

**City of Riverbank  
CONSTRUCTION STANDARDS  
WATER**

## **SECTION 5: DOMESTIC WATER FACILITIES**

**General:** Domestic water facilities shall be furnished and installed in accordance with these Construction Specifications and as shown on the plans.

**Payment:** Full compensation for furnishing all labor, materials, tools, equipment, excavating, backfilling, testing, disinfecting and flushing and for doing all work involved in installing the water system shown on the plans and as specified in these Construction Specifications shall be included in the appropriate contract item and no additional compensation will be allowed therefore.

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## **5.100 Materials**

### **5.101 Water Main Pipe**

Water main pipe 4" through 12" shall be either ductile iron pipe (DIP) conforming to the requirements of AWWA Standard C-151, Class 51 (4") or Class 50 (6" thru 12") with cement-mortar lining per AWWA C-104, and polyethylene encased per AWWA C-105, or polyvinyl chloride (PVC) pipe conforming to the requirements of AWWA Standard C-900, Cast Iron (CI) O.D. Class 150 (DR18) with elastomeric gasket (solvent weld is unacceptable). DIP shall have "Tyton" joints, "Tyseal" joints, or approved equal.

In addition to the above, the following requirements apply to all pipe joints:

- Solvent welded PVC is not allowed
- Mechanical joints are only allowed at fittings
- Cast-iron repair/adaptor couplings may be used where approved by the City Engineer
- Water service lines shall be per Section 5.103 of these specifications

### **5.102 Miscellaneous Fittings**

Pipe fittings shall conform to AWWA Standard C110, latest revision, and shall be of ductile iron, match the make of pipe used, and be as specified by the manufacturer for use with the pipe specified. Joints in fittings and adapters shall be of the type with a seal ring groove for positively holding the rubber gaskets in place against the water pressure and shall be similar to the specified joint for the pipe used.

All ductile iron fittings shall be coated outside and inside with a bituminous coating as per Section 10-3 of AWWA Standard C110, latest revision.

Flanged fittings are allowed, and shall be used where shown on the plans. Mechanical joint fittings are allowed provided the Contractor follows proper assembly procedures.

Not all pipe fittings required to do the work are shown on the plans. The Contractor shall furnish and install all fittings as necessary to accomplish grade and adjustment changes in conformance with the pipe manufacturer's recommendations and as approved by the Engineer.

### **5.103 Valves**

Valves 2" through 12" valves shall be resilient seated gate valves. Valves over 12" shall be butterfly valves. Resilient seated gate valves shall be Mueller RS, American Flow Control 2500, Clow RS or approved equal and shall conform to the requirements of AWWA Standard C509, latest revision.

Butterfly valves shall be MH 450, Mueller Linesal III, Clow 450 or approved equal and shall conform to the requirements of AWWA Standard C504, latest revision.

All valves shall open left (clockwise to close) and be equipped with a 2-inch AWWA operating nut. All valves shall be coated for buried service per AWWA Standards. All valves shall be Class 150 minimum.

Valves requiring operating wrenches exceeding 4 feet in length shall have extensions and guides as provided by the valve manufacturer installed in the valve riser.

The valve boxes shall be Christy G5 with cast iron cover and extensions and shall conform to City of Riverbank Standard Details. Cover shall have a free fit in the box. All valve boxes shall be adjusted to grade by the paving contractor as per the appropriate Standard Plan.

#### **5.104 Service Lines and Fittings**

Service lines and fittings shall be polyethylene CTS or copper for services 3 inches and smaller and ductile iron or polyethylene for services 4 inches and larger. All water services shall conform to the requirements shown on the appropriate Standard Details.

#### **5.105 Fire Hydrants**

Fire hydrants shall be furnished and installed in accordance with the Standard Details.

#### **5.106 Backflow Prevention Devices**

Backflow prevention devices including double detector checks and reduced pressure principle devices, shall be of a type approved by University of Southern California Foundation for Cross-Connection Control and Hydraulic Research Foundation (USC Foundation), and installed according to the manufacturer's specifications.

### **5.200 Installation**

Water main pipe shall be installed in accordance with the manufacturer's recommendations, City Standard Plans, these Special Provisions and the improvement plans.

#### **5.201 General Requirements:**

Water mains shall be installed with due regard for protection from sanitary hazards, including current spacing and crossing requirements of the California Administrative Code, Title 22. Minimum pipe cover shall be 3 feet.

Thrust blocking shall be installed per City Standard Details at all bends, tees, dead ends, and changes in pipe diameter. Thrust blocking shall be placed so that the joints of the pipe and fittings will be accessible for repair.

No piping shall be directly embedded in concrete. All pipe in concrete shall be wrapped in 20 mil visquine. All piping subject to corrosion shall be protected with 20 mil visquine over lap ends to be secured with compatible adhesive tape.

Trench width shall be 1.25 times the outside diameter of the pipe plus 12", or outside diameter of the pipe plus 16", whichever is greater.

The Contractor shall also take the necessary precautions to protect workers from asbestos fiber hazards. Reference is made to AWWA Manual M-16, "Work Practices for Asbestos-Cement Pipe." Use of any "non-recommended work practices" such as cutting any AC pipe with abrasive disc-dry tools is strictly forbidden.

Reference is made to AWWA Manual M23 "PVC Pipe - Design and Installation" and AWWA Standards C603 "Installation of Asbestos Cement Water Pipe", C600 "Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances", and C601 "Disinfecting Water Mains", and applicable California Department of Health Waterworks Standards.

The pipe must be kept exceptionally clean, and shall be protected from contamination during installation.

The City takes no responsibility for water quality downstream of temporary connections to the water system.

Hydrants installed but not in service shall be wrapped with burlap and wired and remain so until such time as the hydrants are in service. Holes may be cut in the burlap in order that the hydrant may be used for construction water.

#### **5.202 Inspection**

All water lines shall be inspected for proper installation by the City Engineer, prior to backfilling of trenches. If work is to be completed after normal business hours, Contractor shall call 209-869-3671 to arrange for an inspection to be made after normal business hours.

#### **5.203 Disinfection**

Refer to Section 5.302.5 "Disinfection Procedures"

#### **5.204 Connections to Existing Water Mains**

Under no circumstances shall anyone other than a representative of the City of Riverbank Public Works Department open or close any valve in the existing City water system. Requests for valve operation shall be made to the Engineer at least 48 hours in advance. In cases where customer service will be interrupted, the request shall be made at least 48 hours in advance and the Contractor shall make satisfactory preparation for the planned work to minimize the interruption. The procedure shall be reviewed and approved by the City prior to the start of construction.

#### **5.205 Connection Details**

Shall be made per the appropriate Standard Detail(s). The number and location of temporary connections with meter assembly shall be approved by the City Engineer.

Upon request, the City will open its valve to the new pipe after the mains and services have been installed and backfilled and thrust blocks have cured for 48 hours.

### **5.206 PVC Pipe**

Shall not be bent more than as recommended by the manufacturer. Joint deflections are not allowed. The Contractor shall take extra precautions to follow the pipe manufacturer's recommendations regarding rubber rings, fittings, tapping and installation practices.

### **5.300 Testing:**

Official test for acceptance shall normally be conducted after all backfill placed, and compacted as specified elsewhere in this specification has been completed.

#### **5.301 Pressure Test**

All piping shall be tested to a pressure of 150 pounds per square inch (psi). All material, equipment and labor for testing shall be approved by the City prior to testing and shall be furnished without cost to the City of Riverbank. The system will be tested as directed by the Engineer as a unit or in sections not to exceed 1,000 lineal feet. Each unit tested shall successfully meet the requirements herein specified. The water services shall be considered as part of the main for test purposes and no allowance for additional make-up water shall be made.

Unless otherwise directed by the Engineer, testing shall be accomplished by opening hydrants and service line cocks at the high points of the system and blowoffs at all dead ends. The valve controlling the admission of water into the section of pipe to be tested should be opened slowly and fully before closing the hydrants or blowoffs. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested shall be closed, and the line remain in this condition for a period of not less than 24 hours.

The pipe shall then be refilled, if necessary, and subjected to a maintained pressure of not less than 150 pounds per square inch (psi) for a period of one hour.

Allowable make-up water allowance shall not exceed a rate in gallons per hour per 1000' lineal feet of pipeline of 0.25 multiplied by the pipe diameter in inches. (gph per 1000' < 0.25 \* pipe dia).

All leaks that are found shall be immediately corrected and the system again subjected to the same test.

All repairs of any damage to the pipes and their appurtenances, or to any other structures, resulting from or caused by these tests, shall be performed by the Contractor as the Engineer may direct, all without cost to the City of Riverbank.

## 5.302 Bacteriological Test

### 5.302.1 Pipe Assembly Methods

All piping, valves, fittings, and appurtenances which become contaminated during installation shall be cleaned, rinsed with potable water, and then sprayed or swabbed with a 5% sodium hypochlorite disinfecting solution prior to installation, with City representative present. Pipes, fittings, valves, and all other components incorporated into connections with the City's existing system shall be spray disinfected or swabbed with a liquid chlorine solution in accordance with AWWA C651 and as specified herein.

### 5.302.2 Flushing Flowrates

Required Flow to Flush Pipelines

Pipe diameter (Inches)	Flow Required to Produce 3 ft. /sec Velocity minimum in Main* (GPM)
4	120
6	260
8	470
10	730
12	1060
16	1880

\*(40 psi Residual Pressure in Water Main)

### 5.302.3 Materials

#### A. SODIUM HYPOCHLORITE (LIQUID).

Sodium hypochlorite is available in liquid form in glass or plastic containers, ranging in size from 1 qt. to 5 Gal. The solution contains approximately 10% to 15% available chlorine.

#### B. GRANULAR HYPOCHLORITE

Granular hypochlorite may be used when mixed into a solution containing approximately 10% to 15% available chlorine. When using granular hypochlorite in solution, follow the procedure for sodium hypochlorite solution in this section.

### 5.302.4 Chlorination Methods

#### A. SODIUM HYPOCHLORITE SOLUTION (LIQUID)

Sodium hypochlorite solution 1% minimum shall be used for cleaning and swabbing piping and appurtenances immediately prior to installation and for disinfecting all components of connections to the City's existing system.

Sodium hypochlorite solution may be used for the initial disinfection of newly installed water mains. The solution shall be applied at a terminus of the system to be chlorinated using an injector which can adjust the amount of solution being injected into the piping system. The solution shall be injected at the appropriate concentration to achieve the specified concentration range of chlorine throughout the entire piping system. If the system is greater than 1000 feet in length, the contractor may use a secondary chlorine injection site (e.g. hydrant, etc.). Where pumping equipment is used in conjunction with an injector, an integral backflow prevention device shall be installed and connected to the potable water supply.

Pumping equipment, piping, appurtenances, and all other equipment in contact with potable water shall be disinfected prior to use. Water trucks shall not be used for disinfection of pipelines.

Sodium hypochlorite solution may also be used to increase the total chlorine residual if the concentration from the initial chlorination of the system is found to be low. The solution shall be added to the system in sufficient amounts at appropriate locations to ensure that the disinfecting solution is present at a concentration within the specified range (50 to 100 mg/L) throughout the piping system.

#### **5.302.5 Disinfection Procedures**

The pipeline shall be filled at a rate not to exceed 300 GPM or a velocity of 1 foot per second (156 GPM in an 8-inch pipe), whichever is less.

At a point not more than 10 feet downstream from the beginning of the new main, dose the water entering the new main with chlorine fed at a constant rate such that the water will have not less than 50 mg/L and no more than 100 mg/L free chlorine. Measure the chlorine concentration at regular intervals to ensure that this concentration is provided. Measure chlorine in accordance with the procedures described in the current edition of the AWWA Manual M12 or of Standard Methods for the Examination of Water and Wastewater or with a calibrated digital high range Colorimeter. Disinfection shall result in an initial total chlorine concentration of 50 ppm to 100 ppm. This concentration shall be evenly distributed throughout the system to be disinfected.

All valves shall be operated with the disinfection solution present in the pipeline. All appurtenances such as air-vacuum relief valves, blowoffs, hydrants, backflow prevention devices, and water service laterals shall be flushed with the treated water for a sufficient length of time to ensure a chlorine concentration within the specified range in all components of each appurtenance.

The Contractor will verify the presence of the disinfection solution throughout the system by sampling and testing for acceptable chlorine concentrations at the various appurtenances and/or at the test ports

provided by the Contractor. Areas of the system found to be below the specified chlorine concentration level shall receive additional flushing as noted above and/or additional disinfection solution, as necessary. All testing will be done in the presence of the City representative.

The chlorinated water shall be retained in the system for a minimum of 24 hours. The City representative will test the total chlorine residual by a calibrated digital high range Colorimeter. The system shall contain a total chlorine residual of not less than 80% of the initial total chlorine residual before the 24-hour soaking period began. If the total chlorine residual has decreased more than 20%, the system may be soaked for an additional 24-hour period as determined by the City representative. If the total chlorine residual has not decreased after this additional 24-hour period, as determined by a calibrated digital high range Colorimeter, the system shall be flushed in accordance with the procedure detailed herein. If the total chlorine residual has decreased, as determined by a calibrated digital high range Colorimeter, the system shall be flushed in accordance with the procedure detailed herein and shall be re-disinfected. Following a successful retention period as determined by the City representative, the chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by the City. The minimum water velocity during flushing shall be 3 feet per second or as directed by the City.

Flushing shall continue until the replacement water in the new system is equal in chlorine residual to the potable source of supply as verified by the City representative.

#### **5.302.6 Main Isolation**

Potable water may be supplied from a temporary backflow-protected connection to the existing distribution system or other supply approved sources. The cross-connection control device shall be consistent with the degree of hazard for backflow protection of the active distribution system. The flow shall be at a constant, measured rate into the newly installed water main. In the absence of a meter, approximate the rate by placing a Pitot gauge in the discharge or measuring the time to fill a container of known volume. The main should undergo hydrostatic pressure testing prior to disinfection.

#### **5.302.7 Wet or Flooded Trench Requirements**

Water mains under construction that become flooded by storm water, runoff, ground water, or any other sources shall be cleaned by draining and flushing with metered potable water until clear water is evident. Upon completion, the entire main shall be disinfected using a method approved by the City. Bacteriological sampling will also be taken at a minimum of 200 feet intervals. The number and location of sample sites and areas effected by wet trench disinfection shall be determined by the City.

### **5.302.8 Bacteriological Sampling**

- A. At the Contractor's expense, a testing firm will perform bacteriological sampling and testing of all new system installations. The set of samples will include: 24-hr post flush, 48-hr post flush, and 7-Day post flush. The testing methodology employed shall be in accordance with AWWA C651. The Certified Laboratory will analyze the samples for the presence of coliform bacteria, enumerating and confirming members of the coliform group.
- B. The evaluation criteria employed by the City for a passing test sample is as follows:
  - 1. Coliform bacteria: no positive sample

If the initial disinfection fails to produce satisfactory bacteriological test results, the pipeline system shall be re-flushed and re-sampled. If the second set of samples does not produce satisfactory results, the pipeline system shall be re-chlorinated, flushed, and re-sampled. The chlorination, flushing, and sampling procedure shall continue until satisfactory results are obtained. Upon the second failure of a bacteriological test the contractor shall meet with the City to evaluate failed testing and provide a plan to proceed. Upon the fourth failure of any bacteriological test the contractor shall submit a written plan to the City of further measures to clean pipes and mains that shall include one or more of the following, hydro jetting, pigging, water jetting, air scouring, test for leaks or any other method to physically clean installed mains. All costs associated with additional disinfection, sampling, and flush water will be the responsibility of the Contractor.

### **5.302.9 Back Flow Disinfection**

All backflow devices used to isolate installed mains from existing City Distribution system for chlorination or flushing shall be disinfected while under supervision of City Backflow Test Technician and then said backflow shall be tested by the City Backflow Test Technician.

### **5.302.10 Sampling Procedures**

Upon a successful disinfection, the installed mains shall be flushed until the residual chlorine is equal to that of source water (0.05mg/L maximum). Source water will then be Bacteriological sampled and tested to certify a baseline for successful testing to follow. A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required. No flushing or any movement of water in pipe is allowed during sampling phase. Following the 24-hour period, the Contractor shall have a City approved qualified testing firm take water samples for bacteriological tests. Following another 24 hours the City approved firm shall take additional water samples for bacteriological tests. Water samples for bacteriological tests will be taken again after 5 more days (120 hours), if any one of these tests results in a failure, then the installed mains will be flushed and disinfected again, and this process started again. All sampling

shall be done in the presence of the City representative. Contractor shall notify the City representative 48 hours in advance of sampling procedures. Such tests shall meet CDPH requirements for drinking water standards. The number and location of such samples will be as directed by the City; however, a minimum of one bacteriological test sample per 500 feet of main, one set from the end of each line, one set from each branch greater than one pipe length, and a minimum of 2 samples per day, per test section, are required. **One set of samples are required for two consecutive days, 24 hours apart then again after an additional 120 hours (5 Days). All samples, each day, must indicate absent for total coliform. Failure of any sample will require complete retesting, under these procedures, for seven consecutive days.** It is very important that all test results be submitted in writing to the City as soon as available. All sampling and laboratory testing shall be at the Contractor's expense. Original report of the test results shall be given directly to the City. Emailing the results to the City is preferable. It is the responsibility of the Contractor to accomplish this task. System connections cannot be scheduled until this report is submitted to the City. All results must be submitted to City Representative no later than three calendar days of sample date or risk resampling all samples. Upon successful completion of bacteriological testing, the pipeline will be accepted for use in the City potable water system; however, standard policy is to accept the water mains for use upon the City giving Notice of Acceptance of completed disinfection. No paving can be performed until disinfection complete and approval given by the City.

It is the sole responsibility of Contractor to construct a water main capable of passing the pressure and leakage test and to affect a disinfection of the water main. The fact that City provides inspection during the construction and testing of the water facilities and receives laboratory testing results does not relieve Contractor's responsibility in this regard.

It's the responsibility of Contractor to prevent the consumption of water for any and all uses from undisinfected mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the undisinfected main.

Contractor shall indemnify and save the City harmless from any suits, claims, or actions brought by any person or persons for, or on account of, any sickness or death sustained or arising out of the consumption of water from the main until final acceptance by the City. The Contractor shall not operate any gate valve on any existing main.

The Contractor shall pay all rental and deposit fees for hydrant backflow meter devices checked out from the City plus charges for water used.

#### **5.302.11 Weekend Work**

All weekend work is subject to City approval and any request must be made 48 hours in advance and must include a description of all work to be

performed to be considered. In the event it is approved it will be the responsibility of the contractor to pay for all overtime for City staff involved with this work.

#### **5.302.12 Failed Test Requirements**

- If chlorine residual drops more than 20% at initial disinfection it will be at the Cities determination that the contractor will be required to flush and disinfect again before continuing with further testing.
- After any failed bacteriological test requires contractor to flush and repeat disinfection.
- At any time, the City can require a Heterotrophic Plate Count test at the cost of the contractor.
- Upon second failed bacteriological test contractor shall meet with the City to evaluate failed testing and provide a plan to proceed with approval of the City.
- Fourth failed bacteriological test contractor shall submit a written plan to the City for approval of further measures to clean pipes and mains that shall include one or more of the following: hydro jetting, pigging, water jetting, air scouring or any other method to physically clean installed mains.

#### **5.303 Final Connections to Existing Mains**

After notification of passing bacteriological tests, the connections to the existing mains shall be completed by the Contractor per Standard Plan 514. Requests for City valve operation shall be made per these specifications.

Removal of the meter assembly and replacement with the flanged spool shall be accomplished in a sanitary manner in the presence of City representative. The nearest valves on the newly installed main shall be closed to minimize the amount of water that will enter the excavation. No water shall be allowed to reenter the main.

As each connection is made, the main shall be flushed such that the flow is away from the existing water system. Each connection shall be flushed in this manner until the entire new water system is flushed, all under the direction of the Engineer. Burlap wrapping shall be removed from all hydrants. At this point, the City will take over operation of the water system. The contractor will be responsible for the cost of repairing any damage to the system until acceptance by the City Council.

#### **5.304 Backflow Certification**

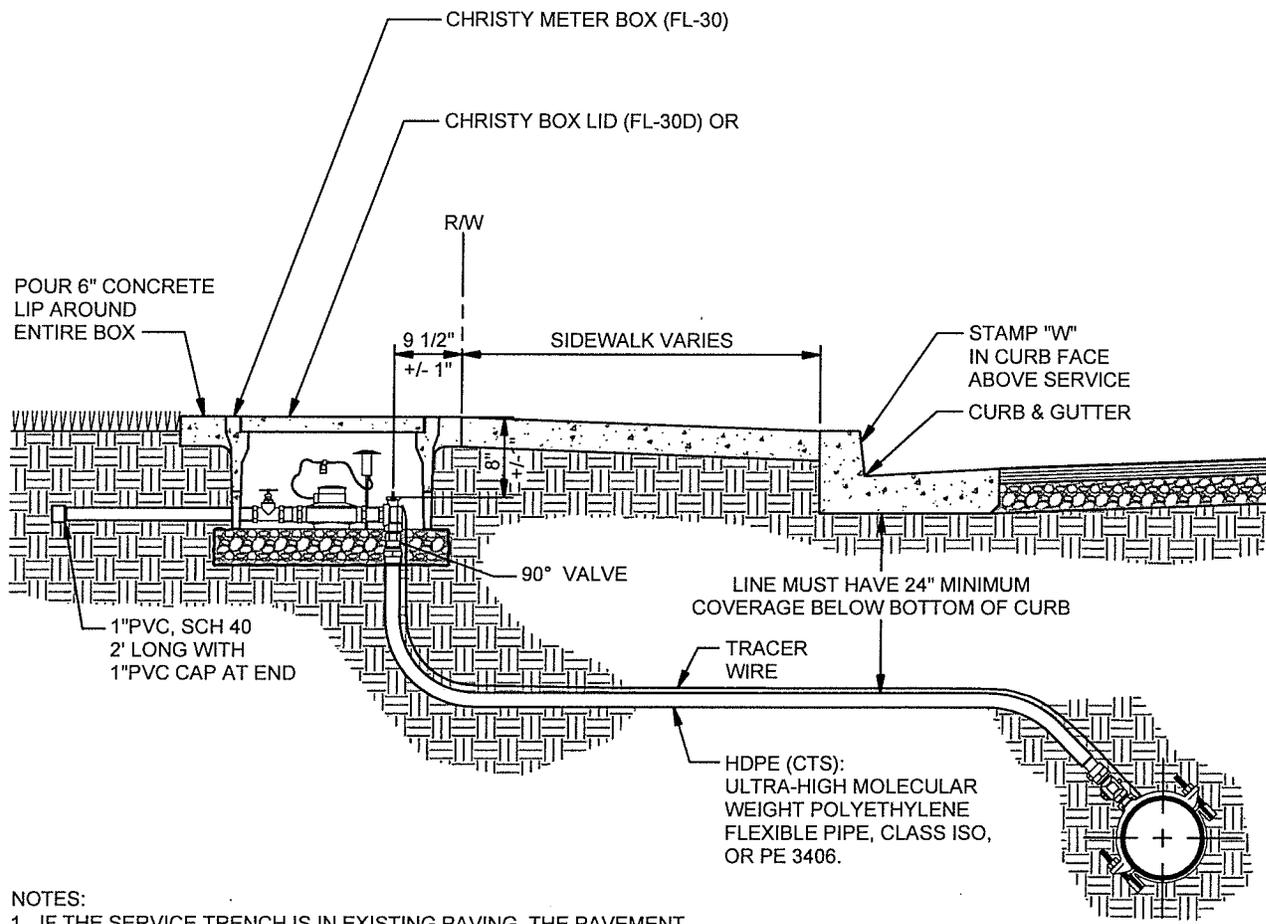
All backflow prevention devices installed shall be certified and tested in accordance with current regulations of the California-Nevada Section of the American Water Works Association (AWWA). Certification shall be provided to

the City Public Works Department prior to acceptance of new backflow prevention devices.

