Charles Town Utility Board

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Water System Specifications

April 2015

FORWARD

In the early 1900's water was provided by The Charles Town Water Company, a private water company. The City of Charles Town purchased the system and took over operation and maintenance responsibilities. In 1989, The Charles Town Water Service Area (CTWSA) was created, which included 11.25 square miles in Jefferson County surrounding the cities of Charles Town and Ranson. In 2000, the CTWSA was expanded by the City of Charles Town Utility Board (CTUB) to include over 15 square miles.

The City of Charles Town's and Ranson's population between 1980 and 2000 remained constant with only a 1.8% increase. However, in the past 10 years, with an increase in the amount of commercial and housing developments being constructed, the population has been increasing. Residential developers proposing to provide housing for expanding Washington D.C. area suburbs will lead to another increase in the City of Charles Town population, thus requiring an increase in the water services.

Nearly all of the CTUB's growth, to date, has occurred due to government funded projects constructed to meet public health, environmental, and quality of life needs. However, an increasing amount of private development is occurring and is proposed for the future. DEVELOPERS are petitioning for rights to connect to the utility infrastructure. DEVELOPERS are further petitioning to assume ownership, operation and maintenance of the DEVELOPER constructed new (in some cases, existing) water and sewer infrastructure.

Thus, it becomes necessary for the CTUB, in order to maintain material, to develop uniform standards and procedures. This standardization is also necessary to minimize maintenance, repairs, facilitate operation and management of the CTUB's total system, and to ensure compliance with the regulations of the WV Public Service Commission (PSC), WV Bureau of Public Health (BPH), WV Department of Environmental Protection (DEP), WV Department of Highways, and other regulatory entities particular to a development project.

These DESIGN STANDARDS have been approved by the CHARLES TOWN UTILITY BOARD on April 22, 2015.

Dave Mills, Chairman

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INTRODUCTION

This "Water System Specification" manual is meant to be a user-friendly guide in matters relating to water facilities within Charles Town Utility Board (CTUB) service area and is not all inclusive. Basic policies, standards, and construction requirements of CTUB are set forth herein to aid CTUB employees, contractors and developers, and the general public.

SECTION 1 defines the general requirements for acceptance of developer-furnished water utilities. The CTUB reserves the right to modify these requirements or add additional requirements/conditions which may be deemed necessary by a particular project.

The goal of the CTUB "Water system Specifications" is to set forth a minimum level of quality and to not impose an undue burden on the CTUB's existing or future customers. Should other regulatory agency requirements differ from these specifications, the more stringent shall apply.

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WATER SYSTEM SPECIFICATIONS

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APPLICATION PROCESS / PERMITS / INSPECTION / FEES

1.0 APPLICATION PROCESS

1.1 PRELIMINARY APPLICATION

A. The DEVELOPER shall submit a written request to the CTUB describing the project. The description shall include:

1. Location of project (include City/County road map with project site indicated)

2. Location of proposed connection to CTUB main

3. Number and type of dwelling(s) or facility proposed.

4. Terms of connection proposed

B. CTUB, unless otherwise warranted, shall discuss the application at the next regular meeting. (CTUB meets the 2nd & 4th Wednesday of each month) If, in the opinion of the CTUB, the project appears feasible, the Board will notify the DEVELOPER and forward the DEVELOPER a standard connection agreement form. If, in the opinion of the CTUB, the project does not appear feasible or is not in the interest of the CTUB'S customer base, the Board will notify the DEVELOPER, in writing, of that decision.

2.0 PERMITS AND APPROVALS

2.1 APPLICATION REQUEST

DEVELOPERS requesting connection to the CTUB Infrastructure are responsible for obtaining any and all permits necessary for the intended project and any costs required for the permit. This includes, but is not limited to, the necessary permits from the West Virginia Department of Public Health; the West Virginia Department of Highways; West Virginia Department of Environmental Protection; and/or railroads for pipe line crossings and longitudinal occupancies; etc.

Permits submitted to the West Virginia Department of Public Health for approval must be signed by an official of CTUB. The DEVELOPER is responsible for any permitting fees.

2.2 RIGHTS-OF-WAY AND EASEMENTS

DEVELOPERS requesting connection to the CTUB Infrastructure are responsible for obtaining the rights-of-way and easements that are necessary for the intended project and for the connection to the CTUB's water infrastructure, including rights-of-way and easement from private individuals as well as those from public agencies such as the WV Department of Highways and from corporate entities such as railroads, gas, electric, and telecommunication utilities.

The rights-of-way and easements shall be written so as to facilitate transfer of same to the CTUB.

2.3 INSPECTIONS

The DEVELOPER shall conduct all work in accordance with the rules and regulations of those respective agencies. Any and all inspections and/or flagmen costs incurred and deemed necessary by the governing agencies at any and all locations where work under this project is performed shall be borne by the DEVELOPER.

The use of equipment on state highways and all related construction activities shall comply with the provisions of the West Virginia Department of Highways.

3.0 REVIEW PROCESS

3.1 ENGINEERING

Once the CTUB has approved the project application in principle, the DEVELOPER must submit detailed construction drawings for review. All projects requiring a WV BPH Construction Permit must have the plans signed by a Registered Professional Engineer in the State of West Virginia.

The DEVELOPER will be responsible for the cost of the CTUB in obtaining supplementary Engineering review, if deemed necessary, including any fees associated with Engineering review of the construction drawings.

3.2 NOTIFICATION

The CTUB shall notify the DEVELOPER within fifteen (15) working days of acceptance of the design or, in writing, of review comments requiring follow-up action.

3.3 SCHEDULE

The DEVELOPER shall submit a construction schedule showing dates of commencement and completion of the project prior to work commencing, which schedule shall be updated throughout the construction period on a monthly basis.

4.0 AGREEMENT PROCESS

4.1 DEVELOPER'S AGREEMENT

Concurrent with the design review process, the CTUB and the DEVELOPER must prepare and execute an Alternative Mainline Extension (or Project) Agreement. The agreement must satisfy WV Public Service Commission regulations and other legal requirements. The CTUB hereby establishes the use of the Alternative Mainline Extension Agreement Form (Appendix C) as the basic instrument to be used for all the CTUB – Developer Agreements. The agreement format may be modified accordingly to fit unique projects with approval of CTUB.

A. The DEVELOPER must bear the expense of the CTUB engineering review. Any project proposing a booster pump station or a pressure-reducing vault must have an engineering review.

B. The DEVELOPER shall bear the expense of any legal costs associated with processing the agreement and preparations of deeds, etc. necessary to transfer ownership of the project to the CTUB.

C. The DEVELOPER shall provide, in writing or by signed mainline extension agreement, a one-year warranty of the project beginning at date of transfer of ownership of the project to CTUB.

D. The project's water infrastructure, once completed and accepted by the CTUB, shall become the property of the CTUB.

E. Inspection.

1. The CTUB reserves the right to inspect the project on either a full time or interim basis. If the CTUB provides inspection on a full time basis, the cost of the inspection will be born by the DEVELOPER.

2. Due to the CTUB's limited manpower, resources and operation schedule, the CTUB and DEVELOPER may negotiate the inspection process to an extent acceptable to both parties.

F. Security Deposit.

The CTUB may require a security deposit for projects that require a significant amount of the CTUB'S resources for review, peripheral meetings with other entities/parties, and/or inspection services.

G. Tap Fees

The CTUB will normally set all meters and will assess the PSC approved tap fee and security deposit from the DEVELOPER, homebuilder, homebuyer or party requesting water service. The CTUB shall not charge a tap fee if the service connection is installed by the DEVELOPER under an approved arrangement by the CTUB.

H. Fees

CTUB's website (www.ctubwv.com) contains applicable PSC approved tariff charges for tap fees, Capacity Improvement Capital Cost fee, application for water service, security deposit, etc.

5.0 ASSEST TRANSFER PROCESS

5.1 FIELD COPIES OF CONSTRUCTION INFORMATION

The DEVELOPER shall keep a minimum of one (1) complete copy of the Contract construction plans and specifications (including all revisions and addendums) and all shop drawings issued at the project site. All information shall be kept in a neat and good order and shall be given to the CTUB.

5.2 EQUIPMENT AND WORKMANSHIP GUARANTEE

All pipe material and equipment furnished under the project shall be new and guaranteed by the DEVELOPER and manufactures to be free from defects in design, materials, and workmanship. The DEVELOPER shall replace, without cost to CTUB, any pipe, equipment or materials which prove to be defective or which show undue wear within two years after having been placed in satisfactory operation and accepted by the CTUB. Proper pipe bedding and compaction of subgrade must be maintained to compliment the installation.

5.3 AS-BUILT DRAWINGS

A. The DEVELOPER shall keep one copy of all Contract Documents, including working drawings, at the site, in good order, and annotated to show all changes made during the construction process. These as-built drawings shall be available to the CTUB, kept current during the project, and shall be delivered to CTUB upon completion of the project. In the unlikely event that as-built drawings are not delivered to the CTUB, the DEVELOPER risks release of Bonds.

1. Water Lines

    a. Location of all valves, hydrants and meters with reference ties as needed.

    b. Location of all water line with reference ties as needed.

    c. Length, size and type of all water line installed.

2. Water Tanks

    a. All information necessary to describe location, configuration and composition of facility including utilities, equipment, drains, fencing, roadways and other related items.

3. Existing Utilities Encountered

    a. Location, size and type of utility encountered with reference ties as needed.

    b. Note any repairs made to damaged utilities.

    c. Location, size and type for any relocated utilities with reference ties as needed.

NOTE: Location must be established by shown distances, reference ties, or co-ordinates and not by physical placement on a map alone.

B. The DEVELOPER shall deliver to CTUB CAD files of all the water lines encountered or installed as part of the project. The digital information shall be provided on WV North NAD 83 datum.

WATER SYSTEMS

These Water System Specifications are intended as a reference for integrating a water distribution system and system appurtenances into the Charles Town Utility Board (CTUB) Water System. Where specific types or brands are specified, this is done to maintain uniformity within the CTUB system, minimize maintenance and repair problems, and to facilitate operations.

All water line extensions, booster pump stations, pressure reducing stations and storage tanks will require the review and approval of the CTUB prior to submission to applicable State and Federal agencies for review and approval.

6.0 WATER DESIGN STANDARDS

All distribution systems must be designed in accordance with West Virginia Division of Health "Public Water Systems Design Standards" Title 64, Series 77.

6.1 WATER MAIN DESIGN

A. All distribution systems shall be designed to provide a residential peak demand flow (not including fire flows) in accordance with Table E of 64CSR77.

B. *Pressure* – All water mains, including those not designed to provide fire protection, shall be ANSI/AWWA C900 Class 235 PVC pipe. The system shall be designed to maintain a minimum pressure above twenty (20) pounds per square inch (psi) at ground level at all points in the distribution system under all conditions of flow and thirty (30) psi under static conditions.

C. *Surge Pressure* – All water mains shall be designed to provide adequate strength to withstand water surge pressure. Design shall allow for at least 5 feet per second instantaneous flow velocity change or higher if conditions warrant.

D. *Diameter* – A minimum diameter of six (6) inch water main is required for providing fire protection. Larger size main will be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressures.

E. *Fire Protection* – Under no circumstances shall fire flows be less than two hundred fifty (250) gallons per minute.

F. *Small Mains* – Only in special circumstances, justified by hydraulic analysis and future water use, shall any mains between 2" and 6" in diameter be considered. No mains less than 2" in diameter will be allowed unless connecting to an area where CTUB only has a 2" water main in place.

G. *Hydrants* -- Water mains not designed to carry fire flow protection shall not have fire hydrants.

H. *Dead Ends* – Due to head loss, dead ends shall be minimized by making appropriate tie-ins whenever practical. When not practical to avoid dead ends, a

fire hydrant, flushing hydrant or blow-off will be required for flushing purposes. No flushing devices shall be directly connected to any sewer.

