. All utility control structures shall be kept accessible. This shall be designed to mean those areas as designed by the Permitting Agency unless otherwise specified. Material stockpiles on private property must have written consent with a copy to FKAA.

**G. Standards**

In general, AWWA C-900 PVC pipe shall be installed in accordance with AWWA Publication No. M23, "PVC PIPE - DESIGN AND INSTALLATION." In the event of conflict between procedures described in this publication and those described above, the above procedures shall take precedence. In general, ductile iron pipe shall be installed in accordance with AWWA Standard C-600, "INSTALLATION OF DUCTILE IRON WATER MAINS AND THEIR APPURTENANCES." In the event of conflict between procedures described in this publication and those described above, the above procedures shall take precedence.

**H. Pigging**

All water main installations shall be cleaned with a polypropylene pigging device to clean all dirt, sand, and debris from the newly installed water main where determined by the FKAA representative. The FKAA field representative shall determine the extent and type of pigging required. At a minimum, a Bare Type, B3 style pig shall be used as manufactured by Pipeline Pigging Products, Inc., or approved equal.

**I. Flushing**

After piping installation has been completed, all water lines shall be flushed with clear water at the highest velocity obtainable and for a sufficient time to replace the pipe volume at least twice. All water for flushing shall be provided from a proper source, approved by the FKAA Engineer.

$$\text{Flushing Time} = \frac{T=2L}{4}$$

T= Time(sec)  
L= Length (ft)

**VI. PRESSURE TESTING**

**A. General**

The Contractor shall provide necessary pumps, meters, piping, calibrated containers and other equipment and materials and all labor necessary to conduct the hydrostatic testing and flushing procedures set forth herein. All water required for testing and flushing shall be supplied by the FCAA, at Contractor's expense. All piping shall be tested and made tight at test pressures hereinafter specified. All leaks disclosed by pressure testing shall be promptly stopped by an approved method, and such other corrective work shall be conducted as necessary to effect pressure tight work, as specified.

The Contractor shall provide for plugging or valving the installed pipe in specified test sections, and installing necessary taps for the insertion of test water, and removing such valves or plugs, and plugging such taps upon satisfactory completion of testing.

**B. Water Mains - PVC and Ductile Iron**

- (1) Leakage Test - Water mains shall be tested between valved sections. A leakage test shall be conducted for distribution systems at 150 psi. Distribution systems shall be pressure tested up to the curb stop. No installation will be acceptable until the leakage is less than the number of gallons per hour as determined by the formula:

$$Q = \frac{LD \sqrt{P}}{148,000}$$

Q equals Quantity of makeup water in gallons per hour, L equals the length of pipe section being tested in feet, D is the nominal diameter of the pipe in inches, and P is the average test pressure during the leakage test, in pounds per square inch gauge. The test shall be maintained for two hours unless, after one hour, it becomes apparent that the leakage is substantially less than the amount allowable. Water supplied to the main during the test, to maintain the required pressure, shall be measured by a 5/8-inch meter installed on the discharge side of the test pump, or by pumping from a calibrated container. The test shall be made against a secured bulkhead, blind flange or closed valve. All leaks to be repaired if visible regardless of size.

- (2) **Corrective Work** - Where leakage exceeds the allowable limits, the defective pipe or joints shall be located and repaired. If the defective portions cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary in order to conform to the specified limits.

No additional payment will be made for the correction of such defective work, or for damage to other parts of the work resulting from such corrective work. The Contractor will be responsible for payment of retesting.

### **C. WATER MAINS – HDPE**

Pressure Testing of HDPE pipe shall follow criteria presented above for PVC/Ductile Iron, except that the pipe section to be tested shall be initially pumped to the required test pressure and allowed to sit for a minimum of two hours. This will allow the HDPE pipe barrel to expand to allowance tolerance limits. After the initial 2-hour holding period, the Contractor shall add necessary water to the pipe section to return it to the required test pressure. At that time, the actual pressure test shall be conducted as presented in paragraph B of this section.

The Contractor shall test different pipe materials independently; following criteria given for each type material.

## **VII. DISINFECTION**

### **A. General**

All new piping, valves, service connections, meters, hydrants and all items to come in contact with treated water shall be thoroughly disinfected in accordance with the requirements of this section of the Specifications and in accordance with AWWA Standard C-651, latest edition. Reservoirs, tanks, standpipes, pumps or other equipment or facilities to come in contact with treated water shall also be thoroughly disinfected, in general compliance with the requirements of this section, and as may be more particularly described or modified in other sections of these Specifications.

### **B. Disinfection**

The disinfection agent shall be liquid chlorine, sodium hypochlorite solution, or calcium hypochlorite powder.

### **C. Flushing System**

Prior to the application of the sterilizing agent, all facilities shall be pigged and thoroughly flushed of all foreign matter, oil or dirt in accordance with the requirements of AWWA C651. Flushing shall continue until clear water flows from a remote point of discharge, and it is apparent that all sources of contamination have been removed.

**D. Disinfection Procedures**

Chlorine shall be introduced into the piping system or facilities to be disinfected in such amounts which will provide a minimum concentration of fifty parts per million (50 ppm), but not to exceed one hundred parts per million (100 ppm), throughout the system.

Where piping systems are to be connected to existing systems, the disinfection agent shall be introduced as close as possible to each point of connection to the existing system and the distance shall not exceed 10 feet from the point of connection. All valves and fittings to be connected to existing piping shall be thoroughly swabbed with a solution containing at least 300 ppm chlorine.

The disinfection agent shall remain in the piping system or facilities for a minimum contact period of 24 hours, and the residual shall not drop below 25 ppm before it is flushed out.

**E. Residual Chlorine Test**

After the disinfection outlined above has been accomplished, flushing shall continue until residual chlorine tests reflect normal system chlorine residuals. Such tests shall be in accordance with standard methods by the use of a standard DPD test set.

**F. Bacterial Tests**

Upon completion of the work of disinfection and flushing described above, samples of water shall be taken from remote points of the system, in suitable sterilized containers, on two consecutive days (24 hours apart).

Samples may be forwarded to the FKAA Florida City or Stock Island Labs or State certified testing lab (at no expense to the FKAA) for bacterial examination. If tests of such samples indicate the presence of coliform organisms, the disinfection as outlined above shall be repeated until tests indicate the absence of such contamination. The bacterial tests shall be satisfactorily completed and submitted into FDEP by a certified sampler. Only following receipt of written approval from FDEP can the system be placed in operation.

If methods of disinfection differ materially from those outlined above, such methods shall be in accordance with directions of the State Department of Health and Rehabilitative Services and all methods employed shall have approval of the FKAA. Definite instructions as to the collection and shipment of samples shall be secured from the FKAA Water Quality Engineer prior to sterilization and shall be

followed in all respects. Final approval of the bacterial samples shall be secured from the Florida Department of Environmental Protection before the system can be put into operation.

**VIII. MATERIAL AND INSTALLATION STANDARDS**

The following standards are referenced within these specifications; all installations whether implied or indicated shall adhere to the following:

<b><u>DESCRIPTION</u></b>	<b><u>TITLE</u></b>
AWWA C104	CEMENT MORTAR LINING FOR DUCTILE IRON PIPE AND FITTINGS
AWWA C105	POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE
AWWA C110	DUCTILE IRON AND GRAY-IRON FITTING, 3-INCH THROUGH 48-INCH
AWWA C110	DUCTILE IRON AND GRAY-IRON FITTING, 3-INCH THROUGH 48-INCH
AWWA C111	RUBBER GASKET JOINTS FOR DUCTILE IRON PIPE
AWWA C115	FLANGED JOINTS FOR DUCTILE IRON PIPE
AWWA C150	THICKNESS DESIGN OF DUCTILE IRON PIPE
AWWA C151	DUCTILE IRON PIPE
AWWA C153	COMPACT DUCTILE IRON FITTINGS
AWWA C504	RUBBER SEATED BUTTERFLY VALVES
AWWA C509	RESILIENT SEATED GATE VALVES
AWWA C510	DOUBLE CHECK VALVE BACKFLOW-PREVENTION ASSEMBLY
AWWA C511	REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY
AWWA C550	PROTECTIVE EPOXY INTERIOR COATINGS FOR VALVES AND HYDRANTS

AWWA C600	INSTALLATION OF DUCTILE IRON WATER MAINS AND THEIR APPURTENANCES
AWWA C651	DISINFECTING WATER MAINS (INCLUDES ADDENDUM C651a-90)
AWWA C800	STANDARD FOR UNDERGROUND SERVICE LINE VALVES AND FITTINGS
AWWA C900	POLYVINYL CHLORIDE (PVC) PRESSURE PIPE 4-INCH THROUGH 12-INCH, FOR WATER
AWWA C901	POLYETHYLENE PRESSURE PIPE, TUBING AND FITTINGS, 1/2-INCH THROUGH 3-INCH
AWWA C905	HDPE HIGH DENSITY POLYTHYLENE
AWWA C906	POLYETHYLENE PRESSURE PIPE AND FITTINGS 4"-63"
AWWA	M11-A GUIDE FOR THE DESIGN AND INSTALLATION OF MANUALS STEEL PIPE
M14	RECOMMENDED PRACTICE FOR BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL
M23	PVC PIPE - DESIGN AND INSTALLATION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ANSI	AMERICAN NATIONAL STANDARD INSTITUTE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION

**NOTES:**

When ANSI and AWWA Standards are the same, only the AWWA designation is used in describing the above standards. For instance, AWWA C110 is used instead of ANSI/AWWA-C110/A21.10. It is to be understood that the latest revision of any standard referenced above which exists at the time of design is the version to be used for design purposes.

**IX. STANDARD DETAILS**

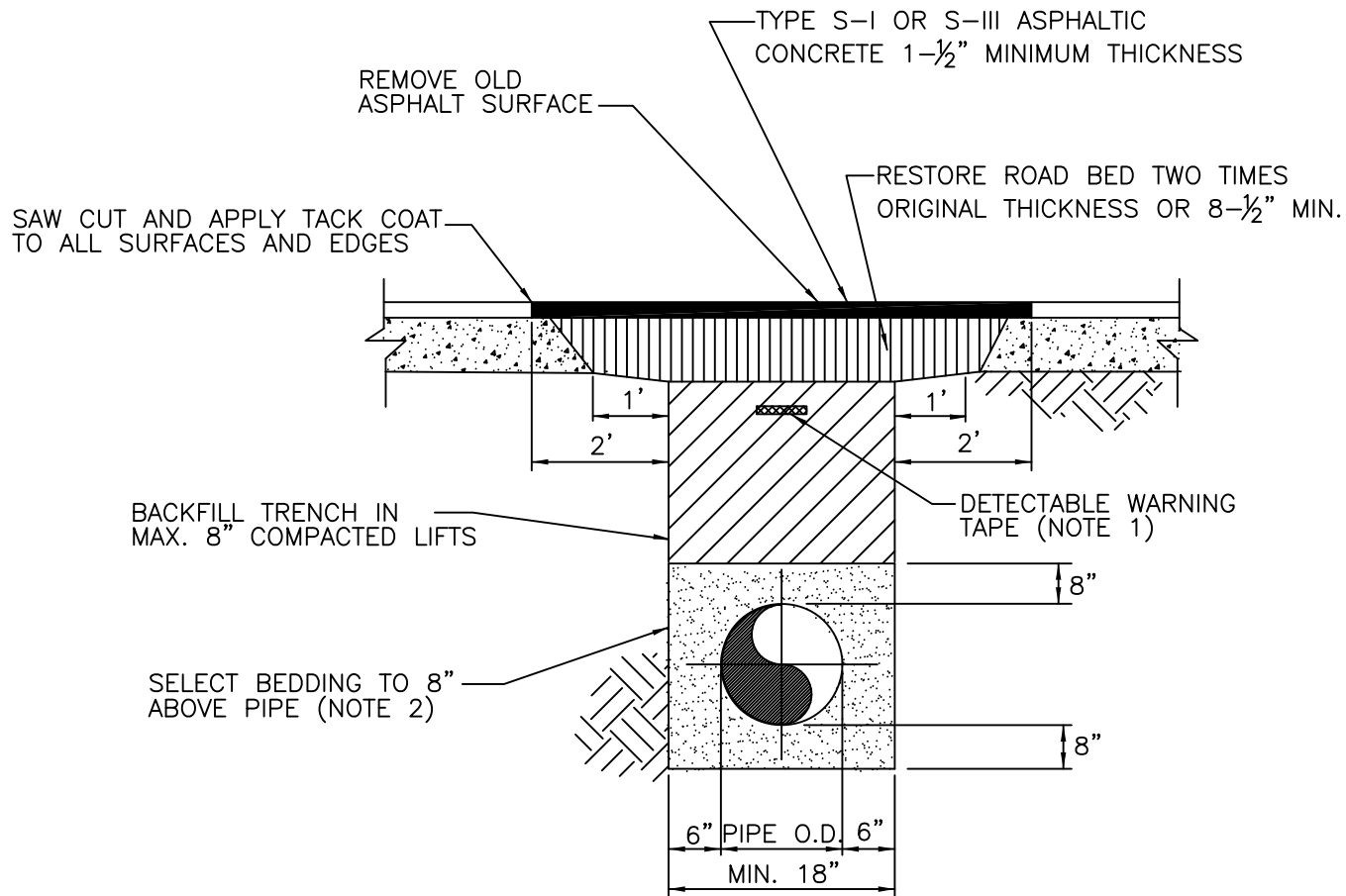
**DRAWING NO.**      **TITLE**

1. TRENCH AND PAVEMENT RESTORATION
2. CUSTOMER SERVICE TRENCH RESTORATION
3. FULL LANE RESTORATION WITH ASPHALT OVERLAY
4. THRUST RESTRAINT
5. GATE VALVE AND BOX
6. BUTTERFLY VALVE AND BOX
7. TAPPING SLEEVE AND VALVE FOR DISTRIBUTION MAIN
8. FLUSH OUT ASSEMBLY
9. HYDRANT INSTALLATION
10. JACK AND BORE DETAIL
11. TYPES OF SERVICE CONNECTIONS
12. 5/8 AND 1" METER ASSEMBLY
13. 1" AND 2" METER ASSEMBLY
14. METER ASSEMBLY 3" AND LARGER
15. SERVICE CONNECTION
16. METER BANK
17. FITTINGS FOR 1" TAP DUAL SERVICE CONNECTION
18. SEPARATE FIRE LINE INSTALLATION
19. COMBINED DOMESTIC AND FIRE LINE INSTALLATION
20. 2-1/2" TO 10" REDUCED PRESSURE BACKFLOW PREVENTER INSTALLATION

21. 3/4" TO 2" REDUCED PRESSURE BACKFLOW PREVENTER INSTALLATION
22. 3/4" TO 10" DOUBLE CHECK VALVE ASSEMBLY INSTALLATION
23. ACCEPTABLE AIR GAP CONSTRUCTION
24. IRRIGATION PIPING
25. DEDUCT METER INSTALLATION
26. STANDARD MASTER METER VAULT
27. 2" TRANSMISSION MASTER METER PIPING
28. 4" TRANSMISSION MASTER METER PIPING

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IN THE PROCESS OF REVISIONS



NOTES:

1. 2" WIDE DETECTABLE WARNING TAPE SHALL BE INSTALLED BETWEEN 6" AND 12" BELOW FINISH GRADE ABOVE ALL WATER MAINS. SEE IV MATERIAL SPECIFICATIONS.
2. PIPE SHALL BE BEDDED IN COMPACTED GRANULAR SELECT MATERIAL FREE OF ROCKS, CLAY, AND ORGANIC MATERIAL. BEDDING SHALL PASS THROUGH A 3/8" SIEVE.

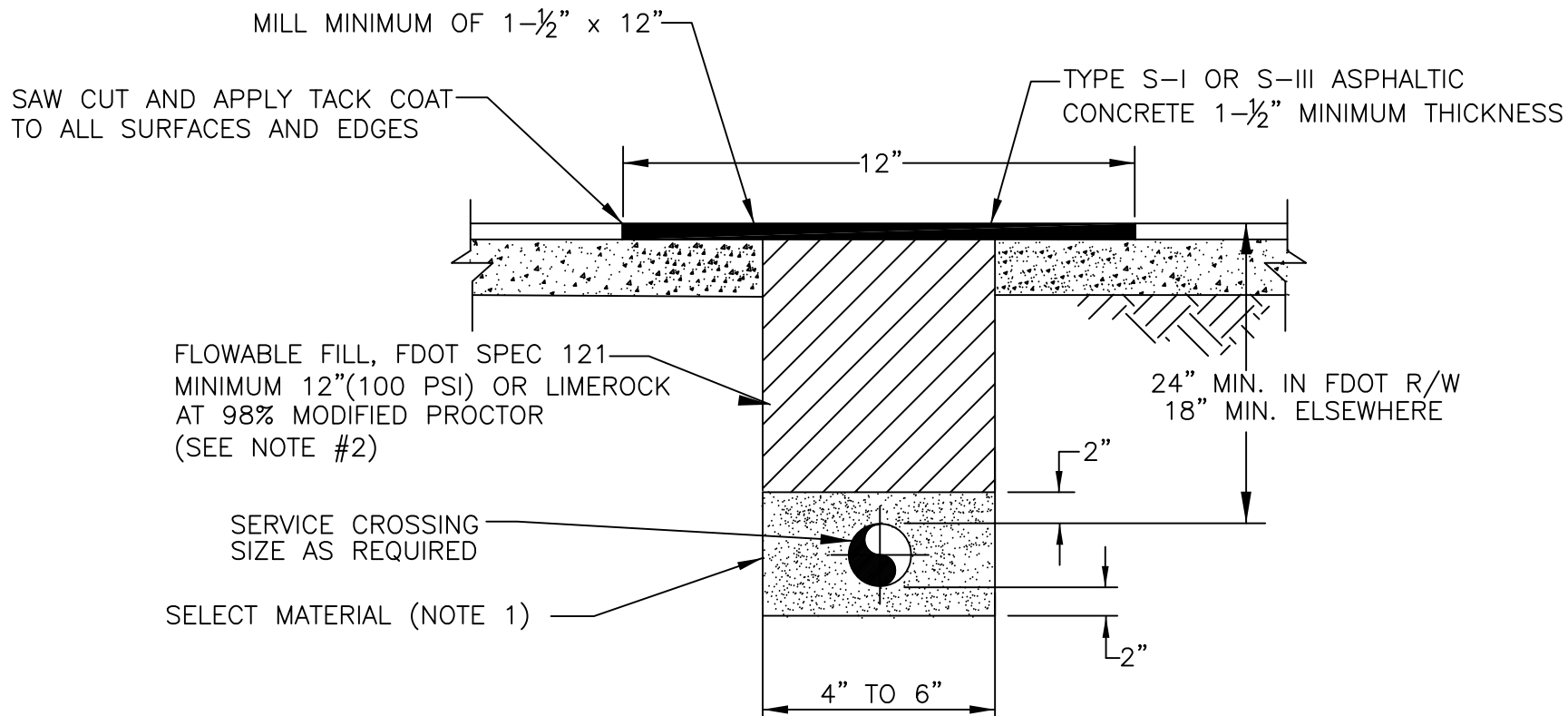
FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA

SCALE  
N.T.S.  
DATE  
3/96  
REVISED  
2/08

TRENCH AND PAVEMENT  
RESTORATION

STANDARD DETAIL  
DRAWING No.

1



**NOTES:**

1. MATERIAL SHALL BE FREE OF ROCKS, CLAY, AND ORGANIC MATERIAL. MATERIAL SHALL PASS THROUGH A 3/8" SIEVE.
2. SERVICE LINES IN FDOT RIGHT-OF-WAY REQUIRE A MINIMUM VERTICAL CLEARANCE OF THIRTY-SIX INCHES (36") BELOW TOP OF PAVEMENT AND THIRTY INCHES (30") BELOW UNPAVED GROUND LINE INCLUDING DITCH GRADE.