In addition, the location of any backflow prevention device shall be field verified with the City Public Works Department, or their appointed representative, prior to installation.

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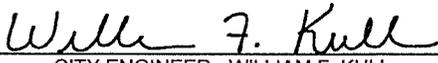
<b>Drawing No.</b>	<b>Description</b>
501	1" Water Service Residential
502	1" Water Service Residential (Detail)
503	1" Water Service Meter Box Location
504	1" Water and Fire Service Residential
505	2" Water Service
506	Water Service 4" and Larger
507	Fire Service Double Detector Check Valve
508	Fire Service Double Detector Check Valve with P.I.V. and F.D.C.
509	Fire Service Double Detector Check Valve with F.D.C.
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512	Reduced Pressure Principle Backflow Prevention Assembly 1" to 2 1/2" Size
513	Reduced Pressure Principle Backflow Prevention Assembly for 3" & Larger
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532	Restrained Joints Bends
533	Restrained Joints Reducers and Ends



**NOTES:**

1. IF THE SERVICE TRENCH IS IN EXISTING PAVING, THE PAVEMENT SHALL BE REPLACED AS PER SPECIFICATIONS FOR MAIN LINE TRENCH.
2. CONTRACTOR/OWNER SHALL BE RESPONSIBLE FOR DAMAGE TO THE CURB, GUTTER AND SIDEWALK, INCLUDING DRAINAGE FROM SETTING THE TRENCH, IF THEY ARE INSTALLED PRIOR TO TRENCHING.
3. CURB, GUTTER AND SIDEWALK TO BE INSTALLED AFTER WATER SERVICE INSTALLATION, UNLESS OTHERWISE NOTED.
4. SERVICE LINE SHALL BE A MINIMUM OF 24" BELOW BOTTOM OF CURB.
5. ALL FITTINGS TO BE BRASS.

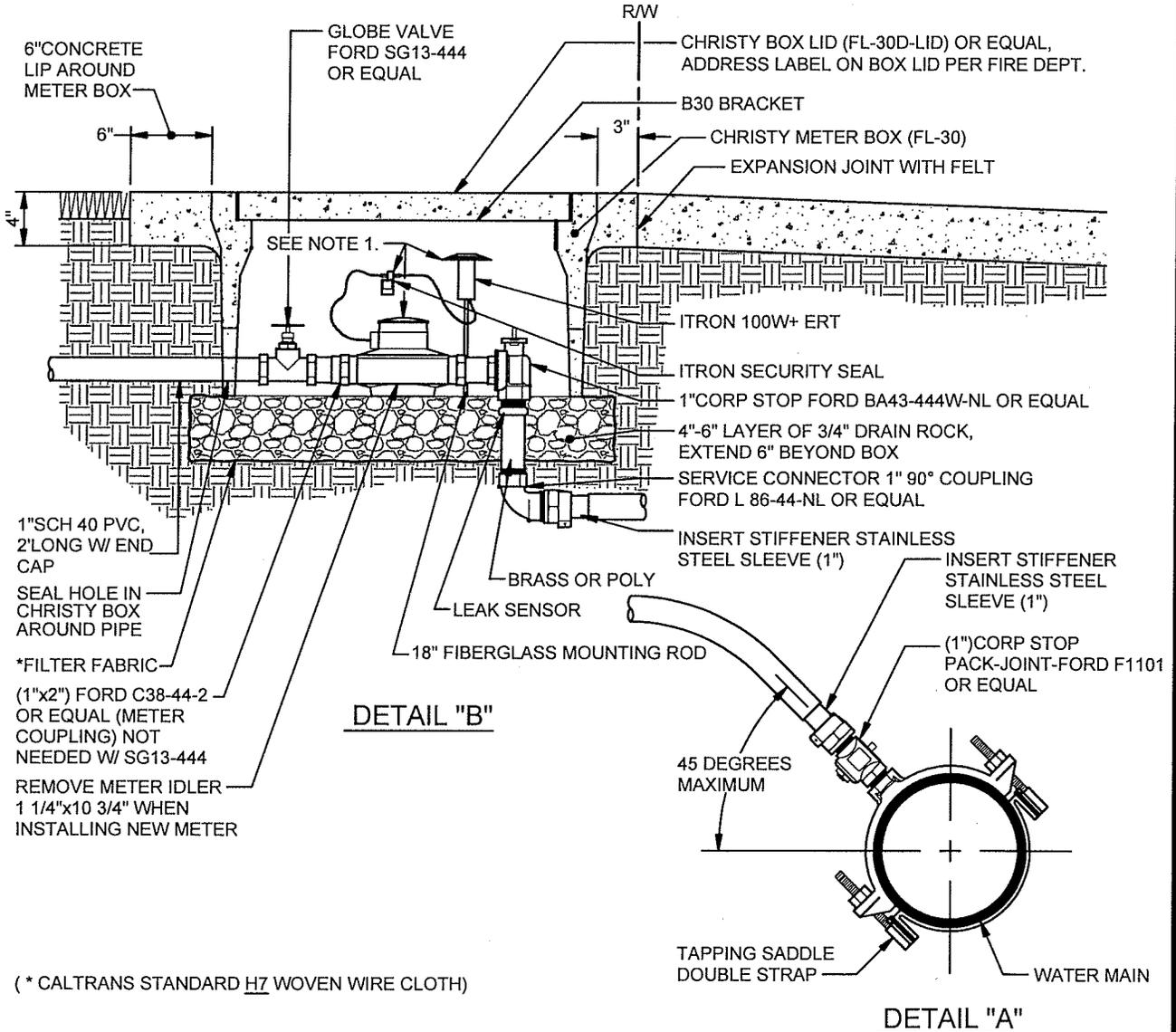
REFER TO (STD 502)

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>NEW 1" WATER SERVICE</b>  <b>RESIDENTIAL</b>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 2/2/18	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 501.DWG	2-13-18	501

VENDOR:  
 CONTACT THE WATER SUPERVISOR  
 FOR VENDOR INFORMATION:  
 CITY OF RIVERBANK  
 6707 THIRD ST (MAILING)  
 2901 HIGH ST  
 RIVERBANK, CA 95367  
 PHONE (209)869-7128

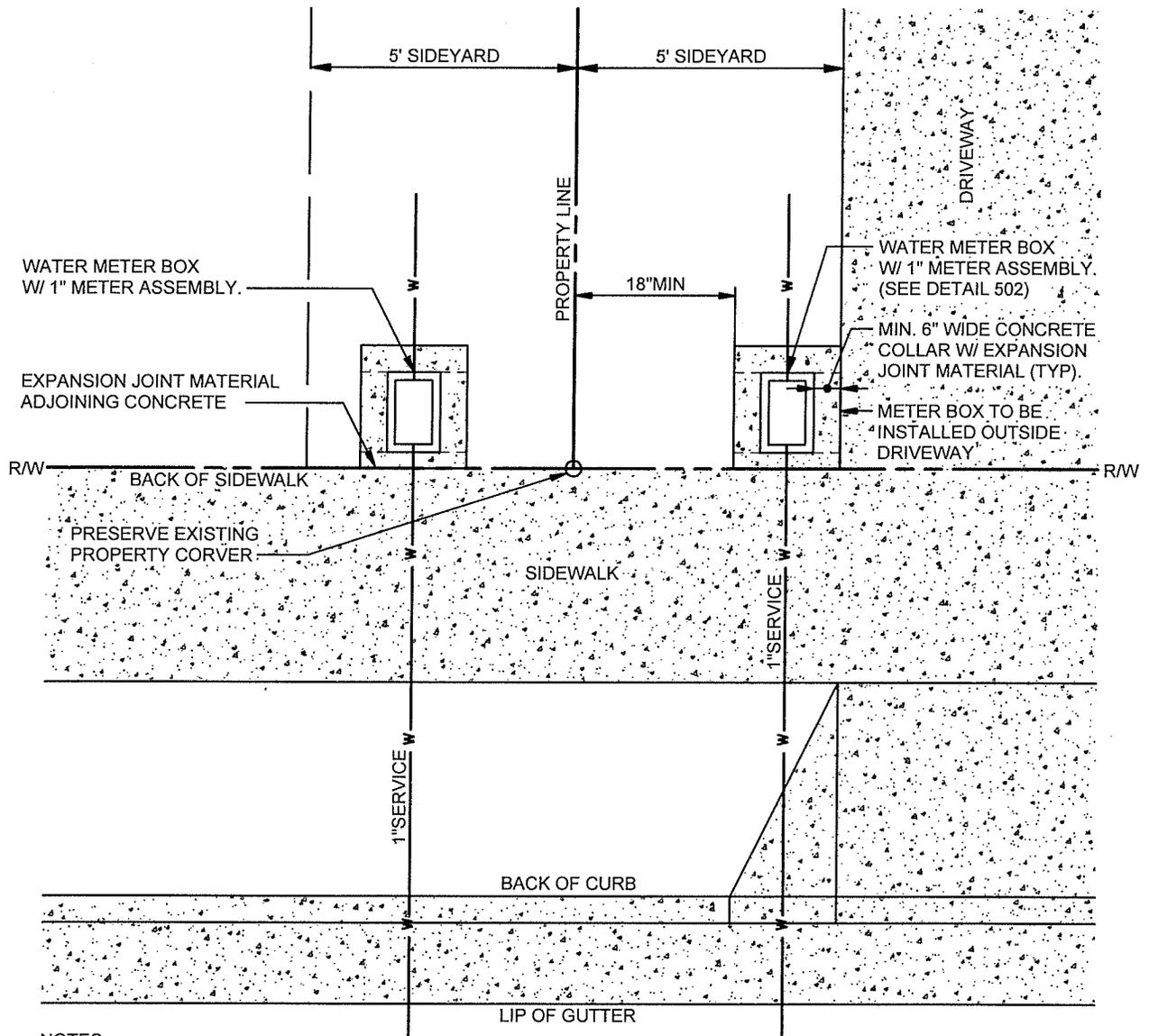
- NOTES:
1. CONTRACTOR/OWNER TO FURNISH AND INSTALL NEW 1" WATER METER, SENDING UNIT, BRACKET AND SECURITY SEAL PER METER INSTALLATION MANUALS. REFER TO ATTACHED DETAILS.
  2. CITY TO INSPECT INSTALLATION OF METER SENDING UNIT AND LEAK SENSOR, VERIFY METER NUMBER TO HOUSE ADDRESS PRIOR TO HOUSE OCCUPANCY.
  3. CONTRACTOR TO TAKE SPECIAL CARE AS NOT TO CROSS THREAD BRASS FITTINGS ONTO PLASTIC METER. THIS WILL DAMAGE THE METER. PLEASE CONTACT THE PUBLIC WORKS DEPARTMENT AT (209)869-7128, IF YOU HAVE ANY INSTALLATION QUESTIONS.

METER INFORMATION:  
 1"BADGER METER MODEL 55  
 BRONZE DISK METER  
 HR-E 8 DIAL REGISTER WITH ILC  
 ITRON 100W+ ERT  
 ITRON LEAK SENSOR+ METERED IN GALLONS



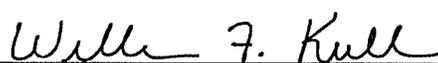
(\* CALTRANS STANDARD HZ WOVEN WIRE CLOTH)

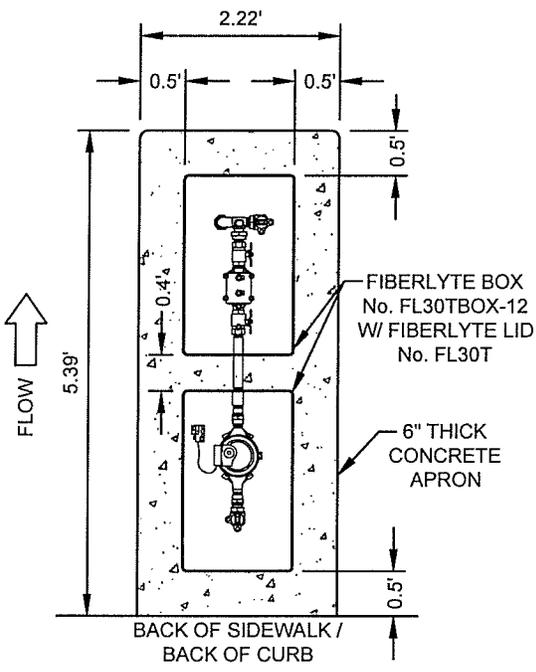
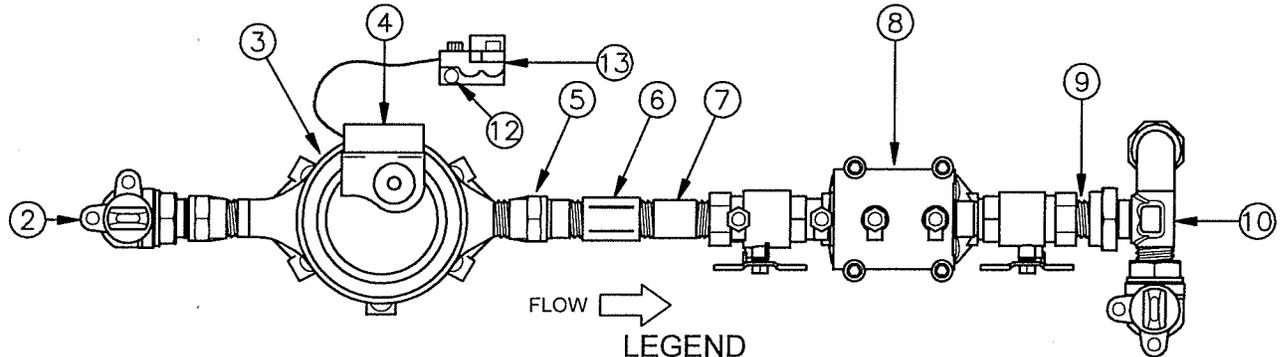
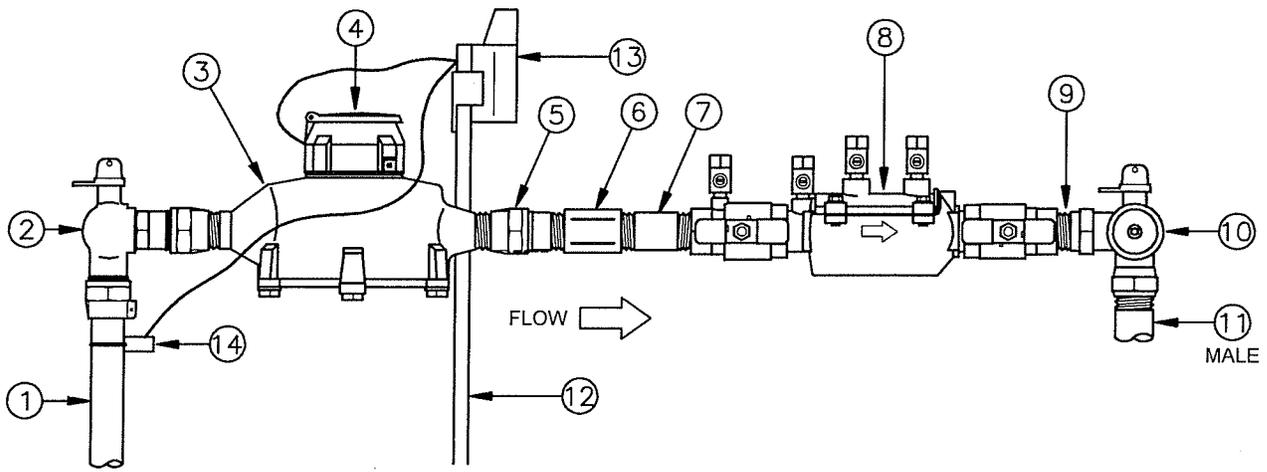
CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS			NEW 1" WATER SERVICE RESIDENTIAL	
 CITY ENGINEER - WILLIAM F. KULL			ADOPTED BY THE CITY COUNCIL:	
DRAWN BY: GK	DATE: 1/30/18	SCALE: NTS	2-13-18	
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 502.DWG	DRAWING NO. 502	



**NOTES:**

1. THE PREFERRED LOCATION FOR THE NEW RESIDENTIAL WATER SERVICE IS 18" TO 5 FEET OFF THE PROPERTY CORNER AND ON THE OPPOSITE SIDE OF THE LOT FROM JOINT TRENCH SERVICES (CABLE, GAS, ELECTRIC, PHONE, AND SEWER). HOWEVER, THIS STANDARD LOCATION MAY BE SHIFTED FURTHER FROM THE PROPERTY LINE AS NECESSARY TO AVOID CONFLICTS WITH OTHER UTILITIES.
2. IN NO CASE SHALL A WATER SERVICE BOX BE LOCATED WITHIN DRIVEWAY, OR WITHIN OTHER AREAS OF ONSITE CONCRETE (i.e. SLABS, SIDEWALKS, DECORATIVE). EXCEPTIONS TO THIS RULE WILL BE GRANTED ONLY WHEN IT IS NOT PRACTICAL OR FEASIBLE TO KEEP THE SERVICE BOX OUT OF THE DRIVEWAY, AND SHALL REQUIRE SPECIFIC APPROVAL BY THE CITY ENGINEER. SERVICES WITHIN DRIVEWAYS, IF ALLOWED, WILL REQUIRE A TRAFFIC RATED BOX AND CAST IRON LID.
3. THE CONTRACTOR IS TO PRESERVE ALL PROPERTY CORNERS. DAMAGED OR REMOVED CORNERS WILL REQUIRE REPLACEMENT BY A LICENSED LAND SURVEYOR, AT THE CONTRACTOR'S EXPENSE.