6.2 VALVES

A sufficient number of valves shall be provided on water mains to reduce sanitary hazards and to minimize the customers affected during repairs. Valves shall be located no more than 500-foot intervals in commercial districts and no more than 800-foot intervals in other districts.

6.3 HYDRANTS (See Standard Detail No. W-5)

A. *Location and Spacing* –Hydrants shall be provided at street intersections and at intermediate points between intersections as recommended by the ISO.

B. *Valves and Nozzles* – Fire hydrants shall have a bottom valve size of at least 5", one 4-½" pumper nozzle and two 2-½" nozzles.

C. *Hydrant Leads* – The hydrant lead shall have a bottom valve size of 6", one 4 1/2" steamer and two 2 ½" nozzles.

D. *Drainage* – Hydrant drains shall be provided with a gravel pocket and not located within 10 feet of a sanitary sewer or storm drain.

E. Draining type frost proof yard hydrants are not permitted.

6.4 AIR RELIEF VALVES, VALVES, METER AND BLOW-OFF CHAMBERS

A. *Air Relief Valves* – At high point in the water mains provision shall be made to remove the air by hydrants or air relief valves.

B. *Air Relief Valve Piping* – Use of manual air relief valves is recommended wherever possible.

C. *Chamber Drainage* – Chambers, pits or manholes containing valves, blow-offs, meters or other such appurtenances to a distribution system shall not be connected directly to any storm drain or sanitary sewer. They shall be drained to the surface of the ground where they are not subjected to flooding or to absorption pits underground.

6.5 SAMPLING STATION(S) (See Standard Detail No. W-7)

A. The CTUB reserves the right to require that a sufficient number of sampling stations shall be incorporated into the water distribution system proposed for connection to the CTUB water system.

B. Sampling Stations are particularly necessary if the proposed Water Distribution Project lacks looping.

C. The CTUB shall review the number and location of sampling station(s) and may require revisions in order to ensure operational integrity and regulatory compliance.

6.6 SEPARATION OF WATER MAINS/SANITARY SEWERS

All new water mains shall conform to the West Virginia Bureau for Public Health, Office of Environmental Health Services, Environmental Engineering Division, Public Water System Design Standards 64CSR77 10.7 Separation of Water Mains, Sanitary Sewers and Storm Sewers including:

A. Parallel Installation – Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge.

B. Crossings – Water mains shall cross above sewers and shall be laid to provide a minimum vertical distance of 18 inches between the bottom of the water main and the top of the sewer. At crossings, one full length (20 feet) 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.

6.7 LAWN SPRINKLERS

There is a separate application and fee process for service connections that will include lawn sprinklers. Following application approval, a separate water service will be installed, complete with backflow prevention, on the property.

7.0 MATERIALS

Materials listed in these standards and specifications represent the minimum requirements acceptable for the use by CTUB. Specifically, CTUB has reviewed and consulted the appropriate standards writing agencies with a view to determine what materials most suit the specific design criteria, maintenance needs, and cost requirements of CTUB.

All pipe, fittings, and other related materials used in the construction of lines shall be in full compliance with the written specifications and details of CTUB's latest modifications or revisions.

Where a manufacture's name is used in these specifications, it is used to designate a minimum standard of quality based on the specific design characteristic to the manufacturer specified, not limited to, but including, material quality, flow characteristics, interchangeability, design features, inventory, warranty, maintenance costs, and service.

Equality evaluation shall be determined not solely on whether a product is capable of doing an adequate job, but rather if a product will perform the specific job specified, as well as meeting the additional specific requirements set forth herein.

CTUB will be the sole judge as to whether a product shall be approved as an equal.

Any product not specified in the latest modifications or revisions of CTUB's written specifications and details, must have written approval before shipment to projects within CTUB's jurisdiction.

Representative samples of materials, intended for incorporation in the specifications of CTUB, shall be submitted for examination and/or test.

A written point-by-point detailed comparison to material currently specified shall be submitted with any points of exceptions noted.

Written warranties, along with certifications of material compliances, shall be required for all materials submitted for review.

The DEVELOPER shall allow 15 working days for CTUB to review each submission.

Any product shipped to projects without prior approval shall be deemed unresponsive to CTUB and shall be removed and replaced by approved materials at no cost to CTUB.

Furthermore, any product shipped without prior written approval, shall be disqualified for review for acceptance.

7.1 PIPES AND PIPE FITTINGS

Special attention shall be given to selecting pipe materials that will protect against both internal and external pipe corrosion. Pipes containing more than eight percent (8%) lead shall not be used.

A. Ductile Iron (DIP):

1. Ductile iron pipe shall be manufactured in accordance with the requirements of ANSI/AWWA C151/A21.5. Push-on joints and mechanical joints for such pipe shall be in accordance with ANSI/AWWA C111/A21.11.

2. Pipe thickness shall be designed in accordance with ANSI/AWWA C150/A21.50 and shall be based on laying conditions and internal pressure.

3. Wall thickness for 3” to 12” shall be CL52, 350 psi working pressure

4. Wall thickness for 14” to 24” shall be CL51, 350 psi working pressure (to 20 inch diameter)

6. Pipe shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4 double-lined.

7. Laying lengths shall be either 18’ or 20’ nominal lengths.

8. Pipe larger than 12” shall be shipped with an appropriate percentage of fully gauged pipe to facilitate fitting requirements.

9. Ductile iron for use as restrained joint shall be mechanical joint pipe using wedge action restraining glands. Pipe shall be used as indicated on drawing or details.

B. Flanged Ductile Iron Pipe:

1. Flanged ductile iron pipe shall be manufactured in accordance with ANSI/AWWA C115/A21.15 and have a minimum wall thickness of Class 53.

2. Flanges shall conform to Class 125 lb. as shown in ANSI B16.1.

3. Bolt circle and holes shall be compatible with Class 125 B16.1 or Class 150 ANSI B16.5 (steel) flanges.

4. Flanges requiring greater pressures, Class 250 to Class 350, shall meet the appropriated standards with the requirements indicated on the contract drawings.

5. Unless otherwise shown on the drawings, pipe shall be cement mortar lined in accordance with the requirements of ANSI/AWWA C104A21.4 standard.

6. All fabricated flange piping in sizes 3" to 24" shall be manufactured from components manufactured of ductile iron and must meet all the requirements listed above.

7. Flange pipe shall have an outside coating or primer.

8. Flange Bolt Kits:

a. Flange bolt and gasket kits shall be furnished for each flange joint connection.

b. Flange gaskets shall be full face red rubber with a minimum thickness of ⅛" conforming to ANSI A21.11. Gaskets shall be manufactured of styrene butadiene rubber.

c. Flange bolts shall be manufactured of carbon steel per ASTM A307, or 304 stainless steel.

1). *Bolts:* ANSI B18.2.1.

2). *Nuts:* ANSI B18.2.2.

C. Polyvinyl Chloride Pipe (PVC) 4" – 12" Diameters:

1. Pipe: ASTM D 2241, ASTM D 1784, AWWA C900, AWWA C111, UNI-B-1. Must meet U.L. and F.M. Standards.

a. Pipe shall have a 3:1 safety factor in each respective pressure lass and conform to the following pressure rating and DR's:

1) Pressure Class 235 psi., DR 18

b. Pipe Joints: Push-on or compression type, joint performance ASTM D 3139, rubber gasket suitable for potable water service ASTM F 477.

c. Each joint of pipe shall be hydrostatically tested at the factory before shipment.

d. Certifications of Compliance of the above specifications and standards shall be required from the manufacturer before acceptance of delivery or award of contract.

D. Polyvinyl Chloride Pipe (PVC) 2" Diameter, SDR 13.5

1. PVC pressure pipe shall be manufactured to steel pipe size (IPS) outside dimensions with DR's and tolerances in compliance with ASTM D2241 PVC plastic pipe, DR, PR.

2. Pipe shall be manufactured to steel pipe O.D.'s (IPS) in sizes 2". Pipe shall be joined by means of a rubber ring bell joint, which shall be an integral and homogeneous part of the pipe.

3. Pipe shall conform to all requirements of ASTM D2214 for PVC pipe.

4. Pressure rating and class shall be as indicated on drawings. If drawings do not show class, the highest class shall be required.

5. Pipe shall have a 2 to 1 safety factor with class and SDR's as follows:

a. Pressure Class 315, SDR 13.5

6. When used for potable water systems, pipe shall bear the N.S.F. seal and the following ASTM's shall be required:

a. ASTM D1784 PVC compound.

b. ASTM D2214 PVC standard specifications.

c. ASTM D3139 joints for PVC pressure pipe.

d. UNI-B-1 thermoplastic pipe joints.

7. Certificates of compliance of the above specifications shall be required from the manufacturer before acceptance of delivery or award of contract.

8. 2" ductile iron push joint fittings as manufactured by Harco Corp., or approved equal.

E. Mechanical Joint Fittings

1. Mechanical joint fittings in sizes 3" to 24" shall meet the requirements of AWWA C153.

2. Fittings shall be manufactured from a high strength, impact resistant ductile iron, having a minimum tensile of 70,000 psi with a minimum yield of 50,000 psi and a minimum elongation of 5%.

3. Fitting wall thickness shall be CL54 through 24" diameters and CL56 through 24" diameters.

4. Fittings shall be rated at 350 psi.

5. All fittings shall be cement-lined in accordance with ANSI A21.4 – AWWA C111- latest revision.

6. All joint accessories, glands, bolts and gaskets shall conform to ANSI A21.11 – AWWA C111 – latest revision.

7. All fittings shall be listed with Underwriters Laboratories (U.L.).

8. Where fittings are to be used with PVC piping systems, appropriate gaskets shall be furnished if required.

9. Hydrant locking tees will be required for hydrant connections.

10. Pipe and fittings are preferred to be manufactured domestically.

11. Where fittings are to be used with PVC piping systems, appropriate gaskets shall be furnished, if required.

12. Hydrant locking tees will be required for hydrant connections.

13. Fittings shall be as manufactured by Tyler/Union or approved equal.

F. Flanged Fittings:

1. Flanged fittings in sizes 3" to 24" shall be manufactured in accordance with ANSI/AWWA C110 A21.10 or to ANSI B16.1.

2. Fittings shall be manufactured of ductile iron and rated for 250 psi water working pressure.

3. All elbows or bends (straight sizes), tees, crosses, concentric reducers, base elbows (except reducing sizes), and bottom base tees shall be manufactured to ANSI/AWWA C110/A21.10 standards.

4. Long radius and reducing elbows, reducing on-the-run tees, size outlet fittings, eccentric reducers and laterals are in accordance with ANSI B16.1.

5. All fittings shall be drilled and faced for 125 lb. drilling pattern, unless otherwise shown on drawings.

6. Fittings shall have cement mortar lining, except for air piping.

7. Fittings shall have a primer coating.

8. Flanged fittings shall be manufactured by Tyler/Union and shall be in strict accordance with the above specifications.

G. Brass Fittings – **All brass must comply with requirements of Federal Senate Bill S3874, effective January 1, 2014 for "no lead" brass**.

1. All threaded fittings for buried service shall be manufactured from brass, meeting ANSI B16.15 specifications.

2. Brass fittings shall be so designed and manufactured to provide full flow with minimum restrictions.

3. All threads shall be accurately machined and gauged to insure a perfect fit with pipe.

4. Nipples shall be available in various lengths as required.

H. Infact Foster Adapters:

1. Mechanical joints (MJ) valves and fittings shall be connected using a bolt-through positive restraint mechanism manufactured of USA ductile iron, conforming to ASTM A536- 80-55-06.

2. The positive restrain device shall connect the valves and/or fittings at a linear distance not to exceed 1 ½" and without attachment to pipe.

3. The device shall come complete with all accessories, including standard styrene butadiene rubber (SBR) MJ gaskets conforming to the latest revision of AWWA C111/ASTM F-477 and weathering steel (corten) bolts conforming to AWWA C111/A21.11 and ASTM A242. Nuts for 4 through 12" sizes shall be SAE grade 2 steel with black oxide coating. Nuts for 16" and larger adapters shall be heavy hex corten steel conforming to ASTM A242.