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

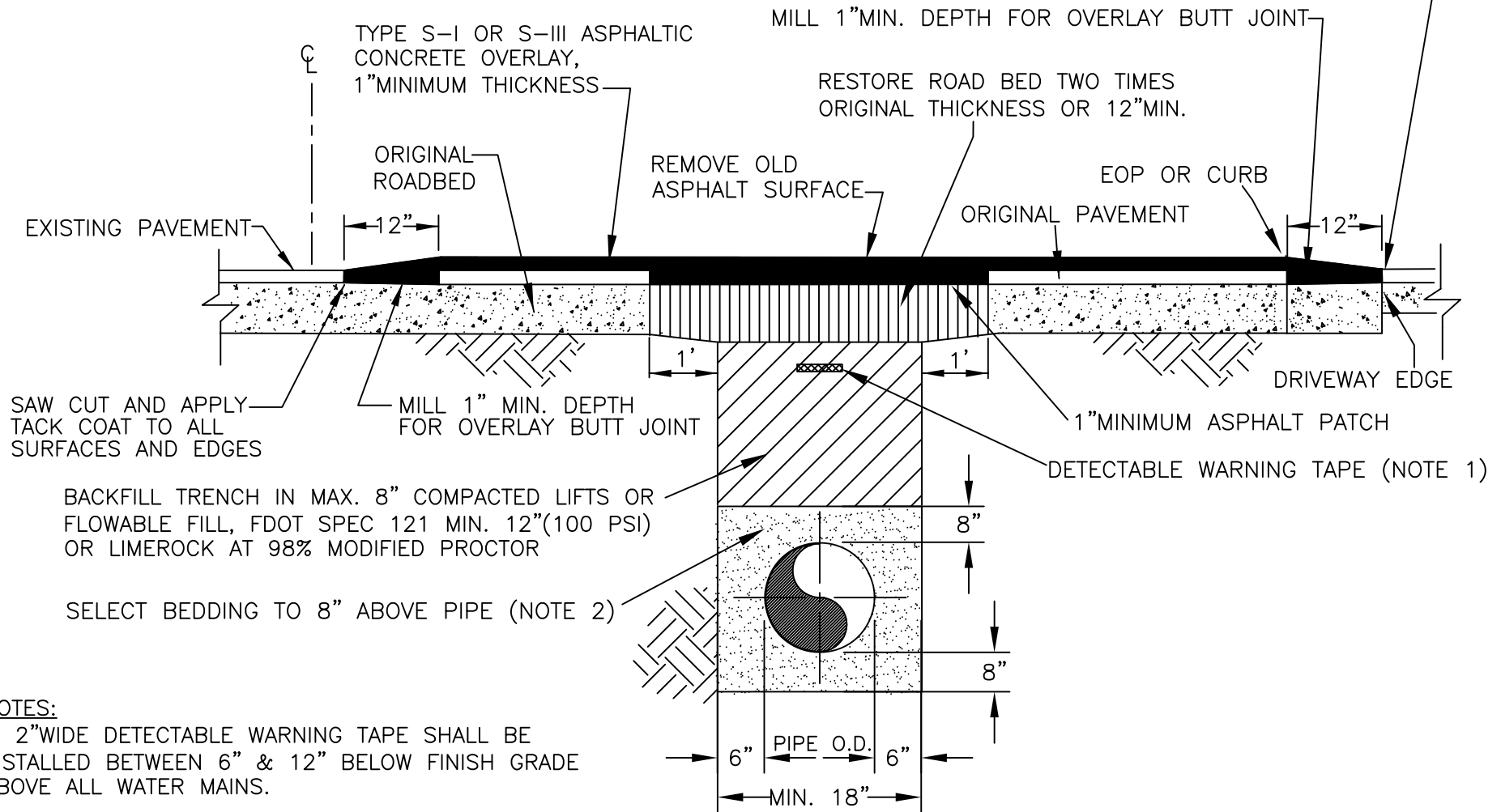
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DATE  
6/03  
REVISED  
2/2010

*CUSTOMER SERVICE  
TRENCH RESTORATION*

*STANDARD DETAIL  
DRAWING No.*

*2*

IN SECTIONS WITH DRIVEWAYS: SAW CUT & APPLY TACK COAT TO ALL SURFACES AND EDGES



**NOTES:**

1. 2" WIDE DETECTABLE WARNING TAPE SHALL BE INSTALLED BETWEEN 6" & 12" BELOW FINISH GRADE ABOVE ALL WATER MAINS.

2. PIPE SHALL BE BEDDED IN COMPACTED GRANULAR SELECT MATERIAL FREE OF ROCKS, CLAY, AND ORGANIC MATERIAL. BEDDING SHALL PASS THROUGH A 3/8" SIEVE.

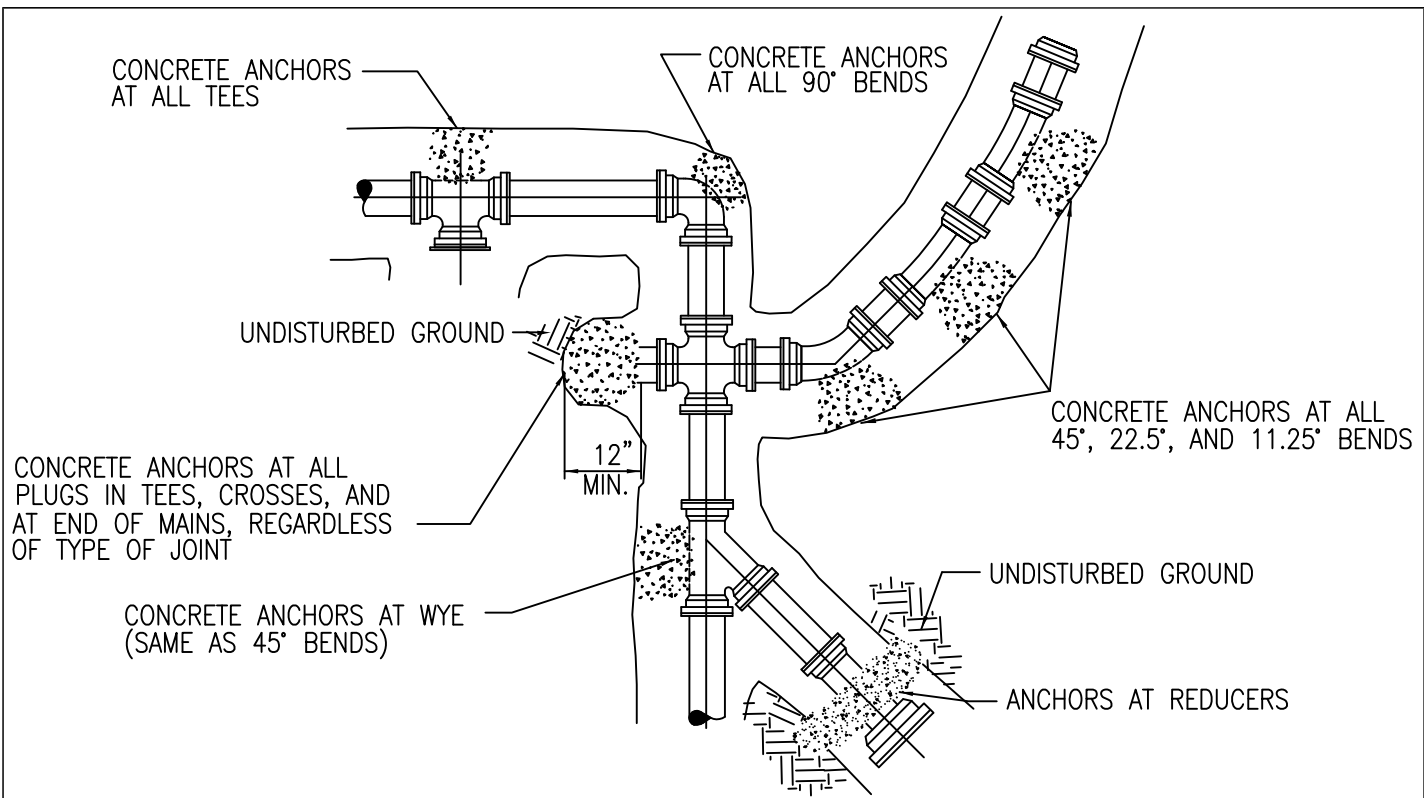
FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA

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DATE  
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REVISED  
2/08

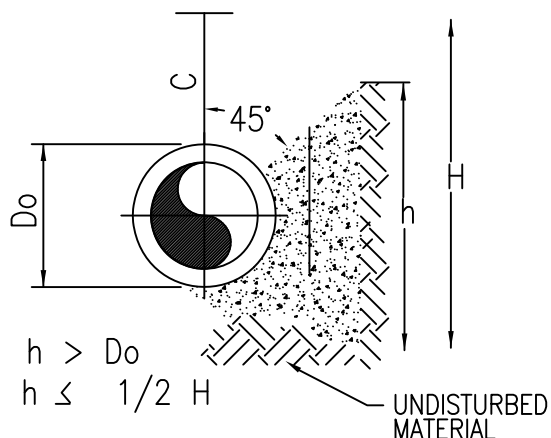
FULL LANE RESTORATION WITH  
ASPHALT OVERLAY

STANDARD DETAIL  
DRAWING No.

3



*PLAN VIEW*



*SECTION VIEW*

CONCRETE THRUST BLOCK BEARINGS ON UNDISTURBED SOIL OF TRENCH WALL IN SQ. FT.						
PIPE SIZE	DEAD END	HORIZONTAL BEND				
		90° ELBOW	45° ELBOW	22.5° ELBOW	11.25° ELBOW	
4"	2	3.0	1.5	1.0	1.0	
6"	3	4.5	2.0	1.5	1.5	
8"	6	7.5	4.5	2.0	2.0	
10"	9	12	7.0	3.0	2.5	
12"	10	15	9.0	4.5	3.0	

**NOTES:**

1. BEARING AREAS ARE BASED ON AN ALLOWABLE SOIL BEARING PRESSURE OF 2000 lbs./sq.ft. AND MAY BE VARIED BY THE ENGINEER IF OTHER SOIL CONDITIONS ARE ENCOUNTERED. BEARING AREAS SHALL BE CALCULATED ON AREAS OF UNDISTURBED GROUND IN CONTACT WITH THRUST RESTRAINT.
2. PLASTIC SHEET SHALL BE USED BETWEEN THRUST BLOCK AND PLUGS, BOLTS, OR HUBS. CONCRETE ANCHORS ARE REQUIRED ON TAPPING SLEEVES WHERE THE BRANCH IS EQUAL TO SIZE RUN.
3. THRUST BLOCKS SHALL BE POURED IN DRY TRENCH.
4. CONCRETE SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF 3500 PSI.

<i>SCALE</i> N.T.S.	<i>THRUST RESTRAINT – THRUST BLOCKS</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> 3/96		<i>4</i>
<i>REVISED</i>		<i>PAGE 1 OF 3</i>

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PIPE OR RUN SIZE	DEAD ENDS	HORIZONTAL BENDS (1)				VERTICAL 45 OFFSETS (2)		TEES (3)		REDUCERS (4)		
		90	45	22.5	11.25	HIGH SIDE	LOW SIDE	BRANCH SIZE		SIZE	LARGE SIDE	SMALL SIDE
						(30" DEEP)	(48" DEEP)					
4"	38	12	5	2	1	16	3	4"	FITTING ONLY			
6"	53	17	7	3	2	22	4	6"	FITTING ONLY	6"x4"	27	40
								4"	FITTING ONLY			
8"	70	22	9	4	2	29	6	8"	4	8"x6"	29	38
								6"	FITTING ONLY			
								4"	FITTING ONLY			
10"	83	26	11	5	3	34	7	10"	16	10"x8"	28	35
								8"	FITTING ONLY			
								6"	FITTING ONLY			
								4"	FITTING ONLY			
12"	98	30	12	6	3	41	8	12"	30	12"x10"	29	34
								10"	2			
								8"	FITTING ONLY			
								6"	FITTING ONLY			
								4"	FITTING ONLY			

Notes:

- (1) Restrain joints for distance specified on both sides of the bend.
- (2) Restrain all joints in the offset and for the distance specified for the high side and low side pipes.
- (3) Distances are based on a 10' minimum single pipe length on each side of the run of the tee.
- (4) If the specified small side distance is free of bends, valves, tees, or other fittings, no restraint is necessary.  
If not, restraint must be used in the large side for the specified distance.

General:

- A) Distances are expressed in feet.
- B) Distances are based on a bury depth of 30", a Type 5 trench, a test pressure of 150 psi, and a soil consisting of well graded gravel, well graded sands, gravelly sands and sandy gravels.

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

*SCALE  
N.T.S.  
DATE  
3/96  
REVISED  
6/01*

*THRUST RESTRAINT –  
RESTRAINED JOINT DISTANCES  
FOR PVC PIPE*

*STANDARD DETAIL  
DRAWING No.  
4  
PAGE 2 OF 3*

PIPE OR RUN SIZE	DEAD ENDS	HORIZONTAL BENDS (1)				VERTICAL 45 OFFSETS (2)		TEES (3)		REDUCERS (4)		
		90	45	22.5	11.25	HIGH SIDE	LOW SIDE	BRANCH SIZE		SIZE	LARGE SIDE	SMALL SIDE
						(30" DEEP)	(48" DEEP)					
4"	68	14	6	3	1	28	4	4"	FITTING ONLY			
6"	96	20	8	4	2	40	5	6"	FITTING ONLY	6"x4"	50	73
								4"	FITTING ONLY			
8"	126	25	10	5	2	52	7	8"	7	8"x6"	53	69
								6"	FITTING ONLY			
								4"	FITTING ONLY			
10"	150	30	12	6	3	62	8	10"	29	10"x8"	50	63
								8"	FITTING ONLY			
								6"	FITTING ONLY			
								4"	FITTING ONLY			
12"	176	35	14	7	3	73	10	12"	54	12"x10"	51	62
								10"	3			
								8"	FITTING ONLY			
								6"	FITTING ONLY			
								4"	FITTING ONLY			

Notes:

- (1) Restrain joints for distance specified on both sides of the bend.
- (2) Restrain all joints in the offset and for the distance specified for the high side and low side pipes.
- (3) Distances are based on a 10' minimum single pipe length on each side of the run of the tee.
- (4) If the specified small side distance is free of bends, valves, tees, or other fittings, no restraint is necessary.  
If not, restraint must be used in the large side for the specified distance.

General:

- A) Distances are expressed in feet.
- B) Distances are based on a bury depth of 30", a Type 5 trench, a test pressure of 150 psi, and a soil consisting of well graded gravel, well graded sands, gravelly sands and sandy gravels.

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KEY WEST, FLORIDA*

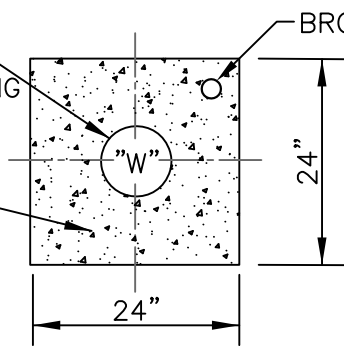
*SCALE  
N.T.S.  
DATE  
3/96  
REVISED  
11/01*

*THRUST RESTRAINT –  
RESTRAINED JOINT DISTANCES  
FOR POLYETHYLENE ENCASED  
DUCTILE IRON PIPE*

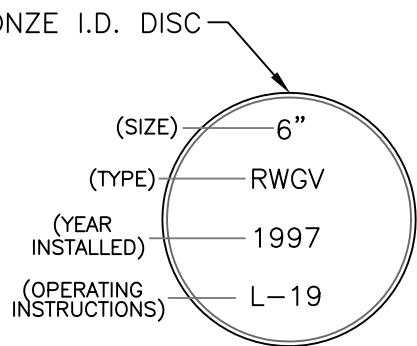
*STANDARD DETAIL  
DRAWING No.  
4  
PAGE 3 OF 3*

VALVE BOX LID SHALL HAVE  
NON-PROTRUDING, NON-PENETRATING  
PICKHOLES AND THE LETTER "W"

CONCRETE COLLAR SHALL HAVE  
A LEVEL AND SMOOTH FINISH  
IN UNPAVED AREAS (NOTE 1)

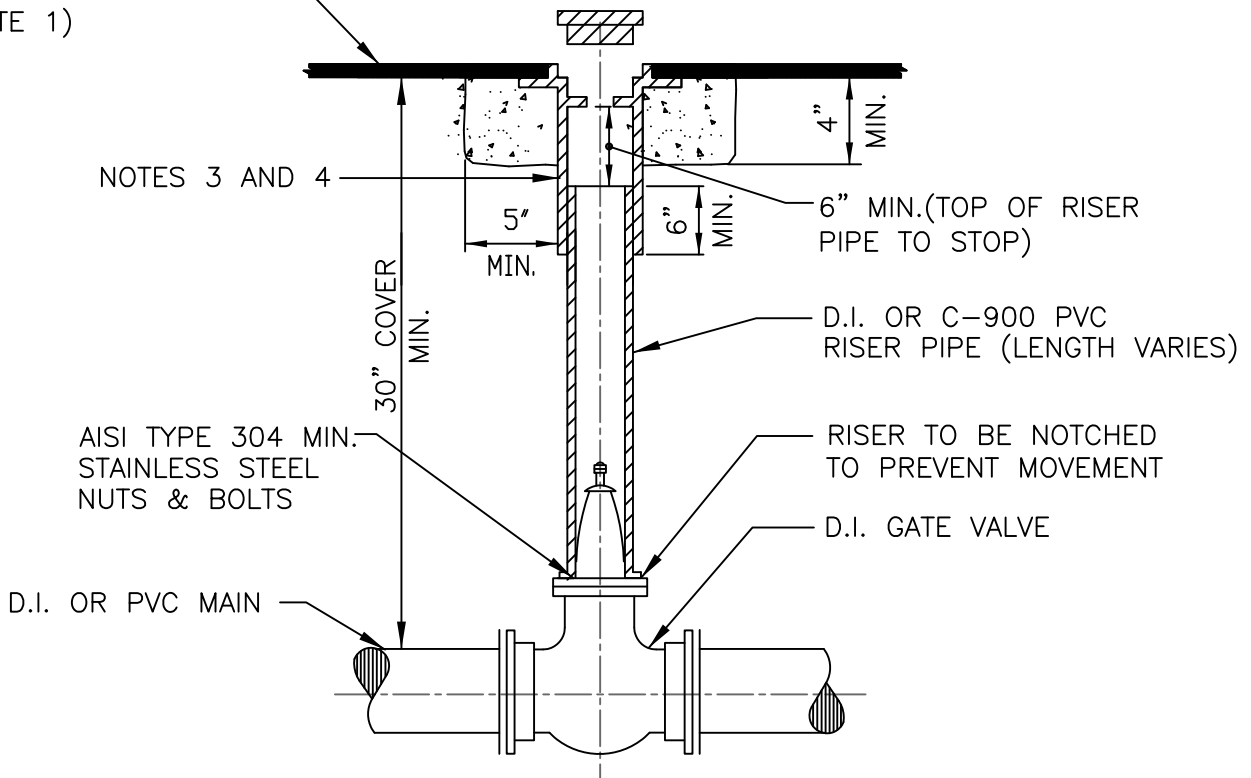


*PLAN VIEW*



*DETAIL*

MATCH EXISTING OR  
PROPOSED SURFACE  
(NOTE 1)



*ELEVATION VIEW*

NOTES:

1. CONCRETE COLLAR ALSO MAY BE FORMED AS A 24" DIA. CIRCLE UNDER PAVEMENT.
2. IN UNPAVED AREA INSTALL VALVE BOX LID 1/2" ABOVE SURFACE.
3. U.S.F. No. 7615 OR APPROVED EQUAL WITH 6" DIA. RISER FOR VALVES 6" DIA. OR SMALLER.
4. U.S.F. No. 7630 OR APPROVED EQUAL WITH 10" DIA. RISER FOR VALVES 8" DIA. OR LARGER.

SCALE  
N.T.S.

DATE  
3/96

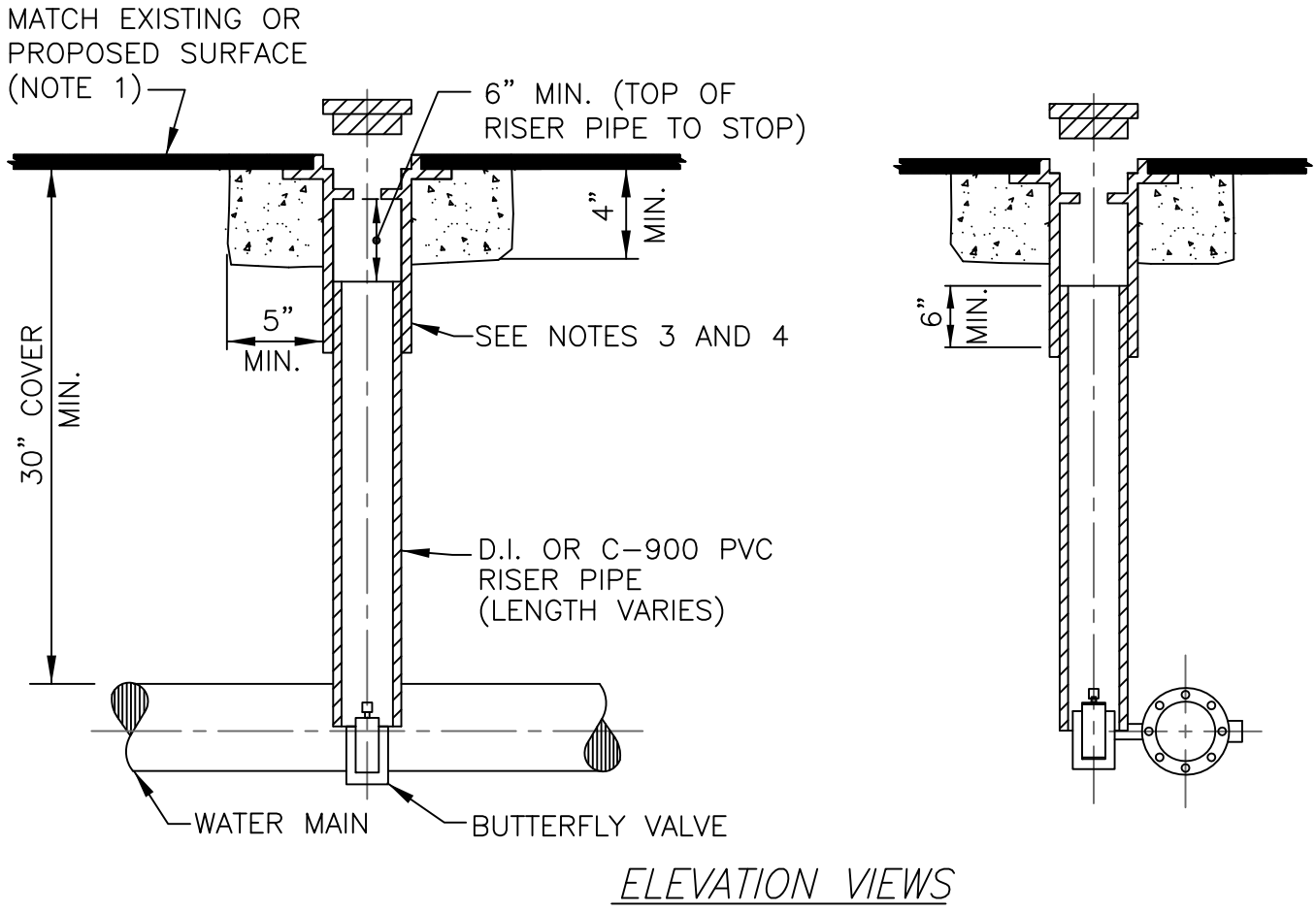
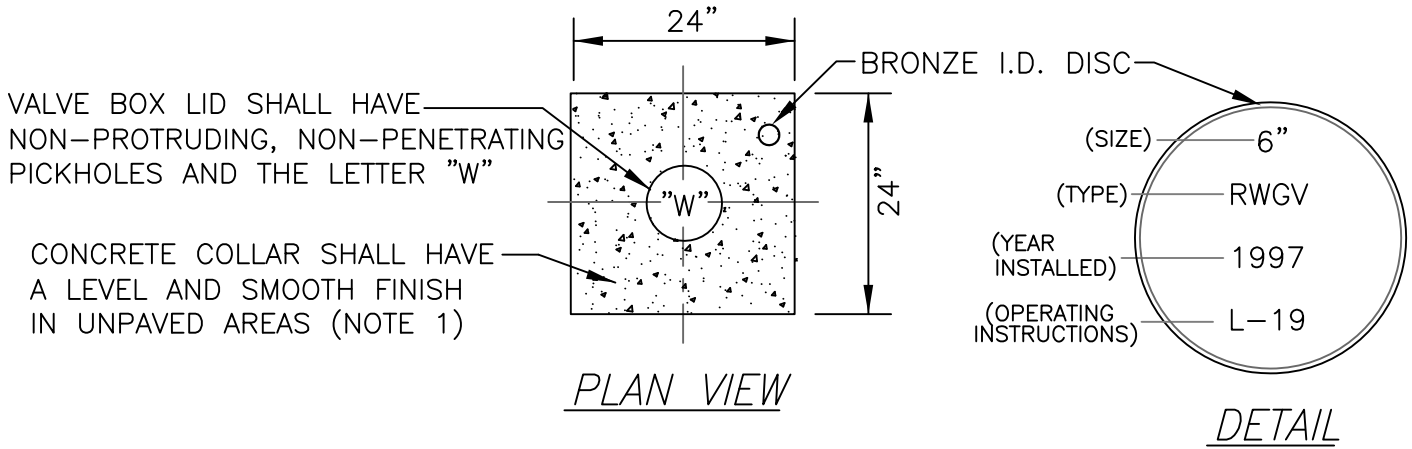
REVISED  
2/08