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>1" WATER SERVICE</b> <b>METER BOX LOCATION</b>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 503.DWG	2-13-18	503

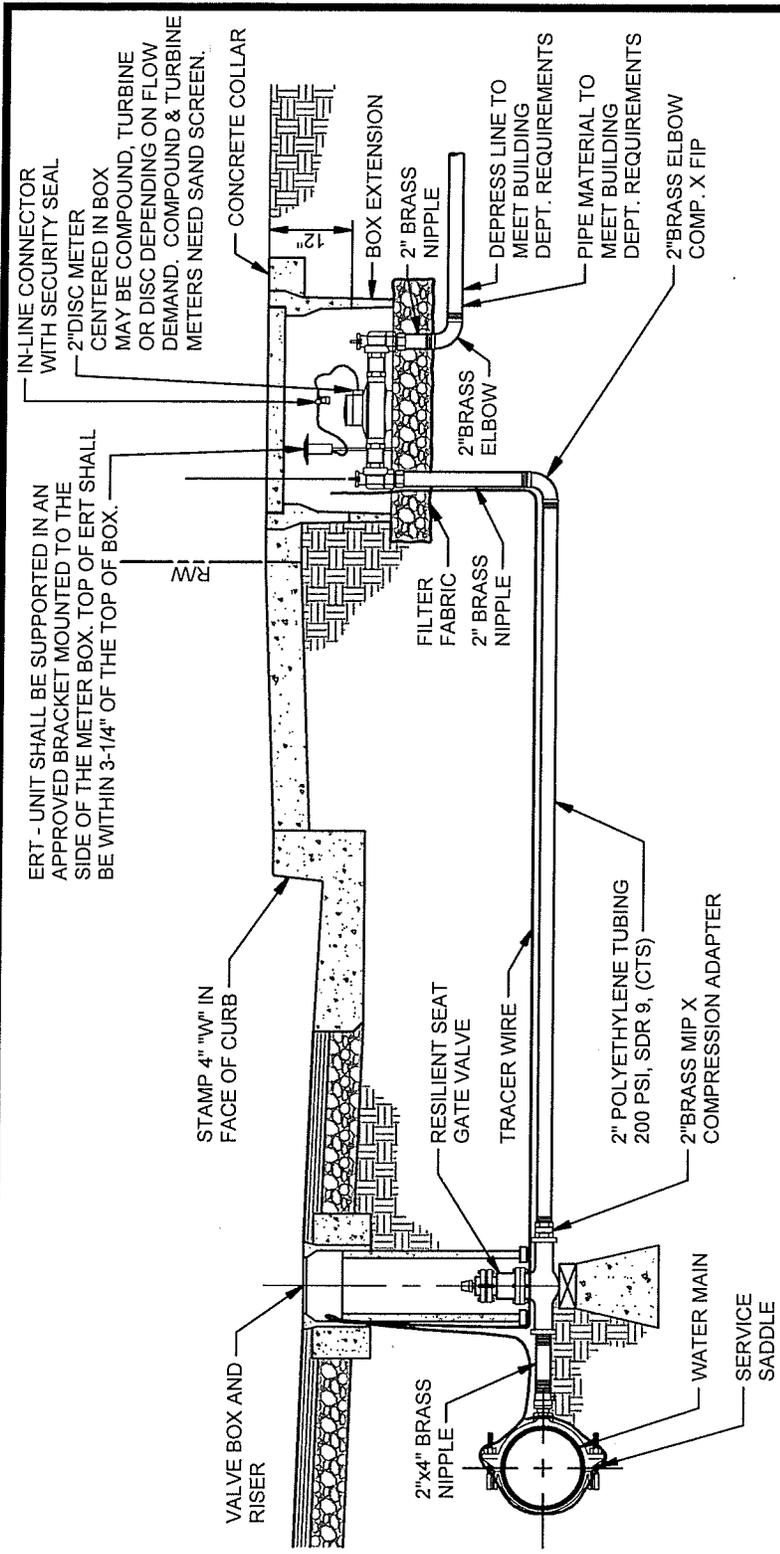


**LEGEND**

- 1 1" CTS(POLY PIPE) SUPPLY LINE FROM WATER MAIN.
- 2 FORD 1" ANGLE BALL VALVE - MODEL BA43-444W-NL.
- 3 BADGER METER - MODEL 55, 1" RECORDALL COLD WATER BRONZE DISC METER WITH BRASS BOTTOM.
- 4 BADGER METER - HR-E 8 DIAL ENCODER REGISTER WITH ITRON IN-LINE CONNECTOR, GALLONS.
- 5 FORD METER COUPLING - MODEL C38-44-2-NL.
- 6 1" BRASS COUPLING
- 7 1" SCH-80 PVC NIPPLE (ADJUST LENGTH TO SPAN SERVICE BETWEEN TWO FIBERLYTE BOXES)
- 8 WILKINS - DOUBLE CHECK VALVE ASSEMBLY - MODEL 950XLT2 OR 350XLT2.
- 9 1" THREADED BRASS NIPPLE.
- 10 FORD ELL TEE FOR FIRESETTER, 1"IN X 1"OUTLETS - MODEL LTBA 113-444W-AWT-NL, OR EQUIVALENT.
- 11 (2)1" SCH-40 SUPPLY LINES TO RESIDENCE - WATER SERVICE AND FIRE SERVICE, OR EQUIVALENT.
- 12 18" FIBERGLASS MOUNTING ROD.
- 13 ITRON 100W+ ERT@ COMMUNICATION MODULE, SHOULD BE MOUNTED ABOUT 2" BELOW FIBERLYTE, FL-30D LID.
- 14 ITRON LEAK SENSOR+

NOTE: WATER & FIRE SERVICE ASSEMBLY TO BE SET WITHIN TWO FIBERLYTE BOXES - No. FL30TBOX-12, WITH FIBERLYTE LIDS No. FL30T. BOXES TO BE INSTALLED IN LINE AND ALLOW ACCESS TO ALL VALVES. BLOCK BELOW BOX CUTOUTS WITH PRESSURE TREATED 2x's.

<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>NEW 1" WATER &amp; FIRE SERVICE - RESIDENTIAL</b></p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>			<p>ADOPTED BY CITY COUNCIL</p>	
<p>DRAWN BY: GK</p>	<p>DATE: 12/6/17</p>	<p>SCALE: NTS</p>	<p>DRAWING NO. <b>504</b></p>	
<p>REVISIONS: NONE</p>	<p>SECTION: WATER</p>	<p>DRAWING NAME: 504.DWG</p>	<p><b>2-13-18</b></p>	



**NOTES:**

1. ALL COMPRESSION FITTINGS SHALL HAVE STAINLESS STEEL INSERTS.
2. METER SHALL BE FURNISHED AND SET BY CONTRACTOR. PROVIDE ERT AND TRANSMITTING REGISTER WITH 5' LEAD.
3. SERVICE LATERAL AND BUILDING SUPPLY LINE SHALL BE INSTALLED UNDER BOX.
4. EXTEND BUILDING SERVICE LINE TO A MINIMUM OF EITHER 2' BEYOND BACK OF METER BOX OR 2' BEYOND BACK OF SIDEWALK AND CAP.
5. REFER TO CITY WATER STANDARDS FOR CONSTRUCTION STANDARDS, SPECIFICATIONS AND ENGINEERS LIST OF APPROVED MATERIALS.
6. NO FENCING SHALL BE INSTALLED BETWEEN STREET AND METER BOX.
7. DISTANCE BETWEEN BOX ENDS AND ANGLE BALL METER VALVES TO BE EQUAL.
8. CONNECT SERVICE TRACER WIRE TO THE TRACER WIRE ON THE MAIN. IN ABSENCE OF MAIN TRACER WIRE, WRAP SERVICE TRACER WIRE AROUND THE MAIN. RUN CONTINUOUS FROM MAIN TO METER BOX WITH LOOPS INTO EACH VALVE BOX.

METER INFORMATION:  
 FOR METER INFORMATION CONTACT NATIONAL  
 METER AND AUTOMATION INC.

**CITY OF RIVERBANK**  
 DEPARTMENT OF PUBLIC WORKS

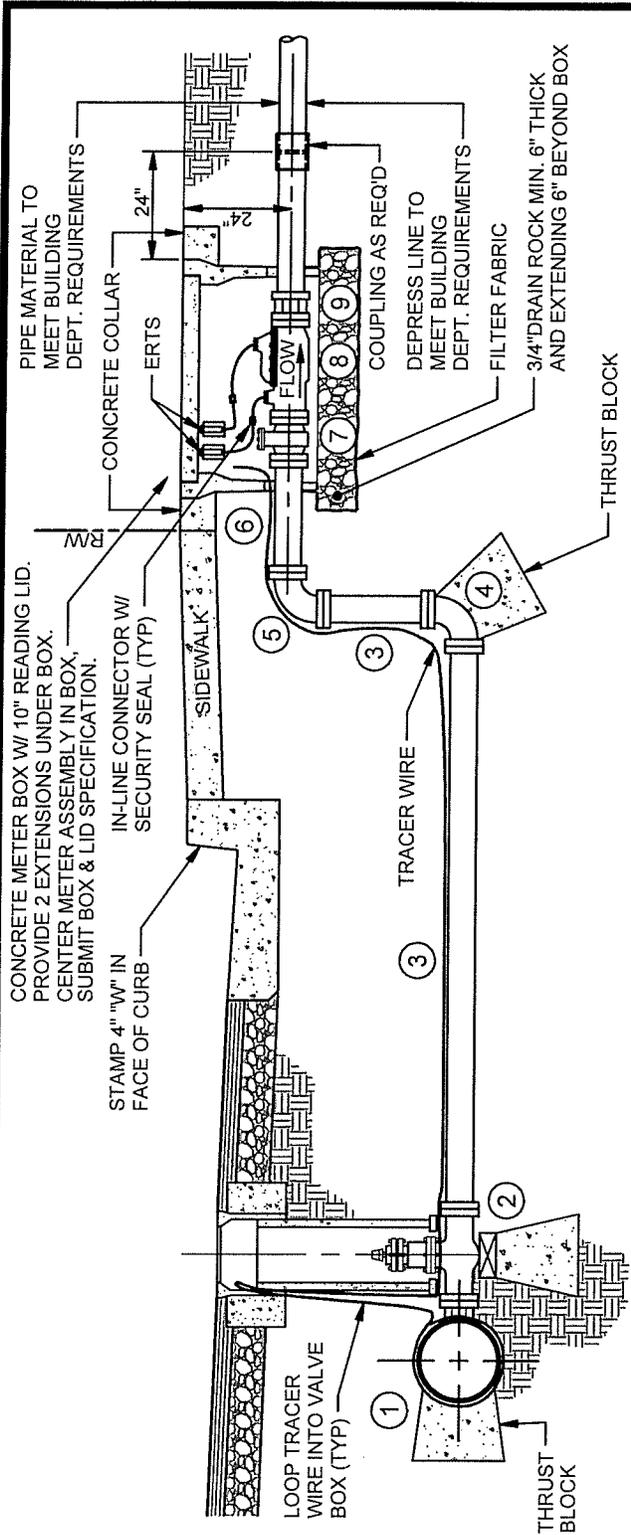
*William F. Kull*  
 CITY ENGINEER - WILLIAM F. KULL

**2" WATER SERVICE**

DRAWN BY: GK	DATE: 1/30/18	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 505.DWG

ADOPTED BY THE CITY COUNCIL:  
**2-13-18**

DRAWING NO.  
**505**



**NOTES:**

1. SET METER BOX FLUSH WITH FINISHED SURFACE.
2. METER ASSEMBLY SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR. PROVIDE ERTS AND TRANSMITTING REGISTERS WITH 5 FT. LEADS.
3. REFER TO CITY STANDARD 515 FOR GATE VALVE INSTALLATION DETAILS. VALVES MAY BE INSTALLED IN SIDEWALK WHERE SPACE LIMITATIONS EXIST.
4. REFER TO CITY WATER STANDARDS FOR CONSTRUCTION STANDARDS, SPECIFICATIONS AND ENGINEER'S LIST OF APPROVED MATERIALS.
5. PIPE OPENINGS IN METER BOX SHALL BE CUT - DO NOT USE HAMMER. PRIOR TO BACKFILLING, PIPE OPENINGS AND BOX JOINTS SHALL BE GROUTED.
6. CONNECT SERVICE TRACER WIRE TO THE TRACER WIRE ON THE MAIN. IN ABSENCE OF MAIN TRACER WIRE, WRAP SERVICE TRACER WIRE AROUND THE MAIN. RUN CONTINUOUS FROM MAIN TO METER BOX WITH LOOPS INTO EACH VALVE BOX.
7. ERTS TO BE MOUNTED IN APPROVED BRACKET ATTACHED TO BOX WITH STAINLESS STEEL ANCHORS. THE TOP OF ERTS SHALL BE NO MORE THAN 3-1/4" BELOW TOP OF BOX.
8. NO FENCING SHALL BE INSTALLED BETWEEN STREET AND METER BOX.
9. ALL METER ASSEMBLIES SHALL BE BADGER MODEL FSA-01.

METER INFORMATION:  
FOR METER INFORMATION CONTACT NATIONAL  
METER AND AUTOMATION INC.

NO	ITEM DESCRIPTION
①	TEE OR TAPPING TEE WITH FLANGED OUTLET
②	GATE VALVE, FLG X MJ
③	DIP, PVC (LENGTH AS REQUIRED, INTERMEDIATE JOINTS RESTRAINED)
④	90° ELL, MJ W/ MEGA-LUG RETAINER GLANDS
⑤	90° ELL, MJ W/ MEGA-LUG RETAINER GLAND X FLG
⑥	DIP SPOOL, FLG (24" MIN. LENGTH)
⑦	PLATE STRAINER
⑧	COMPOUND METER W/ 2 TRANSMITTING REGISTERS AND 2 ERTS
⑨	FLANGED COUPLER ADAPTER

**CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS**

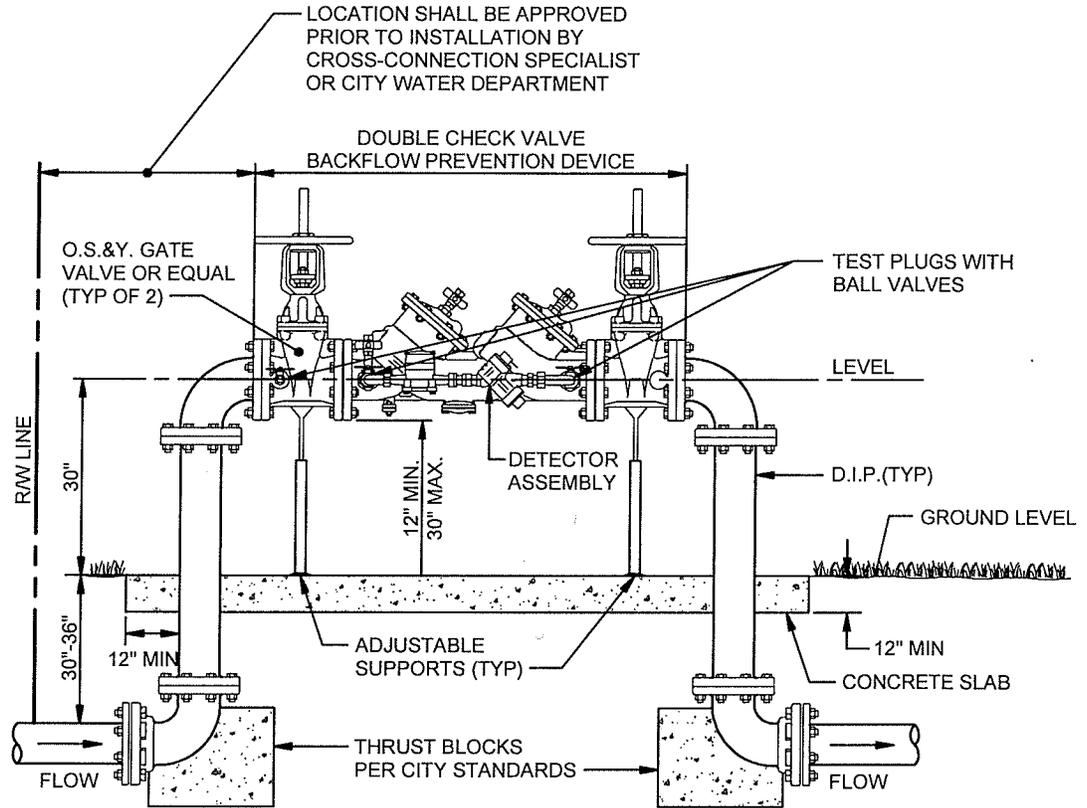
*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

**WATER SERVICE  
4" AND LARGER**

DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 506.DWG

ADOPTED BY THE CITY COUNCIL:  
**2-13-18**

DRAWING NO.  
**506**



**FIRE SERVICE-DOUBLE CHECK DETECTOR ASSEMBLY**

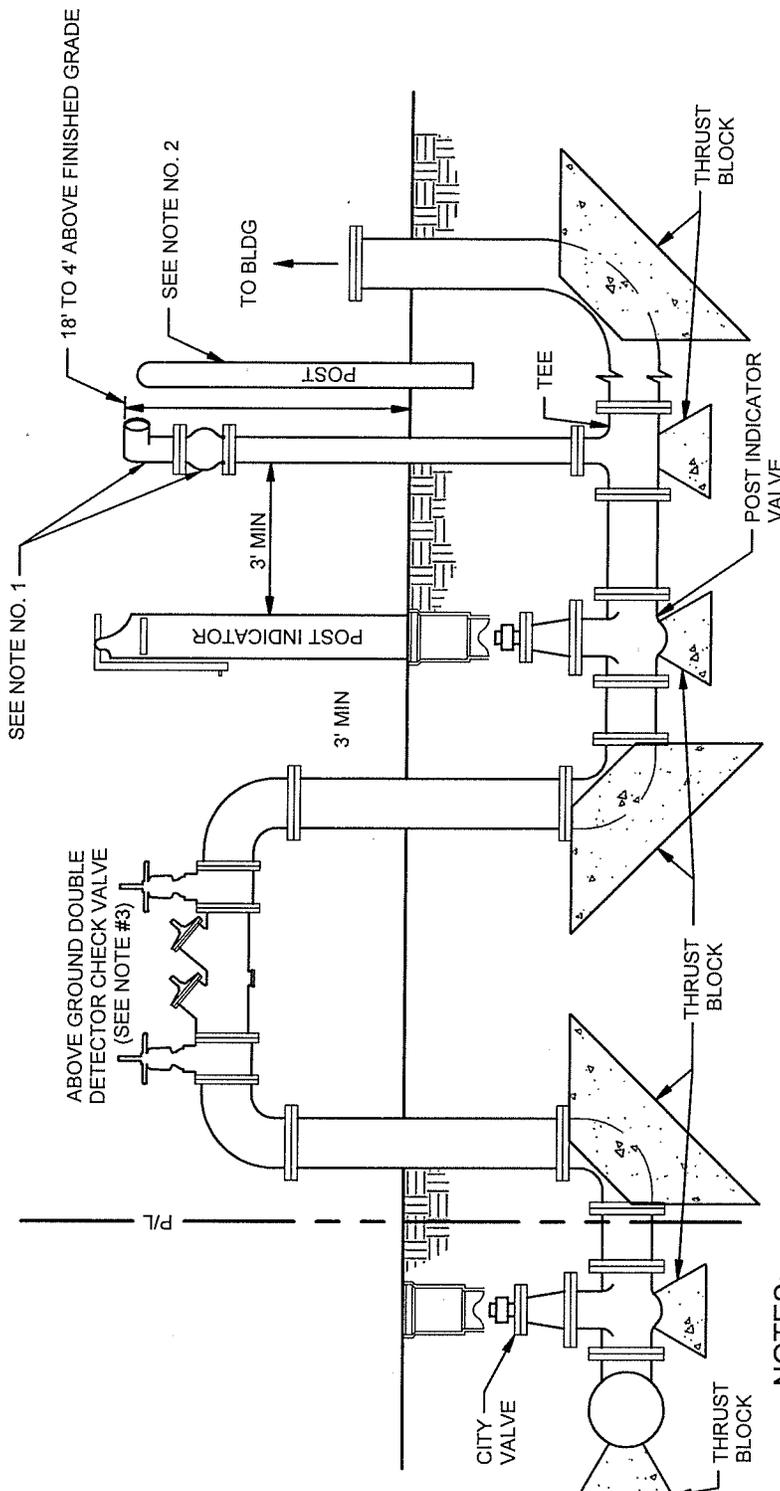
**NOTES:**

1. REQUIRED BY TITLE 17 OF THE CALIF. DEPT OF HEALTH SERVICES, MODEL OF BACKFLOW DEVICE TO BE DETERMINED FOR EACH INSTALLATION DEPENDING ON THE TYPE OF HAZARD AND UPON ALLOWABLE HEAD LOSS.
2. BARRIER POST SHALL BE LOCATED TO PROTECT PIPING AND VALVES. CURB AND PARKING BARRIERS CAN BE CONSIDERED PROTECTION IF EFFECTIVELY LOCATED.
3. DEVICE SHALL BE ACCESSIBLE FOR TESTING AND MAINTENANCE.
4. CERTIFICATION REQUIRED PRIOR TO ACCEPTANCE.
5. ALL DESIGN PLANS ARE TO BE SUBMITTED TO THE CROSS-CONNECTION SPECIALIST FOR APPROVAL AND A CROSS CONNECTION SURVEY IS TO COMPLETED TO EVALUATE HAZARDS THAT POSSIBLY EXIST.
6. ELECTRONICALLY MONITORED TAMPER SWITCHES ARE REQUIRED IN ACCORDANCE WITH NFPA72.

**MATERIALS:**

1. ALL STEEL PIPE SHALL BE AS PER AWWA C-200 WITH 1/4" WALL COATED AND LINED BY FUSION BONDED EPOXY AS PER AWWA C-213, 20 MILS MINIMUM
2. ALL STEEL FLANGES SHALL BE CLASS D AS PER AWWA C-207
3. ALL DUCTILE IRON FITTINGS SHALL MEET AWWA C-153 CLASS 150. THE INTERIOR SHALL BE MORTAR LINED AS PER AWWA C-104 AND BELOW GROUND EXTERIOR SHALL HAVE A COAL TAR COATING AS PER AWWA C-203.
4. ALL NUTS AND BOLTS BELOW GROUND SHALL BE POLYETHYLENE ENCASED AS PER AWWA C-105 AND TAPE WRAPPED AS PER AWWA C-209. 20 MILS MINIMUM IN BOTH CASES.
5. STEEL CAGE & BLANKET REQUIRED.