4. Sizes 4-12" of the bolt-through MJ positive restraining device shall be supplies with an NSF 61 asphaltic seal coating in accordance with ANSI/AWWA C104/A21.4. Sizes 16-24" shall be supplied with NSF 61, 5 mil., fusion bonded epoxy. The device shall be used with standard mechanical joint fittings (AWWA C110 or C153) valves. The device shall be Infact Corporation foster adapter or equal.

I. Tapping Sleeves:

1. Mechanical Joint Tapping Sleeves

a. Tapping sleeves shall be the split type mechanical joint ductile iron with side and end gaskets and be rated for 250 PSI.

b. Sleeves shall conform to all applicable requirements of ANSI/AWWA C110 A21.10, ANSI/AWWA C111 A21.11, and ANSI B16.11 Class 125 Flange.

c. Sleeves shall be for application on cast, ductile iron, or transite as required.

d. Field verification of existing pipe's outside diameter shall be required before ordering said sleeve.

e. Sleeves shall be similar to those manufactured by American Flow Control, or approved equal.

2. Stainless Steel Tapping Sleeves

a. Stainless Steel tapping sleeves shall be manufactured of 304 heavy gauge stainless steel.

b. Sleeve shall be a split type tig welded and fully passivated. It shall have a two-piece design featuring tig welded 304 S.S. 5/8 N.C. thread and heavy stainless steel hex nuts and bolts.

c. Bolt threads shall be coated to prevent galling, and be tig welded to prevent loss. Sleeve shall have a S.S. lifter bar allowing a positive locking hold and easy assembly.

d. Sleeves shall incorporate a full circumferential gasket seal for positive pressure sealing. The gasket shall be of virgin SBR compound for water service.

e. Sleeve shall be applicable for installation on A.C., PVC SDR sizes, PVC C900 sizes, ductile iron, or cast iron piping systems.

f. A ¾" N.P.T. test plug for test shall be incorporated in each sleeve.

g. Flanges shall be manufactured of carbon steel.

h. Stainless steel sleeves shall not be permitted on size on size taps, only mechanical joint tapping sleeves will be allowed on size on size applications

i. Sleeves shall be as manufactured by Ford Meter Box Co., Fast Series, or equal.

j. Tapping sleeves for other applications shall be approved by the CTUB for the project.

J. Service Line: – **All brass must comply with requirements of Federal Senate Bill S3874, effective January 1, 2014 for "no lead" brass**.

1. Installed Underground - Copper Tubing

a. Tubing: ASTM B88 type K annealed.

b. Joints: Compression.

c. Fittings: Compression - Cast Copper Alloy Compression Tube Fittings ANSI B16.26.

2. Installed Underground – PE Pipe

a. Service tubing in sizes ¾" through 2" shall be polyethylene tubing, conforming to all applicable requirements in the latest revision of the following standards:

1) Polyethylene extrusion compound from which the tubing is extruded shall comply with the applicable requirements for PE-3408 high molecular weight polyethylene material as described in ASTM D2737.

2) Polyethylene tubing shall be rated for use with water at 73.4 degrees Fahrenheit at a hydrostatic design stress of 800 psi and a maximum working pressure of 200 psi, SDR-9 copper tube size (CTS-OD) ASTM D3035.

3) The tubing shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions or other defects. It shall be uniform in color, opacity, density and other physical properties.

4) Furnish a certification from the manufacturer of the tubing that the manufacturer is fully competent and capable of extruding PE tubing of uniform texture and strength that will fully comply with the properties specified herein.

5) Tubing shall be manufactured with consistent outside diameters to insure the compatibility of AWWA C800 service line fittings.

6) Tubing intended for water service should be buried at least 12" below the maximum expected frost penetration.

7) Backfill materials with particle size recommended in ASTM-D2774 should be used and compacted per that standard.

8) Tubing shall be as manufactured by Crestline or approved equal.

9) Wherever feasible, service lines shall be one continuous piece from the corporation stop to the meter setting.

10) Service Line Casings: All service lines under roadways and driveways are to be installed within PVC Schedule 40 Casing Pipes with spacers if necessary. Casing sizes are as follows:

Service Line Diameter	Casing Diameter (ID)
5/8"	2"
3/4"	2"

1”	4”
1 – 1/2"	4”
2”	4”

11) Brass Service saddles for PVC pipe shall conform to AWWA C800. – **All brass must comply with requirements of Federal Senate Bill S3874, effective January 1, 2014 for “no lead” brass**.

a) They shall be machined to rigid specifications and allow ample width to provide greater distribution of clamping pressure to avoid deforming of the pipe.

b) Bronze saddles in sizes 4” through 8” shall be designed as a single unit with the upper and lower casting permanently hinged together with a silicon bronze pin. The tightening device of the saddle shall be a slotted hex head silicon bronze bolt as to prevent over-torque with the lower casing being tapped.

c) Bronze saddles in sizes 10” through 12” shall be designed as a two piece unit with the upper and lower castings bolted together using silicon bronze bolts with the lower casting tapped for bolting.

d) Outlet taps shall be ¾” through 2” having CC type threads.

e) For PVC pipe 2” through 12” S 90 Series saddles as manufactured by Ford Meter Box Co., Inc. or equal. S70 Series for 2”, S90 Series for 4” through 12”.

K. Ball Curb Stops – **All brass must comply with requirements of Federal Senate Bill S3874, effective January 1, 2014 for “no lead” brass**.

1. Curb stops in sizes ¾” through 2” shall be the ball type manufactured from water works brass conforming to AWWA C800.

2. The ball shall be fluorocarbon coated brass, seating against Buna-N-Rubber seats.

3. Valves shall be water tight against flow in either direction.

4. The stem shall be held in place by a bronze ring and shall exert no other force on it, except to open or close the ball valve.

5. Each valve shall have a substantial T-head for the operation of opening and closing with a ¼ degree turn of a standard slotted tee handle curb wrench.

6. Stops or lugs for controlling the motion of the T-head shall be enclosed and properly positioned to line up the waterway through the ball with the water passage through the valve body.

7. Stem seals shall consist of two (2) O-rings.

8. 1½" and 2" curb valves shall be capable of being fitted with a 2" operating nut to accommodate standard tee handle valve keys.

9. When curb valves are used as blow-off valves, the end connections shall be FITP (Female Iron Pipe Thread).

10. Ball curb valves shall be manufactured by Ford Meter Box Co, Inc. or equal.

11. Curb Extension Stems:

    a. Curb extension stems for curb stops ¾" to 2 ½" shall be fabricated using high tensile ductile iron end pieces and .625 diameter steel rod.

    b. The end pieces shall be factory welded with the top piece welded in a position to indicate as to whether the valve is opened or closed. Each stem shall be supplied with a 2" diameter alignment washer welded approximately 3 ½" below the top piece. Stems shall be 2' in length.

    c. Curb extension stems shall be as manufactured by the General Engineering Co, Frederick, MD.

L. Corporation Stops: – **All brass must comply with requirements of Federal Senate Bill S3874, effective January 1, 2014 for "no lead" brass**.

1. Ball corporation stops shall be of the ball valve type. The ball, stem, nut and body shall be of a red brass conforming to AWWA C800. The ball shall be fluorocarbon coated and shall be held in position by, and seal against, seats of Buna-N rubber seats shall be secured in place by an epoxy adhesive.

2. Corporation stops shall be designed to create minimum resistance to flow. The waterway shall be no smaller than the nominal size of the valve. Valves shall be watertight at any pressure up to 300 psi.

3. Each stop shall be designed so that they may be installed in mains under pressure using standard tapping machines.

4. Corporation stops in sizes ¾" to 2" shall be available from the same manufacturer. FB1000-3QNL, FB1100-7QNL or FB1600-QNL ARV.

5. Corporation stops shall have threads conforming to the AWWA Standard C800. The inlet threads shall be AWWA. The outlet connections shall be compression pack joint copper.

6. Ball-Corp corporation stops shall be manufactured by the Ford Meter Box Co, Inc. or equal.

M. Detectable Warning/Marker Tape:

1. Composition of detectable wiring tape shall consist of .50 mil. thick, solid core, encased in a reinforced protective plastic jacket that is resistant to alkalis, acids, and other destructive elements commonly found in soil. Overall thickness shall be 4.5 mil. nominal and a width of 6 inches.

2. Color shall be bright blue with printed black letters on one side stating CAUTION WATER LINE BURIED BELOW.

3 Tape shall be 6-inch detectable tape as manufactured by Allen Systems, Pro-line, or equal.

4. Tape shall be installed 12 to 18 inches below ground. This tape shall be installed in conjunction with main lines including service connections. (See Standard Detail No. W-9)

N. Mechanical Joint Restraints

1. Mechanical Joint Restraint for ductile iron fittings and pipe shall be incorporated in the design of the follower gland. Said gland shall include a restraining mechanism which, when actuated, imparts multiple gripping/wedging surfaces against the pipe which increases its resistance as pressure increases.

a. Glands shall be designed to allow flexibility of pipe joints after installation and backfill.

b. Glands shall be manufactured of ductile iron, conforming to ASTM A536-80.

c. Restraining devices shall be of ductile iron, heat-treated to a minimum hardness of 370 BHN.

d. Dimensions of gland shall be such that it can be used with the standardized mechanical joint bell with tee-head bolts conforming to ANSI/AWWA A21-11/C111, and ANSI/AWWA A21.53/C153 latest revision.

e. The design shall incorporate twist-off nuts to insure proper torque upon installation, leaving hex head nut for disassembly if required.

f. The mechanical joint restraining device in sizes 3" through 16" shall have a working pressure of 350 psi, with a safety factor of two to one.

g. In sizes 18" through 48", the working pressure shall be 250 psi with a two to one safety factor.

h. Glands shall have U.L. listing through 24" in size, and factory material approval through 12".

i. Restraining glands shall be as manufactured by EBAA Iron Mega Lugs, 2000 or 1100 Series, or Ford Meter Box Series 1400 or equal.

j. All ductile iron pipe installed in stream crossings and within steel casing pipe shall be mechanical joint pipe with mechanical joint restraint.

2. Mechanical Joint Restraint for PVC Pipe, using mechanical joint fittings, shall be incorporated in the design of the follower gland.

a. The restraint mechanism shall consist of a plurality of individually activated gripping surfaces to maximize restraint capability.

b. Glands shall be manufactured of ductile iron conforming to ASTM A536-80.

c. Dimensions of the glands shall be such that it can be used with to ANSI/AWWA A21.11/C111 and ANSI AWWA A21.53/C153 of latest revision.

d. The design shall incorporate twist-off nuts to insure proper torque upon installation, leaving hex head nut for disassembly if required.

e. The mechanical joint restraining device in sizes 4" through 14" shall have a working pressure of 150 PSI with a two to one safety factor.

f. In sizes 16" through 24" the working pressure shall be 100 PSI with a two to one safety factor.

g. Restraining glands shall have a pressure rating equal to that of the PVC pipe on which it is used and shall be EBAA iron, Inc. mega lug 2000 or 1100 Series, or Ford Meter Box 1500 AND 1300 Series or equal.

7.2 WATER METER ASSEMBLY (See Standard Detail No. W-1)

Water meter assemblies shall be supplied and installed by the CTUB. Equipment supplied by the CTUB includes:

- Pressure Reducing Valve (only if required)
- Polyethylene Meter Box
- Meter Box Cover
- Coppersetter (only if required)
- Check Valve
- Water Meter
- **All brass material must comply with requirements of Federal Senate Bill S3874, effective January 1, 2014 for "no lead" brass**.