*GATE VALVE AND BOX*

*STANDARD DETAIL  
DRAWING No.*

*5*

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

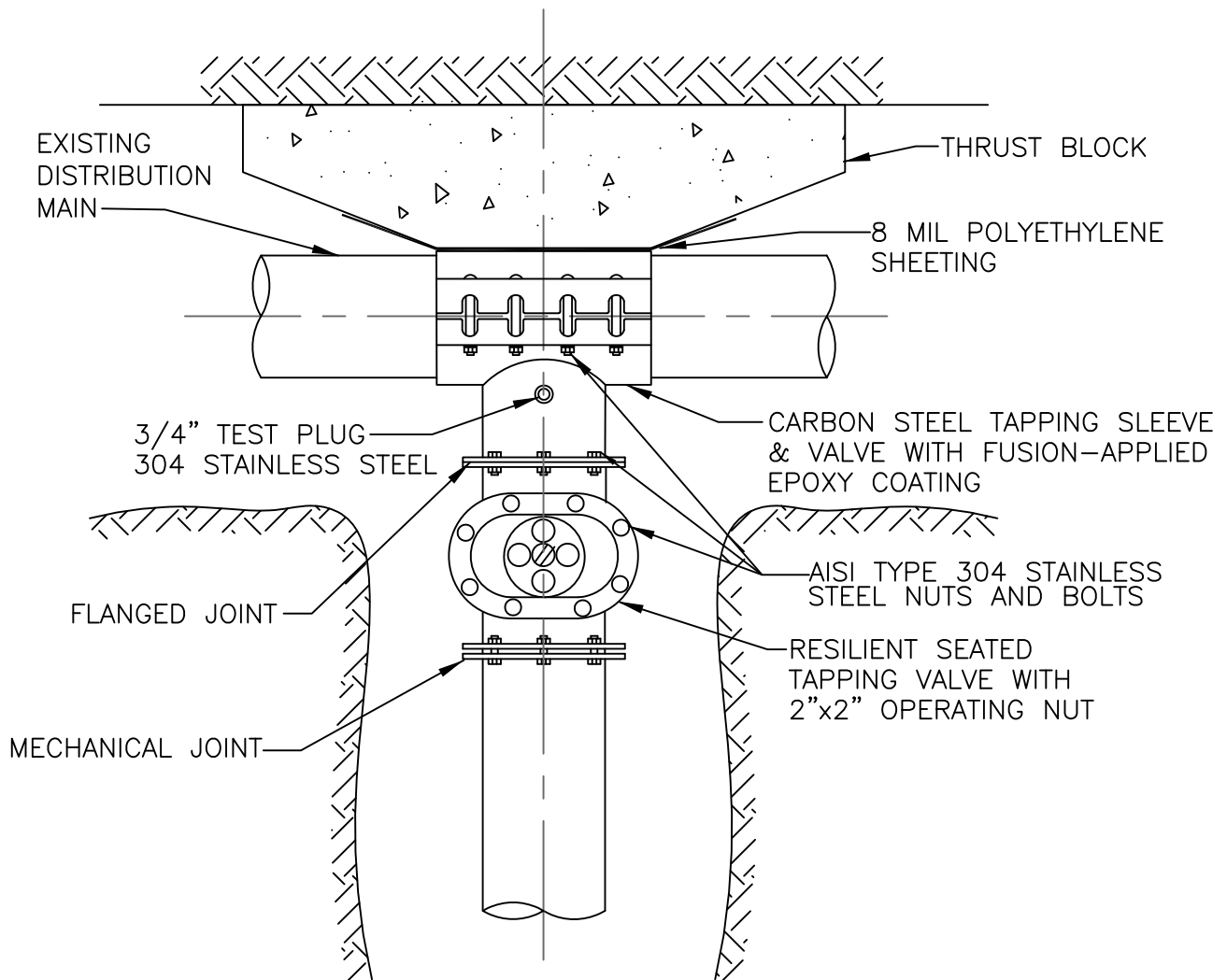


NOTES:

1. CONCRETE COLLAR ALSO MAY BE FORMED AS A 24" DIA. CIRCLE.
2. IN UNPAVED AREA INSTALL VALVE BOX LID 1/2" ABOVE SURFACE.
3. U.S.F. No. 7615 OR APPROVED EQUAL W/ 6" DIA. RISER FOR VALVES 6" DIA. OR SMALLER.
4. U.S.F. No. 7630 OR APPROVED EQUAL W/ 10" DIA. RISER FOR VALVES 8" DIA. OR LARGER.

<i>SCALE</i> N.T.S.	<i>BUTTERFLY VALVE AND BOX</i>	<i>STANDARD DETAIL</i>
<i>DATE</i> 3/96		<i>DRAWING No.</i>
<i>REVISED</i> 2/08		6

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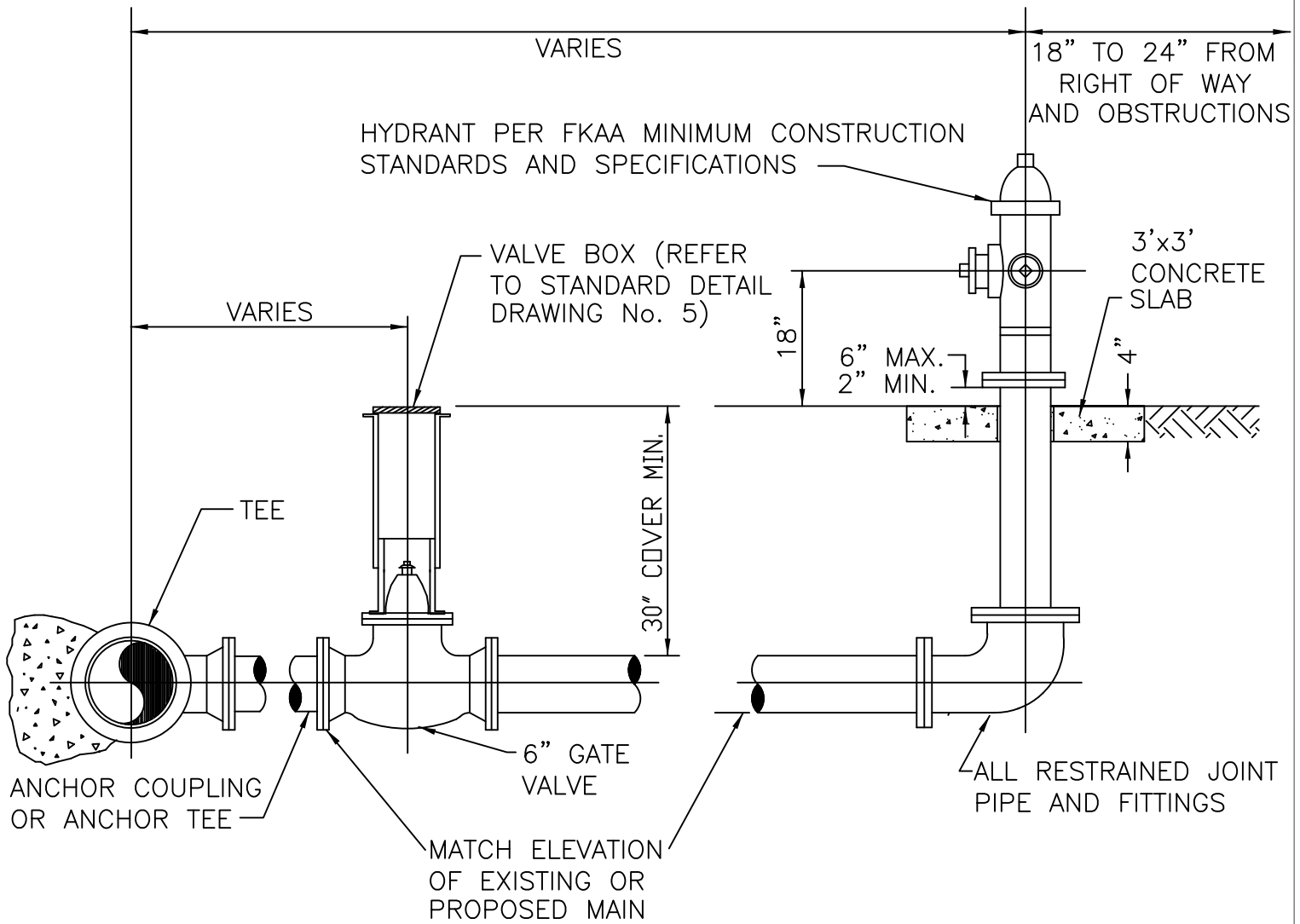
PLAN VIEW

NOTES:

1. PRESSURE TEST INSTALLED TAPPING SLEEVE AND VALVE ASSEMBLY BEFORE TAPPING EXISTING MAIN. SEE FCAA MINIMUM CONSTRUCTION STANDARDS & SPECIFICATIONS.
2. SEE FCAA MINIMUM CONSTRUCTION STANDARDS & SPECIFICATIONS FOR LIST OF APPROVED TAPPING SLEEVES AND VALVES.
3. ALL TAPS SHALL BE MADE WITH AN APPROVED TAPPING DEVICE.

<i>SCALE</i> N.T.S.	<i>TAPPING SLEEVE AND VALVE FOR DISTRIBUTION MAIN</i>	<i>STANDARD DETAIL</i> <i>DRAWING No.</i>
<i>DATE</i> 3/96		7
<i>REVISED</i> 2/08		
<i>REVISED</i> 4/22/10		
<i>FLORIDA KEYS AQUEDUCT AUTHORITY</i> <i>KEY WEST, FLORIDA</i>		





ELEVATION VIEW



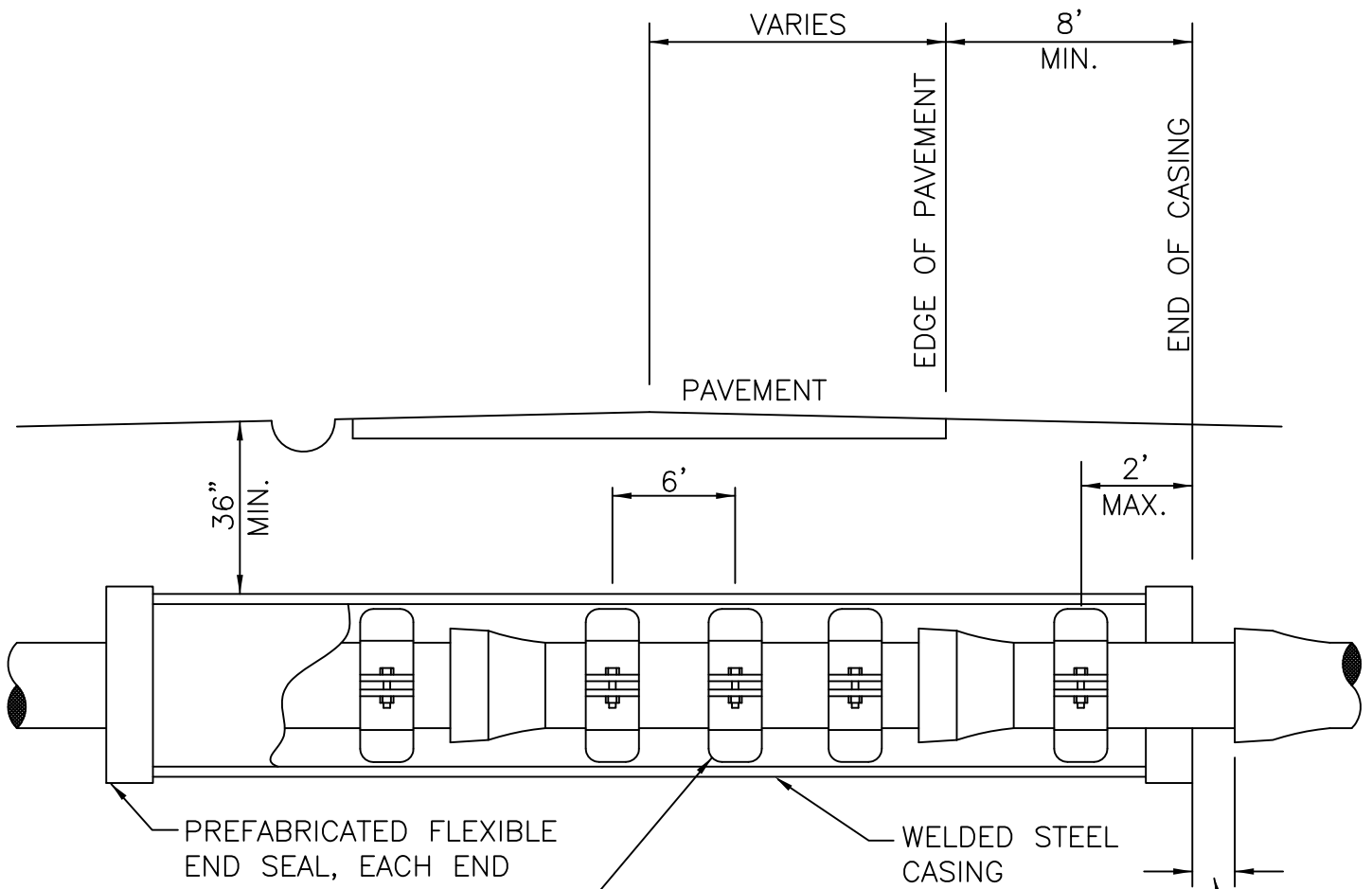
TYPICAL PLAN VIEWS

**NOTES:**

1. CONCRETE SLAB MAY BE ELIMINATED IN AREAS WHERE SIDEWALK IS INSTALLED PRIOR TO FINAL ACCEPTANCE OF THE HYDRANT.

SCALE N.T.S.	<i>HYDRANT INSTALLATION</i>	STANDARD DETAIL DRAWING No.
DATE 3/96		9
REVISED 10/96		

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KEY WEST, FLORIDA*



PREFABRICATED SPACERS LOCATED EVERY 6' FEET (MAX. O.C.) (REFER TO FCAA MINIMUM CONSTRUCTION STANDARDS AND SPECIFICATIONS)

JOINT TO BE 6" MINIMUM FROM END OF CASING

PIPE SIZE	NOMINAL CASING SIZE	WALL THICKNESS
4"	10"	.250
6"	12"	.250
8"	14"	.375
10"	18"	.375
12"	22"	.375

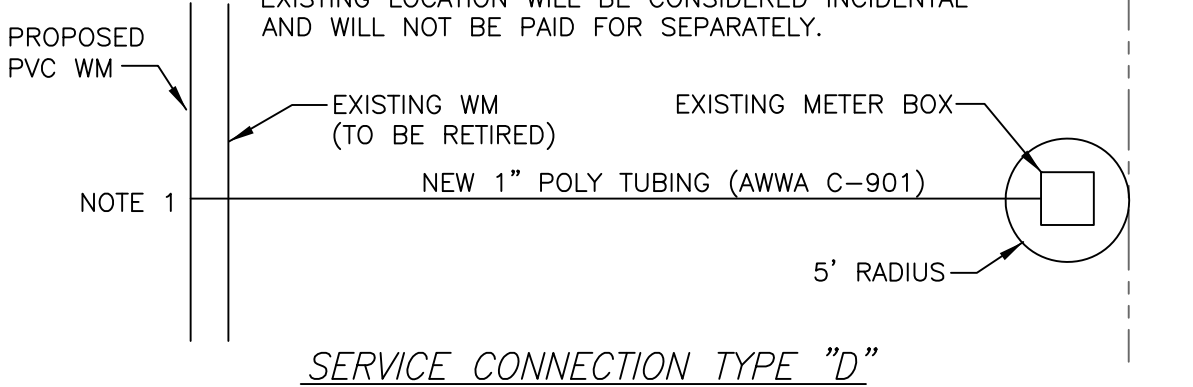
ELEVATION VIEW

**NOTES:**

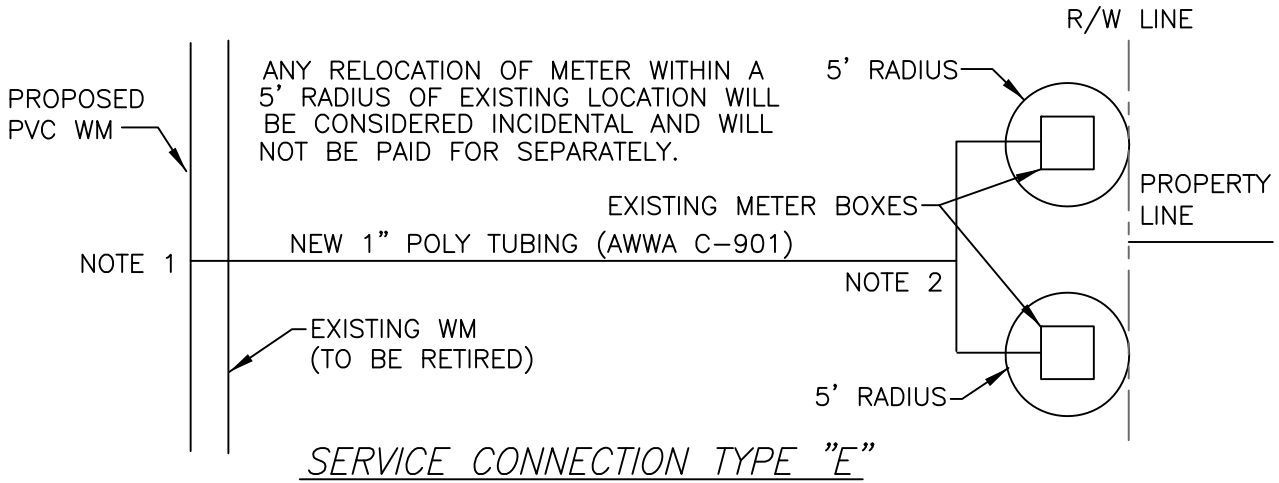
- JACK AND BORE OPERATIONS SHALL BE IN ACCORDANCE WITH FDOT "UTILITY ACCOMODATION GUIDE".
- LOCATE PIT MINIMUM OF 8' FROM EDGE OF PAVEMENT AND ERECT TRAFFIC BARRIER AROUND PIT IN FDOT RIGHT-OF-WAY ONLY.

SCALE N.T.S.	<i>JACK AND BORE DETAIL</i>	STANDARD DETAIL DRAWING No.
DATE 3/96		10
REVISED		

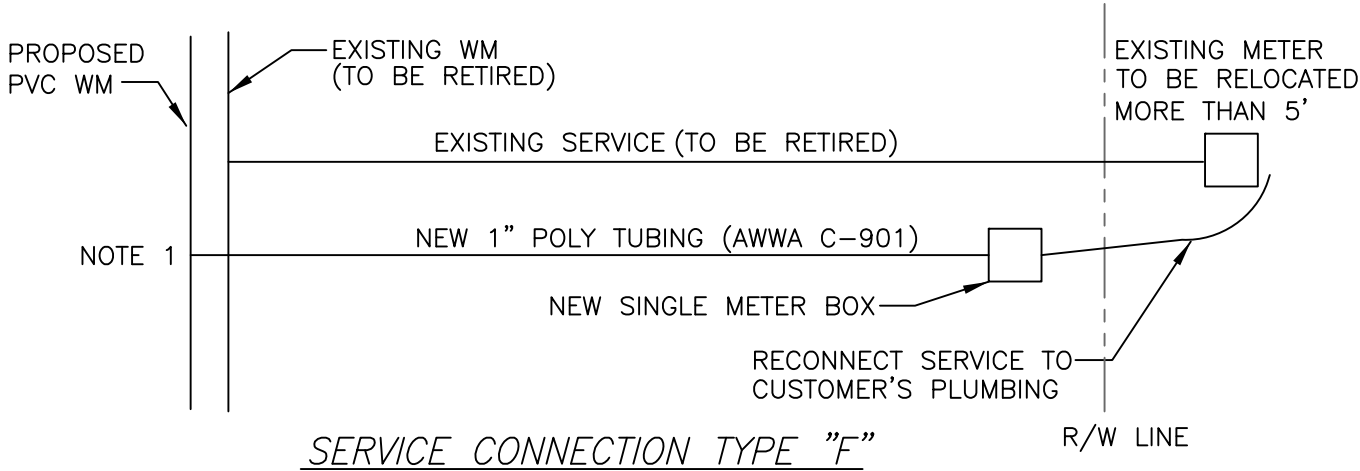
ANY RELOCATION OF METER WITHIN A 5' RADIUS OF EXISTING LOCATION WILL BE CONSIDERED INCIDENTAL AND WILL NOT BE PAID FOR SEPARATELY.