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>FIRE SERVICE DOUBLE          DETECTOR CHECK VALVE</b>	
CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 12/6/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 507.DWG	<b>2-13-18</b>	<b>507</b>



**NOTES:**

1. LISTED AND APPROVED FIRE DEPT. CONNECTION WITH CHECK VALVE PER CITY OF RIVERBANK FIRE DEPT. REQUIREMENTS.
2. GUARD POSTS AS REQUIRED.
3. DOUBLE CHECK VALVE WITH VALVES DETERMINED BY FIRE SPRINKLER DESIGNER WITH APPROVAL BY THE CITY CROSS CONNECTION SPECIALIST. ALSO REQUIRED FOR FIRE HYDRANTS ON PRIVATE PROPERTY.
4. CLASS 3-6 FIRE SPRINKLER SYSTEMS SHALL REQUIRE A REDUCED PRESSURE DEVICE.
5. CLASS 200, C-900 PIPE.
5. BLANKET AND CAGE REQUIRED ON ALL INSTALLATIONS

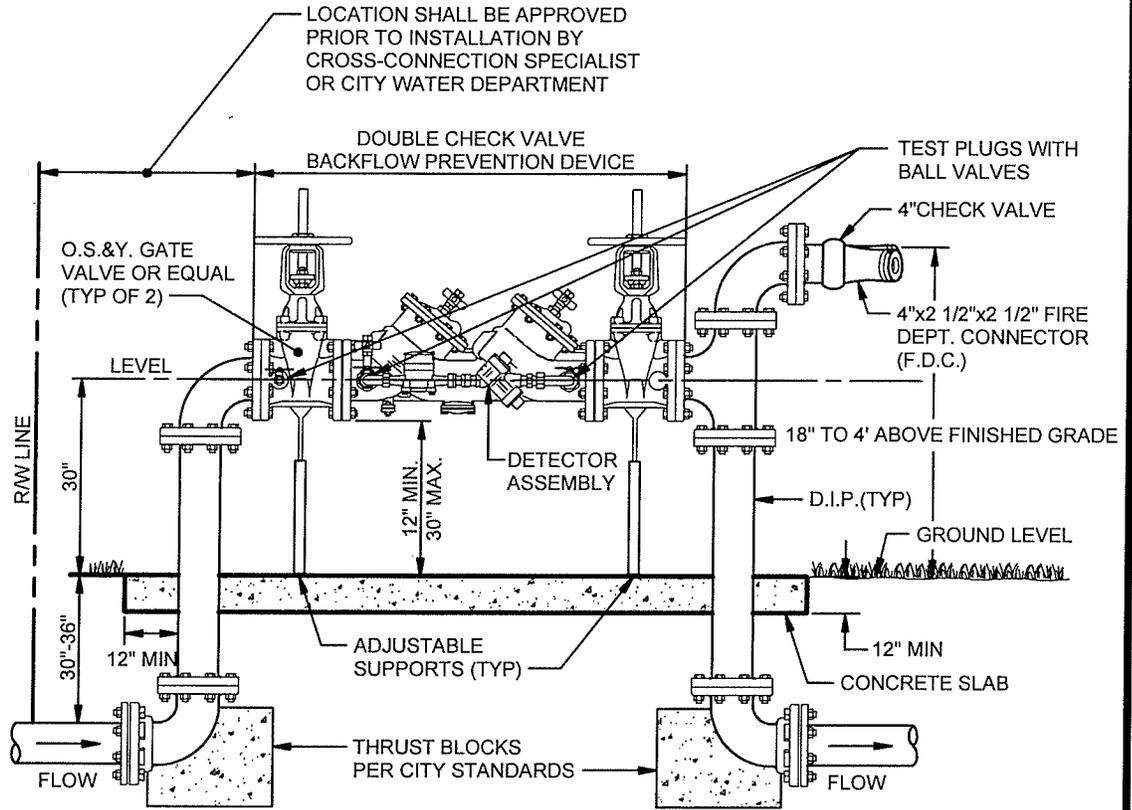
CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

FIRE SERVICE DOUBLE  
DETECTOR CHECK VALVE  
WITH P.I.V. AND F.D.C.

DRAWN BY: GK	DATE: 1/30/18	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 508.DWG

ADOPTED BY THE CITY COUNCIL:  2-13-18	DRAWING NO.  508
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**FIRE SERVICE-DOUBLE DETECTOR CHECK VALVE  
WITH FIRE DEPARTMENT CONNECTION**

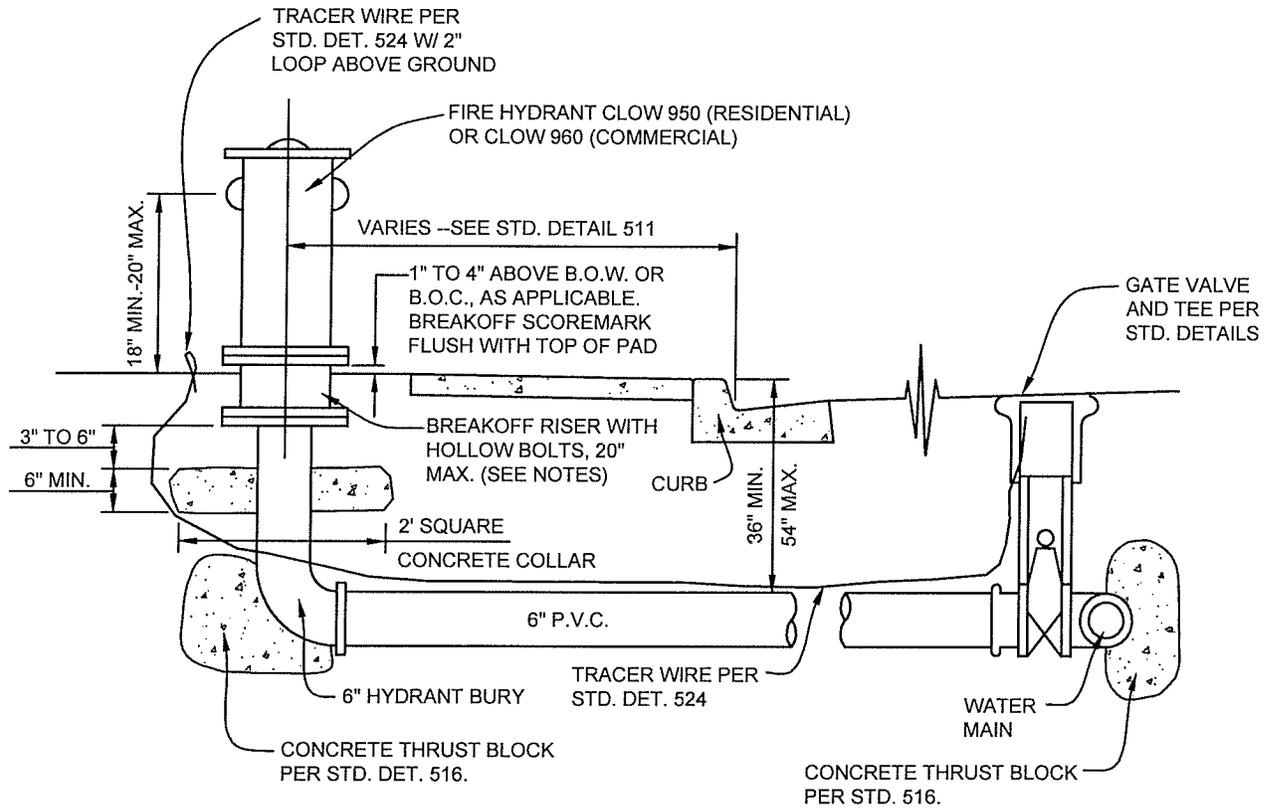
**NOTES:**

1. REQUIRED BY TITLE 17 OF THE CALIF. DEPT OF HEALTH SERVICES, MODEL OF BACKFLOW DEVICE TO BE DETERMINED FOR EACH INSTALLATION DEPENDING ON THE TYPE OF HAZARD AND UPON ALLOWABLE HEAD LOSS.
2. BARRIER POST SHALL BE LOCATED TO PROTECT PIPING AND VALVES. CURB AND PARKING BARRIERS CAN BE CONSIDERED PROTECTION IF EFFECTIVELY LOCATED.
3. DEVICE SHALL BE ACCESSIBLE FOR TESTING AND MAINTENANCE.
4. CERTIFICATION REQUIRED PRIOR TO ACCEPTANCE.
5. ALL DESIGN PLANS ARE TO BE SUBMITTED TO THE CROSS-CONNECTION SPECIALIST FOR APPROVAL AND A CROSS CONNECTION SURVEY IS TO COMPLETED TO EVALUATE HAZARDS THAT POSSIBLY EXIST.
6. ELECTRONICALLY MONITORED TAMPER SWITCHES ARE REQUIRED IN ACCORDANCE WITH NFPA72.

**MATERIALS:**

1. ALL STEEL PIPE SHALL BE AS PER AWWA C-200 WITH 1/4" WALL COATED AND LINED BY FUSION BONDED EPOXY AS PER AWWA C-213, 20 MILS MINIMUM
2. ALL STEEL FLANGES SHALL BE CLASS D AS PER AWWA C-207
3. ALL DUCTILE IRON FITTINGS SHALL MEET AWWA C-153 CLASS 200. THE INTERIOR SHALL BE MORTAR LINED AS PER AWWA C-104 AND BELOW GROUND EXTERIOR SHALL HAVE A COAL TAR COATING AS PER AWWA C-203.
4. ALL NUTS AND BOLTS BELOW GROUND SHALL BE POLYETHYLENE ENCASED AS PER AWWA C-105 AT TAPE WRAPPED AS PER AWWA C-209. 20 MILS MINIMUM IN BOTH CASES.
5. STEEL CAGE AND BLANKET REQUIRED.

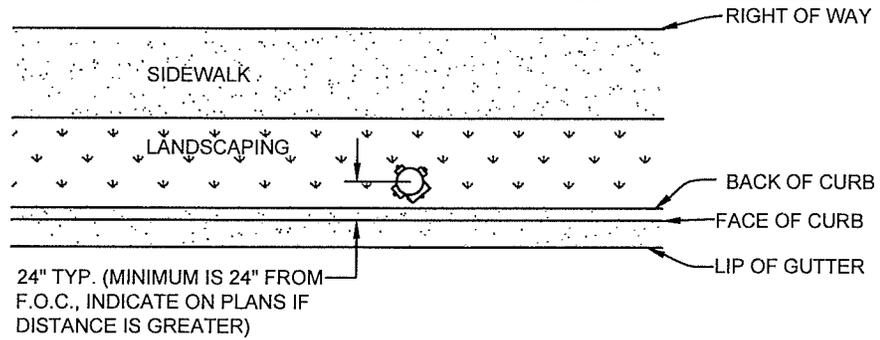
<b>CITY OF RIVERBANK DEPARTMENT OF PUBLIC WORKS</b>			<b>FIRE SERVICE DOUBLE DETECTOR CHECK VALVE WITH F.D.C.</b>	
CITY ENGINEER - WILLIAM F. KULL			ADOPTED BY THE CITY COUNCIL:	
DRAWN BY: GK	DATE: 1/30/18	SCALE: NTS	<b>2-13-18</b>	
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 509.DWG	<b>DRAWING NO. 509</b>	



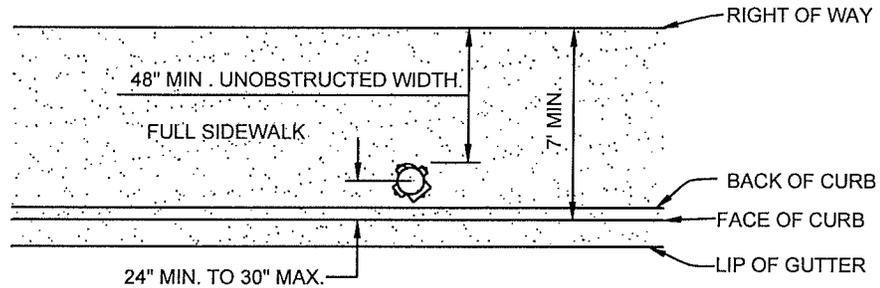
**NOTES:**

1. ALL FIRE HYDRANTS ARE TO HAVE HOLLOW BOLTS LOCATED THROUGH THE FIRE HYDRANT FLANGE WITH THEM POINTING DOWN.
2. ALL FIRE HYDRANTS WILL BE INSTALLED SO THAT THE DISTANCE BETWEEN THE CENTER OF THE 4 1/2" OUTLET AND THE TOP OF SIDEWALK OR CURB IN ALL ZONES WILL BE NO LESS THAN 18" AND NO GREATER THAN 20".
3. ALL HYDRANTS SHALL BE PAINTED SAFETY YELLOW AT THE FACTORY AND FURNISHED WITH NATIONAL STANDARD HOSE THREAD OUTLETS AND CAST IRON CAPS.
4. INSTALL GUARD POSTS WHERE HYDRANTS ARE INSTALLED IN PAVED AREAS ACCESSIBLE TO TRAFFIC, OR AS OTHERWISE DIRECTED BY THE CITY ENGINEER.
5. ALL FIRE HYDRANTS WHEN INSTALLED, POSITIONED OR REPOSITIONED SUCH THAT THE 4 1/2" DISCHARGE IS 45 DEGREES FROM THE RUN OF THE STREET. IF LOCATED ON A CORNER, 4 1/2" DISCHARGE SHALL BE 45 DEGREES FROM RUN OF NEAREST STREET.
6. HYDRANTS SHALL HAVE ONE 4-1/2" OUTLET, AND TWO 2-1/2" OUTLETS MINIMUM, AND SHALL BE OF A TYPE APPROVED BY THE STANISLAUS CONSOLIDATED FIRE DISTRICT.
7. EACH HYDRANT SHALL BE INSTALLED WITH A BLUE RETROREFLECTIVE PAVEMENT MARKER, INSTALLED 6" FROM THE ADJACENT CENTERLINE OF THE ROADWAY. IF ON A CORNER, MARKERS WILL BE PLACED ON BOTH ADJACENT STREETS.

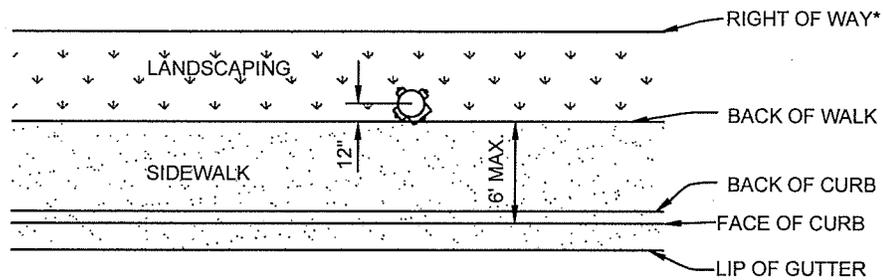
<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>FIRE HYDRANT INSTALLATION</b></p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 510.DWG	2-13-18	510



**SPLIT LANDSCAPE / SIDEWALK**



**FULL SIDEWALK**

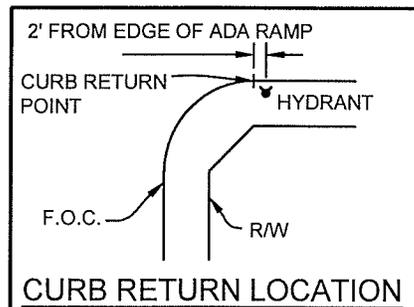


**SIDEWALK ADJACENT TO CURB**

\* NOTE: EASEMENT OR ADDITIONAL R/W DEDICATION WILL BE REQUIRED IF SUFFICIENT LANDSCAPE AREA IS NOT AVAILABE WITHIN R/W FOR INSTALLATION OF HYDRANT.

**NOTES:**

1. MAINTAIN 48" MIN. CLEAR UNOBSTRUCTED TRAVEL WAY ON SIDEWALKS AND 24" MIN. CLEARANCE FROM F.O.C. IN LOCATIONS WITH DIFFERENT WIDTHS THAN SHOWN ABOVE.
2. HYDRANTS SHALL BE INSTALLED A MIN. OF 5' FROM THE EDGE OF RESIDENTIAL DRIVEWAYS, AND 10' FROM COMMERCIAL DRIVEWAYS. (DISTANCE TAKEN FROM DRIVEWAY THROAT)
3. THE PREFERRED LOCATION FOR HYDRANTS ARE ON CURB RETURNS. HYDRANTS ON STRAIGHT RUNS SHALL BE LOCATED ON PROPERTY LINES WHENEVER POSSIBLE.



**CURB RETURN LOCATION**

**CITY OF RIVERBANK**  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

**FIRE HYDRANT  
LOCATION**

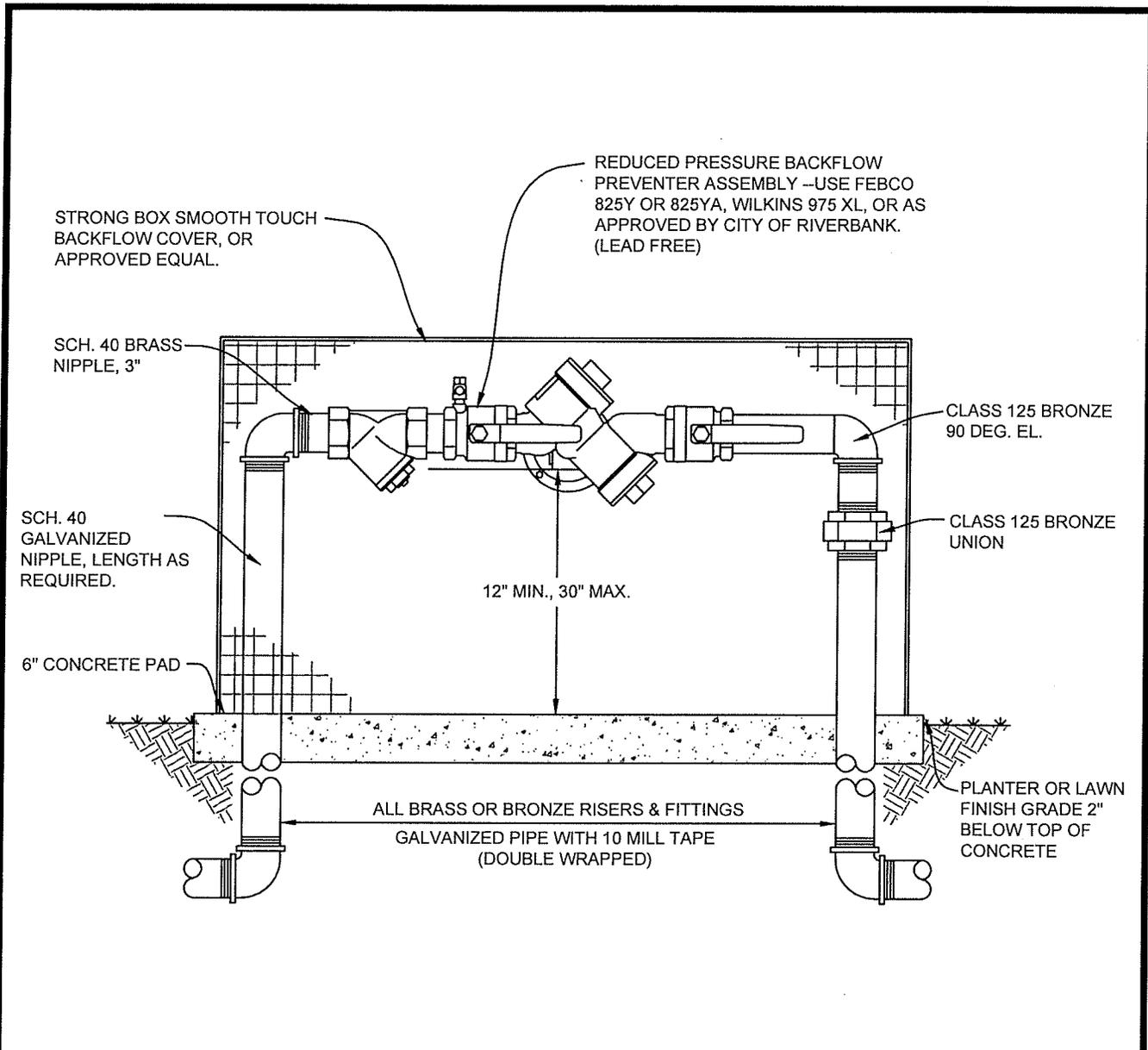
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 511.DWG

ADOPTED BY THE CITY COUNCIL:

**2-13-18**

DRAWING NO.

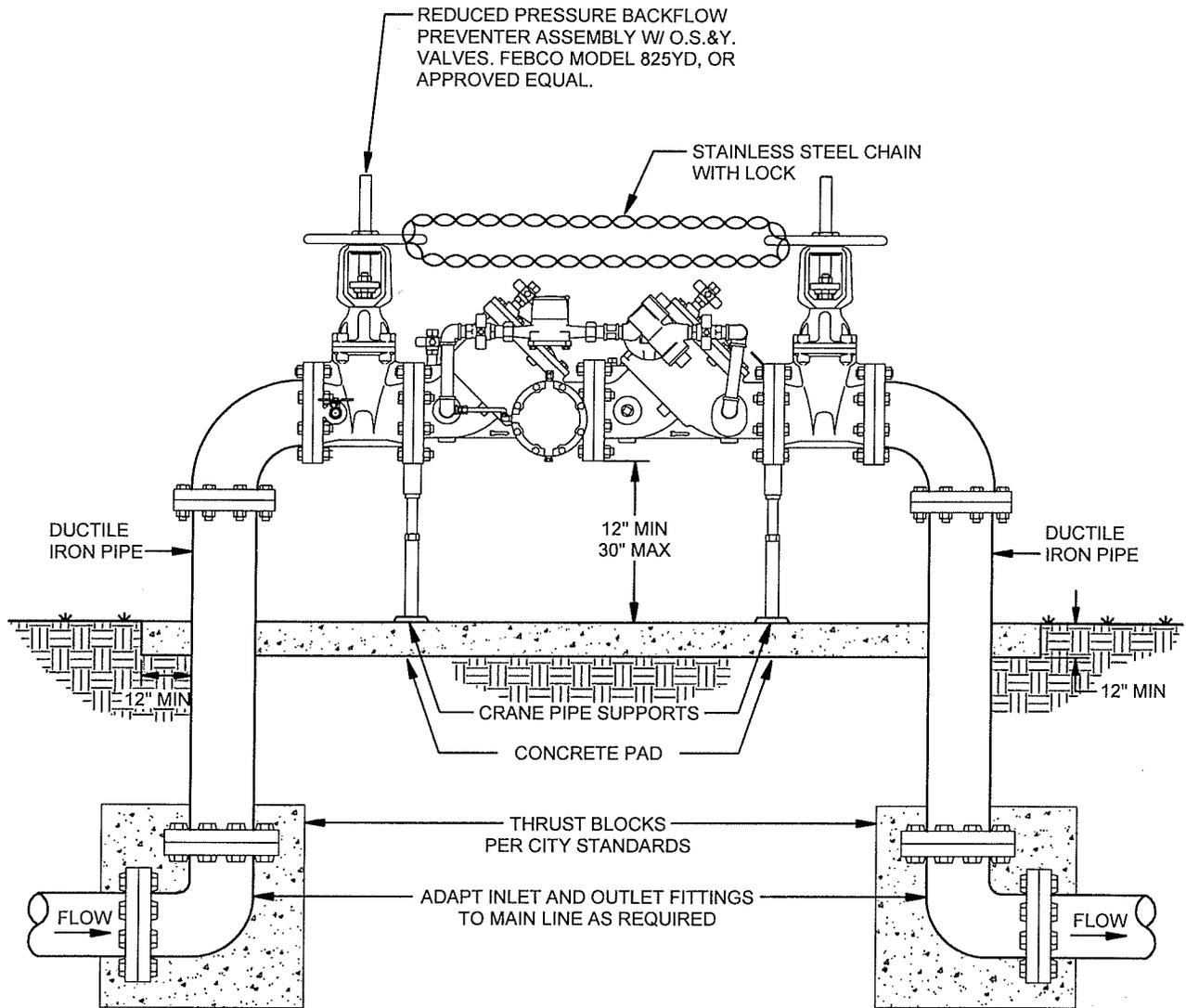
**511**



**NOTES:**

- 1. INSTALL APPROPRIATELY SIZED WEATHER BLANKET AND CAGE TO ALL BACKFLOW PREVENTION DEVICES.
- 2. BACKFLOW PREVENTERS SHALL BE PLACED IN LANDSCAPE AREAS, A MIN. OF 24" CLEAR FROM ADJACENT CURBS. BACKFLOW PREVENTERS NOT PLACED IN CURBS SHALL REQUIRE GUARD POSTS TO THE SATISFACTION OF THE CITY ENGINEER.