7.3 COMBINATION AIR VALVE AND VAULT (See Standard Detail No. W-2)

A. Combination air, release air and vacuum valves shall be manufactured of cast iron per ASTM A48 Class 35. Leverage frame seat and float shall be of stainless steel per ASTM A240. Valve shall be designed to release air from the line automatically during filling and operation, and to allow air into lines to prevent a vacuum. Valve shall meet AWWA C512 Standard. Valve construction as follows:

1. Valve Bodies and Covers: Cast iron, ASTM A 126, Class B.

2. Inlet Sizes: 1 inch (for 8" water lines and smaller);
2 inch (for 10" water lines and larger)

3. Outlet Size: 1 inch, NPT. (for 8" water lines and smaller)
2 inch, NPT. (for 10" water lines and larger)

4. Maximum Working Pressure: 150 psi.

5. Orifice Button: Stainless Steel and Buna-N, Nitrile Rubber ASTM SB 800.

6. Valve Floats: Stainless Steel, ASTM A 240.

7. Valve Orifice Seat: Buna-N, Nitrile Rubber, ASTM SB 800.

8. Float arm and retainer and guide shaft: Stainless Steel, ASTM A 276.

9. Acceptable Manufacturers:

a. Val-Matic Valve and Manufacturing Corp.; Model No. 201C or equal.

B. Combination Air Valve Vault

1. Precast Reinforced Manhole Components: Refer to “Manholes”, Section 2.2.2 under Sewer Specifications.

7.4 VALVES

A. General:

1. Provide valves of the same type by same manufacturer; suitable for the intended service.

2. Markings shall be cast on the bonnet or body of the valve indicating manufacturer's name or mark, the year the valve casting was made, the size of the valve, designation of working water pressure, and material of manufacturer.

3. Pressure-temperature ratings of valve shall be not less than the design criteria applicable to the system components.

4. Valve shall open to the left (counterclockwise). Valve shall be operated by hand wheel or operating nut. Operating wheel shall have cast thereon an arrow indicating the direction of opening.

5. During CTUB’s review, CTUB may require additional valves.

B. Gate Valves - Ductile Iron

Gate Valves in sizes 2" through 30" shall be manufactured to meet, and or exceed, all the requirements of AWWA C515 for resilient seated ductile iron gate valves.

Valves shall include the following specific design criteria:

1. Valve body shall be manufactured of ductile iron and have a working pressure of 250 PSI in all sizes.

2. All ferrous components shall be ductile iron, body, wrench nut, stuffing box, and valve wedge.

3. The words “DI” or “Ductile Iron” shall be cast into the valve body along with “250W” or 250 PSI”.

4. The valve wedge shall be ductile iron, encapsulated with nitrile rubber, in sizes 2" through 12", SBR rubber sized 14" through 24", and EDPM in 30". The wedge shall be symmetrical and seal equally well with flow in either direction.

5. Valves shall have a fusion bonded epoxy coating inside and out for maximum corrosion resistance, complying with ANSI/AWWA C550 applied electrostatically prior to assembly.

6. The valve shall have a smooth full diameter waterway with no recesses to trap debris or obstruct flow.

7. Valve stem shall be high strength corrosion resistant bronze. Stem shall be sealed by three O-rings. The top two O-rings shall be replaceable with valve fully open and while subject to full rated working pressure. O-rings set in a cartridge shall not be allowed.

8. Sealing gaskets shall be pressure energized O-rings.

9. Torque minimizing thrust washers located with (1) above and (1) below the thrust collar, assuring trouble free operation of the valve.

10. Gate valves in sizes 4" through 12" shall conform to U.L. Underwriters laboratories listed, and F.M. Factory Mutual Research Corporation approved.

11. Valves shall be NSF standard G1 Certified.

12. Bolting materials shall develop the physical strength requirements of ASTM A307, and may have either regular square or hexagonal heads with dimensions conforming to ANSI B18.2.1. Metric size socket head cap screws therefore are not allowed. Exposed bolts and nuts shall be 304 stainless steel.

13. Operating nut shall have four flats at stem connection to assure even input torque to the stem.

14. Flanged valves in sizes 3" through 12" shall be O S & Y 125 LB. Flanges. Manufacturer shall be able to furnish 250 LB. Flanges if required.

15. Valves 16" and larger shall have an enclosed gear case. Design shall be of the bevel or spur gear type, dependent upon the depth of bury and installation conditions of the valve.

16. Valves and hydrants can be by different manufacturers but preferred to be from the same manufacturer.

In addition to all the above requirements, the pressure ratings and specifics of the above conditions must be published in the manufacturer's catalogs. The manufacturer must have been in the valve manufacturing business for a period of at least twenty (20) years, and have a ten (10) year warranty against defective material and workmanship.

Valves shall be American Flow Control, Series 2500 Ductile Iron Resilient Wedge Gate Valves, or approved equal.

CLOW valves will not be considered “or equal”.

C. Swing Check Valves

1. Swing check valves in sizes 4” through 12” shall be manufactured in accordance with AWWA C508 resilient seated design. Valves shall be manufactured of ductile iron meeting or exceeding ASTM A536 65-45-12 and rated for 250-psi cold water working pressure.

2. Valves shall have a ductile iron disc fully encapsulated with Buna-N-Rubber. The disc travel to closure shall not be more than 35 degrees and shall seal drop tight at pressures above 5 psig.

3. Valves shall be coated with fusion bonded epoxy on all internal and external ferrous surfaces. The valve shall be so designed as that the disc shall be only allowable moving part and said disc shall be reversible so either side will seal equally. The valve shall have 100% unobstructed flow area free of pockets and voids.

4. A factory installed back flushing actuator can be furnished as an option for priming pumps, back flushing, draining lines, and system testing. Options shall be shown on drawings and or bid items.

5. Valves shall be equal to American Flow Control, Series 2100 Ductile Iron Resilient Seated Check Valve, or approved equal.

D. Valve Extension Stems:

1. All valves buried in excess of 5'0" shall have extension stems extending to within approximately one foot of finished grade.

2. Valve extension stems shall be factory assembled using a .875" diameter hot rolled steel rod meeting ASTM A-36-84A. The top and bottom piece shall be 2" squared to accommodate the valve and the valve-operating wrench.

3. These pieces shall be of high tensile ductile iron, factory pinned, and welded in place.

4. Stems shall be furnished with open left, open right drop in indicator to fit top piece. Bottom piece shall be furnished with two stainless steel set screws to lock on valves.

5. The stem shall also be fitted with a steel alignment ring to position the stem in the center of the valve box. This ring shall be positioned approximately 10" from the top of the stem.

6. Stems shall be coated with asphaltum paint.

7. Bonnet bolts and nuts shall be 304 stainless steel.

E. Tapping Valve:

1. Resilient seated.

2. Raised male face on flanged end for bolting to sleeve.

3. Mechanical joint with slotted holes for bolting to tapping machine.

F. Valve Boxes:

1. Valve boxes for valves 3" through 24" shall be manufactured of cast iron with a minimum wall thickness of ¼". The clear shaft openings shall not be less than 5 ¼".

2. Cover shall be marked WATER.

3. Lids shall be drop type, adjustable from 24" x 36" or 36" x 48" as required. When greater depths are encountered, the use of middle piece extensions shall be required.

4. Boxes shall be of the two piece design with a round bottom.

5. All pieces shall have a protective coating of coal tar epoxy.

6. Valve boxes shall be screw type adjustable as manufactured by Tyler Pipe.

G. Valve Boxes (1½" through 3"):

1. Valve boxes for valves 1½" through 2" shall be manufactured of cast iron and have minimum wall thickness of ¼". The clear shaft opening shall not be less than 4 ½".

2. Valve cover shall be marked WATER.

3. Lids shall be drop type, adjustable from 36" x 48" as required. When greater depths are encountered, the use of middle piece extensions shall be required.

4. Boxes shall be of the two piece design with an arched bottom.

5. All pieces shall have a protective coating of coal tar epoxy.

6. Valve Boxes shall be screw type adjustable as manufactured by Tyler Pipe.

H. Blow Off

Blow off valves shall not be installed.

7.5 FIRE HYDRANTS (See Standard Detail No. W-5)

A. All fire hydrants shall conform to AWWA C502-85 for Dry Barrel Fire Hydrants as stated in an Affidavit of Compliance to be furnished by the hydrant manufacturer. Hydrants shall have two 2 ½" and one 4 ½" nozzles with standard threads conforming to NFPA No. 194. Operating valve shall be 5 ¼ " nominal diameter with bronze to bronze valve seats. "O" ring seals shall completely isolate valve stem threads from hydrant barrel area. Hydrant main valve and movable parts of drain valve shall be accessible without excavation. Hydrant shall be painted red in color and open left.

B. All fire hydrants shall have a 4' minimum bury and shall extended to ground level. No variation in water main depth shall be allowed to accomplish proper setting of fire hydrants. The DEVELOPER shall be responsible for the proper height of all fire hydrants by installing appropriate extensions.

C. Hydrants shall be dry barrel, compression type, and traffic model of break-a-way design.

D. The main valve closure shall be of the compression type, opening against the pressure and closing with the pressure.

E. Traffic feature to be designed so that the nozzle section of the hydrant can be rotated (by degree) to full 360 degrees circle during field installations if necessary.

F. The main valve opening shall not be less than 5¼" and be designed so that removal of seat, drain valve mechanism, internal rod, and all working parts can be removed through top of hydrant, without disturbing the ground line joint or the nozzle section of the hydrant.

G. Bronze to Bronze. The bronze seat shall be threaded into mating threads of bronze for easy field removal.

H. The draining system of the hydrant shall be bronze, and activated by the main stem without the use of auxiliary rods, toggles, pins, etc. The drain mechanism shall be completely closed after no more than three turns of the operating nut in the opening direction, allowing throttling of hydrants as needed. A minimum of two inside ports and four drain port outlets to the exterior of the hydrant, insuring positive drain when closed. Drain shut-offs shall be by direct compression closure.

I. The operating nut, main stem, coupling, and main valve assembly shall be capable of withstanding input torque of 200 ft/lbs in opening or closing directions.

J. Dry Top. There shall be an internal top housing with triple O-rings to seal operating threads from the waterway and accommodate an anti-friction washer.

K. Nozzle section of hydrants shall be designed to permit field replacement of damaged threads without special tools, excavation, or disturbing the ground line

joint. Bronze nozzles are to be locked into the hydrant barrel with locking lugs, and be sealed by heavy-duty O-rings. Threading of hose and pumper nozzles shall conform to NST Specifications. Operating nut shall conform to NST Specifications.

L. Hydrants shall comply with both Factory Mutual Research Corporation, and Underwriters Laboratories U.L. 246 standards.

M. Friction loss through hydrant shall not exceed 2.0 PSI at 1000 GPM through the pumper nozzle. Above flow test and certification of this feature shall be conducted by an independent testing laboratory and be in accordance with AWWA C502, latest revision.

N. All below ground portions of hydrants (barrel & shoe) shall be manufactured of ductile iron. Ground line extensions shall be available in 6" increments through 36". Shoe bolts shall be stainless steel. Shoe shall be epoxy coated.

O. Hydrant lead pipe shall be CL 52 Tyton Joint ductile iron pipe double cement lined.

P. Hydrants shall be B-62-B as manufactured by American Flow Control, or approved equal. Valves and Hydrants must be of the same manufacturer. CLOW hydrants will not be considered “or equal”.

Q. Ground line joint shall be set 0.25 feet above finished grade.

R. During CTUB’s review, the location and quantity of hydrants may be adjusted.

7.6 SAMPLING STATIONS (See Standard Detail No. W-7)

A. Sampling stations shall conform to the Eclipse No. 88 Specifications as manufactured by the Kupferle Foundry, St. Louis, MO, or equal.

B. No. 88 Specifications

1. Sampling stations shall be 42” bury, with a ¾” FIP inlet, and (¾” hose or unthreaded) nozzle. All stations shall be enclosed in a lockable nonremovable, aluminum-cast housing.

2. When opened, the station shall require no key for operation, and the water will flow in an all brass waterway.

3. All working parts will also be of brass and be removable from above ground with no digging. Exterior piping shall be galvanized steel (brass pipe also available).

4. A copper vent tube will enable each station to be pumped free of standing water to prevent freezing and to minimize bacteria growth.