ANY RELOCATION OF METER WITHIN A 5' RADIUS OF EXISTING LOCATION WILL BE CONSIDERED INCIDENTAL AND WILL NOT BE PAID FOR SEPARATELY.

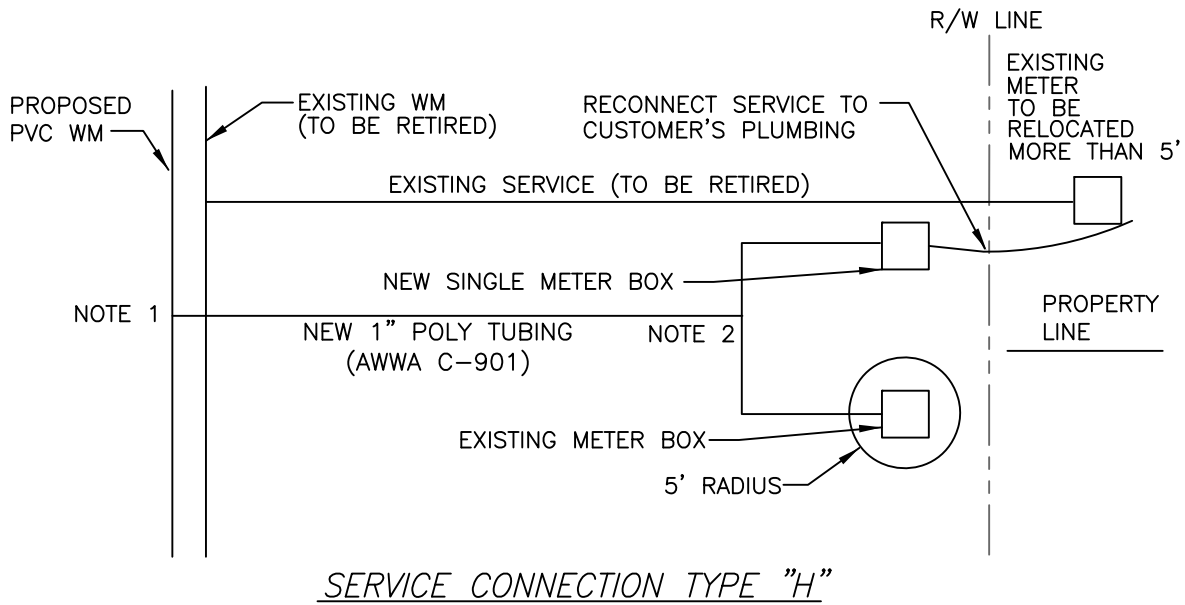
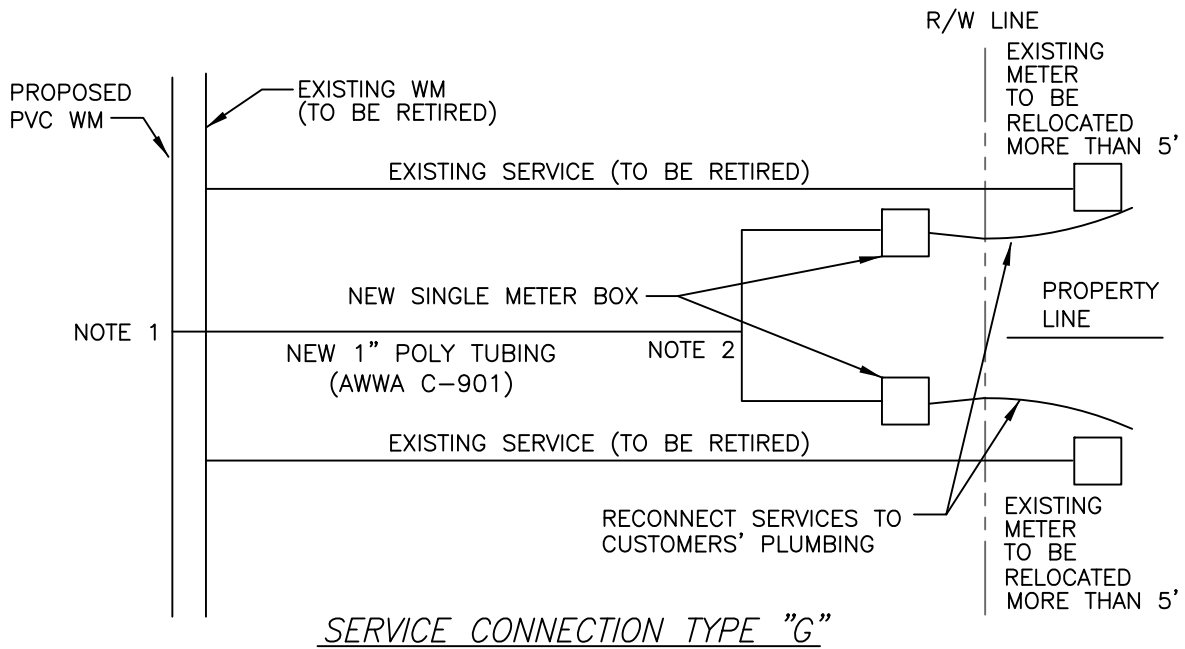


EXISTING METER TO BE RELOCATED MORE THAN 5'



SCALE N.T.S.	<i>TYPES OF SERVICE CONNECTIONS</i>	STANDARD DETAIL DRAWING No. <b>11</b> PAGE 1 OF 3
DATE 6/03		
REVISED 2/08		

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<i>SCALE</i> N.T.S.	<i>TYPES OF SERVICE CONNECTIONS (CONTINUED)</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> 6/03		<i>11</i>
<i>REVISED</i> 2/08		<i>PAGE 2 OF 3</i>

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

NOTES FOR TYPES OF SERVICE CONNECTIONS:

1. REFER TO STANDARD DETAIL DRAWING No. 15 FOR SERVICE CONNECTION TO WATER MAIN.
2. REFER TO STANDARD DETAIL DRAWING No. 17 FOR BRANCH DETAILS.
3. CUT AND PLUG EXISTING SERVICE PIPES AT POINT OF CONNECTION TO EXISTING WATER MAIN.
4. REMOVE RETIRED SERVICE PIPES.
5. MAKE CONNECTIONS TO METERS WITH APPROPRIATELY SIZED COUPLINGS, FITTINGS, OR ADAPTERS.
6. METER LOCATION TO BE 6" FROM PROPERTY LINE OR 6" FROM BACK OF CONCRETE SIDEWALK. EXACT METER AND SERVICE LOCATIONS SHALL BE DETERMINED BY FKAAs FIELD REPRESENTATIVE.
7. WHEN SERVICE LINE IS INSTALLED THROUGH CONCRETE, SERVICE LINE MUST BE SLEEVED.
8. DESCRIPTIONS OF SERVICE CONNECTIONS:

TYPE "D" – CONNECT TO EXISTING METER WITHIN R/W WITH NEW POLY TUBING (AWWA C-901). METER CAN BE MOVED WITHIN A 5' RADIUS OF CURRENT LOCATION.

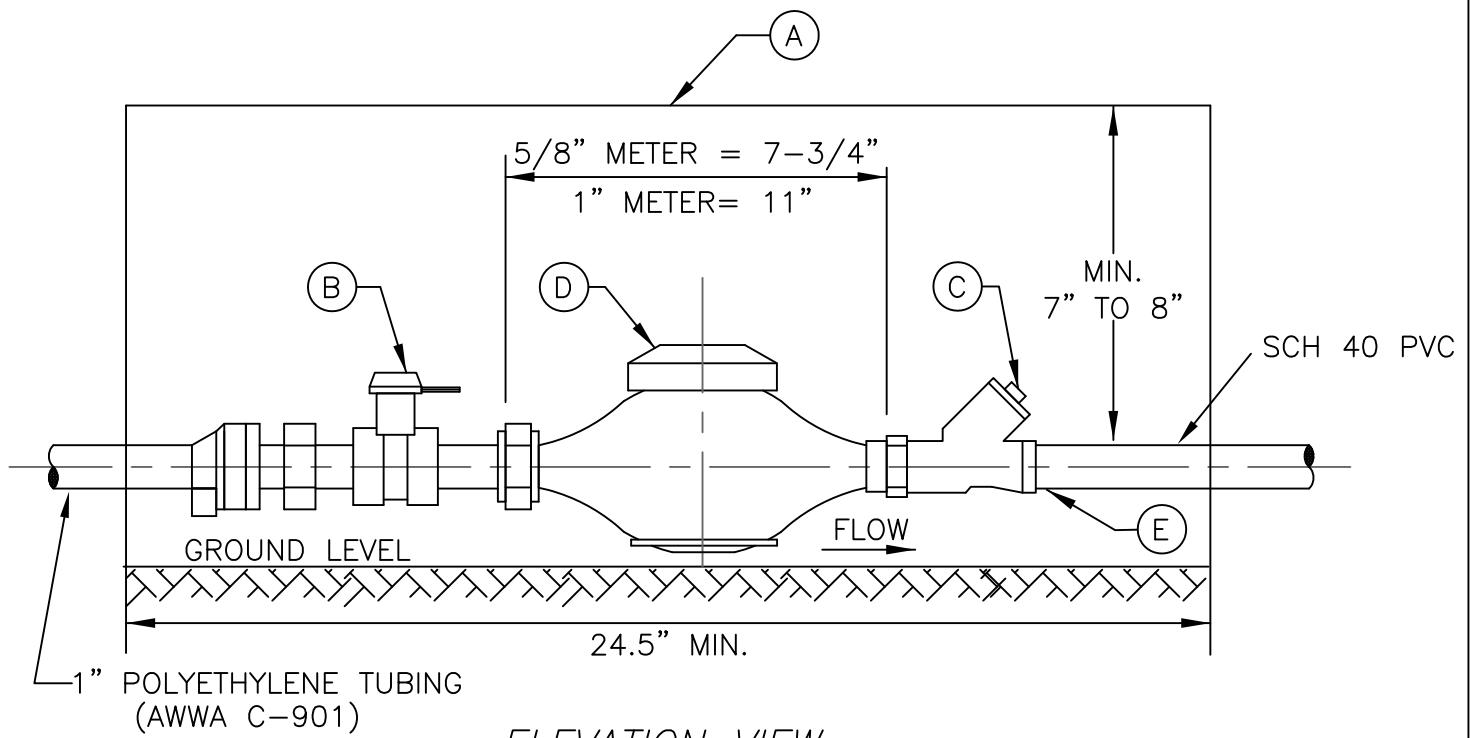
TYPE "E" – CONNECT TO TWO EXISTING METERS W/IN R/W WITH NEW POLY TUBING (AWWA C-901). METERS CAN BE MOVED WITHIN A 5' RADIUS OF CURRENT LOCATIONS.

TYPE "F" – CONNECT TO NEW METER LOCATION (MORE THAN 5' FROM CURRENT LOCATION) IN R/W WITH NEW POLY TUBING (AWWA C-901). RECONNECT SERVICE TO CUSTOMER'S PLUMBING.

TYPE "G" – CONNECT TO TWO NEW METER LOCATIONS (MORE THAN 5' FROM CURRENT LOCATIONS) IN R/W WITH NEW POLY TUBING (AWWA C-901). RECONNECT SERVICES TO CUSTOMERS' PLUMBING.

TYPE "H" – CONNECT TO ONE EXISTING METER LOCATION (WITHIN 5' RADIUS OF CURRENT LOCATION) AND ONE NEW METER LOCATION (MORE THAN 5' FROM CURRENT LOCATION) IN R/W WITH NEW POLY TUBING (AWWA C-901). RECONNECT SERVICE TO CUSTOMER'S PLUMBING.

<i>SCALE</i> <i>N.T.S.</i>	<i>TYPES OF SERVICE CONNECTIONS</i> <i>(CONTINUED)</i>	<i>STANDARD DETAIL</i> <i>DRAWING No.</i>
<i>DATE</i> <i>6/03</i>		<i>11</i>
<i>REVISED</i> <i>2/08</i>		<i>PAGE 3 OF 3</i>
<i>REVISED</i> <i>2/11</i>		<i>FLORIDA KEYS AQUEDUCT AUTHORITY</i> <i>KEY WEST, FLORIDA</i>



ELEVATION VIEW

A= METER BOX AND LID

BOX-OLDCASTLE PRECAST #1118-12 HW BCF-XL BODY(0-2 MOUSE HOLE)  
 LID-OLDCASTLE PRECAST #FL12P001-NO FIBERLYTE LID WITH NEPTUNE PROBE PROVISION  
 SEE SECTION IV - MATERIAL SPECIFICATIONS

**NOTE: PLASTIC BOXES MUST HAVE LIDS IN PLACE PRIOR TO POURING THE CONCRETE.**

B= FORD LOCKABLE METER STOP OR APPROVED EQUAL

METER DIAMETER	METER STOP
$\frac{3}{4}$ " x $\frac{5}{8}$ "	No. B43-342 W
1"	No. B43-344 W*

\* "W" ON CATALOG NUMBER IS FOR\*PADLOCK WINGS.

C= FKA A APPROVED DUAL CHECK VALVE: MUELLER No. H-14242 OR  
 FORD HHS 31-323, HHS 31-444, OR APPROVED EQUAL

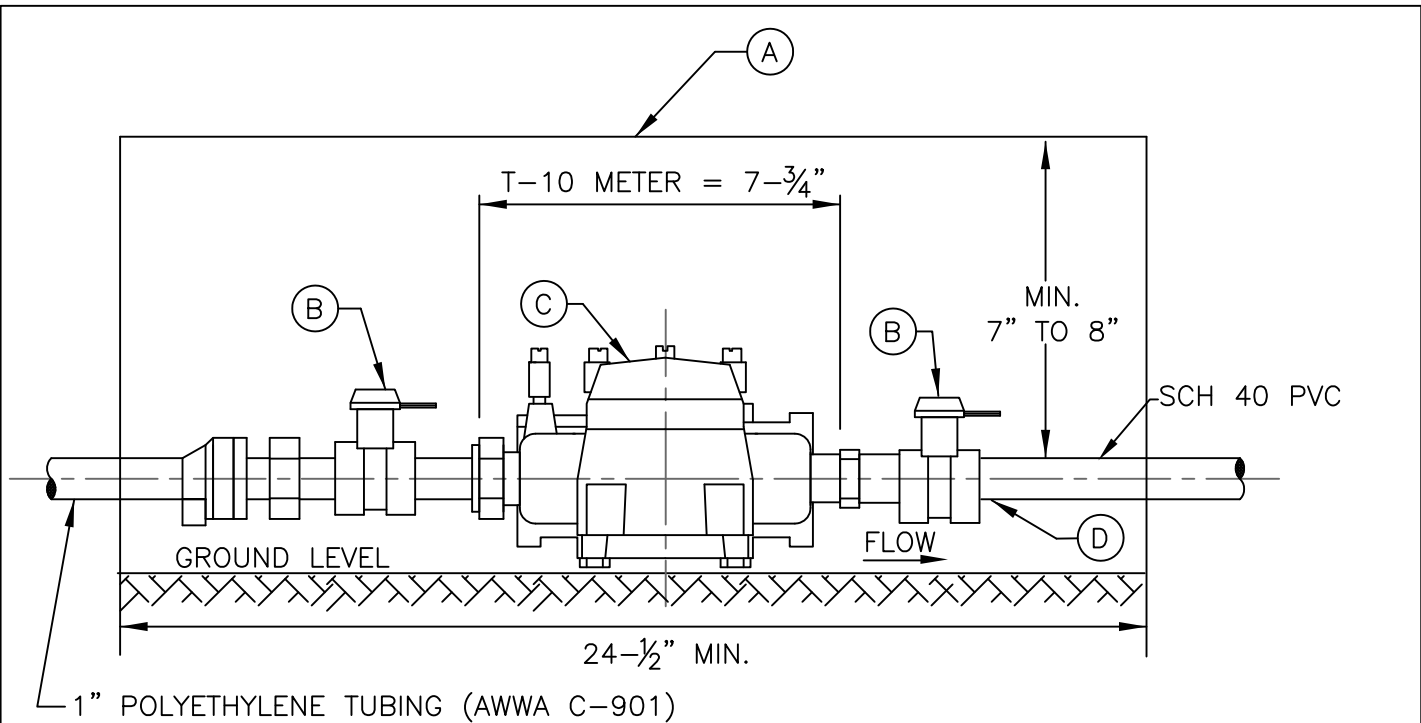
D= SEALED REGISTER WATER METER

E= CUSTOMER TIE-IN POINT

**NOTE:**

MINIMUM DISTANCES BETWEEN METER INLETS/OUTLETS AND THE CLOSEST FITTINGS SHALL BE MAINTAINED PER METER MANUFACTURER'S REQUIREMENTS.

SCALE N.T.S.	<i>5/8" AND 1" METER WITH DUAL CHECK VALVE</i>	STANDARD DETAIL DRAWING No.
DATE 3/96		12
REVISED 2/08		SHEET 1 OF 2
REVISED 12/10	<i>FLORIDA KEYS AQUEDUCT AUTHORITY</i>	
REVISED 2/11	<i>KEY WEST, FLORIDA</i>	



ELEVATION VIEW

A= METER BOX AND LID

BOX—OLDCASTLE PRECAST #1118-12 HW BCF-XL BODY(0-2 MOUSE HOLE)  
 LID—OLDCASTLE PRECAST #FL12P001-NO FIBERLYTE LID WITH NEPTUNE PROBE PROVISION  
 SEE SECTION IV – MATERIAL SPECIFICATIONS

NOTE: PLASTIC BOXES MUST HAVE LIDS IN PLACE PRIOR TO POURING THE CONCRETE.

B= FORD LOCKABLE METER STOP OR APPROVED EQUAL

METER DIAMETER	METER STOP
3/4"x5/8"	No. B43-342 W*
1"	No. B43-344 W*

\* "W" ON CATALOG NUMBER IS FOR PADLOCK WINGS.

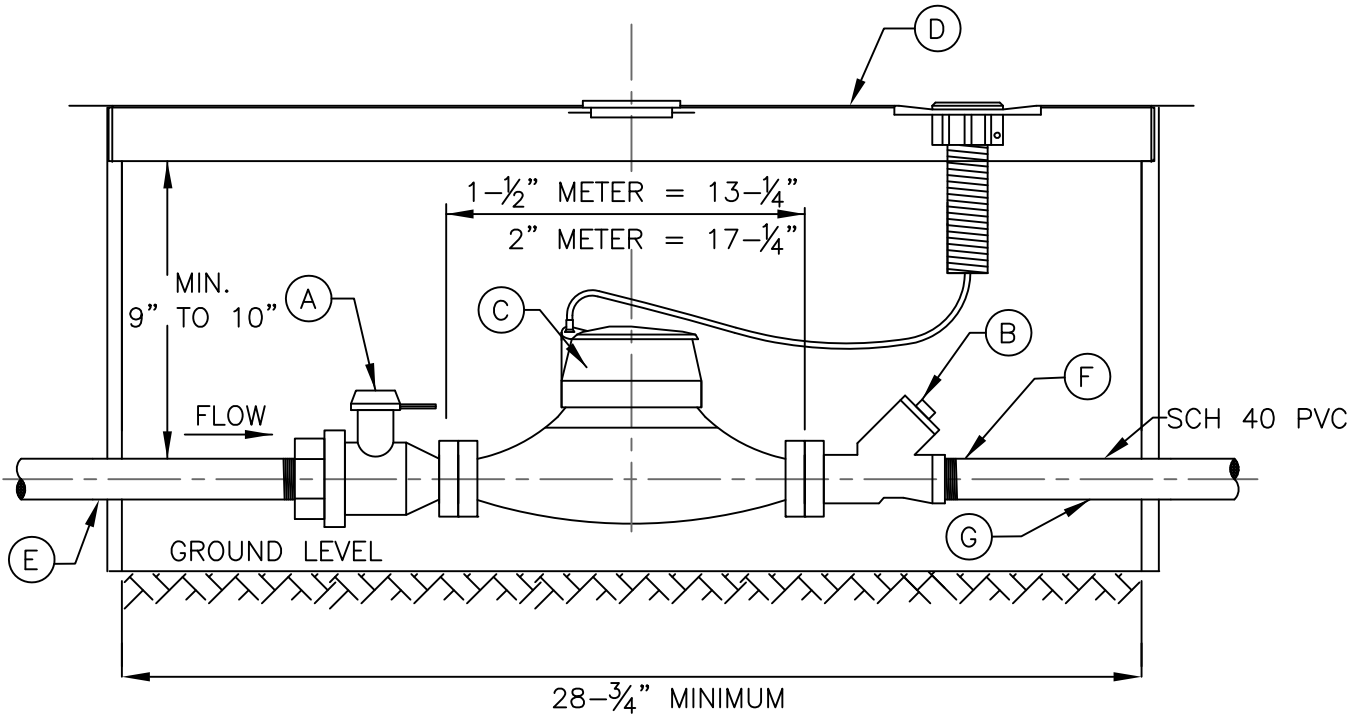
C= SCHLUMBERGER METER/DOUBLE CHECK T-10 ASSEMBLY

D= CUSTOMER TIE-IN POINT

NOTE:

MINIMUM DISTANCES BETWEEN METER INLETS/OUTLETS AND THE CLOSEST FITTINGS SHALL BE MAINTAINED PER METER MANUFACTURER'S REQUIREMENTS.