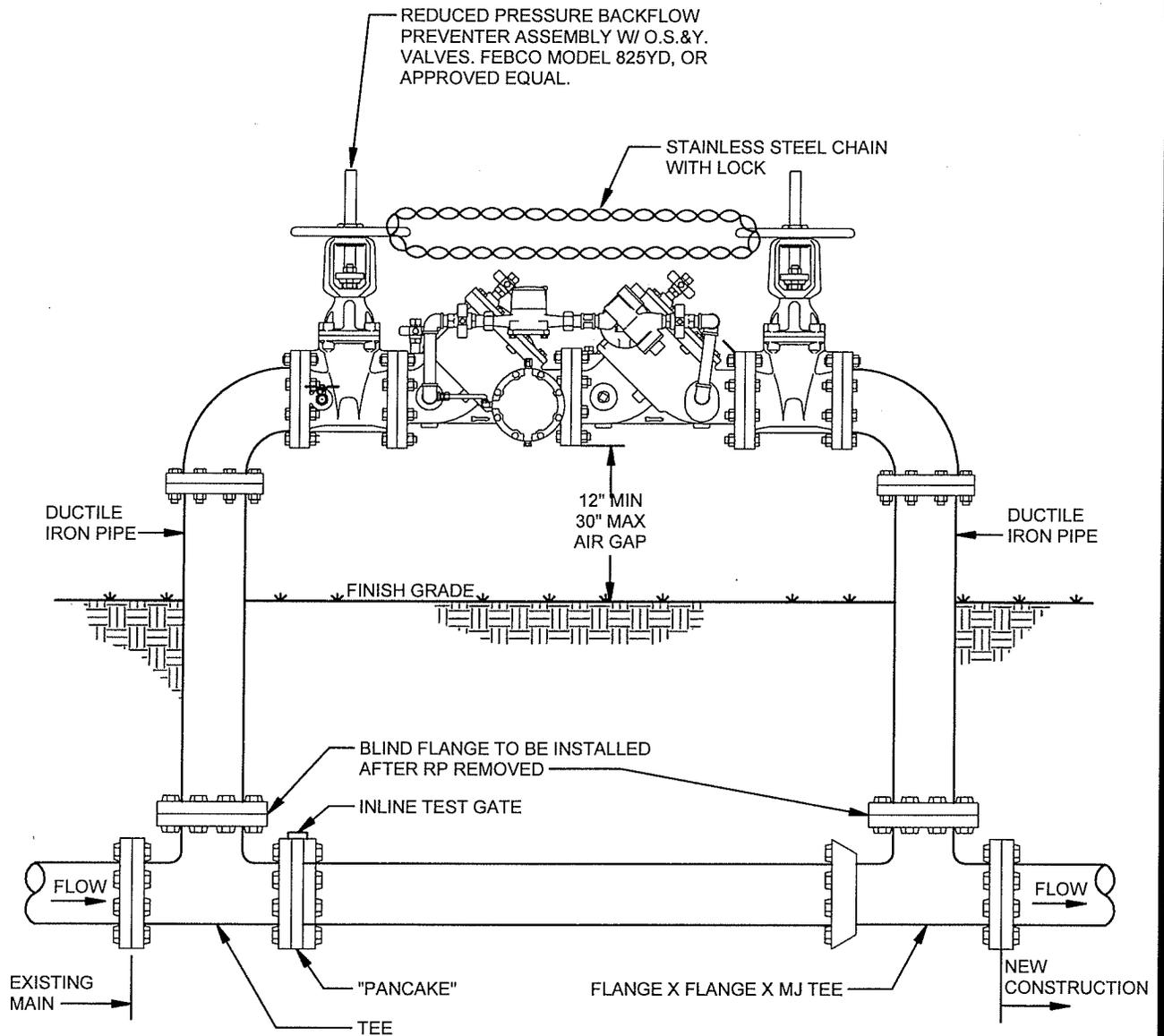
<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY</b> 1" TO 2 1/2" SIZE</p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>			<p>ADOPTED BY THE CITY COUNCIL: <b>2-13-18</b></p>	
<p>DRAWN BY: GK</p>	<p>DATE: 7/21/15</p>	<p>SCALE: NTS</p>	<p>DRAWING NO. <b>512</b></p>	
<p>REVISIONS: NONE</p>	<p>SECTION: WATER</p>	<p>DRAWING NAME: 512.DWG</p>		



**NOTES:**

1. INSTALL 12" AIR GAP MINIMUM (CONSULT LOCAL CODE)
2. ALL CONNECTIONS ON ASSEMBLY TO BE FLANGED.
3. BACKFLOW ASSEMBLY SHOULD BE PLACED IN A PLANTER SO THAT PLANT MATERIAL WILL SCREEN VIEW OF THE ASSEMBLY FROM THE STREET.
4. INSTALL APPROPRIATELY SIZED WEATHER BLANKET AND CAGE.

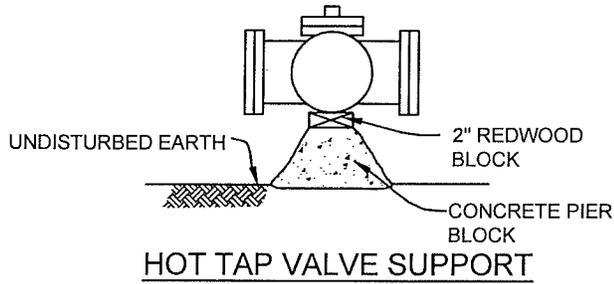
<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY FOR 3" &amp; LARGER</b></p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>				
<p>DRAWN BY: GK</p>	<p>DATE: 7/21/15</p>	<p>SCALE: NTS</p>	<p>ADOPTED BY THE CITY COUNCIL:</p>	<p>DRAWING NO.</p>
<p>REVISIONS: NONE</p>	<p>SECTION: WATER</p>	<p>DRAWING NAME: 513.DWG</p>	<p><b>2-13-18</b></p>	<p><b>513</b></p>



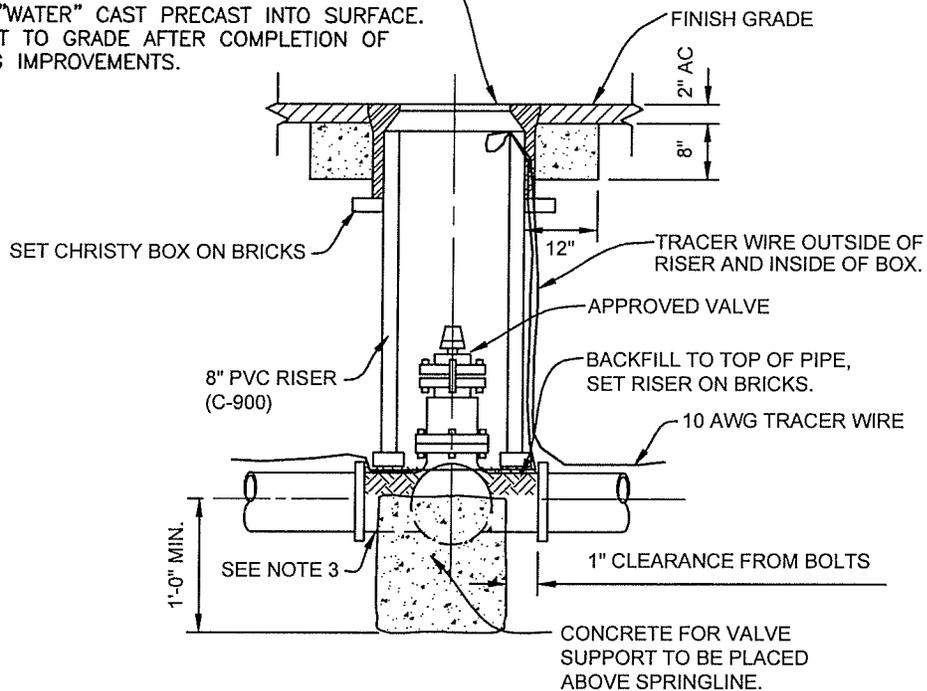
**NOTES:**

1. BACKFLOW DEVICE TO BE SAME SIZE AS EXISTING MAIN.
2. CONTRACTOR TO PROVIDE INLINE METER REQUIRED BY CITY.
3. CONSTRUCTION METER REQUIRED BY CITY.

<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>TEMPORARY BACKFLOW PREVENTION ASSEMBLY FOR 3" &amp; LARGER</b></p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>				
<p>DRAWN BY: GK</p>	<p>DATE: 1/30/18</p>	<p>SCALE: NTS</p>	<p>ADOPTED BY THE CITY COUNCIL: <b>2-13-18</b></p>	<p>DRAWING NO. <b>514</b></p>
<p>REVISIONS: NONE</p>	<p>SECTION: WATER</p>	<p>DRAWING NAME: 514.DWG</p>		



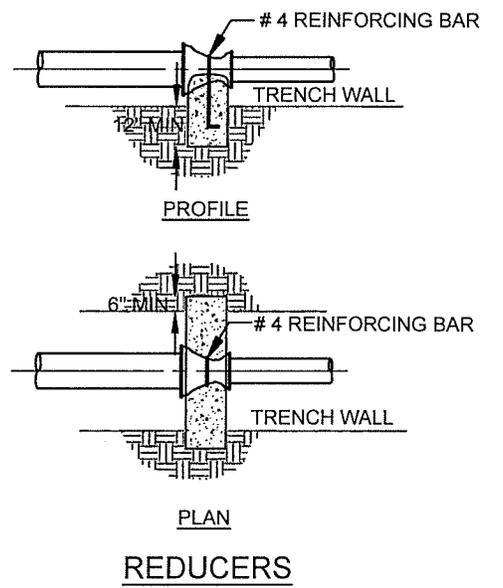
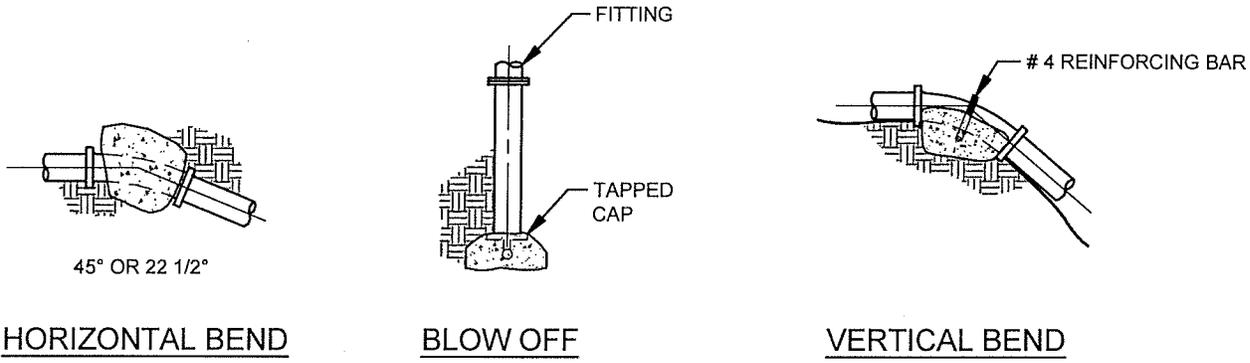
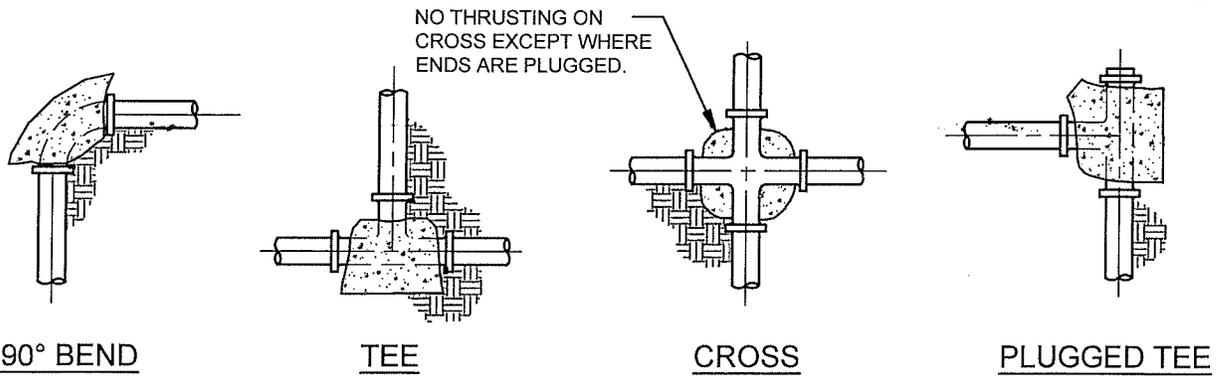
CHRISTY G5 RECEPTACLE WITH C275 CAST IRON LID, OR APPROVED EQUAL. LID TO HAVE "WATER" CAST PRECAST INTO SURFACE. ADJUST TO GRADE AFTER COMPLETION OF PAVING IMPROVEMENTS.



**NOTES:**

1. INSTALL EXTENSION STEM WHEN DISTANCE FROM VALVE COVER TO OPERATING NUT IS GREATER THAN 48"
2. VALVES SHALL HAVE FLANGED FITTINGS AT ALL TEES AND CROSSES UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER.
3. PLACE VISQUEEN AROUND VALVES BEFORE PLACEMENT OF CONCRETE SUPPORTS.
4. VALVES SHALL BE RESILIENT SEAT GATE FOR LINES 12" OR LESS, AND BUTTERFLY VALVES FOR LINES GREATER THAN 12".

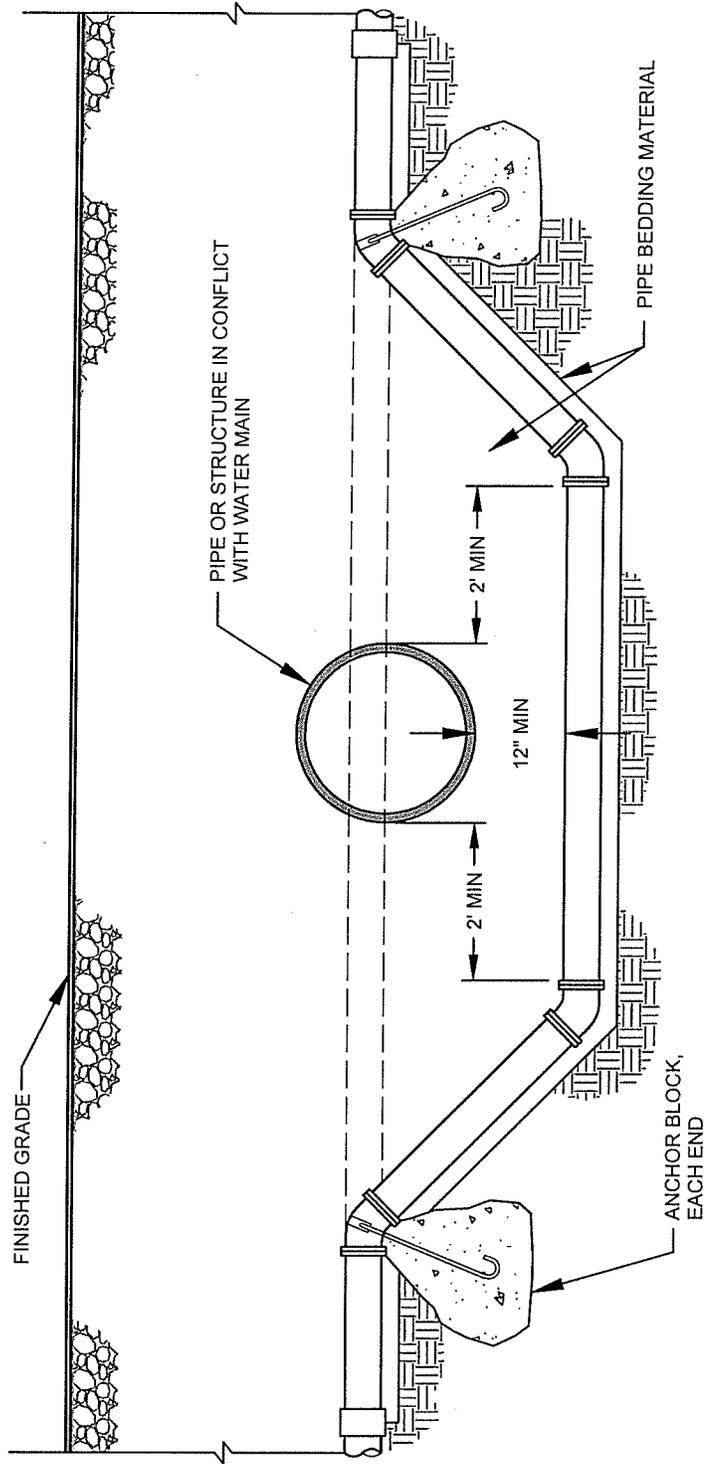
<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>WATER VALVE</b>  <b>INSTALLATION</b>	
CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 12/6/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 515.DWG	<b>2-13-18</b>	<b>515</b>



MINIMUM THRUST BLOCK BEARING AREAS IN SQUARE FEET				
PIPE SIZES	90°	45°	22 1/2°	TEES & BLOWOFF
6"	3	2	2	2
8"	4	3	2	3
10"	6	4	3	4
12"	8	5	3	6
14"	12	7	4	8

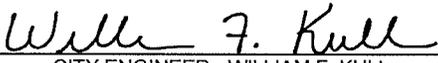
- NOTES:**
1. CONCRETE SHALL BE 2000 PSI MINIMUM AT 28 DAYS.
  2. THRUST BLOCKS SHALL BE PLACED AGAINST UNDISTURBED EARTH.
  3. ALL FITTINGS SHALL BE SUPPORTED IN CONCRETE.
  4. FOR FIRE HYDRANT THRUSTING SEE 90° BEND.
  5. DON'T COVER FLANGE BOLTS WITH CONCRETE.
  6. WRAP ALL FITTINGS AND FLANGES WITH VISQUEEN.
  7. USE RESTRAINT LENGTH CALCULATOR FOR ADDITIONAL JOINTS.

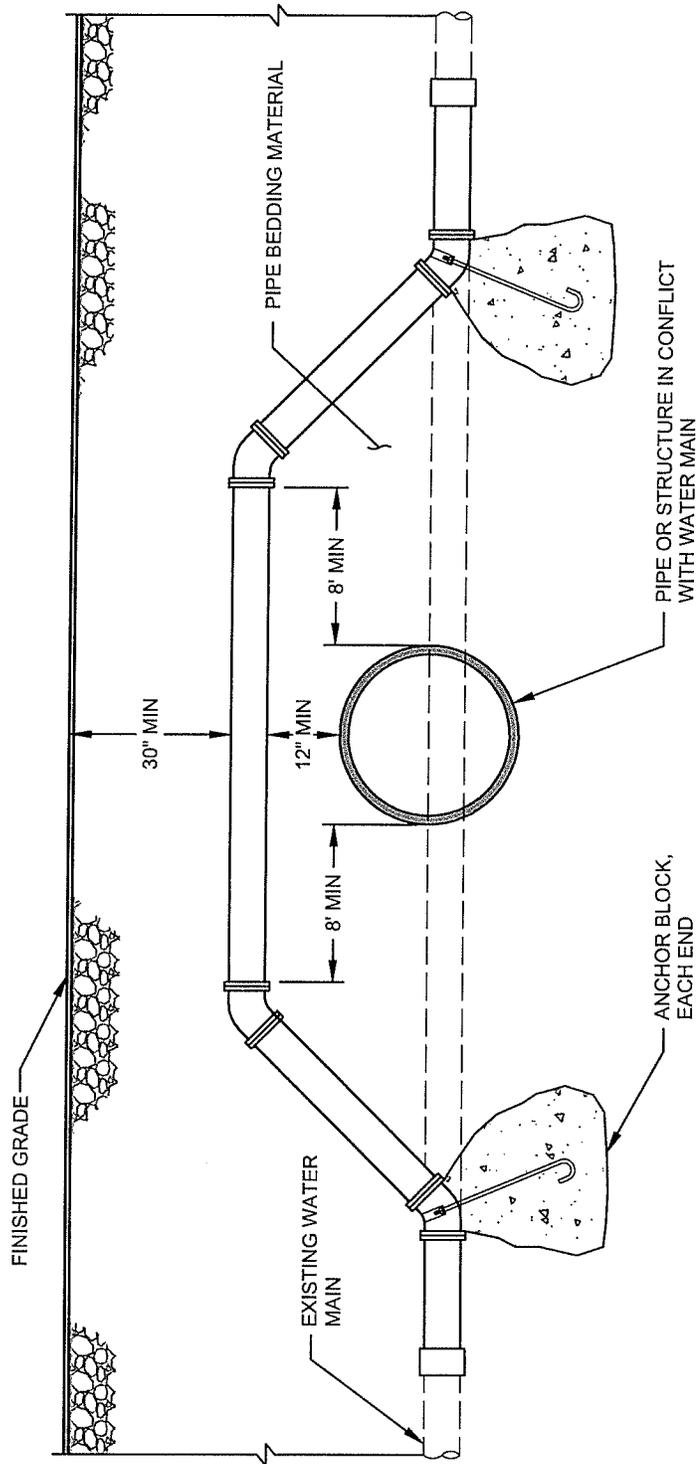
<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>THRUST BLOCK          REQUIREMENTS</b>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 12/6/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 516.DWG	<b>2-13-18</b>	<b>516</b>



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE DUCTILE IRON & SHALL BE WRAPPED IN POLYETHYLENE - PER CITY OF RIVERBANK STD CONSTRUCTION SPECIFICATIONS.
2. ONLY MECHANICAL JOINT FITTINGS WITH RESTRAINED JOINTS MAY BE USED.
3. ALL BENDS SHALL BE 45° OR 22-1/2° FITTINGS.
4. USE RESTRAINT LENGTH CALCULATOR FOR ADDITIONAL JOINTS.