8.0 CONSTRUCTION

8.1 WARNING LIGHTS, BARRICADES AND SIGNS

A. Suitable and adequate barricades shall be erected and properly maintained by the DEVELOPER at all times during the course of construction work clearly and properly caution and protect traffic and pedestrians from open excavations, unstable filled areas, obstructions and other hazards directly or indirectly resulting from the construction.

B. Warning signs, barricades, and handrails shall be erected and sufficient high intensity warning lights shall be located for use at night and at other times when visibility is poor. Also if necessary, a watchman or flagman shall be employed to control traffic at such times as the DEVELOPER's work would interfere with the flow of traffic.

C. All barricades, warning lights, warning signs, and handrails shall be maintained throughout the Construction including at all times overnight, over weekends, holidays, and all other work shutdown or stoppage periods. No open ditches will be allowed overnight without either proper barricades or approval from CTUB.

8.2 EXISTING UTILITY LINES

A. The DEVELOPER shall be completely and solely responsible and liable for any and all property damages, bodily injuries, financial losses and interruptions and service that result from or are attributable to his construction activities and, which affect water lines, electric lines, telephone lines, cable TV lines, drain lines, sanitary and storm sewer lines, and all appurtenances and service facilities connected thereto. Restoration of all such damaged or disturbed facilities shall be accomplished immediately after occurrence with a material and by a method approved by the authority having jurisdiction over the disturbed facility. This includes private property restoration as required. As in all instances the DEVLOPER is required to contact Miss Utility of West Virginia prior to any excavation activities.

B. Water, sewer, cable TV, power and telephone service to dwellings or places of business shall be maintained with a minimum of interruption throughout the construction of the contract work. No such service shall be intentionally interrupted without the approval of the respective utility company concerned, and without first giving due warning to the occupants of the dwelling or business establishment.

C. The DEVELOPER's attention is directed to the fact that much of the proposed work parallels existing underground utilities. The DEVELOPER shall avoid disturbance and/or displacement of those utilities and shall provide all temporary and permanent supports and other required protection. The DEVELOPER shall be completely responsible for the cost of relocating, repairing or the reconstruction of all existing parallel piping, regardless of size, that is disturbed because of his construction activities. There shall be no extra cost to CTUB for any relocation, reconstruction or repair of existing parallel piping.

8.3 MAINTAINING EXISTING WATER FACILITIES IN OPERATIONS

A. The DEVELOPER's attention is directed to the fact that the existing facilities must be maintained in continuous operation throughout the course of the work. To that end, he shall so schedule his work as to avoid interruptions in the operations of the present facilities.

B. If it proves impossible to avoid interruption of the existing facilities, the DEVELOPER shall notify CTUB of a proposed action plan for review and comment. The DEVELOPER shall notify CTUB well in advance as a formal response may take up to 30 days from time of notification. Should an interruption in the operation of the existing facilities be granted, the DEVELOPER shall be responsible for all labor and materials necessary for minimizing the interruption. If so directed, the DEVELOPER shall work around the clock on that portion of the work, which necessitated the interruption. Before the facility is taken out of operation, the DEVELOPER must have all materials, equipment, tools, and other things necessary to complete the work at hand

C. The DEVELOPER shall schedule and coordinate all construction activities and shall cooperate with the CTUB's operating personnel The DEVELOPER shall not operate existing system valves, hydrants or other appurtenances at any time, but when the same is needed to facilitate and accommodate construction, he shall request such operation from the CTUB.

D. The DEVELOPER shall provide the CTUB twenty-four hours (24) advance notice for such assistance.

8.4 WATER LINES TO BE ABANDONED

All existing water lines designated on the drawings to be abandoned shall be cut and plugged. All hydrants removed shall remain the property of the CTUB and shall be moved by the DEVELOPER to the CTUB's storage facility.

8.5 LINES AND GRADES

Many of the proposed lines are designed to be installed with exact alignments; therefore, grade and elevations are extremely critical components of construction throughout the contract work. In consideration of the importance of said critical components, wherever the lines are to be constructed on minimal or otherwise critical slopes, and/or where actual elevations and alignments are obtained from exploratory excavations, an entire section will be required to be staked out by the DEVELOPER before pipe installation commences. It is not the intention to unnecessarily delay construction of any pipelines to confirm such locations or adaptability of the slopes as designed and it shall, therefore, be the DEVELOPER's responsibility to cooperate with CTUB and schedule the exploratory excavations in advance of the desired time of commencement of the construction so that those activities can be properly accomplished.

8.6 OPEN EXCAVATION

A. The depth of trenches shall be such that the location of the proposed pipes will conform to the lines and grades shown on the plans. The shape of all trenches above and within the pipe zone, the construction methods employed, the general protection requirements, the general trenching requirements, and the minimum regulations for trench shoring, shall conform with the regulations set forth under OSHA Regulations 29CFR part 1926 650, 651, & 652. No trenching excavation work shall be performed which is not in accordance with those regulations.

B. The shape of the trenches in the "pipe zone" (which shall be construed to be that portion of the trench between the trench bottom and an elevation one (1) foot above the top of the pipe). The DEVELOPER is herein advised that if trench widths in the pipe zone exceed the outside diameter of the pipe plus two feet, and if CTUB determines that such excessive widths will result in structural loading for which the pipe is not designed, he shall be required to bed the pipe on a concrete cradle at no additional cost.

C. The DEVELOPER shall shape trenches which are located adjacent to existing above ground or underground structures and/or facilities or in other confined areas, so that such structures and facilities are properly protected against damage or disturbance from settlement or displacement. Adequate sheeting, shoring and/or bracing shall be installed and maintained to provide such protection and the DEVELOPER shall be responsible for all damages resulting to such proposed and existing structures, pipelines, and/or facilities as the result of his failure to use and maintain adequate trench wall supports, as well as, a result of any other construction activities. The bottoms of all trenches shall be excavated to a depth of six (6) inches below the bottom of the proposed lines to accommodate the bedding herein after specified.

8.7 DISPOSITION OF UNSATISFACTORY and/or EXCESS EXCAVATED MATERIAL

Where the DEVELOPER encounters boulders, rock, swampy or other materials determined by CTUB to be unsatisfactory for use as backfill, the same shall be removed from the site and disposed of by the DEVELOPER. The DEVELOPER shall, similarly dispose of all excess material remaining after completion of trench backfilling and all excavated material replaced by special backfill. Importation of adequate fill materials shall be the DEVELOPER's responsibility.

8.8 SURFACE WATER CROSSINGS

Surface water crossings, both over and under water, present special problems which should be discussed with the CTUB before final planes are prepared.

8.9 UNDERWATER CROSSINGS

A. The pipe shall be of special construction, having flexible, watertight joints.

B. Valves shall be provided at both ends of water crossings so that the section can be isolated for test or repair; the valves shall be easily accessible and not subjected to flooding.

C. Sampling taps should be available at each end of the crossing. Permanent taps should be made for testing and locating leaks.

8.10 CROSSING CONNECTIONS

A. There shall be no physical connection between the distribution system and any pipes, pumps, hydrants or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the system.

B. The approval of the CTUB shall be obtained for interconnections between potable water supplies.

C. Neither steam condensate nor cooling water from engine jackets nor other heat exchange devices shall be connected to the potable water supply.

8.11 INSTALLATION OF MAINS

Before any pipe is installed in trenches, it shall be inspected for damage and the inside of the pipe shall be swabbed to remove loose dirt and foreign objects. No damaged pipe will be permitted to be installed.

A. *Standards* – Specifications shall incorporate the provisions of the AWWA standards and manufacturer's recommended installation procedures.

B. *Bedding* – Continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones found in the trench shall be removed for a depth of at least 6" below the bottom of the pipe. See typical water line trench detail.

C. *Cover* – All water mains shall be covered with a minimum of 48" of earth covering to prevent freezing. All mains less than 8" in diameter and within 5 feet of a heavily traveled highway shall have a minimum of 42" of covering.

D. *Block* -- All tees, bends, plugs and hydrants shall be provided with tie rods or joints designed to prevent movement.

E. *Pressure and Leakage Testing* – All types of installed pipe shall be pressure tested and leakage tested in accordance with AWWA Standard C600. DEVELOPER shall submit plan of proposed testing.

F. *Disinfection* – All new, cleaned or repaired water mains shall be disinfected in accordance with AWWA Standard C651. The specifications shall include microbiological testing of all water mains. Appendix B includes procedures for disinfecting new and repaired water mains.

G. All non-metallic mains shall be provided with tracer wire or metallic tape, as directed by the CTUB.

8.12 RESTORATION OF IMPROVED SURFACES

A. All paving removed damaged, or destroyed during construction shall be restored in accordance with the general requirements of the City of Charles Town; the West Virginia Department of Highways; or other entity having jurisdiction over the roadway.

B. It shall be the responsibility of the DEVELOPER to obtain all permits required and comply with all requirements of said permits at no additional cost to CTUB.

C. In any event, all paved surfaces shall be restored to a condition equal to or greater than that which existed prior to construction.

D. Where settlement occurs within two years after completion of the work, the DEVELOPER shall be responsible for rectifying the condition as directed and at no cost to CTUB.

E. The DEVELOPER shall maintain close communications with CTUB and Local personnel to assure that they are advised of scheduling, progress and status of construction work in and along the state, county and local highways,

F. The DEVELOPER shall provide emergency roadway maintenance service on all roads or traveled ways 24 hours a day, including weekends, holidays and all other work shutdown or stoppage periods though out the contract. The DEVELOPER shall provide telephone numbers for emergency roadway repair contact throughout contract. If the DEVELOPER is unreachable or does not make prompt repairs when notified, the CTUB reserves the right to make all necessary repairs at the DEVELOPER's expense.

8.13 INSPECTION

A. Inspect each section of pipe and each pipe fitting before laying in conformance with the inspection requirements of the appropriate referenced standard.

B. Remove rejected pipe from the Project.

8.14 PREPARATION

A. Clean piping interior prior to laying pipe and following pipe laying.

B. Keep open ends of piping and pipe attachment openings capped or plugged until actual connection or actual pipe testing.

8.15 WATER MAIN CONSTRUCTION METHODS (See Standard Detail No. W-9)

A. General Requirements: Use proper and suitable tools and appliances for the proper and safe handling, lowering into trench and laying of pipes.

1. Lay pipe proceeding upgrade true to line and grades given. Lay bell and spigot pipe with bell end upgrade.

2. No wedging or blocking permitted in laying pipe unless by written order of Engineer.

3. Unless indicated otherwise, piping shall be installed with not less than 4'-0" of cover.

4. Construct piping from full lengths of pipe using short sections only for runs of less than full pipe length.

5. Cutting of pipe in the field shall be limited to only one piece per run of pipe and this shall be for closure purposes only. Field cut pipe shall not spill back from the cut section, greater than 1/8". There shall be no fishscaling or crazing beyond this point. Pipe shall be beveled after cutting. All cutting shall follow the recommendations of the manufacturer.

6. Keep trenches dewatered until pipe joints have been made and concrete bedding and blocking, if any, have hardened. Under no circumstances lay pipe in water or on subgrade containing frost.

7. Keep interior of pipe free of trench water at all times.

8. Dig bell holes sufficiently large to permit proper joint making and to insure pipe is firmly bedded full length of its barrel.

9. Walking or working on completed pipe line, except as necessary in tamping and backfilling, not permitted until trench is backfilled one-foot deep over top of pipes.

10. Take up and relay pipe having disturbed joints after laying.

11. Take up and replace with new, such in-place pipe sections found to be defective. Replacement work at DEVELOPER's expense.

12. Bedding materials and concrete work for pipe bedding as specified.

13. Marker tape shall be placed 12-18 inches below the ground surface for all piping.

B. Joints: Make joints in joining of pipe materials in strict accordance with manufacturer installation instructions and such included reference standards.

1. Make joints absolutely watertight and immediately repair detected leaks and defects. Methods of repair subject to CTUB's approval.