SCALE N.T.S.	<i>5/8" T-10 DOUBLE CHECK METER</i>	STANDARD DETAIL DRAWING No.
DATE 6/98		12
REVISED 2/08		SHEET 2 OF 2
REVISED 12/10	<i>FLORIDA KEYS AQUEDUCT AUTHORITY</i>	
REVISED 2/11	<i>KEY WEST, FLORIDA</i>	



ELEVATION VIEW

A= FORD LOCKABLE METER STOP OR APPROVED EQUAL: 1- $\frac{1}{2}$ " = BF13-676 W\*,  
 2" = BF13-777 W\*

\* "W" ON CATALOG NUMBER IS FOR PADLOCK WINGS

B= FKA A APPROVED DUAL CHECK VALVE: MUELLER No. H-14242

C= SEALED REGISTER WATER METER

D= MID-STATES PLASTICS MODEL #MSBCF1730-12 OR APPROVED EQUAL

E= 2" POLYETHYLENE TUBING (AWWA C-901)

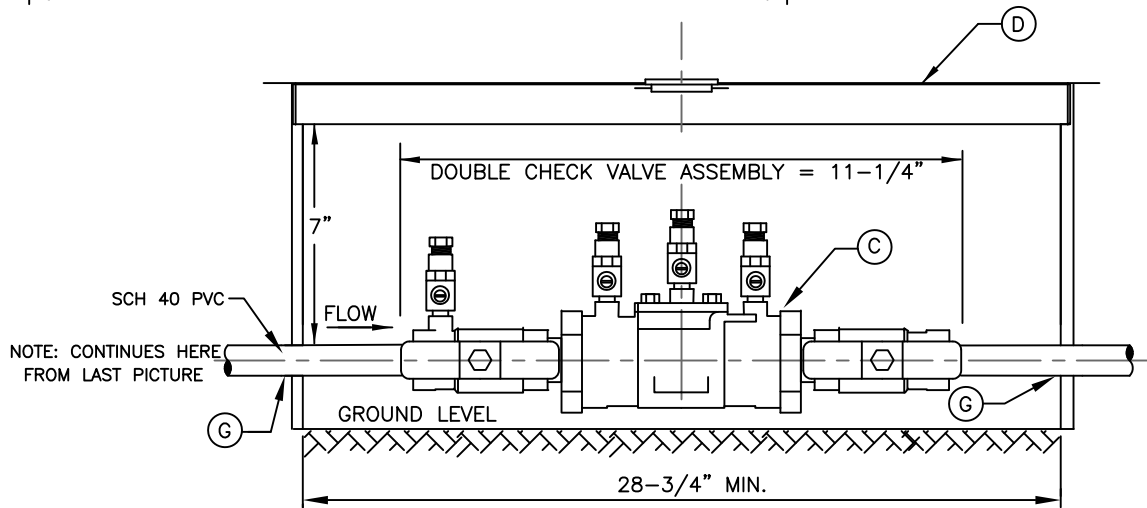
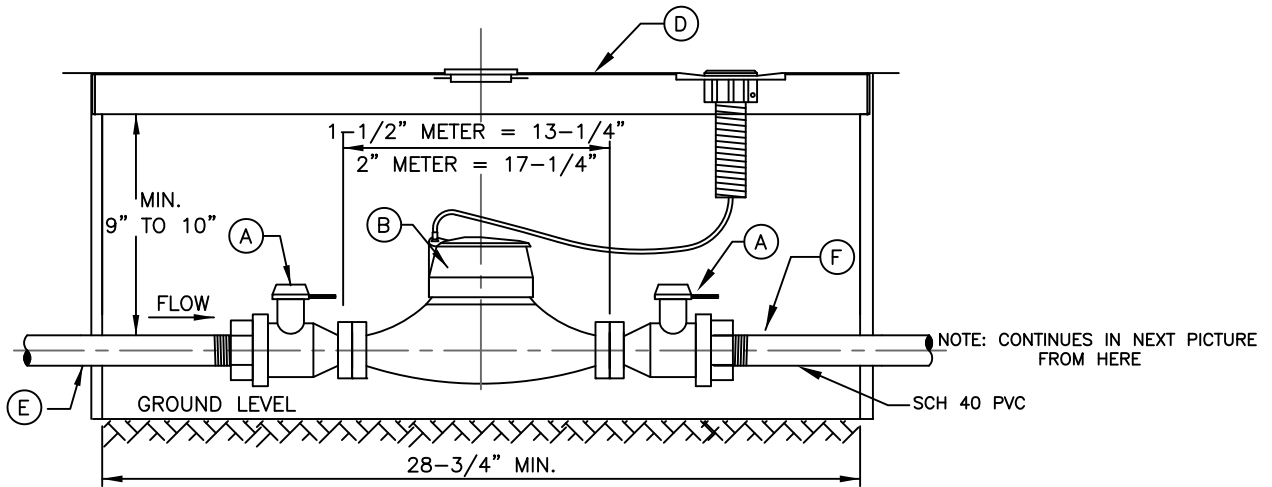
F= CUSTOMER TIE-IN POINT

G= CUSTOMER FURNISHED PIPING/TUBING

NOTE:

MINIMUM DISTANCES BETWEEN METER INLETS/OUTLETS AND THE CLOSEST FITTINGS SHALL BE MAINTAINED PER METER MANUFACTURER'S REQUIREMENTS.

SCALE N.T.S.	1- $\frac{1}{2}$ " AND 2" METER WITH DUAL CHECK VALVE	STANDARD DETAIL DRAWING No.
DATE 3/96		13
REVISED 2/08		SHEET 1 OF 2
REVISED 2/11		FLORIDA KEYS AQUEDUCT AUTHORITY KEY WEST, FLORIDA



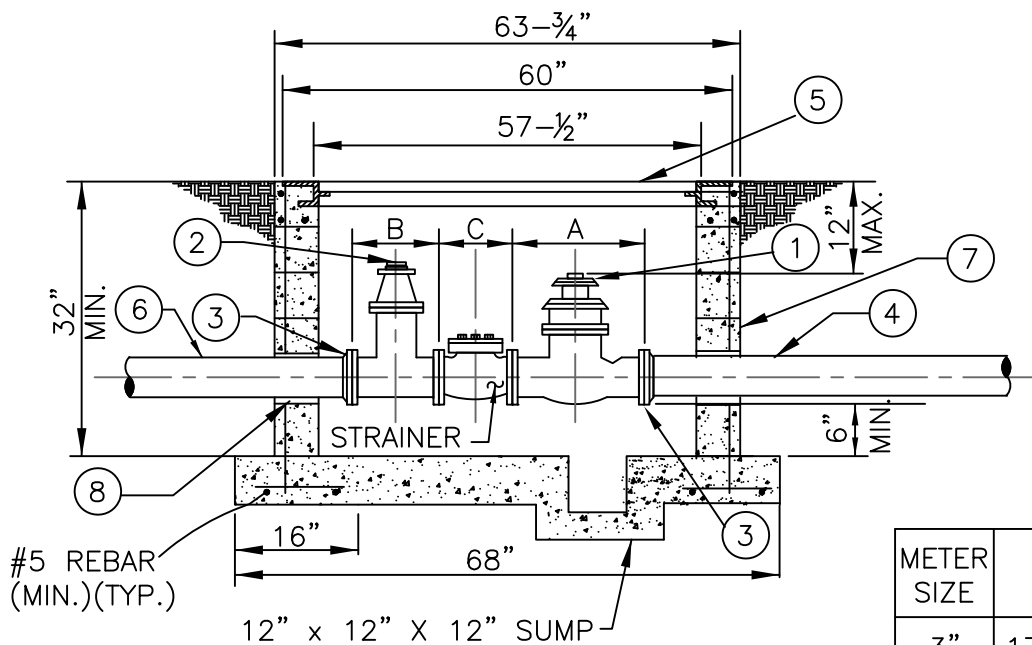
*ELEVATION VIEW*

- A= FORD LOCKABLE METER STOP OR APPROVED EQUAL: 1 1/2" = BF13-676 W\*,  
2" = BF13-777 W\*
- \* "W" ON CATALOG NUMBER IS FOR PADLOCK WINGS
- B= SEALED REGISTER WATER METER
- C= USC APPROVED DOUBLE CHECK VALVE ASSEMBLY (CUSTOMER FURNISHED)\*  
\* WITH VERTICAL TEST COCKS AND PLUGS
- D= MID-STATES PLASTICS MODEL #MSBCF1730-12 OR APPROVED EQUAL
- E= 1" OR 2" POLYETHYLENE TUBING (AWWA C-901)
- F= CUSTOMER TIE-IN POINT
- G= CUSTOMER FURNISHED PIPING/TUBING

**NOTE:**

MINIMUM DISTANCES BETWEEN METER INLETS/OUTLETS AND THE CLOSEST FITTINGS SHALL BE MAINTAINED PER METER MANUFACTURER'S REQUIREMENTS.

<i>SCALE</i> <i>N.T.S.</i>	<i>1" AND LARGER METER WITH DOUBLE CHECK VALVE ASSEMBLY</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> <i>6/98</i>		<i>13</i>
<i>REVISED</i> <i>2/08</i>		<i>SHEET 2 OF 2</i>
<i>REVISED</i> <i>2/11</i>		<i>FLORIDA KEYS AQUEDUCT AUTHORITY KEY WEST, FLORIDA</i>



SECTION VIEW

METER SIZE	"A"	"B"	"C"
3"	17- $\frac{1}{4}$ "	8"	7"
4"	20- $\frac{1}{4}$ "	9"	9"
6"	24- $\frac{1}{4}$ "	10- $\frac{1}{2}$ "	9"

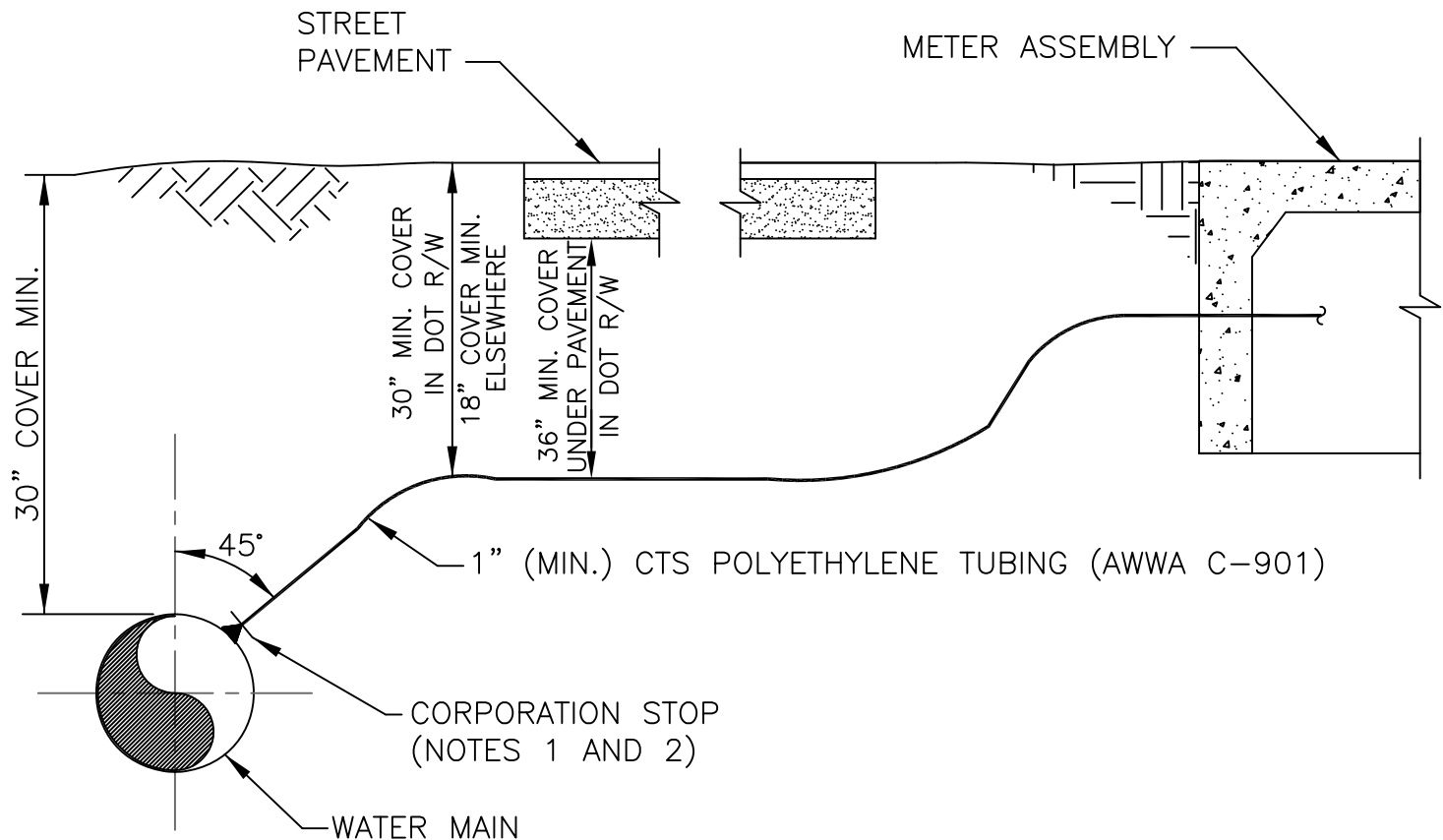
- ① SINGLE REGISTER COMPOUND WATER METER
- ② FLANGED RESILIENT SEAT, NON-RISING STEM GATE VALVE, MAY BE LOCATED INSIDE OR OUTSIDE OF METER VAULT
- ③ UNI-FLANGE OR EQUAL FLANGE PIPE ADAPTER
- ④ TO BACKFLOW PREVENTER (D.I. FOR PIPE DIA. GREATER THAN 3") (REFER TO STANDARD DETAIL DRAWING Nos. 20, 21, AND 22)
- ⑤ U.S. FOUNDRY TYPE AHD 36"x60" ALUMINUM HATCH COVER, CAST IN PLACE (OR APPROVED EQUAL)
- ⑥ TO MAIN AND/OR VALVE (D.I. FOR PIPE DIA. GREATER THAN 3")
- ⑦ 8" CONCRETE BLOCK WALLS WITH CELLS FILLED WITH NON-SHRINK GROUT (NOTE 1)
- ⑧ GROUT AROUND PIPE TO SEAL OPENING, COMPLETELY WRAP PIPE WITH #15 FELT BEFORE GROUTING

NOTES:

- 1. REBAR AS SHOWN ARE MINIMUM REQUIRED. VAULT TO BE DESIGNED BY PRECASTER.
- 2. MINIMUM DISTANCES BETWEEN METER INLETS/OUTLETS AND THE CLOSEST FITTING SHALL BE MAINTAINED PER MANUFACTURER'S REQUIREMENTS.

SCALE N.T.S.	<i>3", 4", AND 6" METER ASSEMBLY</i>	STANDARD DETAIL DRAWING No.
DATE 10/99		14
REVISED 2/08		

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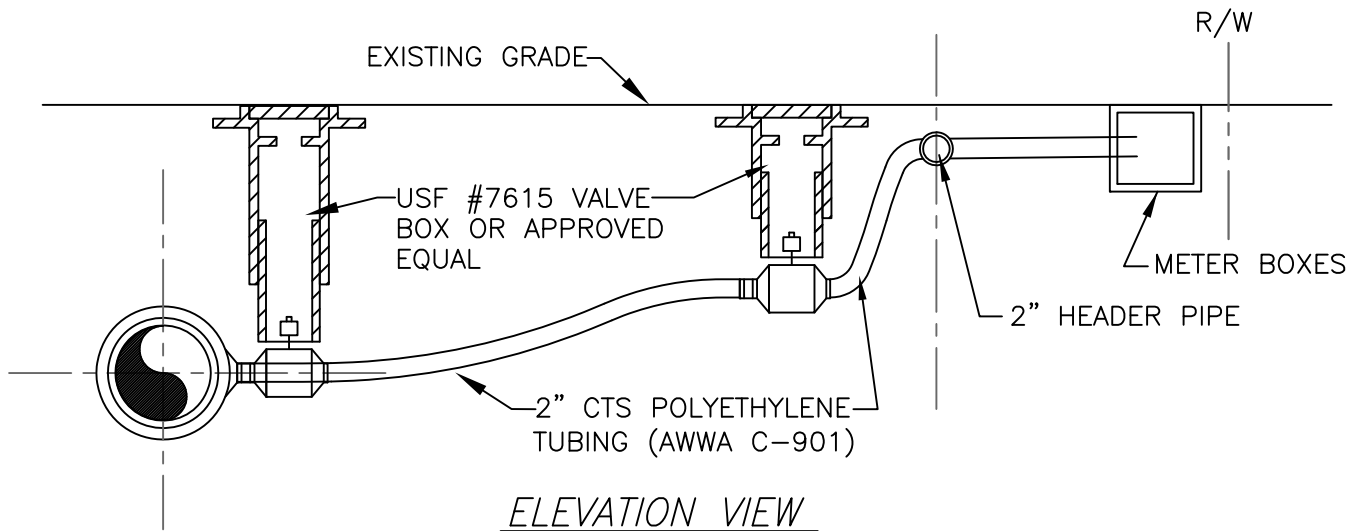
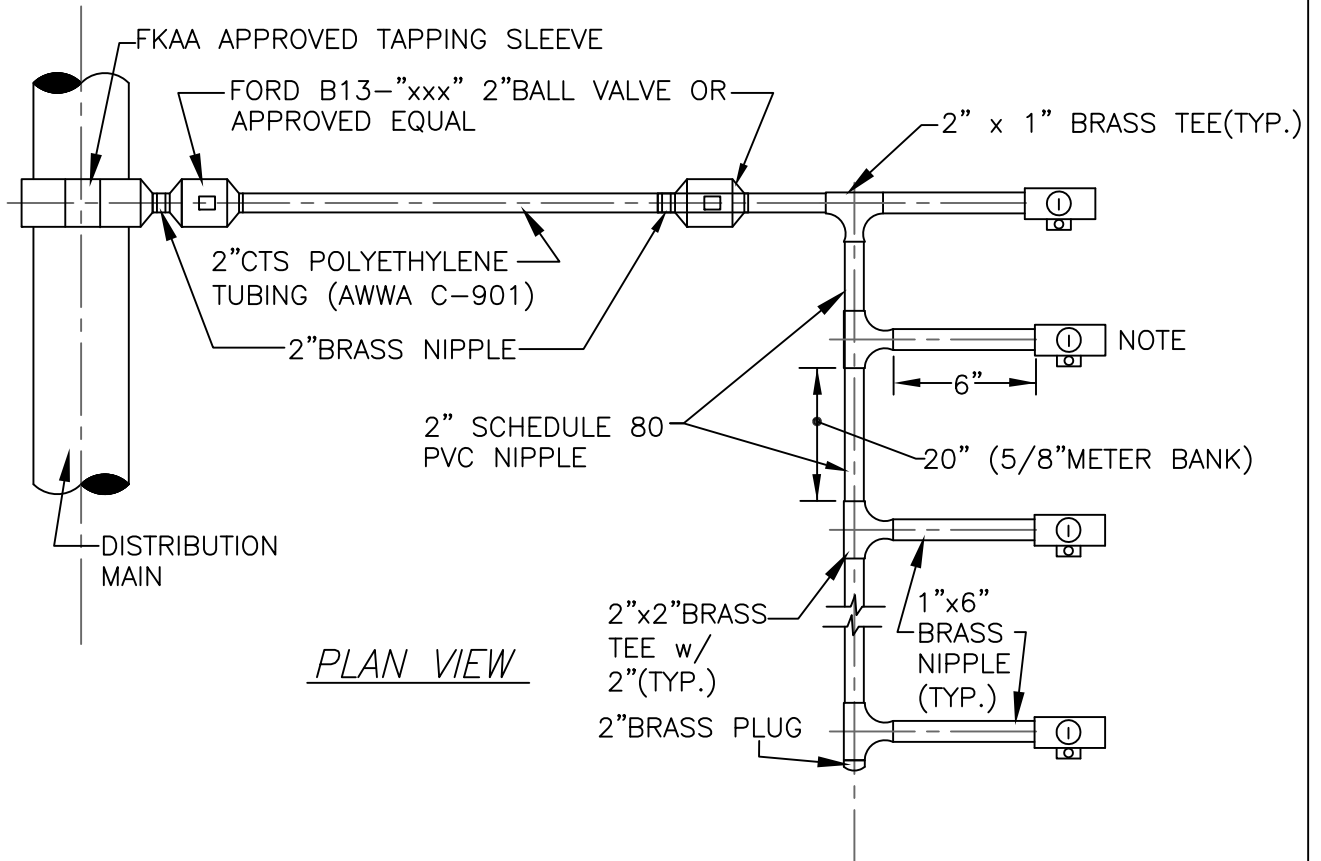
ELEVATION VIEW

NOTE:

1. CORPORATION STOPS TO HAVE AWWA TAPER INLET THREADS AND COMPRESSION FITTING. CORPORATION STOPS SHALL BE DIRECT TAP ON MAINS 6" IN DIA. OR GREATER. USE BRASS TAPPING SADDLE ROCKWELL STYLE 323, OR APPROVED EQUAL, FOR 4" DIA. MAINS.
2. USE FORD F-1000 CORPORATION STOP OR APPROVED EQUAL.