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>WATER MAIN</b>  <b>LOWERING</b>	
 CITY ENGINEER - WILLIAM F. KULL			ADOPTED BY THE CITY COUNCIL:	
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	<b>2-13-18</b>	DRAWING NO.  <b>517</b>
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 517.DWG		



NOTES:

1. ALL PIPE AND FITTINGS SHALL BE CLASS-200 C-900 OR EQUIVALENT PER AWWA STANDARDS
2. ONLY MECHANICAL JOINT FITTINGS WITH RESTRAINED JOINTS MAY BE USED.
3. ALL BENDS SHALL BE 45° OR 22-1/2° FITTINGS. - NO 90° BENDS ALLOWED.
4. IF A MINIMUM COVER OF 30" CAN NOT BE ACHIEVED, THE NEW WATER LINE SHALL BE INCASSED WITH CONCRETE (SEE STD. DWG. NO. W-10) 2 FEET PAST BOTH EXISTING UTILITY PIPE EDGE.

CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

WATER MAIN CROSSING  
OVER EXISTING UTILITY

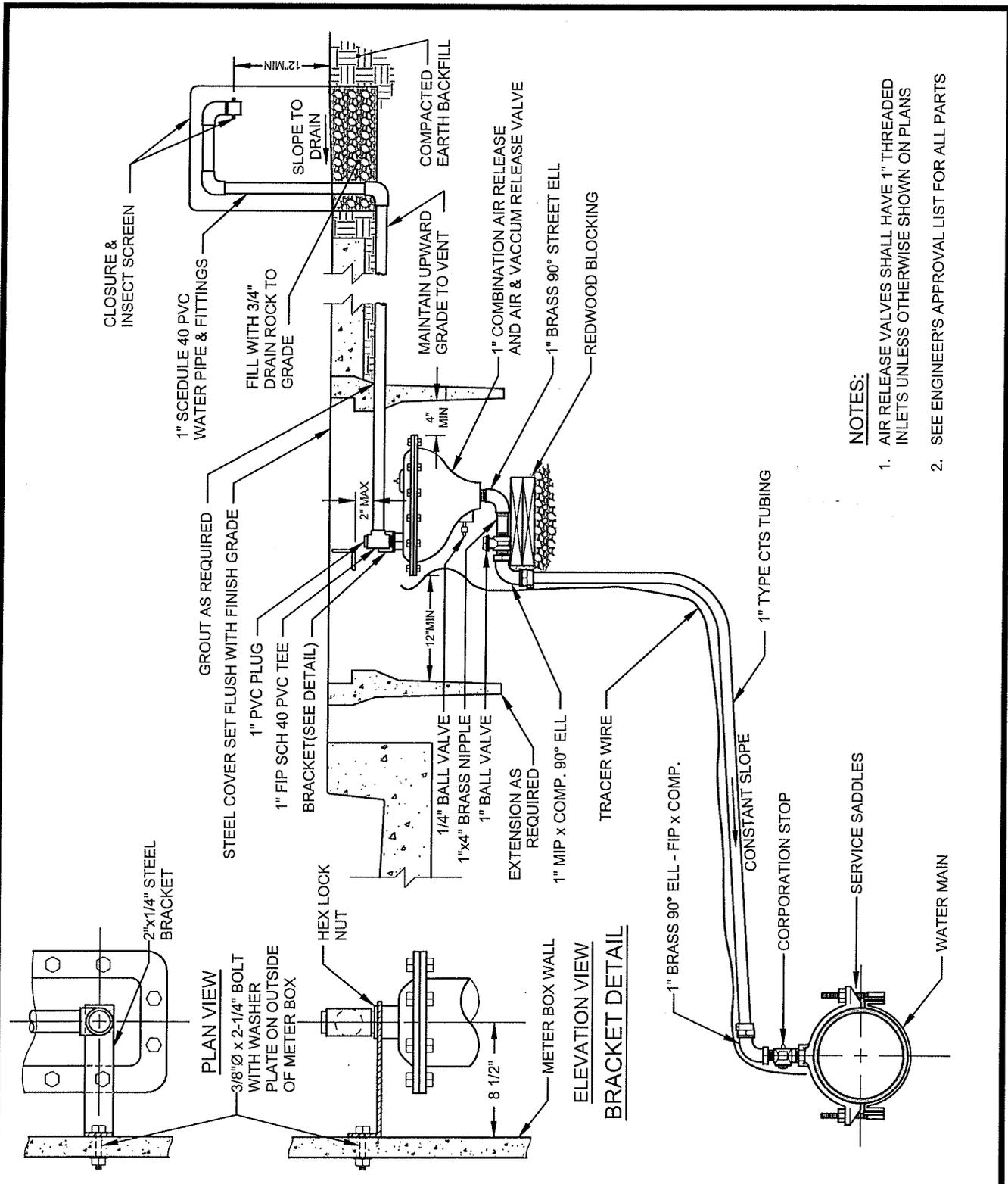
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 518.DWG

ADOPTED BY THE CITY COUNCIL:

2-13-18

DRAWING NO.

518



**NOTES:**

1. AIR RELEASE VALVES SHALL HAVE 1" THREADED INLETS UNLESS OTHERWISE SHOWN ON PLANS
2. SEE ENGINEER'S APPROVAL LIST FOR ALL PARTS

**CITY OF RIVERBANK**  
 DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
 CITY ENGINEER - WILLIAM F. KULL

**AIR AND VACCUM / AIR  
 RELEASE VALVE**

DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 519.DWG

ADOPTED BY THE CITY COUNCIL: <b>2-13-18</b>	DRAWING NO. <b>519</b>
--	---------------------------

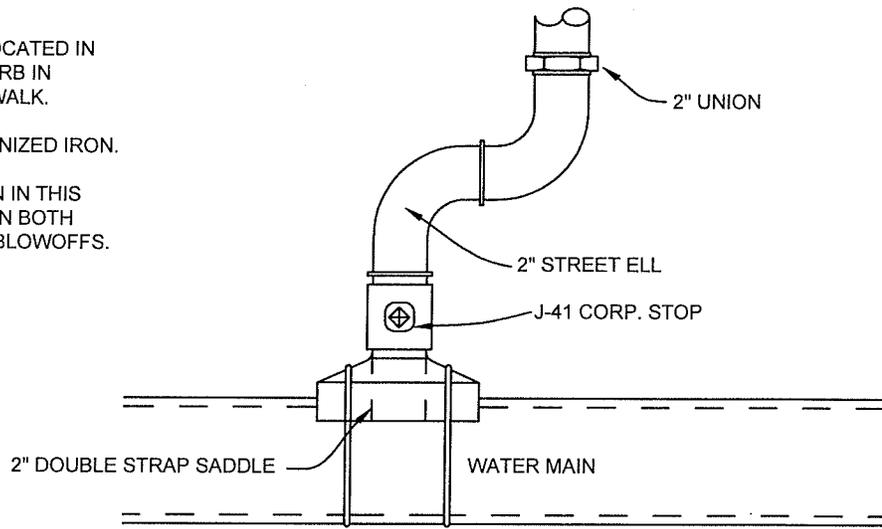
NOTES:

1. BLOW-OFF SHALL NOT BE LOCATED IN SIDEWALK. LOCATE BEHIND CURB IN LANDSCAPING IF IN SPLIT SIDEWALK.

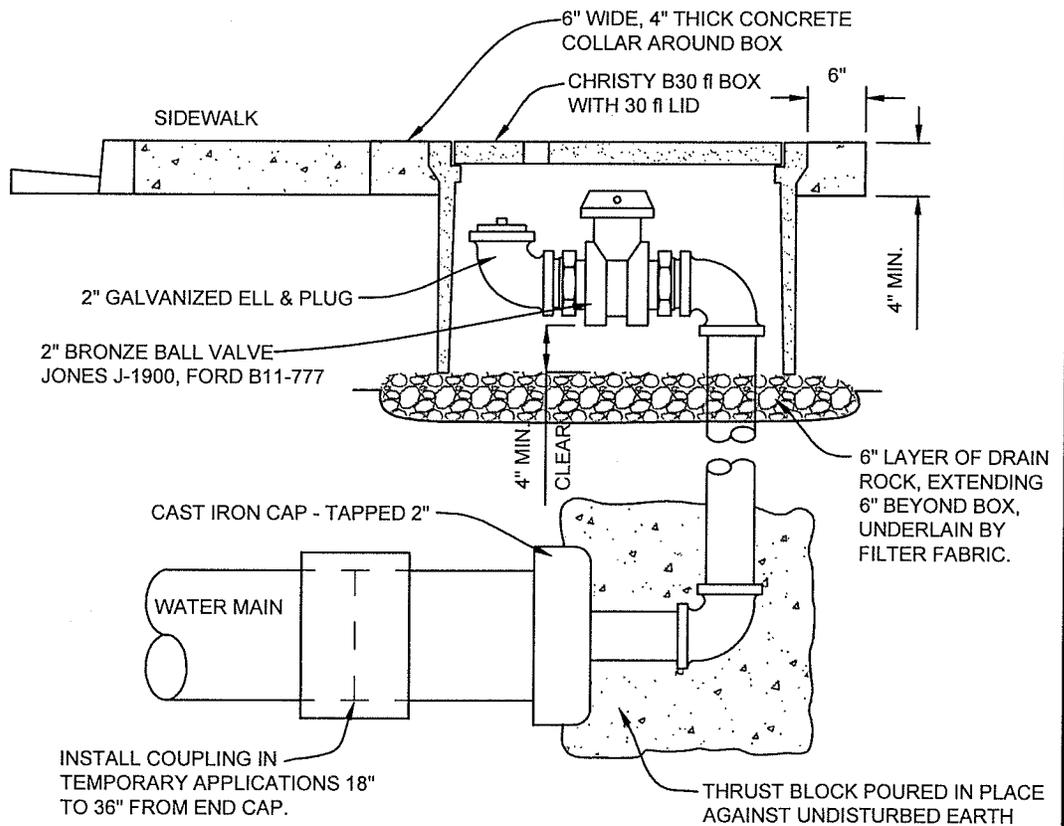
2. ALL FITTINGS TO BE 2" GALVANIZED IRON.

3. ALL APPURTENANCES SHOWN IN THIS DETAIL ARE TO BE INSTALLED ON BOTH TEMPORARY AND PERMANENT BLOWOFFS.

4. TRACER WIRE REQUIRED.

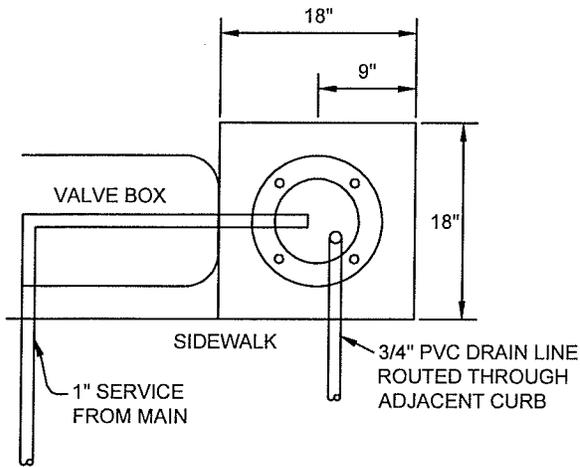


INLINE INSTALLATION



END OF PIPE INSTALLATION

<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>WATER BLOWOFF</b></p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>				
<p>DRAWN BY: GK</p>	<p>DATE: 7/21/15</p>	<p>SCALE: NTS</p>	<p>ADOPTED BY THE CITY COUNCIL: <b>2-13-18</b></p>	<p>DRAWING NO. <b>520</b></p>
<p>REVISIONS: NONE</p>	<p>SECTION: WATER</p>	<p>DRAWING NAME: 520.DWG</p>		



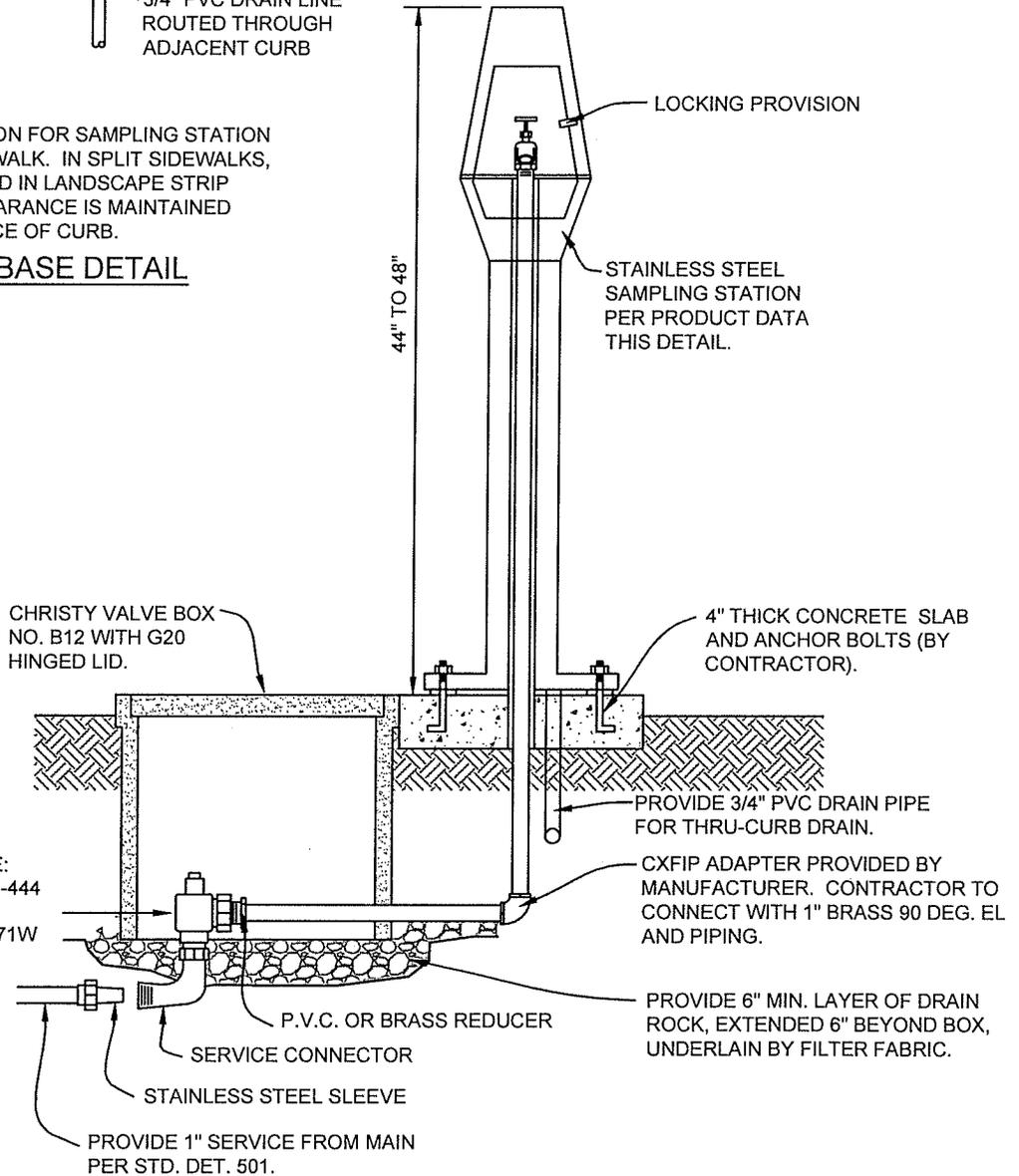
**PRODUCT DATA**

MODEL: MX 3000 SAMPLING STATION  
 VENDOR: STEEL SOURCE CONSTRUCTION  
 ADDRESS: 20885 REDWOOD RD.  
 CASTRO VALLEY, CA 94546  
 PHONE: 510-582-2700  
 FAX: 510-582-2750  
 www.steelsourceco.com

NOTE: ALTERNATE MANUFACTURERS AND MODELS MAY BE SUBSTITUTED GIVEN THE APPROVAL OF THE CITY PUBLIC WORKS DEPT.

THE PREFERRED LOCATION FOR SAMPLING STATION IS BEHIND THE BACK OF WALK. IN SPLIT SIDEWALKS, STATION MAY BE LOCATED IN LANDSCAPE STRIP PROVIDED A 24" MIN. CLEARANCE IS MAINTAINED FROM THE ADJACENT FACE OF CURB.

**CONCRETE BASE DETAIL**



**CITY OF RIVERBANK**  
 DEPARTMENT OF PUBLIC WORKS

**WATER SAMPLING STATION**

*William F. Kull*  
 CITY ENGINEER - WILLIAM F. KULL

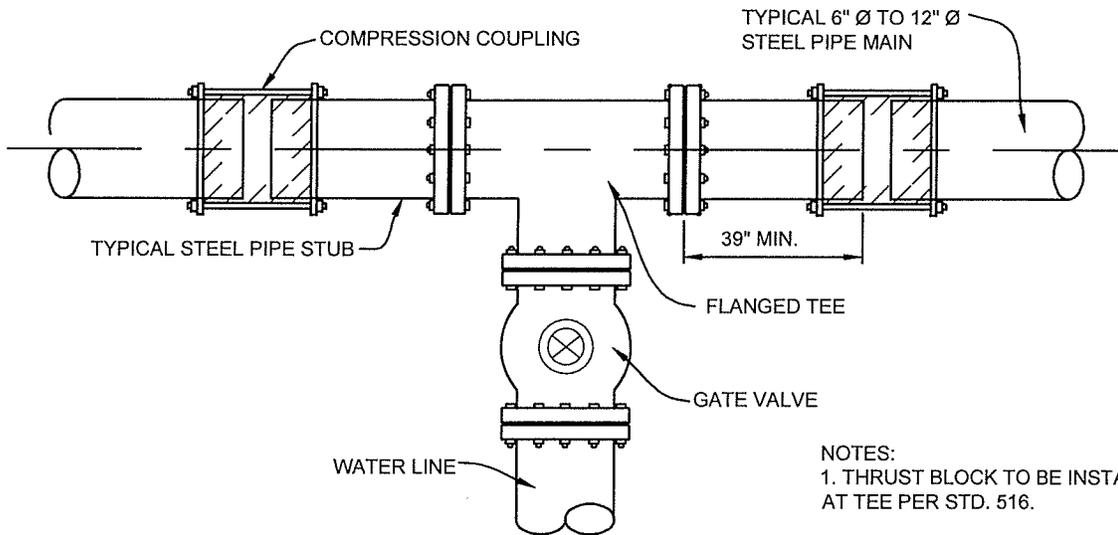
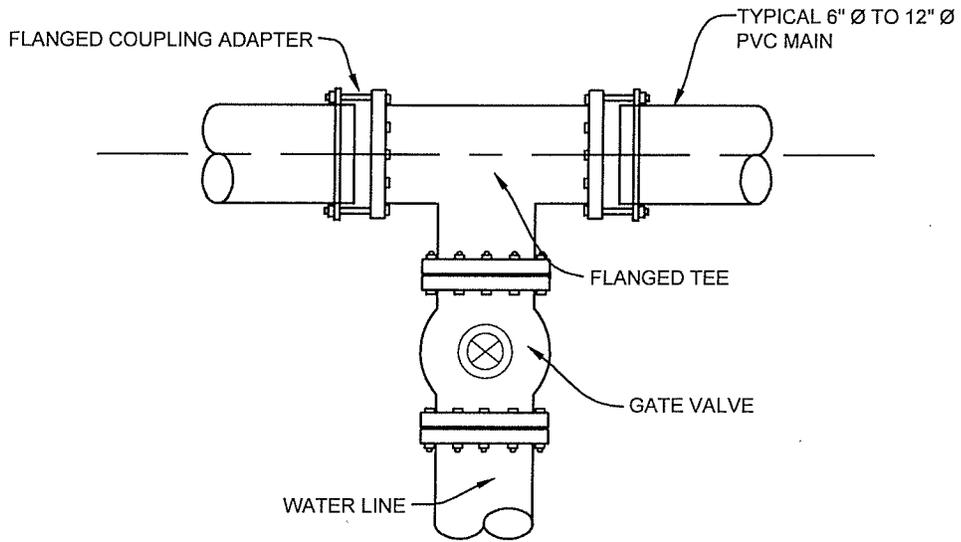
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 521.DWG

ADOPTED BY THE CITY COUNCIL:

DRAWING NO.

2-13-18

521



- NOTES:
1. THRUST BLOCK TO BE INSTALLED AT TEE PER STD. 516.
  2. GATE VALVE TO BE SUPPORTED ON CONCRETE PIER BLOCK PER STD.515.

CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

TEE & GATE VALVE  
INSTALLATION ON EX. MAIN

DRAWN BY:  
GK

DATE:  
7/21/15

SCALE:  
NTS

ADOPTED BY THE CITY COUNCIL:

DRAWING NO.