C. Joint Restraints: Install on buried lines at changes in direction of the water main.

1. Reaction or Thrust-Blocking:

a. Use 3,000-pound (Class B) concrete placed between solid undisturbed ground and fitting to be anchored

b. Minimum area bearing on pipe and on the ground shall be as indicated on Drawings.

D. Setting Valves and Boxes:

1. Unless otherwise directed by CTUB, set valves and boxes truly vertical.

2. Set valve boxes neatly to grade and in such a way that the box does not transfer shock or stress to the valve. Exercise care to center the box over the wrench nut of the valve.

E. Earthwork: Perform earthwork for water main installation as specified in Trenching, Backfilling, and Compacting.

F. *Maintenance of Traffic:*

1. When necessary to provide for uninterrupted use of roadway during construction ingress and egress, particularly in the interest of public health and safety, steel plates must be used over uncompleted water main installation trenches.

2. The use of flowable fill backfill on all State owned and maintained roads shall be in accordance with State Highway requirements. Flowable fill is not permitted on City streets. Work on City streets shall consists of crush and run (CR 6 or CR 8) compacted to within 12" of finish grade the asphalt.

8.16 PRIVATE FIRE PROTECTION SERVICE

A. No pipe or fixtures connected with a private fire service served by the CTUB shall be connected with pipes or fixtures supplied with water from any other source.

B. A back flow valve must be installed by the DEVELOPER on all fire lines at the point it enters the premises or before any connections are made. All valves must be AWWA approved and also be approved by the CTUB.

C. Unless otherwise provided in a written agreement between the DEVELOPER and the CTUB, service lines for private fire protection service shall be distinct and separate from the regular or general water service lines. A private fire service connection is furnished for the sole purpose of supplying water for the extinguishment of fires, and the use of water from such connection for any other purpose is absolutely forbidden.

D. A gate valve, controlling the entire supply shall be placed at the curb or property line of the street in which the main is located or at such points as may be approved by the CTUB and shall be furnished and installed by and at the expense of the DEVELOPER. Unless otherwise approved by the CTUB, said valve shall be installed in a valve pit or vault which shall also be furnished and installed at the expense of the DEVELOPER.

E. Under no circumstances will anti-freeze be permitted in the sprinkling systems.

F. The entire private service system on the DEVELOPER's premises shall be installed, maintained by and at the expense of the DEVELOPER and shall be subject to inspection, testing and approval of the CTUB before the service is made effective and at such time may be deemed necessary or appropriate by the CTUB.

G. Hydrants and other fixtures connected with private fire service system may be sealed by the CTUB and such seals may be broken only in case of fire or as specially permitted by the CTUB. The DEVELOPER shall immediately notify the CTUB of the breaking of any such seal.

H. Whenever a fire service system is to be tested, the DEVELOPER shall notify the CTUB of such proposed test, designating the day and house when same is to be made, so that, if desired, the CTUB may have an inspector present during the test.

8.17 FIELD QUALITY CONTROL

A. General Requirements: Conduct tests specified herein so that the main installed in the Project is tested to CTUB's satisfaction.

1. Provide tools, materials (including water), apparatus and instruments necessary for water main testing.

2. Conduct tests of every kind in the presence of and to the satisfaction of CTUB.

3. Provide an extra pressure gauge of known accuracy to frequently check test equipment and apparatus.

4. Hydrostatic testing equipment and associated testing apparatus subject to CTUB's approval.

5. Prior to testing, allow those installed sections of water piping protected by concrete reaction blocking to stand undisturbed for at least seven days from concrete pour. Provide temporary blocking as required.

6. The DEVELOPER may, at his option, completely backfill the trench or partially backfill the trench over the center section of each pipe prior to performing the pressure test.

7. Fill the section of installed water piping being tested with water a minimum of 24 hours prior to testing. During filling insure the piping is free of air.

B. Cleaning Prior to Tests: Before tests are conducted, clean piping by a method acceptable to the CTUB.

C. Line Acceptance Test:

1. After the water main is constructed, backfilled, and successfully cleaned, perform a hydrostatic "Line Acceptance Test" as follows:

   a. Isolate test section.

   b. Fill water main with clear water.

   c. Raise hydrostatic pressure to 150% of working pressure or 100-psi, whichever is greater.

   d. A preliminary test period for the removal of air from the lines before measuring the leakage will be permitted.

   e. Maintain test pressure for a period of not less than 2 hours.

2. Also conduct a leakage test for a duration of two uninterrupted hours at the same pressure specified for the hydrostatic test and provide a means for measuring leakage. Piping being tested will not be accepted if leakage is greater than that determined by the formula:

$$L = \frac{S \times D \times P^{0.5}}{133{,}200}$$

In which L is the allowable leakage in gallons per hour; S is the length of pipe tested in feet; D is the nominal diameter of the pipe in inches; and P is the average test pressure in pounds per square inch (based on test pressures indicated above, measured at the high point).

In no case shall test pressure be less than specified working pressure of the pipe.

The following table provides allowable leakage in gallons per hour per 1,000 LF of water line for various test pressures and pipe diameters.

Allowable Leakage per 1,000 LF of Pipe

W	P	D					
(psi)	(psi)	2"	4"	6"	8"	10"	12"
60	100	0.150	0.300	0.450	0.601	0.751	0.901
70	105	0.154	0.308	0.462	0.615	0.769	0.923
80	120	0.164	0.329	0.493	0.658	0.822	0.987
90	135	0.174	0.349	0.523	0.698	0.872	1.047
100	150	0.184	0.368	0.552	0.736	0.919	1.103
110	165	0.193	0.386	0.579	0.771	0.964	1.157
120	180	0.201	0.403	0.604	0.806	1.007	1.209
130	195	0.210	0.419	0.629	0.839	1.048	1.258
140	210	0.218	0.435	0.653	0.870	1.088	1.306
150	225	0.225	0.450	0.676	0.901	1.126	1.351
160	240	0.233	0.465	0.698	0.930	1.163	1.396
170	255	0.240	0.480	0.719	0.959	1.199	1.439
180	270	0.247	0.493	0.740	0.987	1.234	1.480
190	285	0.253	0.507	0.760	1.014	1.267	1.521
200	300	0.260	0.520	0.780	1.040	1.300	1.560
210	315	0.266	0.533	0.799	1.066	1.332	1.599
220	330	0.273	0.546	0.818	1.091	1.364	1.637
230	345	0.279	0.558	0.837	1.116	1.394	1.673
240	360	0.285	0.570	0.855	1.140	1.424	1.709
250	375	0.291	0.582	0.872	1.163	1.454	1.745
260	390	0.297	0.593	0.890	1.186	1.483	1.779
270	405	0.302	0.604	0.907	1.209	1.511	1.813
280	420	0.308	0.615	0.923	1.231	1.539	1.846
290	435	0.313	0.626	0.939	1.253	1.566	1.879
300	450	0.319	0.637	0.956	1.274	1.593	1.911

$$L = \frac{S \times D \times P^{0.5}}{133{,}200}$$

L = Leakage (gal/hour)
W = Working Pressure (psi)
S = 1,000 LF of Pipe
P = Test Pressure (psi)
D = Pipe Diameter (in)

P = 1.5 x W

Example: 2,580 LF of 8" water line with a working pressure of 210 psi is to be tested for leakage.

Proceed as Follows: The test pressure, P, to be used during leakage test is 1.5 x 210 = 315 psi. From the chart above, for P = 315 the allowable leakage per 1,000 LF of 8" water main is 1.066 gallons per hour per 1,000 LF of pipe. Since 2,580 LF of pipe is being tested, the allowable leakage is 2,580 ÷ 1,000 x 1.0660 = 2.7503 gal per hour.

For a 2 hour test, the allowable leakage would be 2 x 2.7503 = 5.5006 gallons. If 5.5 ($5\ ^1/_2$) gallons or less must be added to the water line at end of 2 hours to bring the testpressure to 315 psi, the line has passed.

D. Repair and Retesting:

1. At the completion of testing, immediately make tight those leaks which developed under tests and correct defects or deficiencies disclosed as a result of tests.

2. Do not repair leaks with temporary materials. Use only materials as specified for joint making.

3. Repeat tests until test requirements are fully complied with.

E. Disinfection of Water Mains:

1. Conduct disinfection of potable water system after completion of satisfactory pressure and leakage testing.

2. Before being placed in service, all water pipe installed will be disinfected in accordance with the procedures listed in Appendix B.

2. Disinfection of all new, cleaned or repaired water mains shall be disinfected in accordance with AWWA Standard C651. The specifications shall include microbiological testing of all water mains. Microbiological sampling shall be collected by an Environmental Engineering Division certified public water system operator or other individual authorized by the Environmental Engineering Division.

F. As-Builts – As-built drawings shall include as a minimum:

1. Water Lines

d. Location of all hydrants, valves and meters with reference ties as needed.

e. Location of all water line with reference ties as needed.

f. Length, size and type of all water line installed.

g. Location, size and type of all house connections, tees and angles with reference ties as needed.

2. Water Tanks, Pump Stations, Treatment Plants, Basins, etc.

a. All information necessary to describe location, configuration and composition of facility including utilities, equipment, drains, fencing, roadways and other related items.

3. Existing Utilities Encountered

a. Location, size and type of utility encountered with reference ties as needed.

b. Note any repairs made to damaged utilities.

c. Location, size and type for any relocated utilities with reference ties as needed.

NOTE: Location must be established by shown distances, reference ties, or co-ordinates and not by physical placement on a map alone.

4. Two paper copies of as-built drawings shall be furnished to CTUB.

5. One mylar copy of as-built drawings shall be furnished to CTUB for future reference.

6. AutoCAD digital files of the drawings shall be furnished to CTUB.

G. Operating and Maintenance Manual

1. Manuals shall include operating and maintenance information on all systems and items of equipment. The data shall consist of catalogs, brochures, bulletins, charts, schedules, working drawings corrected to as-built conditions and assembly drawings and wiring diagrams describing location, operation, maintenance, lubrication, operating weight, lubrication chart showing manufacturer-recommended lubricants for each rotating or reciprocating unit, and other information necessary for the Engineer to establish an effective operating and maintenance program. The following data shall also be included:

a. Title page giving name and location of facility.

b. Four eight-inch by ten-inch color pictures of the facility, views as directed by CTUB.

c. Photographs (color) of each piece of equipment in place.

d. "Name Plate" data of all equipment.

e. Performance curves for all pumps installed.

f. Approved working drawings of each piece of equipment.

g. Manufacturers' cuts and dimension drawings of each piece of equipment, and details of all replacement parts.

h. Manufacturers' erection, operation, and lubrication instructions for all equipment and apparatus.

i. Complete wiring diagrams of all individual pieces of equipment and systems including one line diagram; schematic or elementary diagrams; and interconnection and terminal board identification diagrams.

j. Complete piping and ductwork layout and interconnecting drawings.

2. All items noted in paragraph 1 that are of sheet size of 8-1/2 inches by 11 inches shall be bound in loose leaf 3-ring type binders with black plastic-coated or blue canvas covers. Binders shall be Vernon Line Royal Number R-6372 or Number R-372.

3. Working drawings 24-inches by 36-inches or similar in size shall be folded such that they can be bound into the 3-ring binder, their title block is exposed, and they can be folded out without being removed from the binder. Alternatively, they may be folded as described and placed in clear pockets which are bound in the manual. Drawings descriptive of a single item of equipment shall be grouped together.