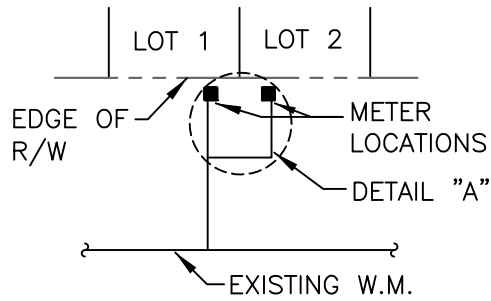
<i>SCALE</i> N.T.S.	<i>SERVICE CONNECTION</i>	<i>STANDARD DETAIL</i> <i>DRAWING No.</i>
<i>DATE</i> 3/96		<i>15</i>
<i>REVISED</i> 2/08		

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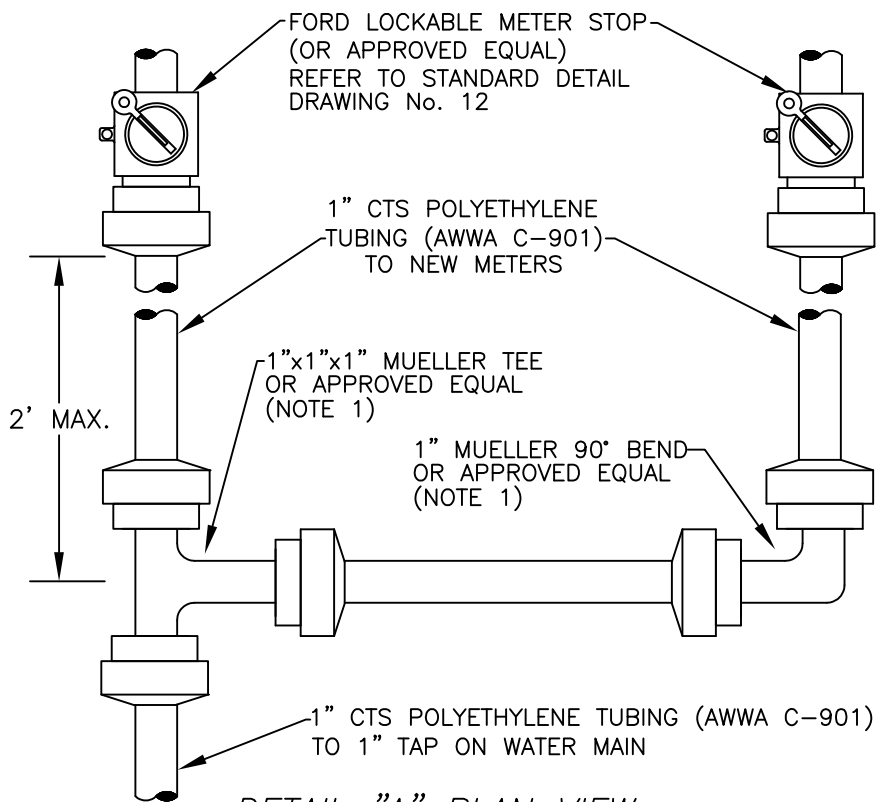


NOTE: REFER TO STANDARD DETAIL DRAWING No. 12 FOR METER ASSEMBLY ONLY.

SCALE N.T.S.	<i>METER BANK</i>	STANDARD DETAIL DRAWING No.
DATE 3/96		16
REVISED 2/08	<i>FLORIDA KEYS AQUEDUCT AUTHORITY KEY WEST, FLORIDA</i>	
REVISED 5/10		
REVISED 3/11		



PLAN VIEW



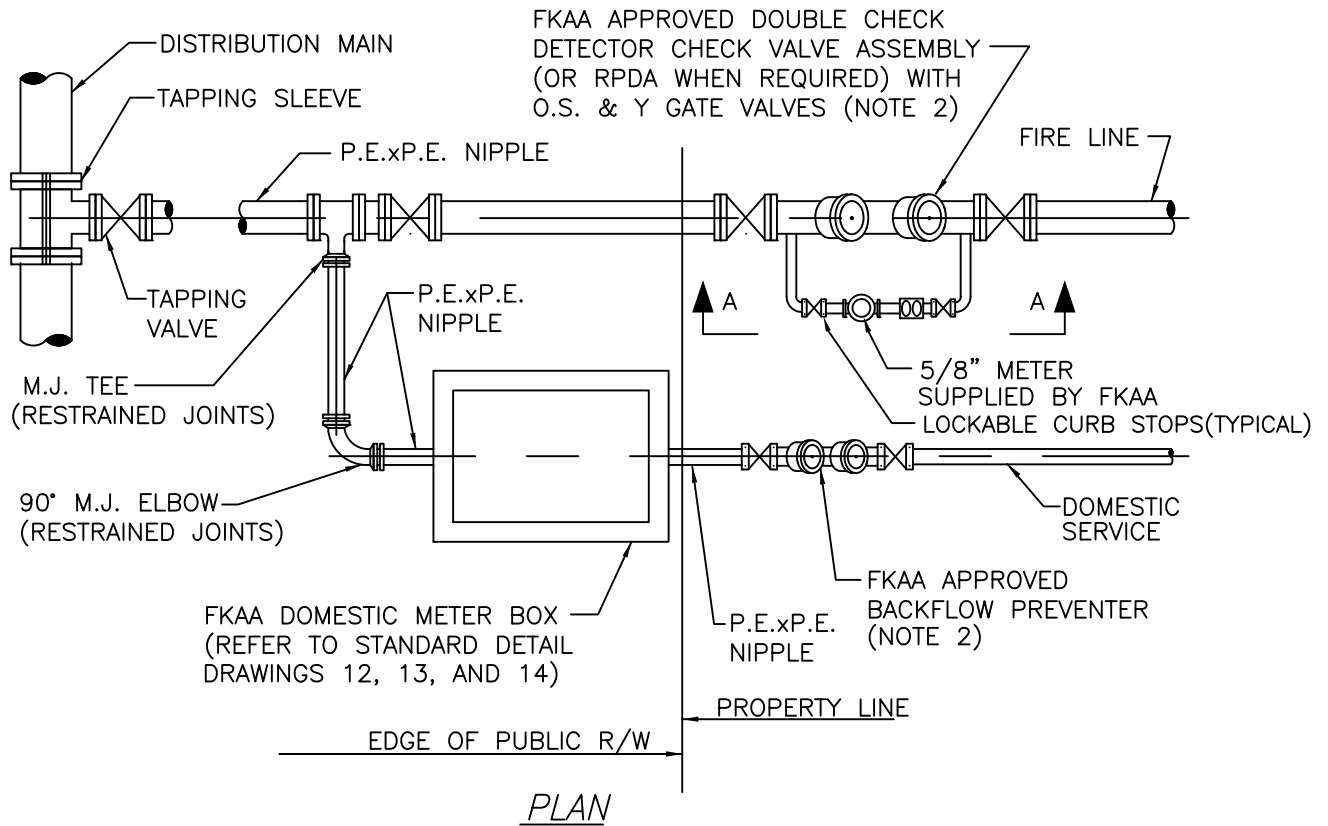
DETAIL "A" PLAN VIEW

NOTES:

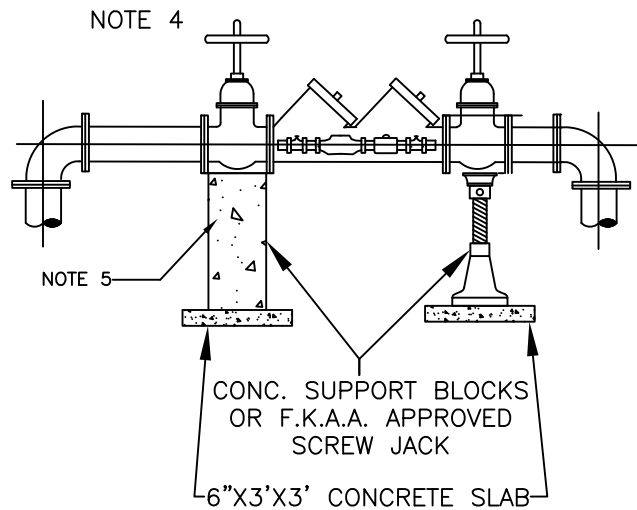
1. USE MUELLER 110 CONDUCTIVE COMPRESSION CONNECTIONS FOR CTS POLYETHYLENE TUBING (AWWA C-901), OR APPROVED EQUAL.

<i>SCALE</i> N.T.S.	<i>FITTINGS FOR 1" TAP DUAL SERVICE CONNECTION</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> 3/96		<i>17</i>
<i>REVISED</i> 2/08		

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KEY WEST, FLORIDA*



*PLAN*



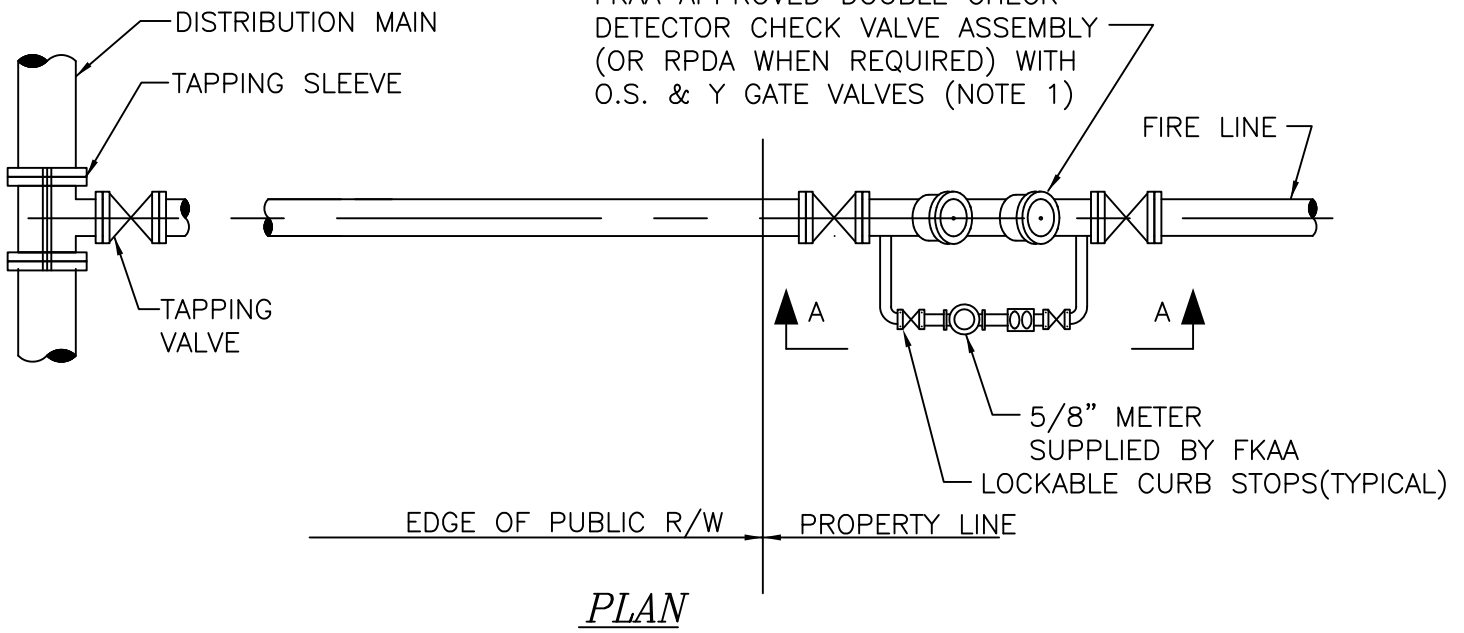
*SECTION A-A*

**NOTES:**

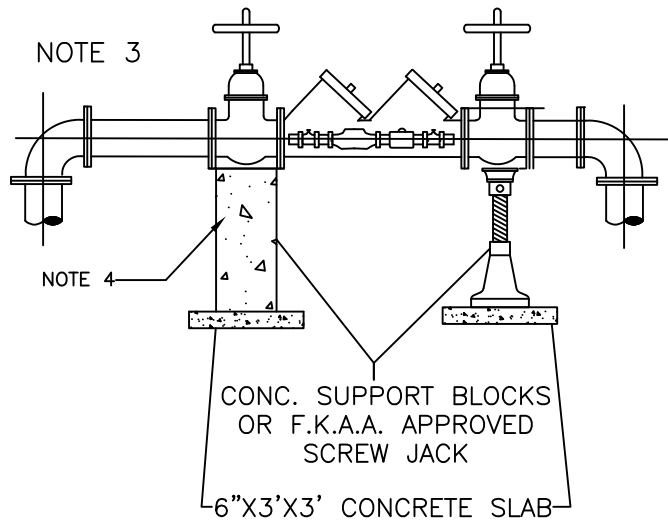
1. P.E. – PLAIN END, M.J. – MECHANICAL JOINT
2. REFER TO FKA A CROSS-CONNECTION CONTROL MANUAL AND FIRE PROTECTION SERVICE REQUIREMENTS IN FKA A MINIMUM CONSTRUCTION STANDARDS AND SPECIFICATIONS.
3. "Y" STRAINER NOT PERMITTED ON SEPARATE FIRE LINE.
4. REFER TO STANDARD DETAIL DRAWING No. 20, 21 or 22 FOR INSTALLATION DETAILS.
5. CONCRETE SUPPORT BLOCKS REQUIRED ON 2 1/2" AND LARGER DOUBLE CHECK VALVES.

<i>SCALE</i> N.T.S.	<i>SEPARATE FIRE LINE W/ DOMESTIC METER</i>	<i>STANDARD DETAIL</i> <i>DRAWING No.</i>
<i>DATE</i> 3/96		18
<i>REVISED</i> 6/01		<i>SHEET 1 OF 2</i>
<i>REVISED</i> 4/10		<i>FLORIDA KEYS AQUEDUCT AUTHORITY</i> <i>KEY WEST, FLORIDA</i>

FKAA APPROVED DOUBLE CHECK  
DETECTOR CHECK VALVE ASSEMBLY  
(OR RPDA WHEN REQUIRED) WITH  
O.S. & Y GATE VALVES (NOTE 1)



PLAN



SECTION A-A

NOTES:

1. REFER TO FKAA CROSS-CONNECTION CONTROL MANUAL AND FIRE PROTECTION SERVICE REQUIREMENTS IN FKAA MINIMUM CONSTRUCTION STANDARDS AND SPECIFICATIONS.
2. "Y" STRAINER NOT PERMITTED ON SEPARATE FIRE LINE.
3. REFER TO STANDARD DETAIL DRAWING No. 20, 21 or 22 FOR INSTALLATION DETAILS.
4. CONCRETE SUPPORT BLOCKS REQUIRED ON 2-1/2" AND LARGER DOUBLE CHECK VALVES.

SCALE  
N.T.S.

DATE  
3/96

REVISED  
6/01

REVISED  
4/10

*SEPARATE FIRE LINE INSTALLATION*

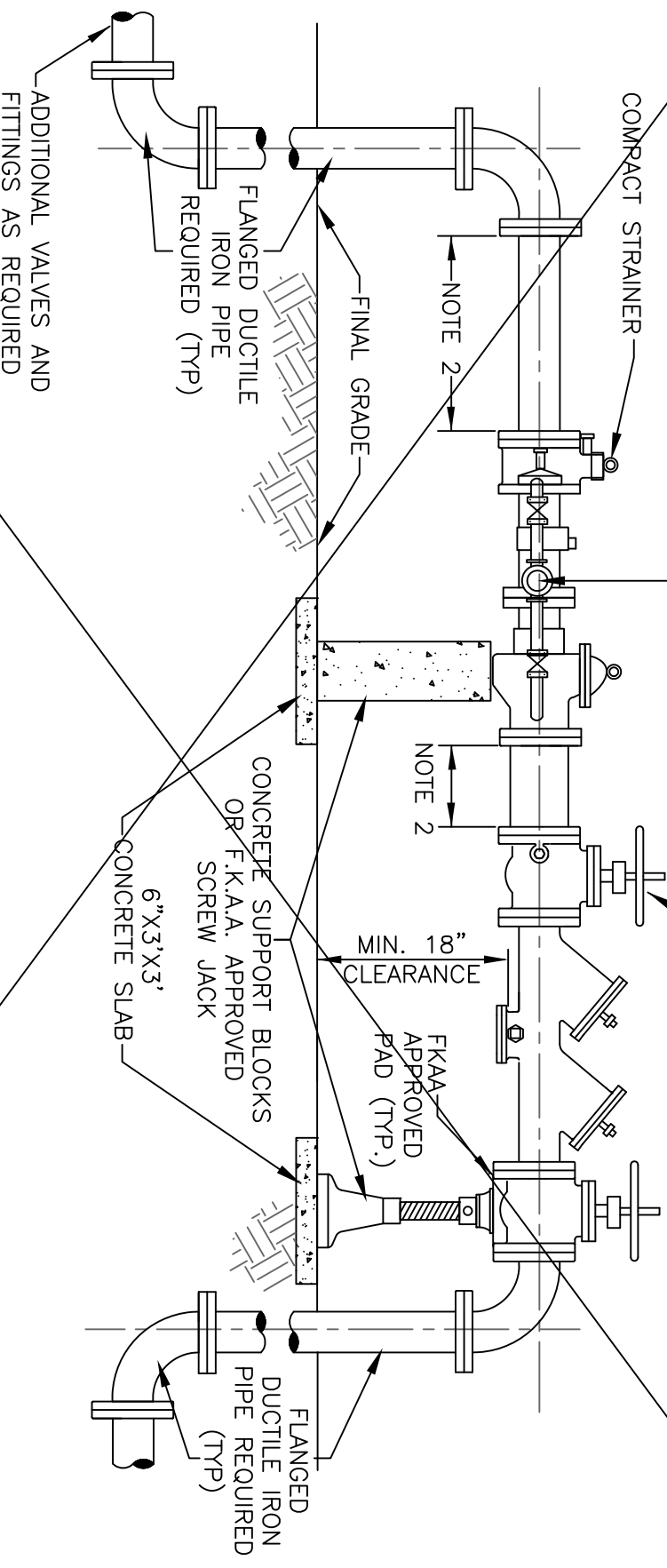
STANDARD DETAIL  
DRAWING No.

18

SHEET 2 OF 2

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

4" 6", 8", OR 10" NEPTUNE HP PROTECTUS III  
 COMPACT FIRE/DOMESTIC METER ASSEMBLY  
 WITH E-Coder(R)R9001 REMOTE READING SYSTEM



ELEVATION VIEW

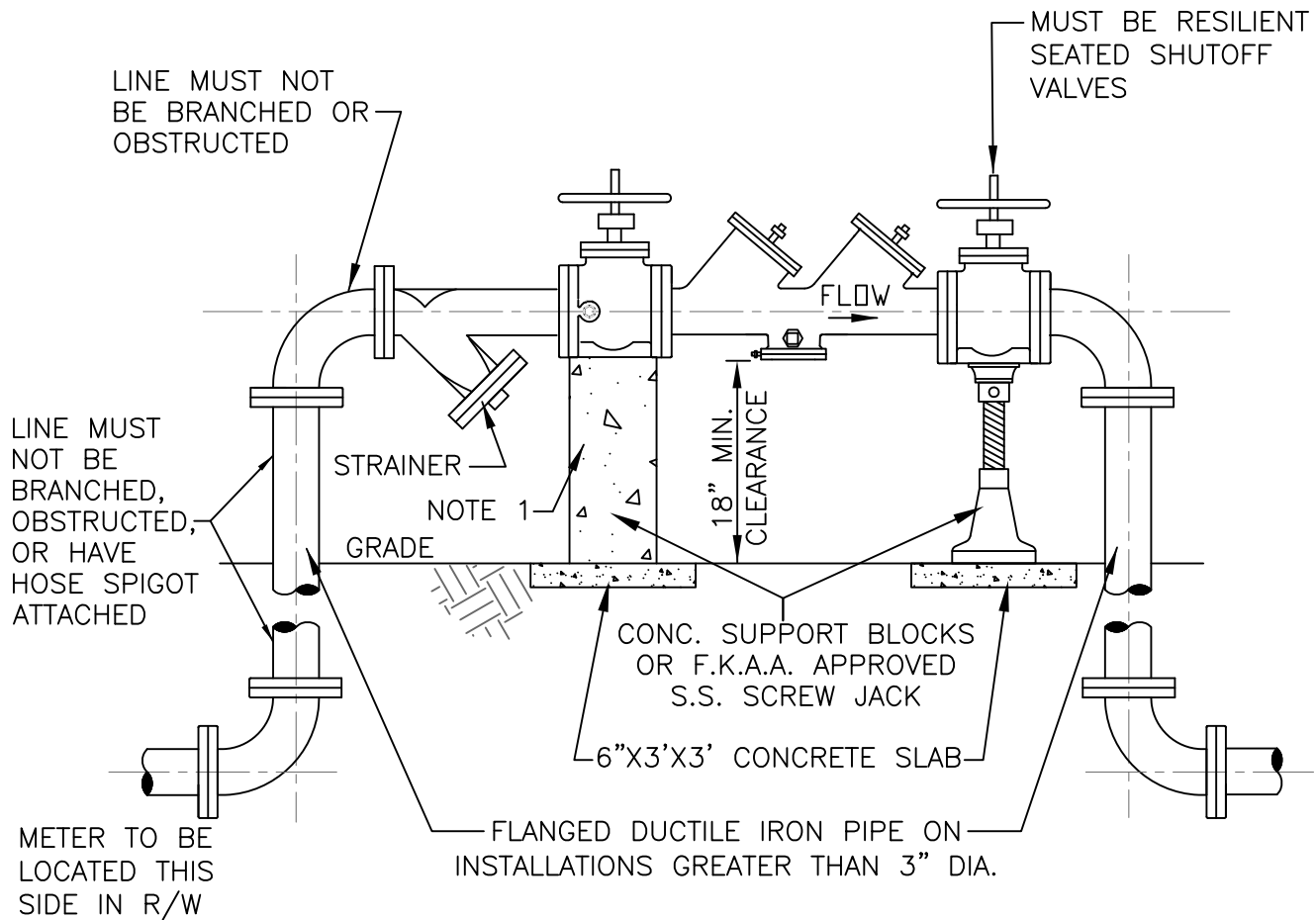
- NOTES:
1. ASSEMBLY MUST BE INSTALLED WITH MINIMUM CLEARANCES OF 30" FOR THE SIDE WITH TEST COCKS AND 8" FOR THE BACK SIDE.
  2. MAINTAIN MINIMUM 4 PIPE DIAMETER STRAIGHT RUN BEFORE STRAINER AND 4 PIPE DIAMETER STRAIGHT RUN AFTER METER ASSEMBLY.