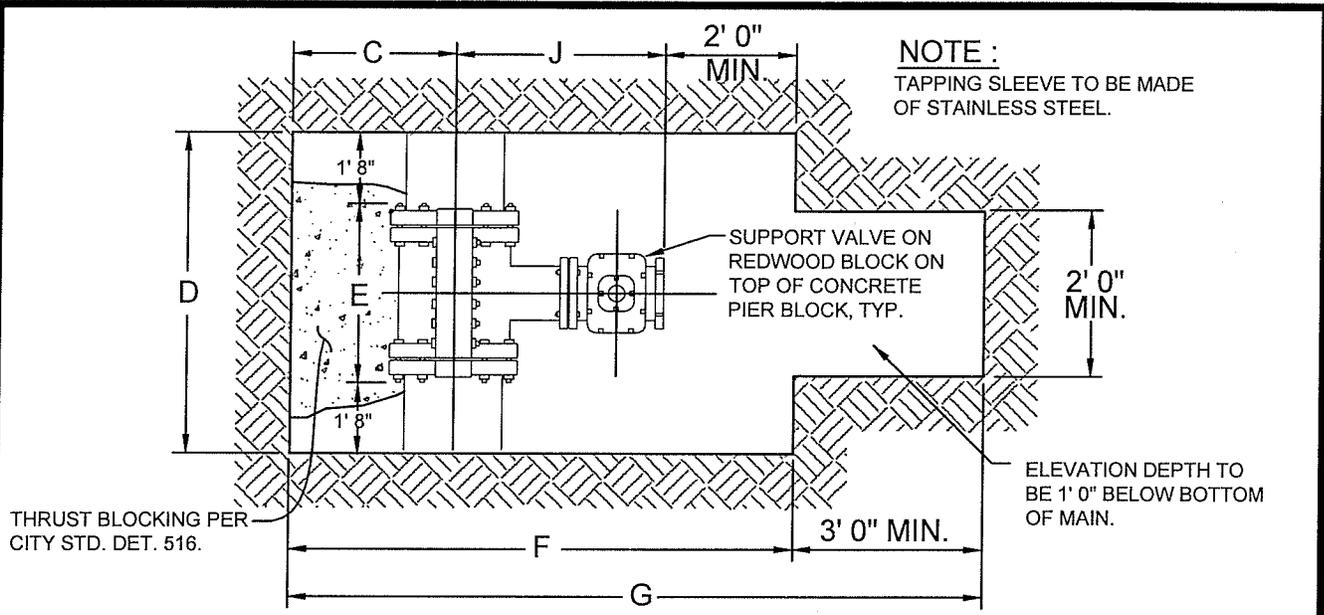
REVISIONS:  
NONE

SECTION:  
WATER

DRAWING NAME:  
522.DWG

2-13-18

522



TAPPING SLEEVE SIZE	C	D	E	F	G	J
4 X 2"	1' 3"	4' 9"	16 1/2"	4' 5"	7' 5"	14 1/32"
4 X 3"	1' 3"	4' 9"	16 1/2"	4' 6"	7' 6"	14 3/4"
4 X 4"	1' 3"	4' 9"	16 1/2"	4' 10"	7' 10"	18 9/16"
6 X 2"	1' 4"	4' 10"	18 3/8"	4' 7"	7' 7"	15 5/32"
6 X 3"	1' 4"	4' 10"	18 3/8"	4' 8"	7' 8"	15 7/8"
6 X 4"	1' 4"	4' 10"	18 3/8"	5' 0"	8' 0"	20 3/8"
6 X 6"	1' 4"	4' 10"	18 3/8"	5' 1"	8' 1"	21 7/16"
8 X 2"	1' 5"	4' 11"	19 1/4"	4' 10"	7' 10"	16 17/32"
8 X 3"	1' 5"	4' 11"	19 1/4"	4' 10"	7' 10"	17 1/4"
8 X 4"	1' 5"	4' 11"	19 1/4"	5' 2"	8' 2"	21 1/16"
8 X 6"	1' 5"	4' 11"	19 1/4"	5' 4"	8' 4"	22 13/16"
8 X 8"	1' 5"	5' 1"	21 1/4"	5' 6"	8' 6"	24 5/8"
10 X 2"	1' 6"	4' 11"	19"	5' 0"	8' 0"	17 25/32"
10 X 3"	1' 6"	4' 11"	19"	5' 1"	8' 1"	18 1/2"
10 X 4"	1' 6"	4' 11"	19"	5' 5"	8' 5"	22 9/16"
10 X 6"	1' 6"	5' 11"	19"	5' 6"	8' 6"	23 13/16"
10 X 8"	1' 6"	5' 3"	23"	5' 7"	8' 7"	25 5/16"
10 X 10"	1' 6"	5' 3"	23"	5' 9"	8' 9"	26 3/8"
12 X 2"	1' 7"	4' 11"	19"	5' 2"	8' 2"	18 29/32"
12 X 3"	1' 7"	4' 11"	19"	5' 3"	8' 3"	19 5/8"
12 X 4"	1' 7"	4' 11"	19"	5' 7"	8' 7"	23 9/16"
12 X 6"	1' 7"	4' 11"	19"	5' 8"	8' 8"	24 13/16"
12 X 8"	1' 7"	5' 1"	21"	5' 9"	8' 9"	25 5/16"
12 X 10"	1' 7"	5' 5"	25"	5' 10"	8' 10"	27 3/8"
12 X 12"	1' 7"	5' 5"	25"	5' 11"	8' 11"	27 1/2"
14 X 4"	1' 8"	5' 8"	27 3/4"	5' 9"	8' 9"	24 5/8"
14 X 6"	1' 8"	5' 8"	27 3/4"	5' 10"	8' 10"	25 7/16"
14 X 8"	1' 8"	5' 8"	27 3/4"	6' 0"	9' 0"	27 15/16"
14 X 10"	1' 8"	5' 8"	27 3/4"	6' 1"	9' 1"	29"
14 X 12"	1' 8"	5' 8"	27 3/4"	6' 1"	9' 1"	29 1/8"
14 X 14"	1' 8"	6' 2"	33 1/2"	6' 2"	9' 2"	30 1/4"

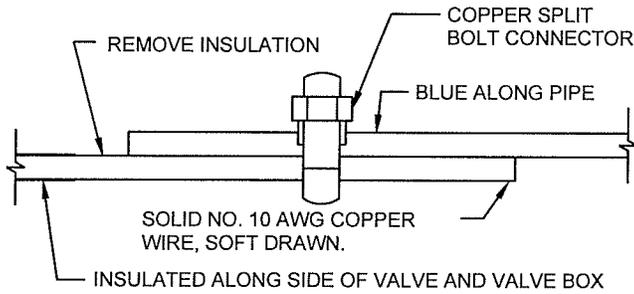
**CITY OF RIVERBANK**  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

**TAPPING SLEEVE  
INSTALLATION**

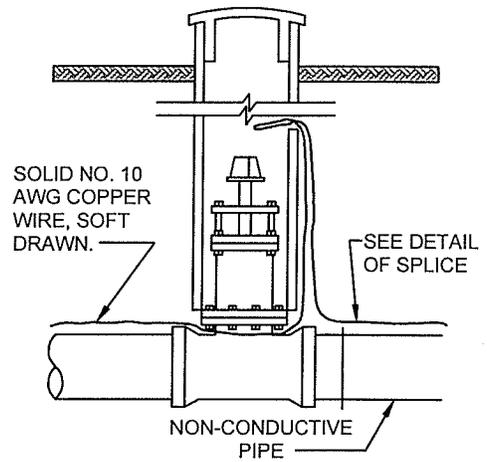
DRAWN BY: GK  
DATE: 7/21/15  
SCALE: NTS  
REVISIONS: NONE  
SECTION: WATER  
DRAWING NAME: 523.DWG

ADOPTED BY THE CITY COUNCIL:  
**2-13-18**  
DRAWING NO.:  
**523**

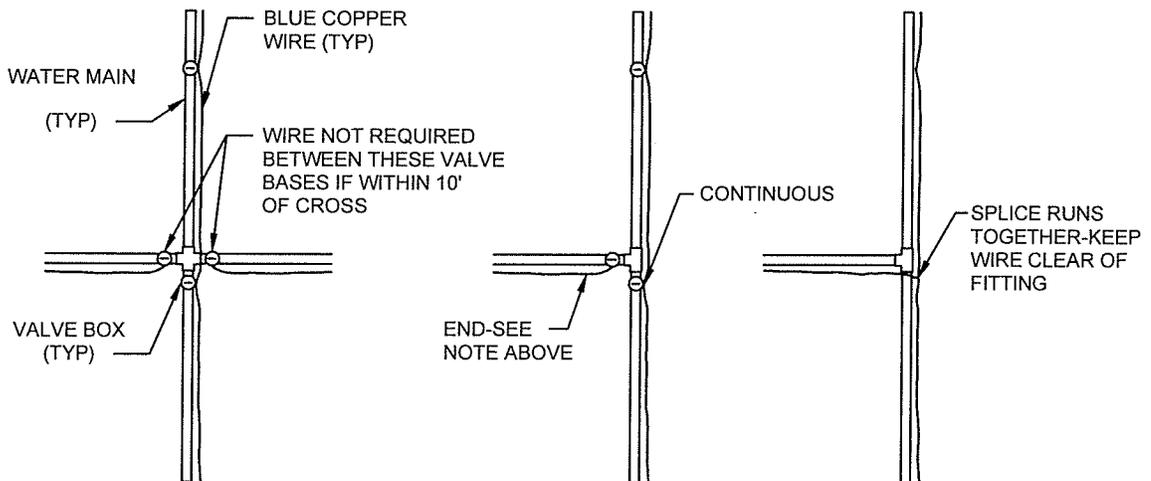


**NOTE:** IF WIRE ENDS AT VALVE BOX, RUN SINGLE INSULATED LEAD UP TO 10' BELOW GROUND.

DETAIL OF CONNECTION



INSTALLATION AT VALVE BOX



TYPICAL PLACING AT MAIN INTERSECTIONS

**NOTES:**

1. WIRE TO BE CONTINUOUS BETWEEN VALVE BOXES, EXCEPT WHERE BOXES ARE WITHIN TEN (10') FEET OF PIPE INTERSECTION.
2. BLUE WIRE NOT TO TOUCH VALVE OR FITTINGS. (COATED WIRE ONLY)
3. LOCATING WIRE TO BE LAID AT TOP OF PIPE.
4. SECURE TO TOP OF PIPE WITH TAPE AT 6' INTERVALS

CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

TRACER WIRE  
INSTALLATION

DRAWN BY:  
GK

DATE:  
1/30/18

SCALE:  
NTS

ADOPTED BY THE CITY COUNCIL:

DRAWING NO.

REVISIONS:  
NONE

SECTION:  
WATER

DRAWING NAME:  
524.DWG

2-13-18

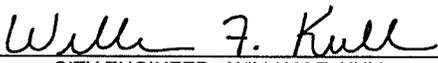
524

# ALLOWABLE GALLONS LOST IN ONE HOUR AT 150 PSI

PIPE LENGTH (FT)	PIPE DIAMETER					
	4"	6"	8"	10"	12"	15"
25	0.03	0.04	0.05	0.06	0.08	0.09
50	0.05	0.08	0.10	0.13	0.15	0.19
75	0.08	0.11	0.15	0.19	0.23	0.28
100	0.10	0.15	0.20	0.25	0.30	0.38
125	0.13	0.19	0.25	0.31	0.38	0.47
150	0.15	0.23	0.30	0.38	0.45	0.56
175	0.18	0.26	0.35	0.44	0.53	0.66
200	0.20	0.30	0.40	0.50	0.60	0.75
225	0.23	0.34	0.45	0.56	0.68	0.84
250	0.25	0.38	0.50	0.63	0.75	0.94
275	0.28	0.41	0.55	0.69	0.83	1.03
300	0.30	0.45	0.60	0.75	0.90	1.13
325	0.33	0.49	0.65	0.81	0.98	1.22
350	0.35	0.53	0.70	0.88	1.05	1.31
375	0.38	0.56	0.75	0.94	1.13	1.41
400	0.40	0.60	0.80	1.00	1.20	1.50
425	0.43	0.64	0.85	1.06	1.28	1.59
450	0.45	0.68	0.90	1.13	1.35	1.69
475	0.48	0.71	0.95	1.19	1.43	1.78
500	0.50	0.75	1.00	1.25	1.50	1.88
525	0.53	0.79	1.05	1.31	1.58	1.97
550	0.55	0.83	1.10	1.38	1.65	2.06
575	0.58	0.86	1.15	1.44	1.73	2.16
600	0.60	0.90	1.20	1.50	1.80	2.25
625	0.63	0.94	1.25	1.56	1.88	2.34
650	0.65	0.98	1.30	1.63	1.95	2.44
675	0.68	1.01	1.35	1.69	2.03	2.53
700	0.70	1.05	1.40	1.75	2.10	2.63
725	0.73	1.09	1.45	1.81	2.18	2.72
750	0.75	1.13	1.50	1.88	2.25	2.81
775	0.78	1.16	1.55	1.94	2.33	2.91
800	0.80	1.20	1.60	2.00	2.40	3.00

**NOTE:**

IN ACCORDANCE WITH CITY CONSTRUCTION STANDARDS, NEW WATERLINES SHALL BE HYDROSTATICALLY TESTED TO A MINIMUM OF 150 PSI, FOR A PERIOD OF NOT LESS THAN 2 HOURS. NO PIPE INSTALLATION SHALL BE ACCEPTED IF LEAKAGE FOR THE SECTION EXCEEDS A RATE IN GALLONS PER HOUR PER ONE THOUSAND FEET (GPH/1000') OF 0.25 MULTIPLIED BY THE PIPE DIAMETER IN INCHES. (GPH/1000' < 0.25xPIPE DIA.) THIS CHART COMPUTES MAXIMUM ALLOWABLE LEAKAGE RATES FOR VARIOUS LENGTHS OF PIPE BASED ON THIS STANDARD, AND IS INTENDED AS A CONVENIENCE, ONLY.

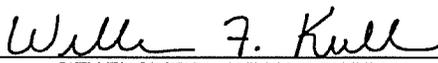
<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>WATER HYDROSTATIC</b>  <b>PRESSURE / LOSS</b>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 525.DWG	<b>2-13-18</b>	<b>525</b>

# ALLOWABLE GALLONS LOST IN ONE HOUR AT 150 PSI

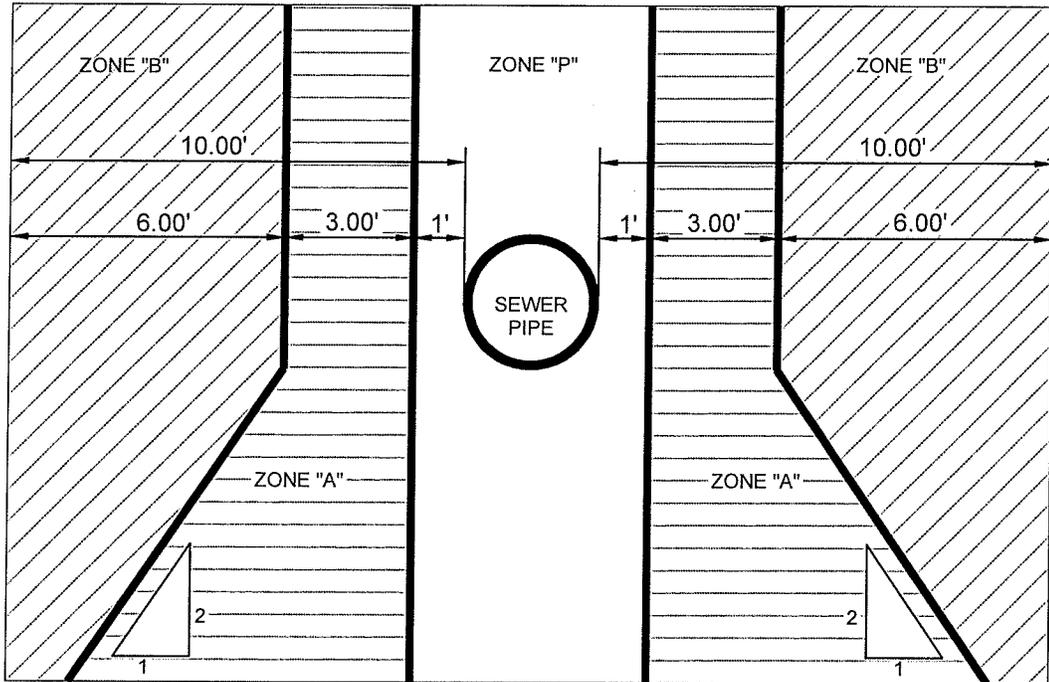
PIPE LENGTH (FT)	PIPE DIAMETER					
	4"	6"	8"	10"	12"	15"
825	0.83	1.24	1.65	2.06	2.48	3.09
850	0.85	1.28	1.70	2.13	2.55	3.19
875	0.88	1.31	1.75	2.19	2.63	3.28
900	0.90	1.35	1.80	2.25	2.70	3.38
925	0.93	1.39	1.85	2.31	2.78	3.47
950	0.95	1.43	1.90	2.38	2.85	3.56
975	0.98	1.46	1.95	2.44	2.93	3.66
1000	1.00	1.50	2.00	2.50	3.00	3.75
1025	1.03	1.54	2.05	2.56	3.08	3.84
1050	1.05	1.58	2.10	2.63	3.15	3.94
1075	1.08	1.61	2.15	2.69	3.23	4.03
1100	1.10	1.65	2.20	2.75	3.30	4.13
1125	1.13	1.69	2.25	2.81	3.38	4.22
1150	1.15	1.73	2.30	2.88	3.45	4.31
1175	1.18	1.76	2.35	2.94	3.53	4.41
1200	1.20	1.80	2.40	3.00	3.60	4.50
1225	1.23	1.84	2.45	3.06	3.68	4.59
1250	1.25	1.88	2.50	3.13	3.75	4.69
1275	1.28	1.91	2.55	3.19	3.83	4.78
1300	1.30	1.95	2.60	3.25	3.90	4.88
1325	1.33	1.99	2.65	3.31	3.98	4.97
1350	1.35	2.03	2.70	3.38	4.05	5.06
1375	1.38	2.06	2.75	3.44	4.13	5.16
1400	1.40	2.10	2.80	3.50	4.20	5.25

**NOTE:**

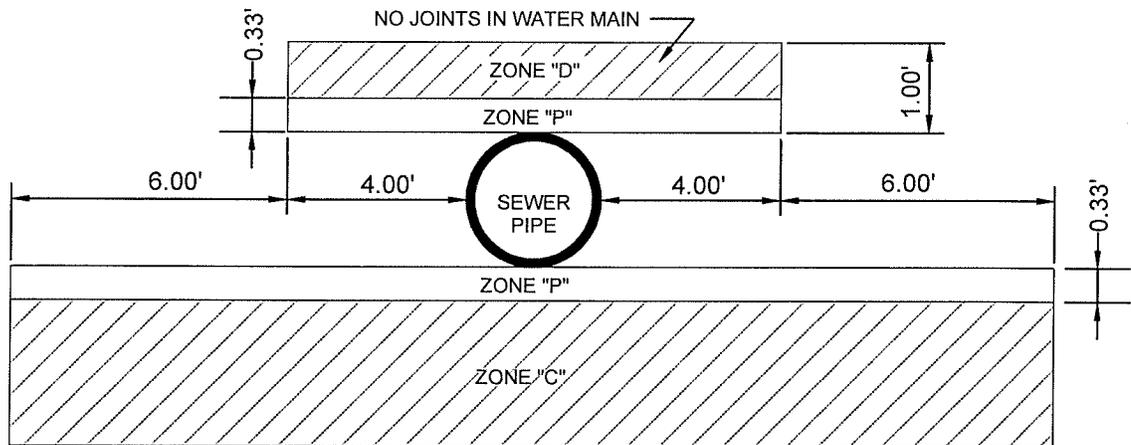
IN ACCORDANCE WITH CITY CONSTRUCTION STANDARDS, NEW WATERLINES SHALL BE HYDROSTATICALLY TESTED TO A MINIMUM OF 150 PSI, FOR A PERIOD OF NOT LESS THAN 2 HOURS. NO PIPE INSTALLATION SHALL BE ACCEPTED IF LEAKAGE FOR THE SECTION EXCEEDS A RATE IN GALLONS PER HOUR PER ONE THOUSAND FEET (GPH/1000') OF 0.25 MULTIPLIED BY THE PIPE DIAMETER IN INCHES. (GPH/1000' < 0.25xPIPE DIA.) THIS CHART COMPUTES MAXIMUM ALLOWABLE LEAKAGE RATES FOR VARIOUS LENGTHS OF PIPE BASED ON THIS STANDARD, AND IS INTENDED AS A CONVENIENCE, ONLY.

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>WATER HYDROSTATIC PRESSURE / LOSS</b>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 526.DWG	<b>2-13-18</b>	<b>526</b>

**ALTERNATE DESIGN FOR REDUCED SEPERATION**  
 (TO BE USED ONLY WHERE REQUIRED 10 FT. SEPARATION CANNOT BE OBTAINED)  
 NEW WATER LINE BEING INSTALLED



PARALLEL CONSTRUCTION

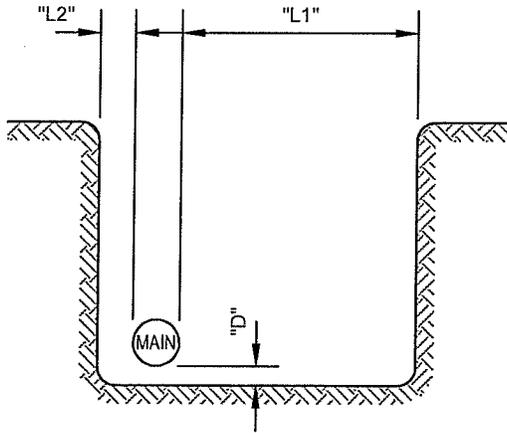


PERPENDICULAR CONSTRUCTION

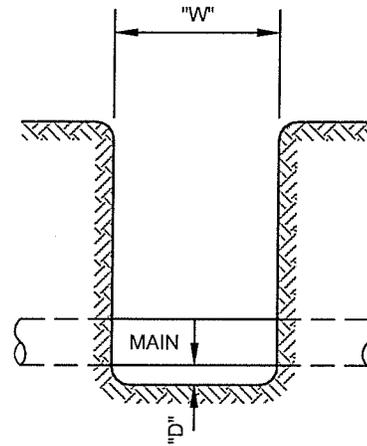
**NOTES:**

1. ZONE "A" REQUIRES SPECIAL PIPE AND SPECIAL PERMISSION FROM THE PUBLIC HEALTH AGENCY
2. ZONE "B" REQUIRES SPECIAL PIPE
3. ZONE "C" REQUIRES SPECIAL PIPE AND PIPE JOINTS ARE NOT ALLOWED
4. ZONE "D" REQUIRES STANDARD PIPE AND PIPE JOINTS ARE NOT ALLOWED
5. ZONE "P" IS A PROHIBITED ZONE.