4. AutoCAD digital files of the drawings shall be furnished to CTUB.

APPENDIX A

Standard Water Details

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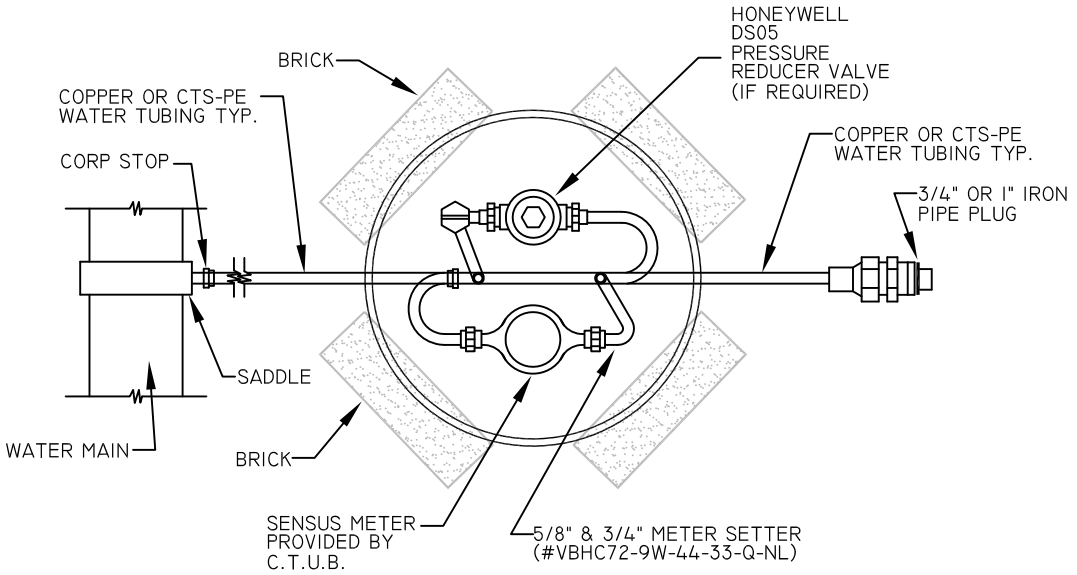
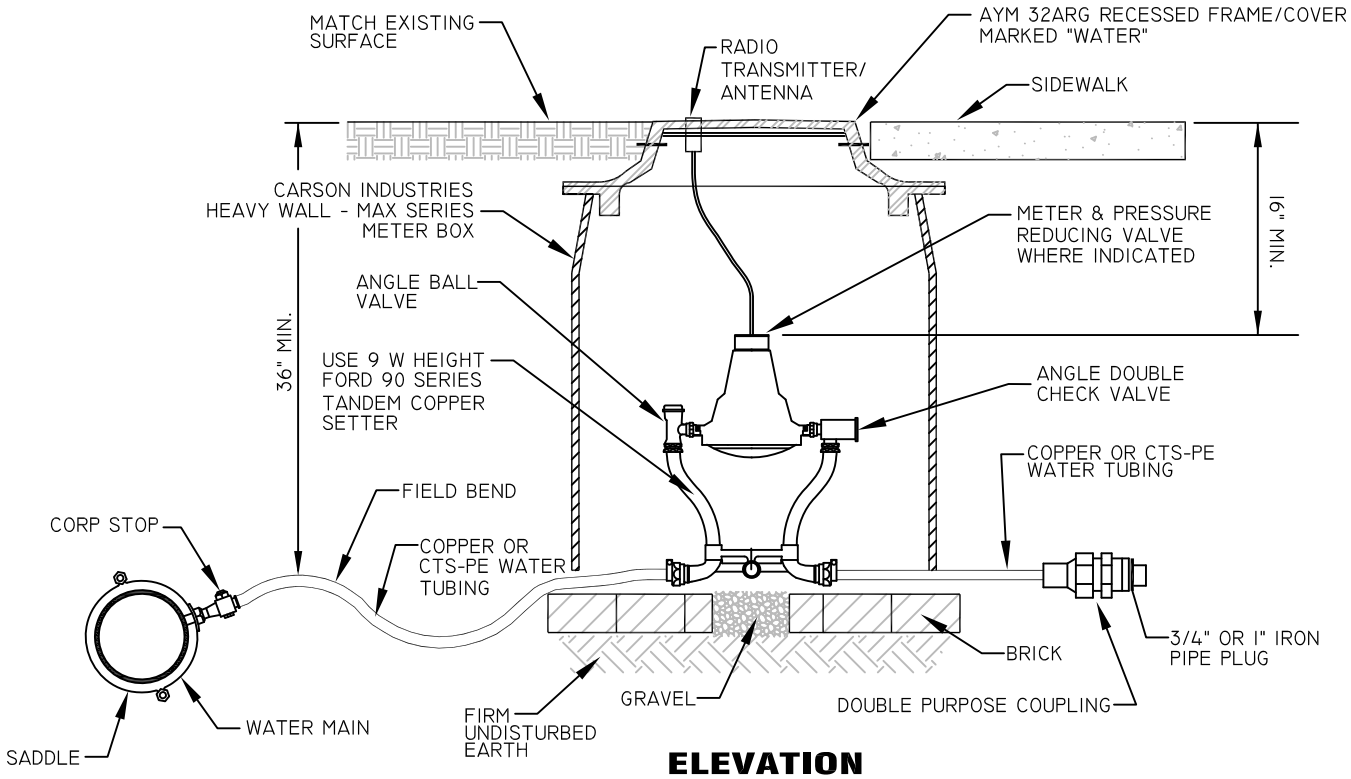


PLAN VIEW



ELEVATION

NOTES:

1. ALL BOLTS TO BE STAINLESS STEEL
2. CONNECT NEW METER SETTER TO EXISTING SERVICE LINES FOR LOCATIONS REQUIRING ONLY METER REPLACEMENT
3. PRESSURE REDUCING VALVE REQUIRED IF STATIC SYSTEM PRESSURES EXCEED 100 PSI
4. ALL METERS TO BE SENSUS RADIO READ PLACED AT PROPERTY LINE.

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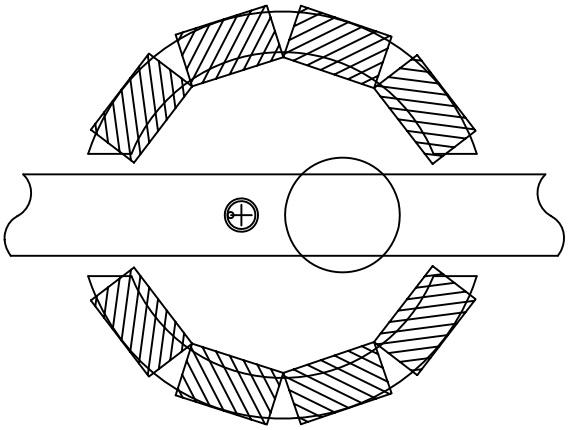
METERED CONNECTION DETAIL

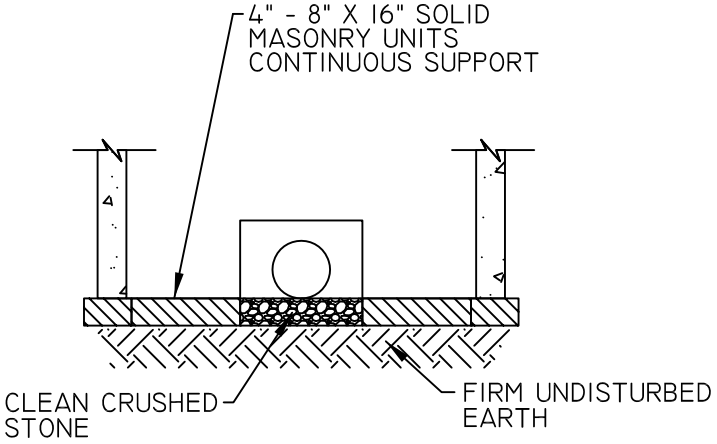
Standard Detail No.
W-1

NOT TO SCALE

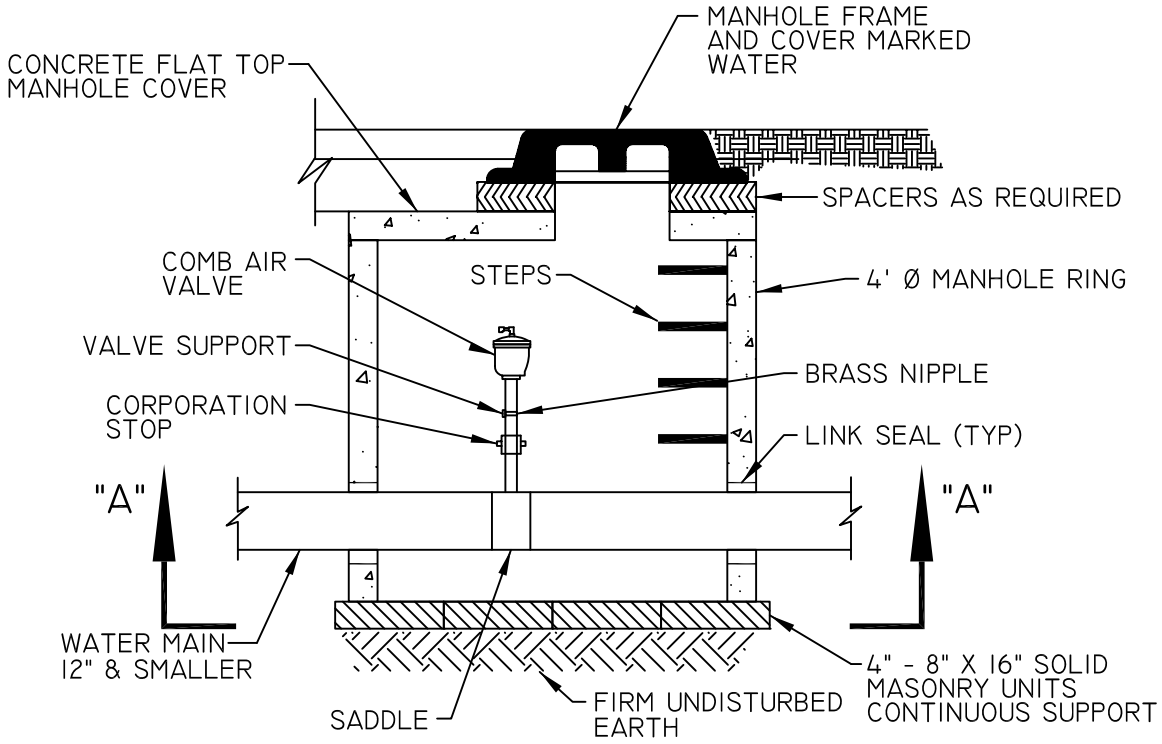
APRIL 2015



PLAN



SECTION A - A



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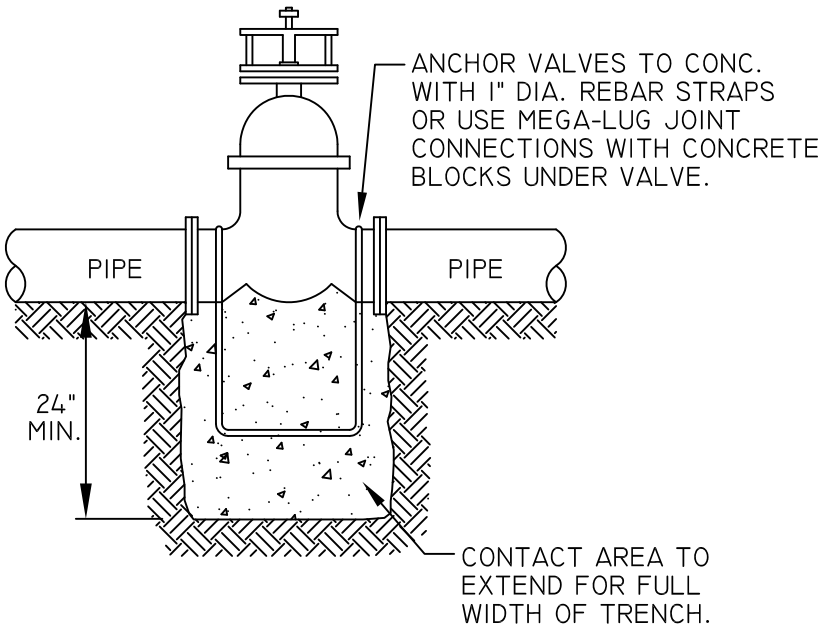
AIR RELEASE & VALVE DETAIL