FLORIDA KEYS AQUEDUCT AUTHORITY  
 KEY WEST, FLORIDA

SCALE:  
 N.T.S.  
 DATE: 3/96  
 REVISED: 02/08

COMBINED DOMESTIC AND  
 FIRE LINE INSTALLATION

STANDARD DETAIL  
 DRAWING No. 19



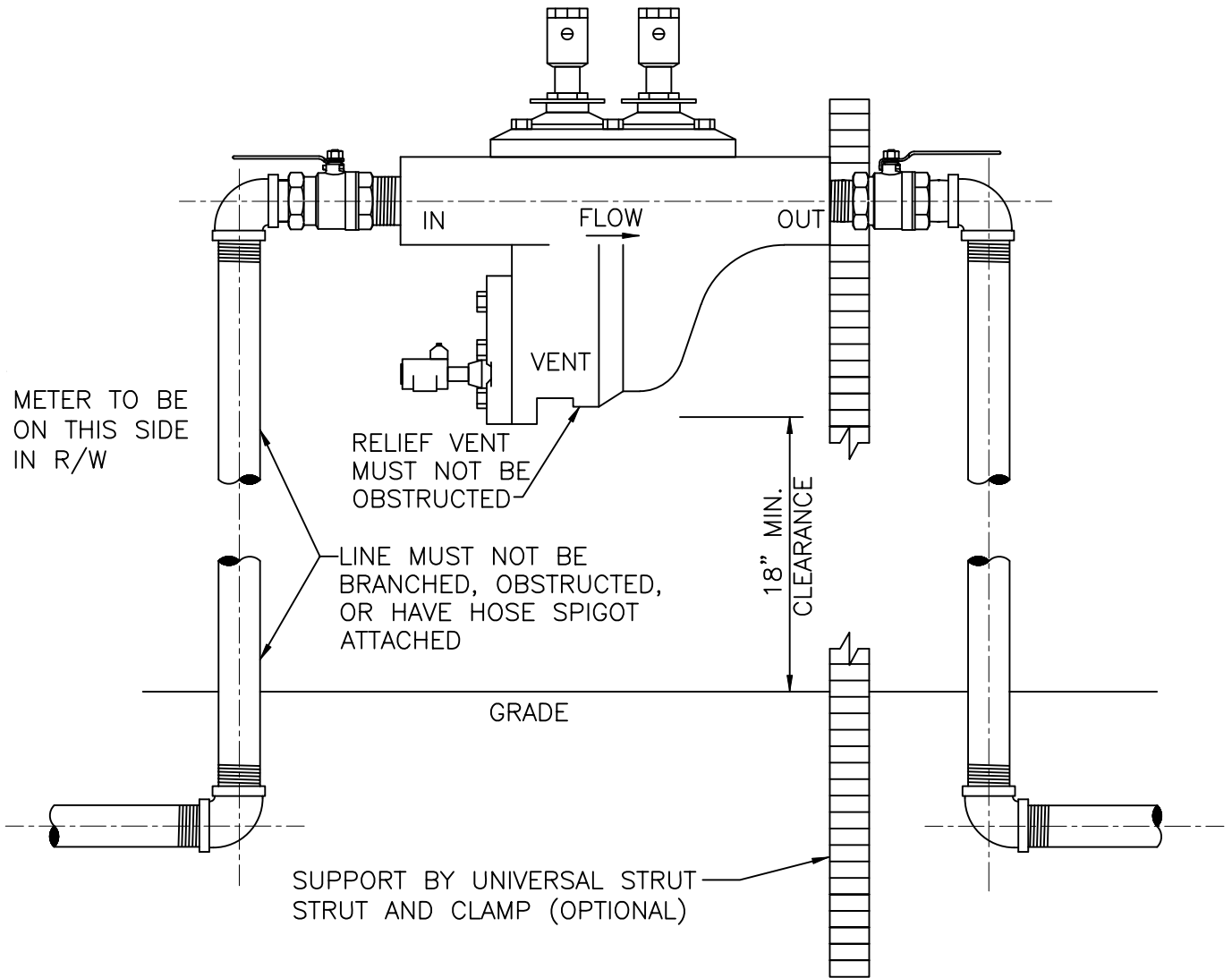
ELEVATION VIEW

NOTES:

1. CONCRETE SUPPORT BLOCKS AND "Y" TYPE STRAINER (WITH STANDARD PERFORATED SCREEN) ON 2 1/2" AND LARGER BACKFLOW PREVENTERS.
2. THE ASSEMBLY MUST BE INSTALLED WITH MINIMUM HORIZONTAL CLEARANCES OF 30" FOR THE SIDE WITH TEST COCKS AND 8" FOR THE BACK SIDE.
3. ACCEPTABLE ASSEMBLIES ARE THOSE THAT ARE APPROVED BY EITHER ASSE OR FCCCHR AND MEET THE MINIMUM DESIGN STANDARDS OF THE AWWA.

SCALE N.T.S.	<i>2 1/2" TO 10" REDUCED PRESSURE BACKFLOW PREVENTER INSTALLATION</i>	<i>STANDARD DETAIL DRAWING No.</i>
DATE 3/96		<i>20</i>
REVISED KC 9/09		

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*



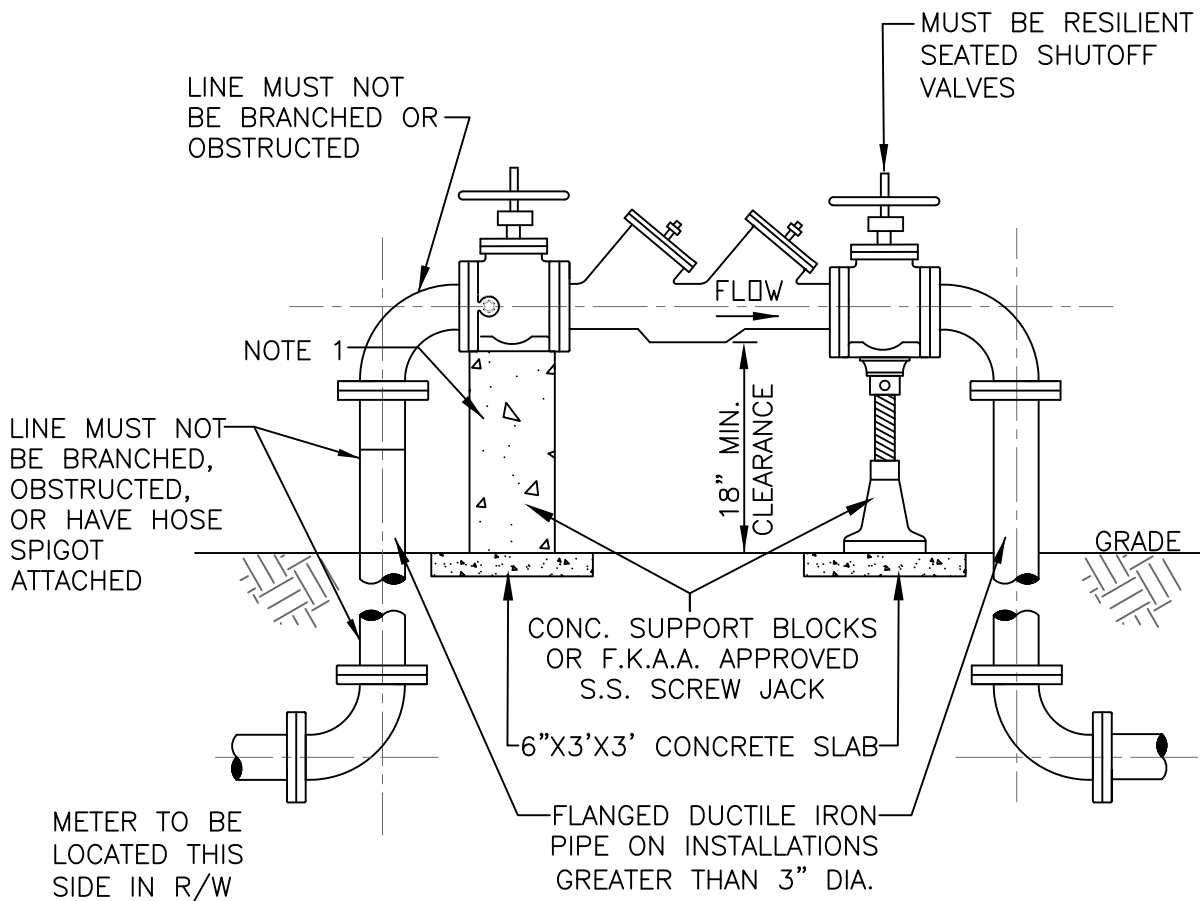
ELEVATION VIEW

NOTES:

1. THE ASSEMBLY MUST BE INSTALLED ON THE CUSTOMER'S PROPERTY, AS CLOSE TO THE METER AS PRACTICAL.
2. THE ASSEMBLY MUST BE ACCESSIBLE FOR TESTING ANNUALLY, AND FOR OVERHAUL EVERY FIVE YEARS.
3. ACCEPTABLE ASSEMBLIES ARE THOSE THAT ARE APPROVED BY EITHER ASSE OR FCCCHR AND MEET THE MINIMUM DESIGN STANDARDS OF THE AWWA.

<i>SCALE</i> N.T.S.	<i>3/4" TO 2" REDUCED PRESSURE BACKFLOW PREVENTER INSTALLATION</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> 3/96		<i>21</i>
<i>REVISED</i> KC 9/09		

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KEY WEST, FLORIDA*



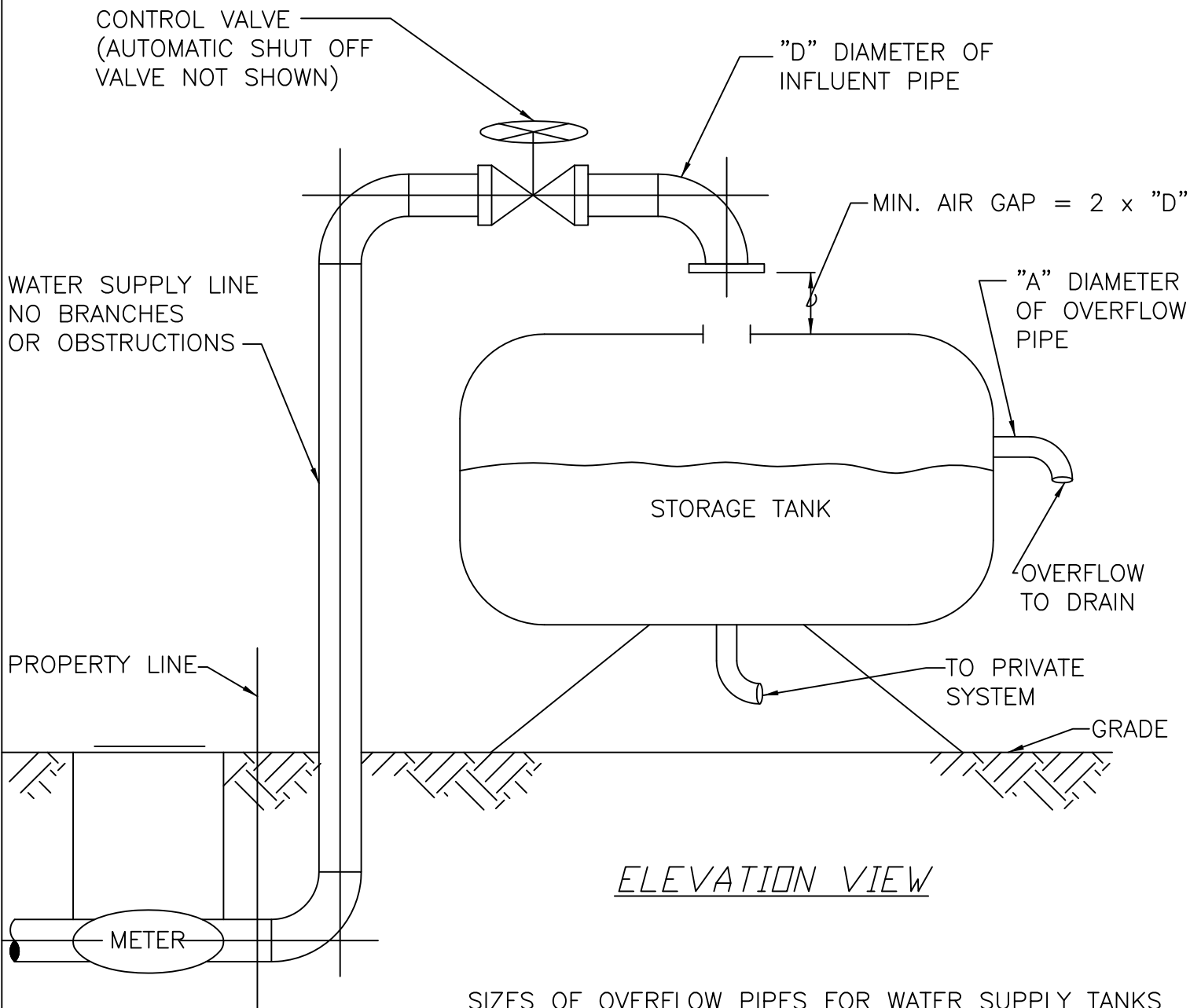
ELEVATION VIEW

NOTES:

1. CONCRETE SUPPORT BLOCKS REQUIRED ON 2 1/2" AND LARGER DOUBLE CHECK VALVES.
2. THE DEVICE MUST BE INSTALLED WITH MINIMUM HORIZONTAL CLEARANCES OF 30" FOR THE SIDE WITH TEST COCKS AND 8" FOR BACK SIDE.
3. ASSEMBLY IS NOT COMPLETE UNLESS ALL TEST COCKS ARE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
4. ACCEPTABLE ASSEMBLIES ARE THOSE THAT ARE APPROVED BY EITHER ASSE OR FCCCHR AND MEET THE MINIMUM DESIGN STANDARDS OF THE AWWA.

<i>SCALE</i> N.T.S.	<i>3/4" TO 10" DOUBLE CHECK VALVE ASSEMBLY INSTALLATION</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> 3/96		<i>22</i>
<i>REVISED</i> KC 9/09		

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*



ELEVATION VIEW

SIZES OF OVERFLOW PIPES FOR WATER SUPPLY TANKS

MAXIMUM CAPACITY OF WATER SUPPLY LINE TO TANK	DIAMETER OF OVERFLOW PIPE, "A"
0 - 50 gpm	2"
50 - 100 gpm	2 1/2"
100 - 200 gpm	3"
200 - 400 gpm	4"
400 - 700 gpm	5"
700 - 1000 gpm	6"
OVER 1000 gpm	8"

SCALE  
N.T.S.

DATE  
3/96

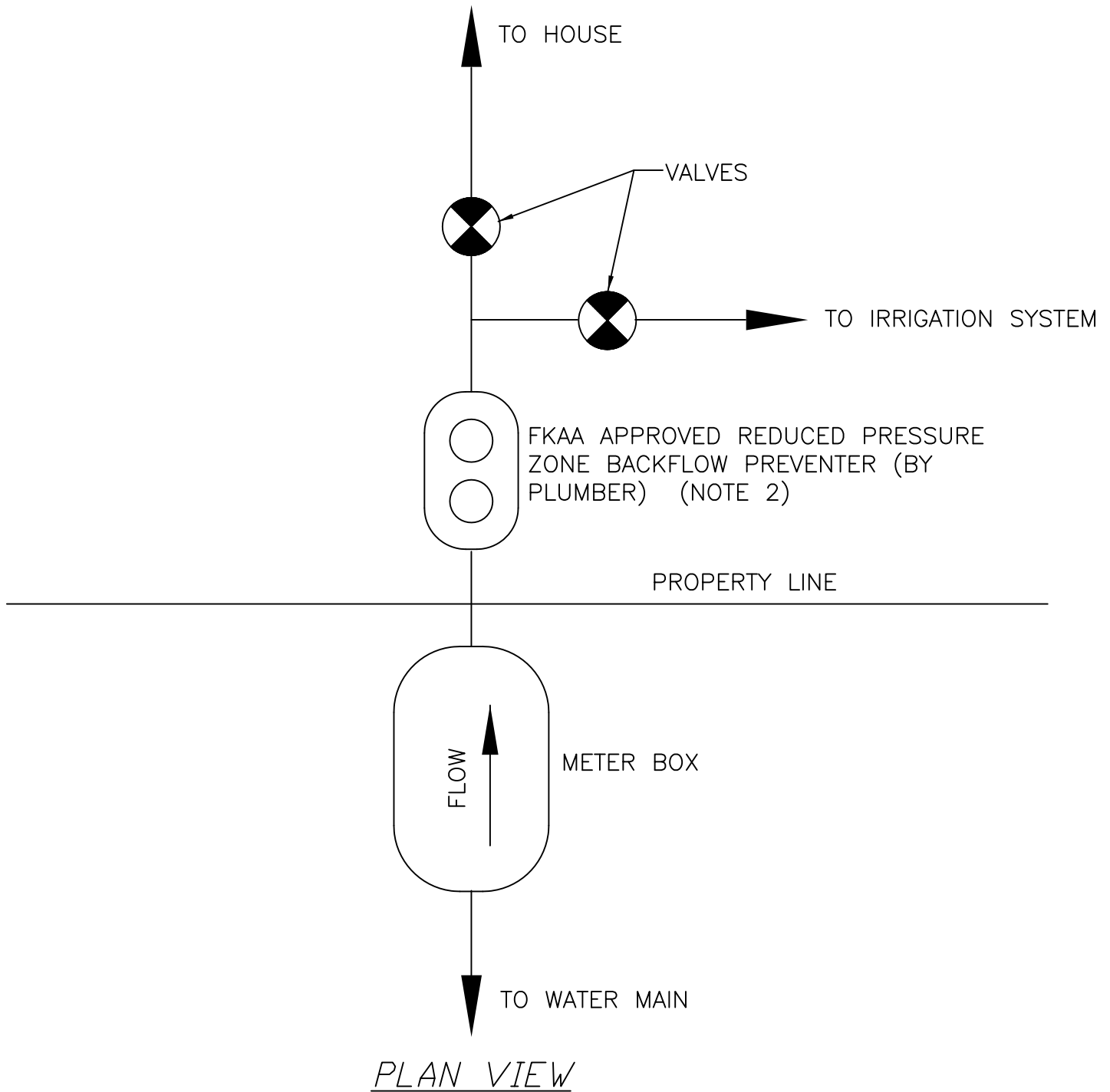
REVISED  
6/01

ACCEPTABLE AIR GAP CONSTRUCTION

STANDARD DETAIL  
DRAWING No.

23

FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA

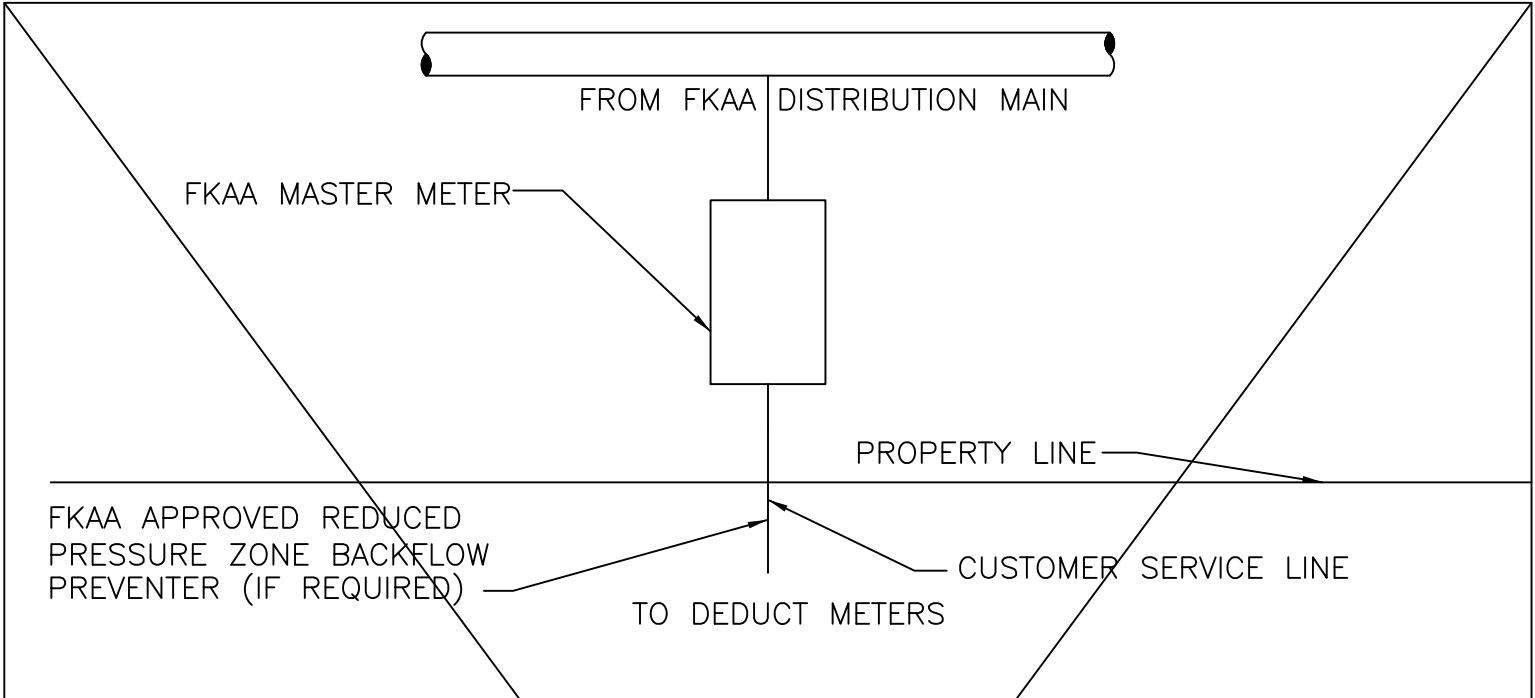


NOTE:

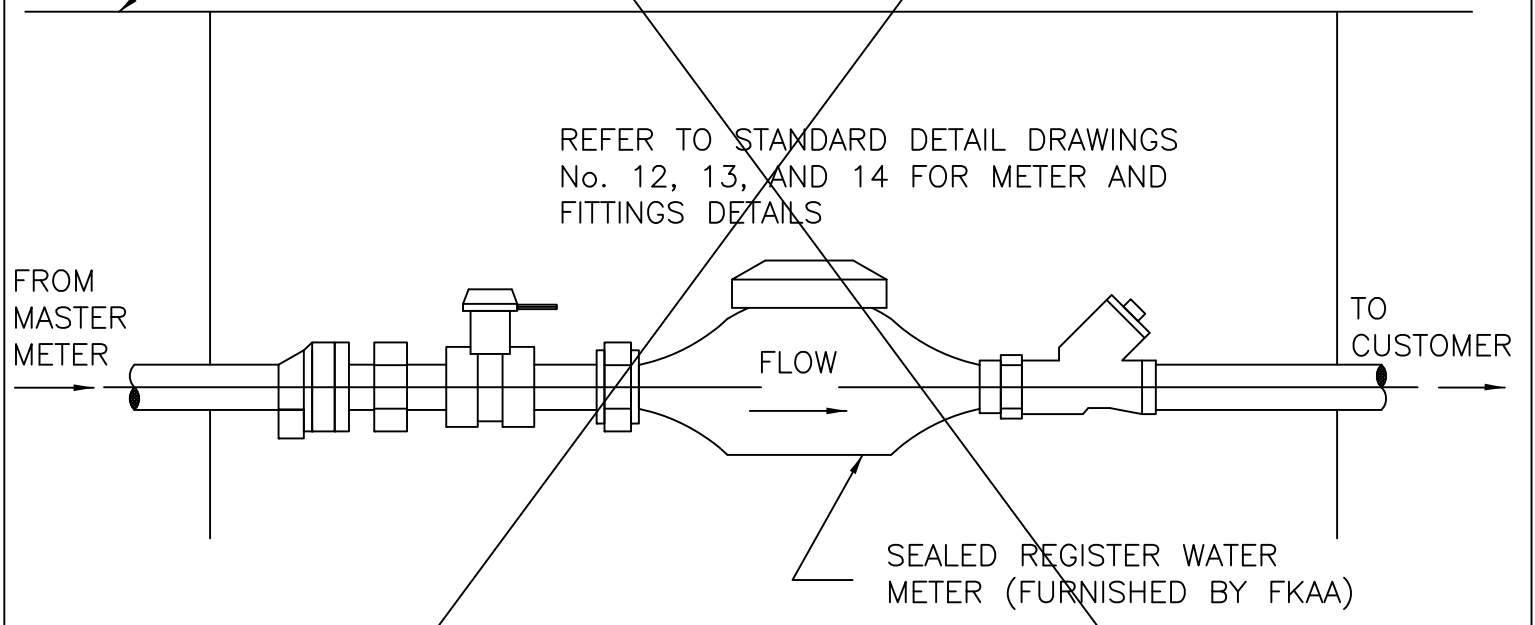
1. FKAA APPROVED PIPING FOR RESIDENTIAL IRRIGATION SYSTEM SERVED THROUGH DOMESTIC METER.
2. REFER TO FKAA MANUAL OF CROSS-CONNECTION CONTROL AND STANDARD DETAIL DRAWINGS No. 20 AND 21.