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>WATER MAIN SEPARATION</b> <b>REGULATIONS</b>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 527.DWG	2-13-18	527



PERPENDICULAR TO EXISTING MAIN



PARALLEL TO EXISTING MAIN

EXCAVATION REQUIREMENTS FOR CONNECTIONS TO EXISTING WATER MAINS

EXISTING PIPE SIZE	W	D	L1	L2
4"	3'-0"	0'-6"	7'-0"	1'-0"
6"	4'-0"	1'-0"	7'-0"	1'-0"
8"	5'-0"	1'-6"	7'-0"	1'-0"
10"	6'-0"	2'-0"	7'-0"	1'-6"
12" OR LARGER	6'-0"	2'-0"	7'-0"	1'-6"

CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

EXCAVATION REQUIREMENTS  
FOR CONSTRUCTION

DRAWN BY:  
GK

DATE:  
7/21/15

SCALE:  
NTS

ADOPTED BY THE CITY COUNCIL:

DRAWING NO.

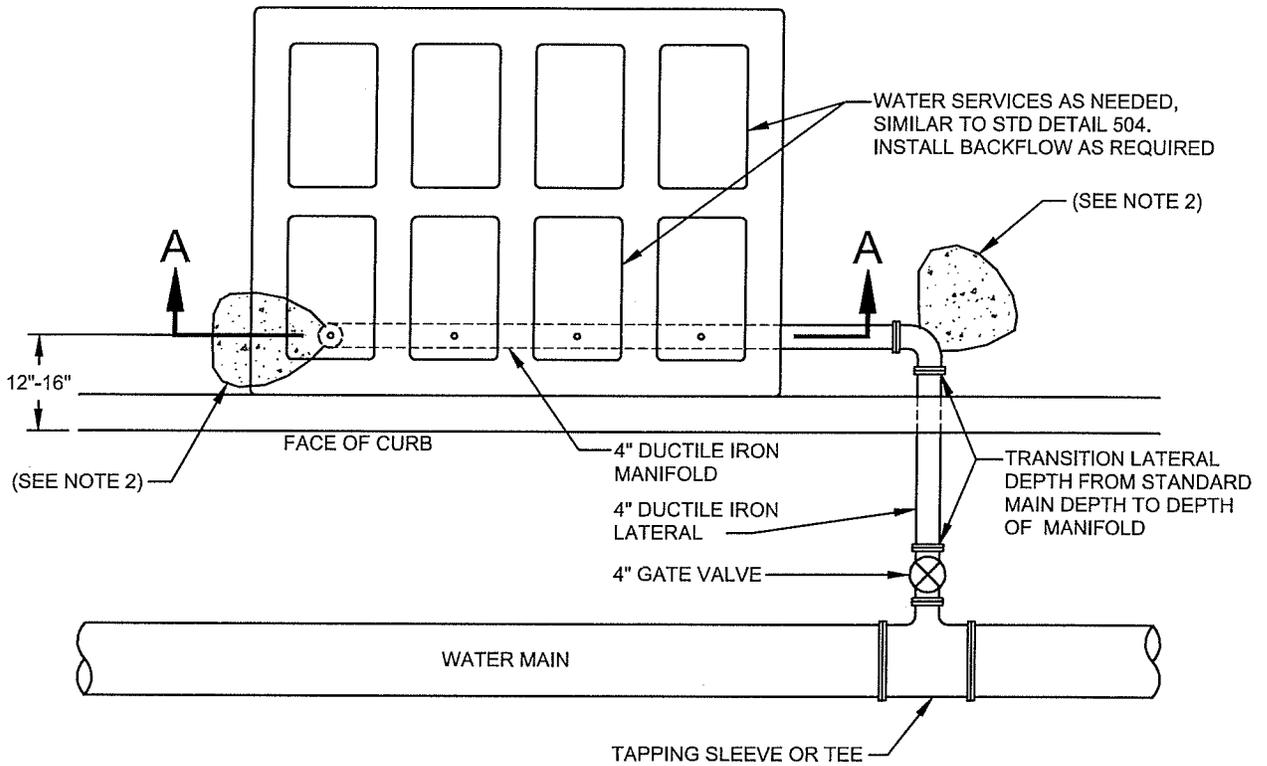
REVISIONS:  
NONE

SECTION:  
WATER

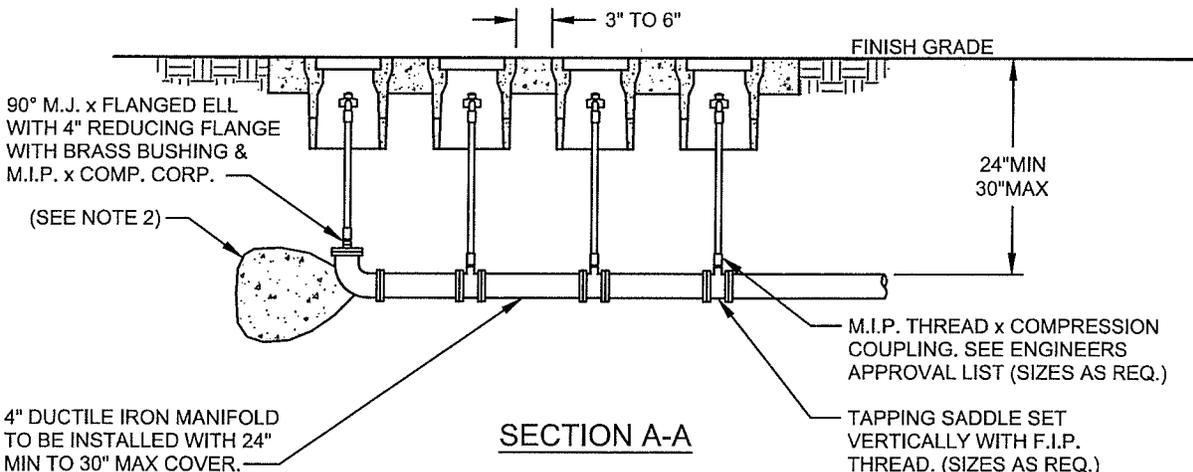
DRAWING NAME:  
528.DWG

2-13-18

528



PLAN VIEW



SECTION A-A

**NOTES:**

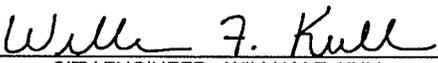
1. THIS STANDARD MAY BE ADAPTED FOR CONNECTION TO A COMBINATION WATER SERVICE PER STD DETAIL 504.
2. RESTRAINED JOINTS ARE REQUIRED FOR ALL NEW CONSTRUCTION FROM GATE VALVE TO END OF 4" MANIFOLD. THRUST BLOCKS ARE ONLY REQUIRED WHERE EXISTING SERVICES ARE BEING MODIFIED AND RESTRAINED JOINTS ARE NOT USED.

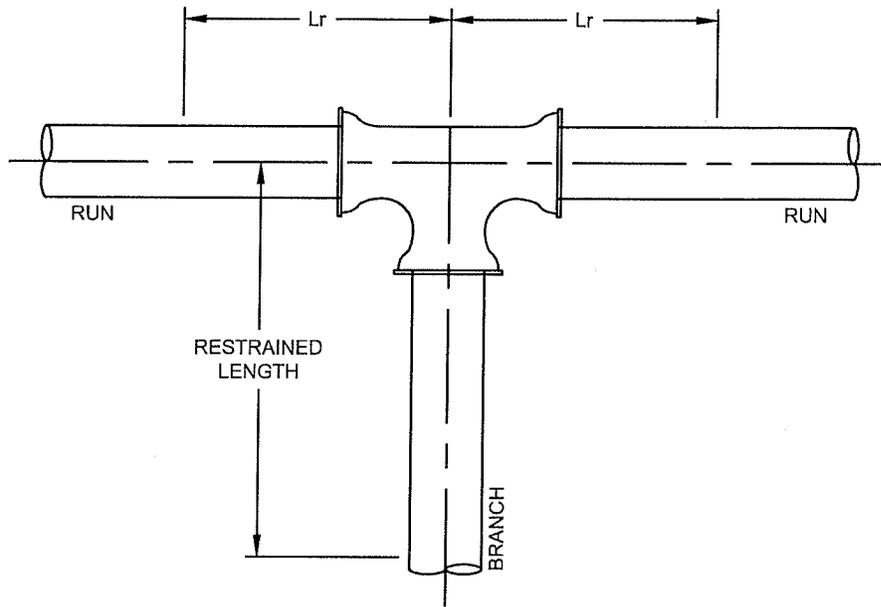
<p><b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS</p>			<p><b>4" DUCTILE IRON</b> <b>MULTI-SERVICE MANIFOLD</b></p>	
<p><i>William F. Kull</i> CITY ENGINEER - WILLIAM F. KULL</p>			<p>ADOPTED BY THE CITY COUNCIL:</p>	
DRAWN BY: GK	DATE: 7/21/15	SCALE: NTS	<p><b>2-13-18</b></p>	<p>DRAWING NO. <b>529</b></p>
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 529.DWG		

## RESTRAINED JOINTS

NOTES:

1. THE LENGTHS OF RESTRAINED PIPE CALLED OUT IN THE FOLLOWING TABLES ARE FOR INSTALLATION OF MECHANICALLY RESTRAINED FITTINGS AND ARE CALCULATED BASED ON THE FOLLOWING PARAMETERS:
  - A. ALL DUCTILE IRON (DI) IS POLYETHYLENE ENCASED.
  - B. THE SOIL TYPE IS "GP" AS DEFINED BY THE UNITED SOIL CLASSIFICATIONS, ASTM STANDARD D2487.
  - C. THE TEST PRESSURE OF THE WATER SYSTEM IS TWO HUNDRED POUNDS PER SQUARE INCH (200 PSI).
  - D. THE TRENCH IS TYPE 5, AS PER ANSI/AWWA C150/A21.5, TRENCH CONDITIONS.
  - E. THE DEPTH OF COVER IS TWO FEET (2').
  - F. THE SAFETY FACTOR SHALL BE 1.5
  
2. IF THE FIELD CONDITIONS VARYING SIGNIFICANTLY FROM THESE PARAMETERS ARE ENCOUNTERED, THE CONTRACTOR SHALL IMMEDIATELY ADVISE THE CITY OF RIVERBANK FIELD INSPECTOR. THE CITY OF RIVERBANK FIELD INSPECTOR WILL ADVISE THE CONTRACTOR OF THE REQUIRED LENGTH OF RESTRAINED PIPE NECESSARY TO MEET THE EXISTING CONDITIONS.
  
3. THE CONSULTANT OR DESIGN FIRM SHALL SPECIFY SOIL TYPE, TEST PRESSURE, TRENCH TYPE, AND DEPTH OF COVER IN THE WATER DISTRIBUTION PLANS. IF THE CITY JUDGES THAT THE REQUIRED RESTRAINED LENGTH EXCEEDS THAT SPECIFIED IN THE TABLES, OR IF THE PIPE DIAMETER EXCEEDS 12", A PROFESSIONAL CIVIL ENGINEER REGISTERED IN CALIFORNIA SHALL PREPARE AND SUBMIT FOR APPROVAL APPROPRIATE RESTRAINED LENGTH CALCULATIONS.

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<h1 style="margin: 0;">RESTRAINED JOINTS</h1> <h2 style="margin: 0;">NOTES</h2>	
 CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 9/28/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 530.DWG	<b>2-13-18</b>	<b>530</b>



**TEES**

THE MINIMUM ATTACHED LENGTH OF PIPE ( $L_r$ ) TO EXTEND IN EACH DIRECTION ALONG THE RUN OF THE TEE SHALL BE A SOLID PIPE WITHOUT JOINTS, FITTINGS, ETC. THE LENGTH OF THE RESTRAINED BRANCH SHALL BE DERIVED FROM THE FOLLOWING TABLE.

TEE SIZE & PIPE MATERIAL	MINIMUM ATTACHED LENGTH OF PIPE ( $L_r$ )												
	0'	2'	4'	6'	8'	10'	12'	14'	16'	18'	20'		
	LENGTH OF RESTRAINED BRANCH												
PVC PIPE	4x4	74'	64'	53'	42'	32'	21'	11'	1'	1'	1'	1'	
	6x4	74'	58'	42'	26'	11'	1'	1'	1'	1'	1'	1'	
	6x6	104'	93'	82'	71'	61'	50'	39'	28'	18'	7'	1'	
	8x4	74'	53'	31'	10'	1'	1'	1'	1'	1'	1'	1'	
	8x6	104'	89'	75'	60'	46'	31'	17'	3'	1'	1'	1'	
	8x8	135'	124'	113'	102'	91'	80'	69'	59'	48'	37'	26'	
	12x4	74'	41'	7'	1'	1'	1'	1'	1'	1'	1'	1'	
	12x6	104'	81'	58'	35'	13'	1'	1'	1'	1'	1'	1'	
	12x8	135'	118'	101'	83'	66'	49'	32'	15'	1'	1'	1'	
	12x12	189'	177'	166'	155'	144'	132'	121'	110'	98'	87'	76'	
	DI POLY WRAP	4x4	112'	96'	80'	64'	48'	32'	17'	1'	1'	1'	1'
		6x4	112'	88'	64'	40'	16'	1'	1'	1'	1'	1'	1'
6x6		157'	141'	124'	108'	92'	75'	59'	43'	27'	10'	1'	
8x4		112'	80'	48'	15'	1'	1'	1'	1'	1'	1'	1'	
8x6		157'	135'	113'	91'	70'	48'	26'	4'	1'	1'	1'	
8x8		204'	187'	171'	154'	138'	121'	105'	88'	72'	55'	39'	
12x4		112'	61'	11'	1'	1'	1'	1'	1'	1'	1'	1'	
12x6		157'	122'	88'	54'	19'	1'	1'	1'	1'	1'	1'	
12x8		204'	178'	152'	126'	100'	74'	48'	22'	1'	1'	1'	
12x12		284'	267'	250'	233'	216'	199'	182'	165'	148'	131'	114'	

**CITY OF RIVERBANK**  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

**RESTRAINED JOINTS**  
**TEE**

DRAWN BY:  
GK

DATE:  
9/28/17

SCALE:  
NTS

ADOPTED BY THE CITY COUNCIL:

DRAWING NO.

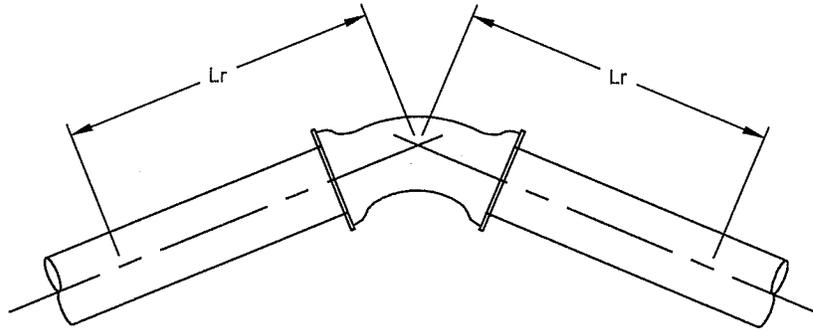
REVISIONS:  
NONE

SECTION:  
WATER

DRAWING NAME:  
531.DWG

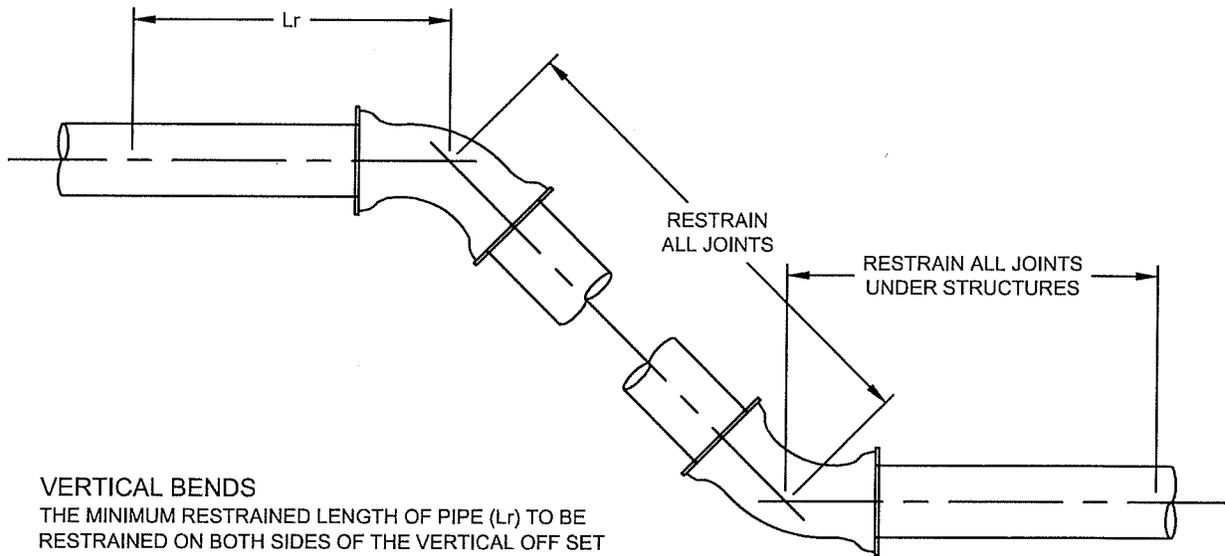
**2-13-18**

**531**



**HORIZONTAL BENDS**

THE MINIMUM ATTACHED LENGTH OF PIPE (Lr) TO EXTEND IN EACH DIRECTION FROM THE HORIZONTAL BEND SHALL BE DERIVED FROM THE FOLLOWING TABLE



**VERTICAL BENDS**

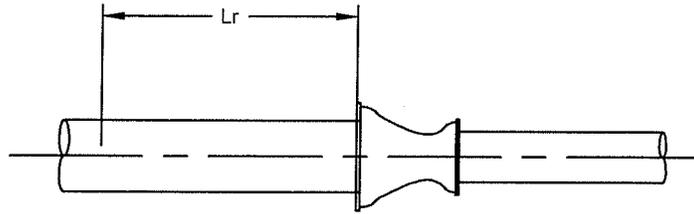
THE MINIMUM RESTRAINED LENGTH OF PIPE (Lr) TO BE RESTRAINED ON BOTH SIDES OF THE VERTICAL OFF SET SHALL BE DERIVED FROM THE FOLLOWING TABLE

PIPE SIZE & MATERIAL	HORIZONTAL BENDS				VERTICAL BENDS				
	11 1/4°	22 1/2°	45°	90°	11 1/4°	22 1/2°	45°	90°	
DIPOLY PVC PIPE	4"	3'	5'	11'	27'	7'	15'	31'	*
	6"	4'	7'	15'	37'	10'	21'	43'	*
	8"	5'	10'	20'	48'	13'	27'	56'	*
	12"	6'	13'	27'	65'	19'	38'	78'	*
DIPOLY PVC PIPE	4"	3'	6'	13'	31'	11'	22'	46'	*
	6"	4'	8'	18'	42'	15'	31'	65'	*
	8"	5'	11'	23'	54'	20'	41'	84'	*
	12"	7'	15'	31'	74'	28'	57'	118'	*

\* NOT RECOMMENDED

<b>CITY OF RIVERBANK</b> DEPARTMENT OF PUBLIC WORKS			<b>RESTRAINED JOINTS</b>  <b>BENDS</b>	
CITY ENGINEER - WILLIAM F. KULL				
DRAWN BY: GK	DATE: 9/28/17	SCALE: NTS	ADOPTED BY THE CITY COUNCIL:	DRAWING NO.
REVISIONS: NONE	SECTION: WATER	DRAWING NAME: 532.DWG	2-13-18	532

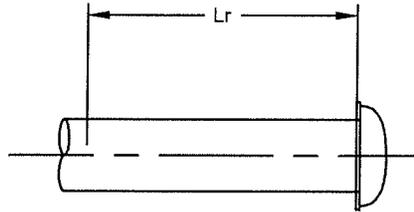
REDUCER SIZE & PIPE MATERIAL		MINIMUM RESTRAINED LENGTH
PVC PIPE	6x4	53'
	8x4	97'
	8x6	56'
	12x4	164'
	12x6	137'
	12x6	100'
DI POLY WRAP	6x4	81'
	8x4	147'
	8x6	85'
	12x4	247'
	12x6	207'
	12x6	151'



### REDUCERS

THE MINIMUM LENGTH OF PIPE ( $L_r$ ) TO BE RESTRAINED ON THE LARGE SIDE OF THE REDUCER SHALL BE DERIVED FROM THE TABLE ABOVE

DEAD END SIZE & PIPE MATERIAL		MINIMUM RESTRAINED LENGTH
PVC PIPE	4	74'
	6	104'
	8	135'
	12	189'
DI POLY	4	112'
	6	157'
	8	204'
	12	284'



### DEAD ENDS

THE MINIMUM LENGTH OF PIPE ( $L_r$ ) TO BE RESTRAINED ON A DEAD END SHALL BE DERIVED FROM THE ABOVE TABLE.

OR CONCRETE MAY BE USED WITH PERMISSION FROM THE ENGINEER.

ALL VALUES SHALL BE CONSIDERED DEAD ENDS IN BOTH DIRECTIONS

CITY OF RIVERBANK  
DEPARTMENT OF PUBLIC WORKS

*William F. Kull*  
CITY ENGINEER - WILLIAM F. KULL

RESTRAINED JOINTS  
REDUCERS & ENDS

DRAWN BY:  
GK

DATE:  
9/28/17

SCALE:  
NTS

ADOPTED BY THE CITY COUNCIL:

DRAWING NO.

REVISIONS:  
NONE

SECTION:  
WATER

DRAWING NAME:  
533.DWG

2-13-18

533