<i>SCALE</i> N.T.S.	<i>IRRIGATION PIPING</i>	<i>STANDARD DETAIL</i> <i>DRAWING No.</i>
<i>DATE</i> 3/96		<i>24</i>
<i>REVISED</i> 6/01		

*FLORIDA KEYS AQUEDUCT AUTHORITY*  
*KEY WEST, FLORIDA*



PLAN VIEW



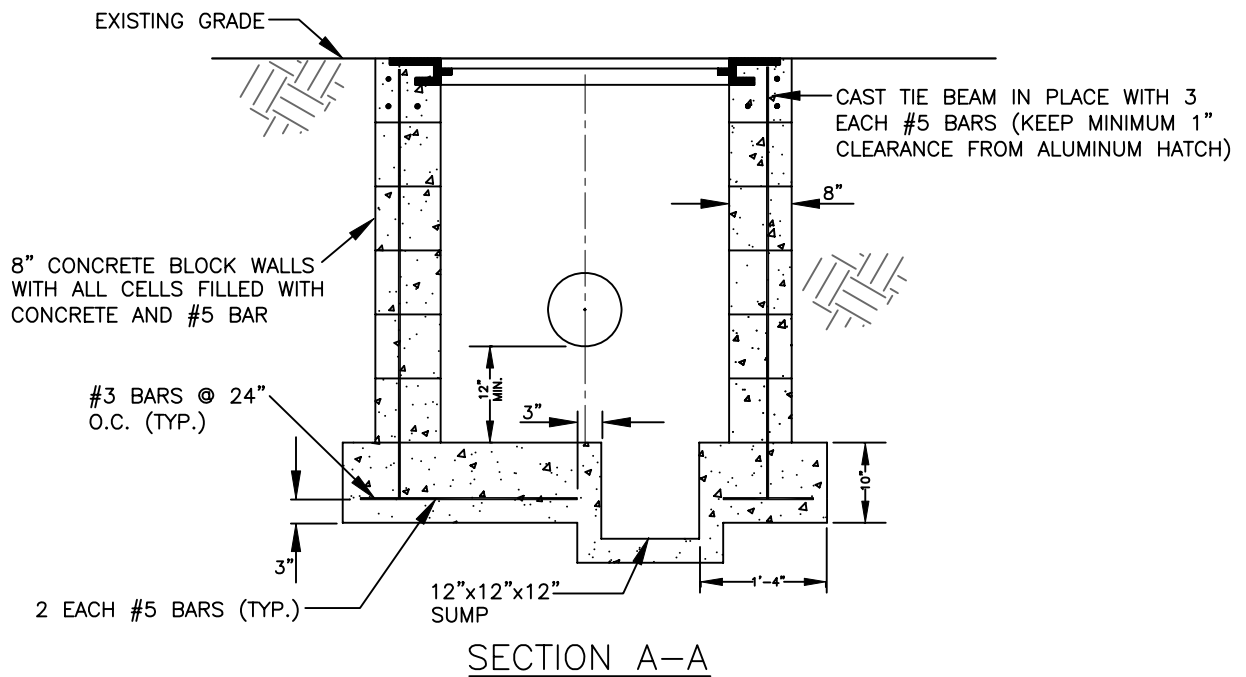
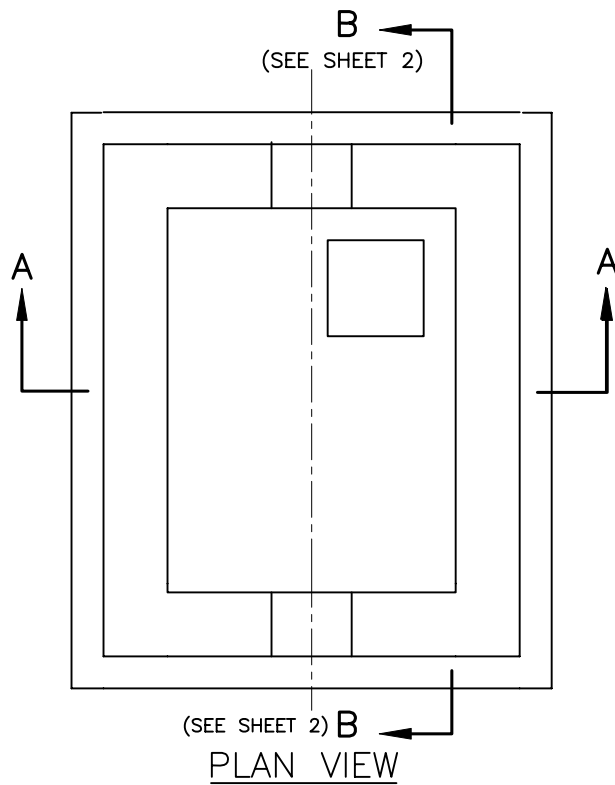
ELEVATION DETAIL

REFER TO STANDARD DETAIL DRAWINGS  
No. 12, 13, AND 14 FOR METER AND  
FITTINGS DETAILS

**NOTE:**

1. LOCATIONS OF DEDUCT METERS TO BE APPROVED BY FCAA.
2. MINIMUM DISTANCES BETWEEN METER INLETS/OUTLETS AND THE CLOSEST FITTING SHALL BE MAINTAINED PER THE METER MAUFACTURER'S REQUIREMENTS.

<i>SCALE</i> N.T.S.	<i>DEDUCT METER INSTALLATION</i>	<i>STANDARD DETAIL DRAWING No.</i>
<i>DATE</i> 3/96		<i>25</i>
<i>REVISED</i> 6/01		



NOTES:

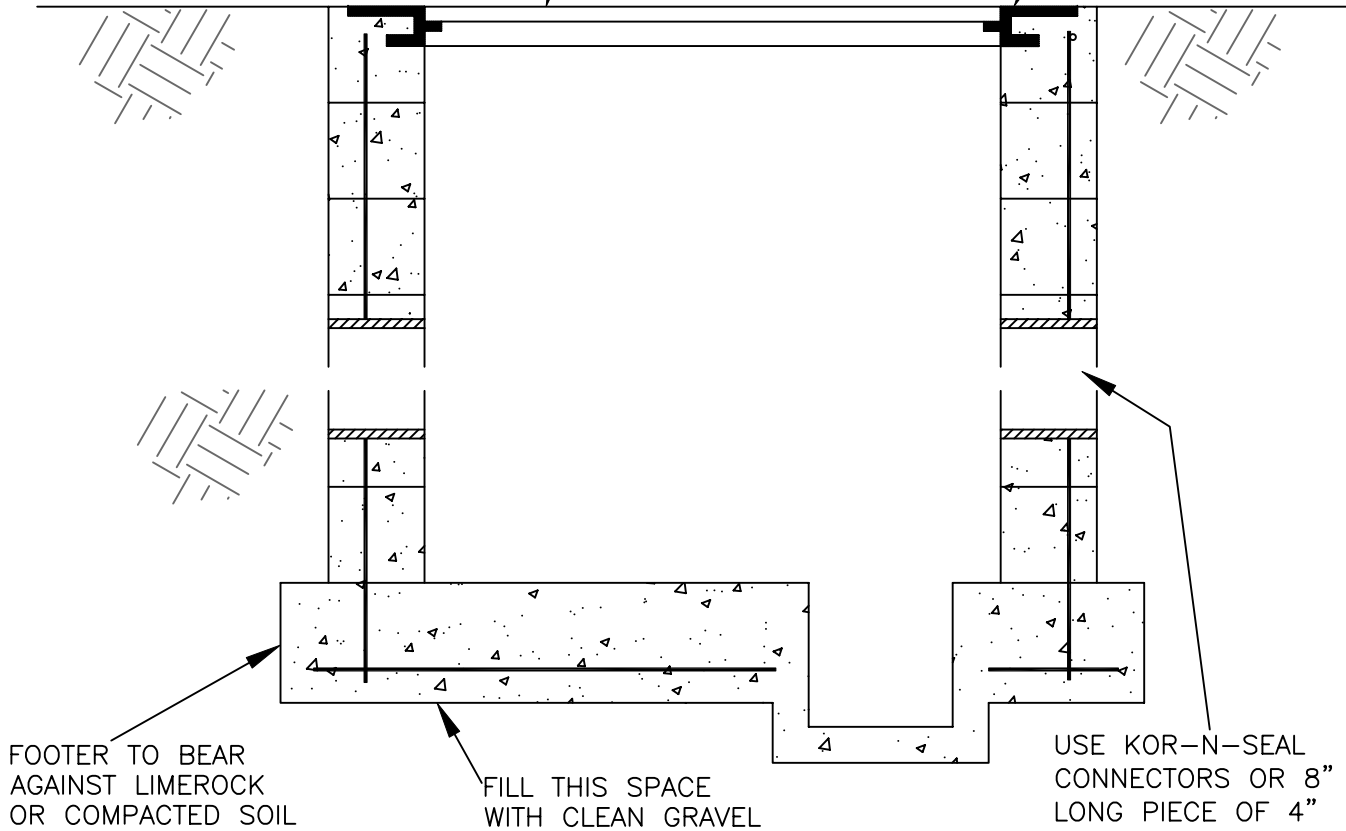
1. REBAR AS SHOWN ARE MINIMUM REQUIRED. APPLICABLE VAULTS TO BE DESIGNED BY OTHERS.

SCALE 1/2"=1'-0"	<i>STANDARD MASTER METER VAULT</i>	STANDARD DETAIL DRAWING NO. <b>26</b>
DATE 3/9/99		PAGE 1 OF 2
REVISED KC 9/09		

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

U.S. FOUNDRY TYPE AHD, 36"x78",  
ALUMINUM SPRING LOADED, DOUBLE  
DOOR, ACCESS HATCH WITH HD-20  
LID (OR APPROVED EQUAL)

ACCESS HATCH FRAME TO  
BE CAST IN TIE BEAM



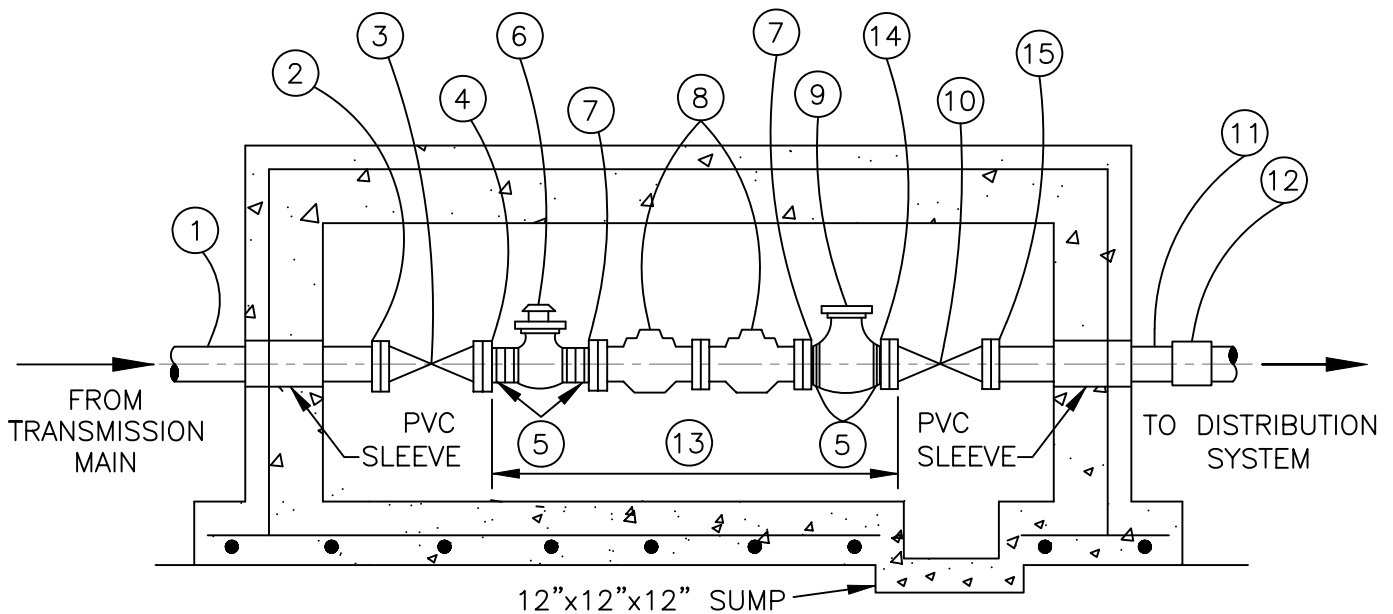
ELEVATION SECTION B-B

NOTES:

1. REBAR AS SHOWN ARE MINIMUM REQUIRED. APPLICABLE VAULTS TO BE DESIGNED BY OTHERS.
2. SOIL TO BE COMPACTED TO 95% DENSITY, AASHTO T-180 STANDARD.

SCALE 3/4"=1'-0"	<i>STANDARD MASTER METER VAULT</i>	STANDARD DETAIL DRAWING NO. <b>26</b> PAGE 2 OF 2
DATE 3/9/99		
REVISED KC 9/09		

*FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA*

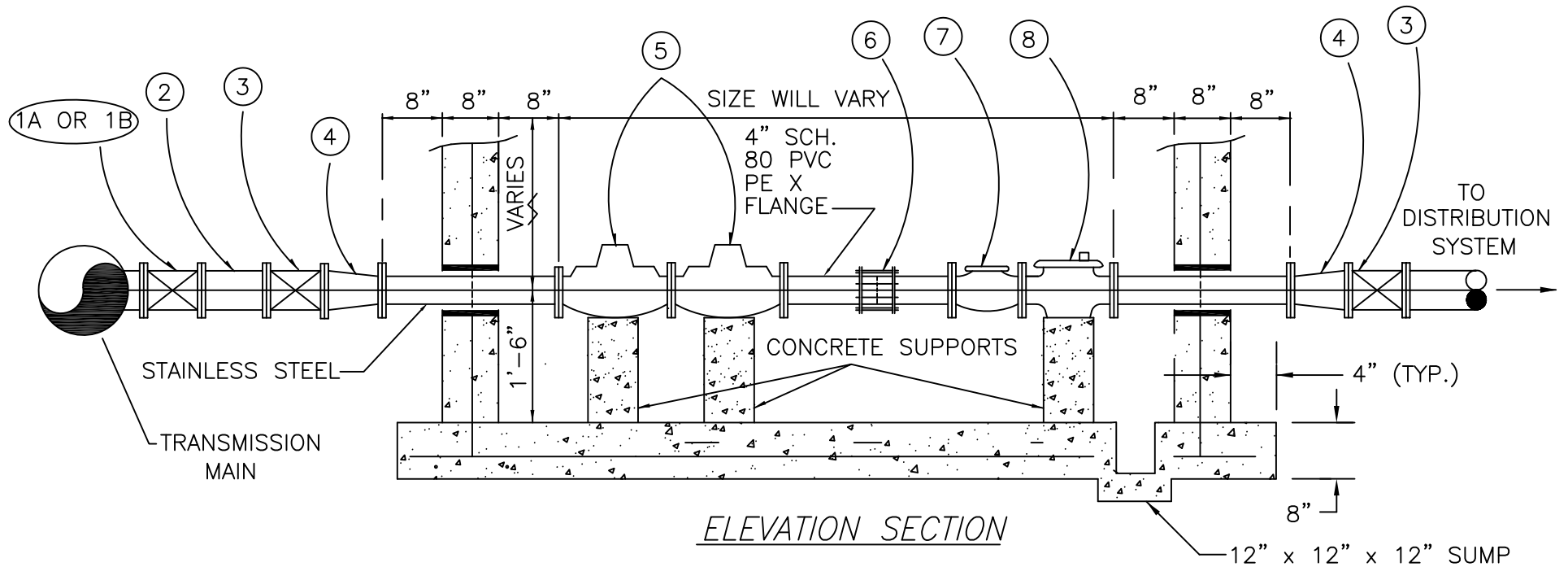


ELEVATION SECTION DETAIL

1. 3" STAINLESS STEEL, SCHEDULE 80 WELDED
2. 3" WELDED CLASS 150 FLANGE
3. 3" GATE VALVE, 125 PSI
4. 3" BLIND FLANGE, CLASS 125, TAPPED FOR 2" PIPE
5. 2" MNPT STAINLESS STEEL SHORT NIPPLE, SCHEDULE 80
6. WATTS 223 PRESSURE REDUCING VALVE
7. 2" BLIND FLANGE, CLASS 125, TAPPED FOR 2" PIPE
8. 2" AMES MODEL 910G PRESSURE REDUCING VALVES  
(2 EACH) (REFER TO FKA A CONSTRUCTION STANDARDS AND SPECIFICATIONS)
9. 2" WATER METER (SUPPLIED BY FKA A)
10. 3" GATE VALVE, 125 PSI
11. 3" STAINLESS STEEL, SCHEDULE 80 NIPPLE
12. 3" M.J.C.I. TRANSITION SLEEVE, AS REQUIRED
13. DISTANCE BETWEEN GATE VALVE FLANGES SHALL BE 58"
14. 3" BLIND FLANGE, CLASS 125, TAPPED FOR 2" PIPE
15. 3" BLIND FLANGE, CLASS 125, TAPPED FOR 3" PIPE
16. REFER TO STANDARD DETAIL DRAWING No. 26 FOR VAULT CONSTRUCTION.

SCALE N.T.S.	<i>2" TRANSMISSION MASTER METER PIPING</i>	STANDARD DETAIL DRAWING No.
DATE 3/96		27
REVISED KC 9/09		

*FLORIDA KEYS AQUEDUCT AUTHORITY  
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- 1A. "STEEL TRANSMISSION PIPE SIZE" WELD O-LET X MINIMUM 6" GATE VALVE(CLASS 125) & BOX
- 1B. "DUCTILE IRON TRANSMISSION PIPE SIZE" TAPPING SLEEVE X MINIMUM 6" GATE VALVE(CLASS 125) & BOX
- 2. 6" STAINLESS STEEL FLANGED SPOOL PIECE OR W/STAINLESS STEEL BENDS AS REQD(CLASS 125).
- 3. 6" GATE VALVE(CLASS 125) AND BOX
- 4. 6" X 4" REDUCER(CLASS 125)
- 5. 4" CAL-VAL (MODEL #90-01) W/STAINLESS STEEL TRIM PRESSURE REDUCING VALVES(CLASS 300)
- 6. 4" ROCKWELL DRESSER COUPLING #411-FUSION BONDED EPOXY & EPDM GASKETS
- 7. 4" NEPTUNE STRAINER(CLASS 125)
- 8. 4" NEPTUNE TURBO METER(CLASS 125)

REVISED 4/10	REVISED 2/11
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SCALE N.T.S.
DATE 3/96
REVISED 1/07

FLORIDA KEYS AQUEDUCT AUTHORITY  
KEY WEST, FLORIDA

4" & LARGER TRANSMISSION  
MASTER METER PIPING

STANDARD DETAIL  
DRAWING No.

28