Standard Detail No.
W-2

NOT TO SCALE

APRIL 2015



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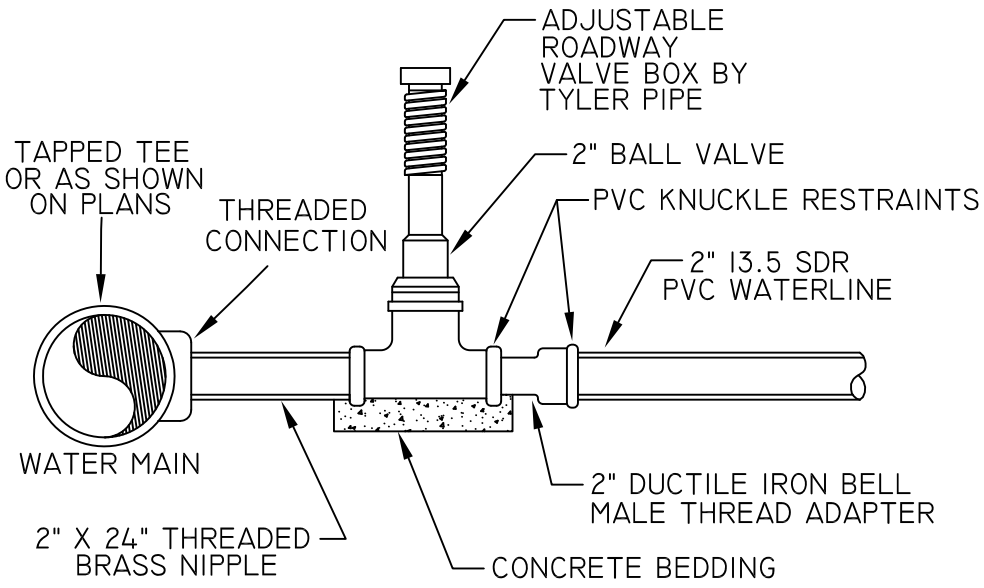
WATER VALVES DETAIL

Standard Detail No.
W-3

NOT TO SCALE

APRIL 2015



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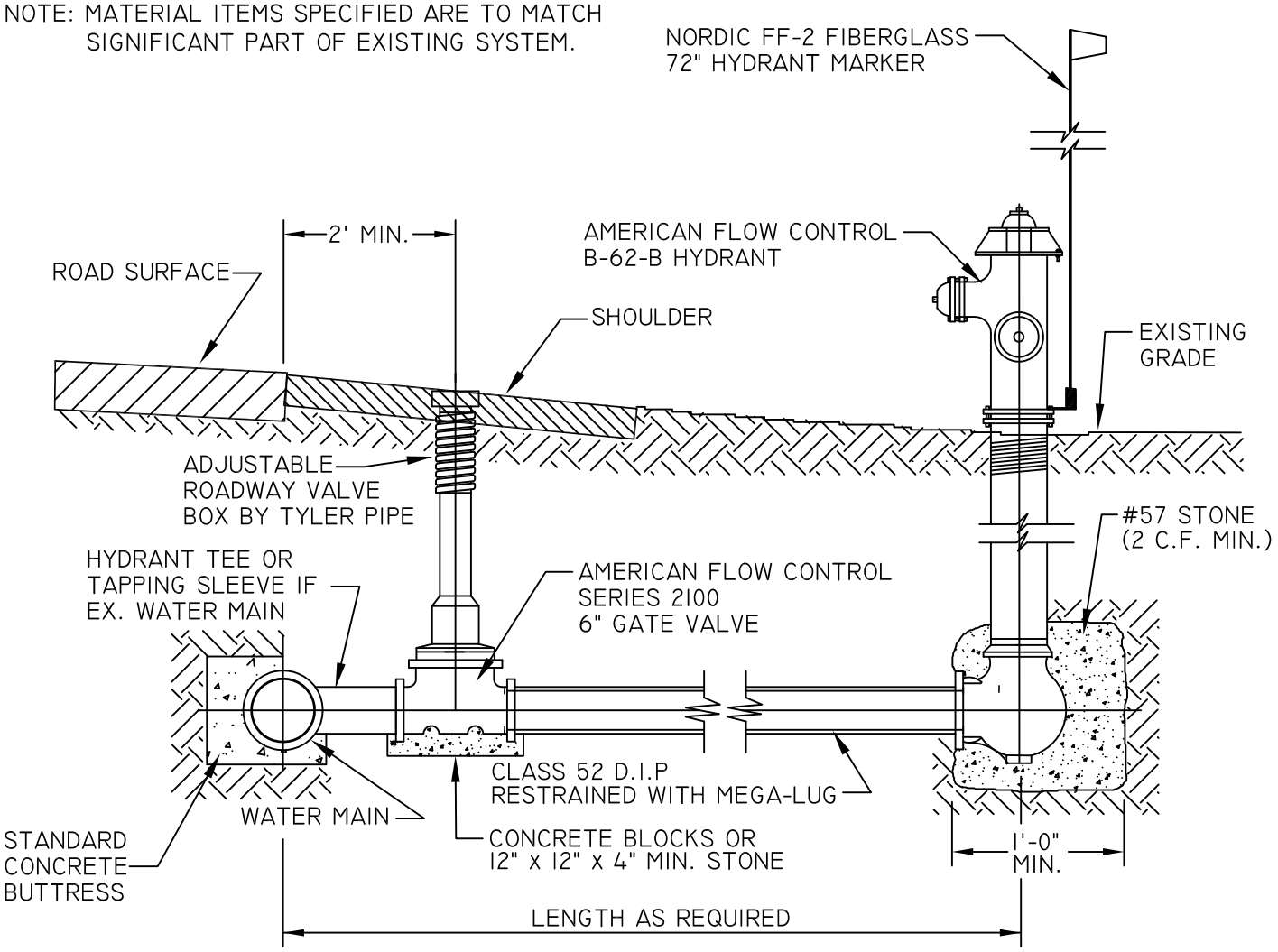
2" VALVE DETAIL

Standard Detail No.
W-4

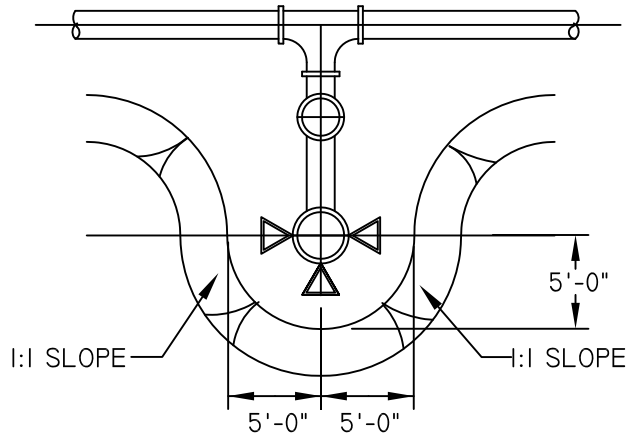
NOT TO SCALE

APRIL 2015

NOTE: MATERIAL ITEMS SPECIFIED ARE TO MATCH SIGNIFICANT PART OF EXISTING SYSTEM.



NOTES:
1. FOR ROAD INSTALLATIONS OR OTHER INTERFERENCES VALVE LOCATION MAY VARY.
2. VALVE BOX TO BE SET PLUMB AND CENTERED ON VALVE.



BANK CUTTING DETAIL

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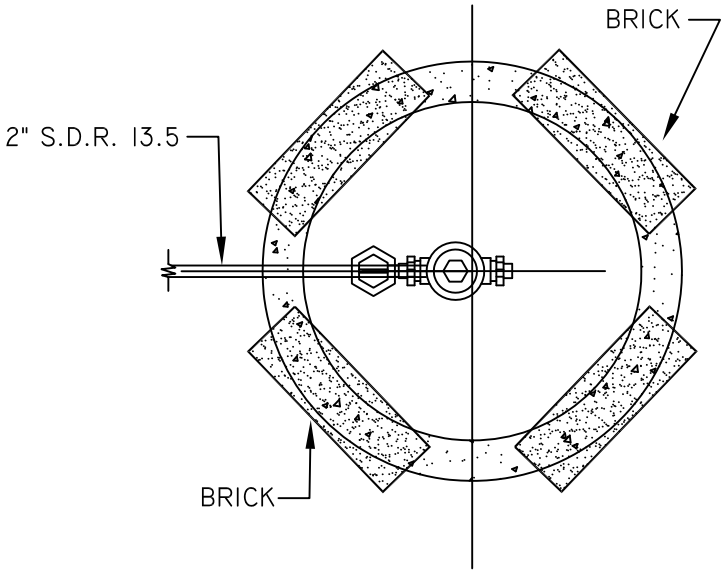
FIRE HYDRANT WITH TAPPING SLEEVE AND VALVE DETAIL

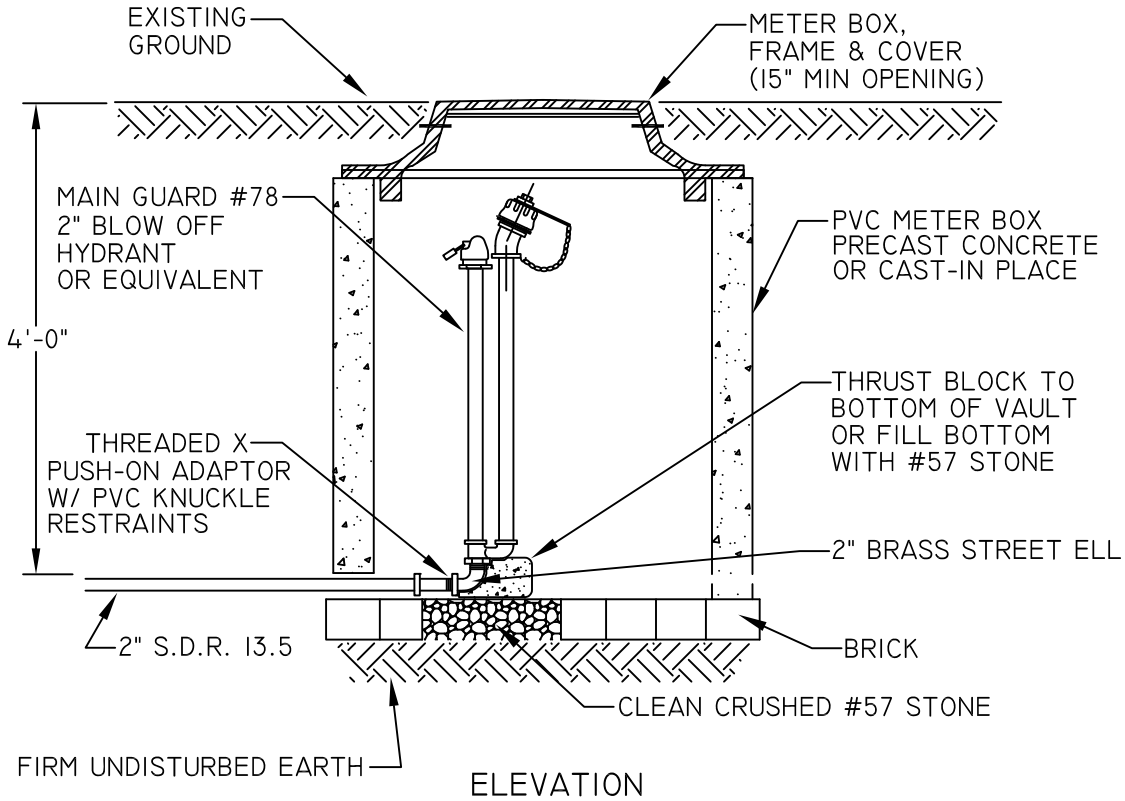
Standard Detail No.
W-5

NOT TO SCALE

APRIL 2015



PLAN VIEW



ELEVATION

NOTE: MAY WANT TO ADD PVC KNUCKLE RESTRAINTS ON EACH MALE ADAPTER IN ORDER TO RESTRAIN PIPE TO THE VALVE.

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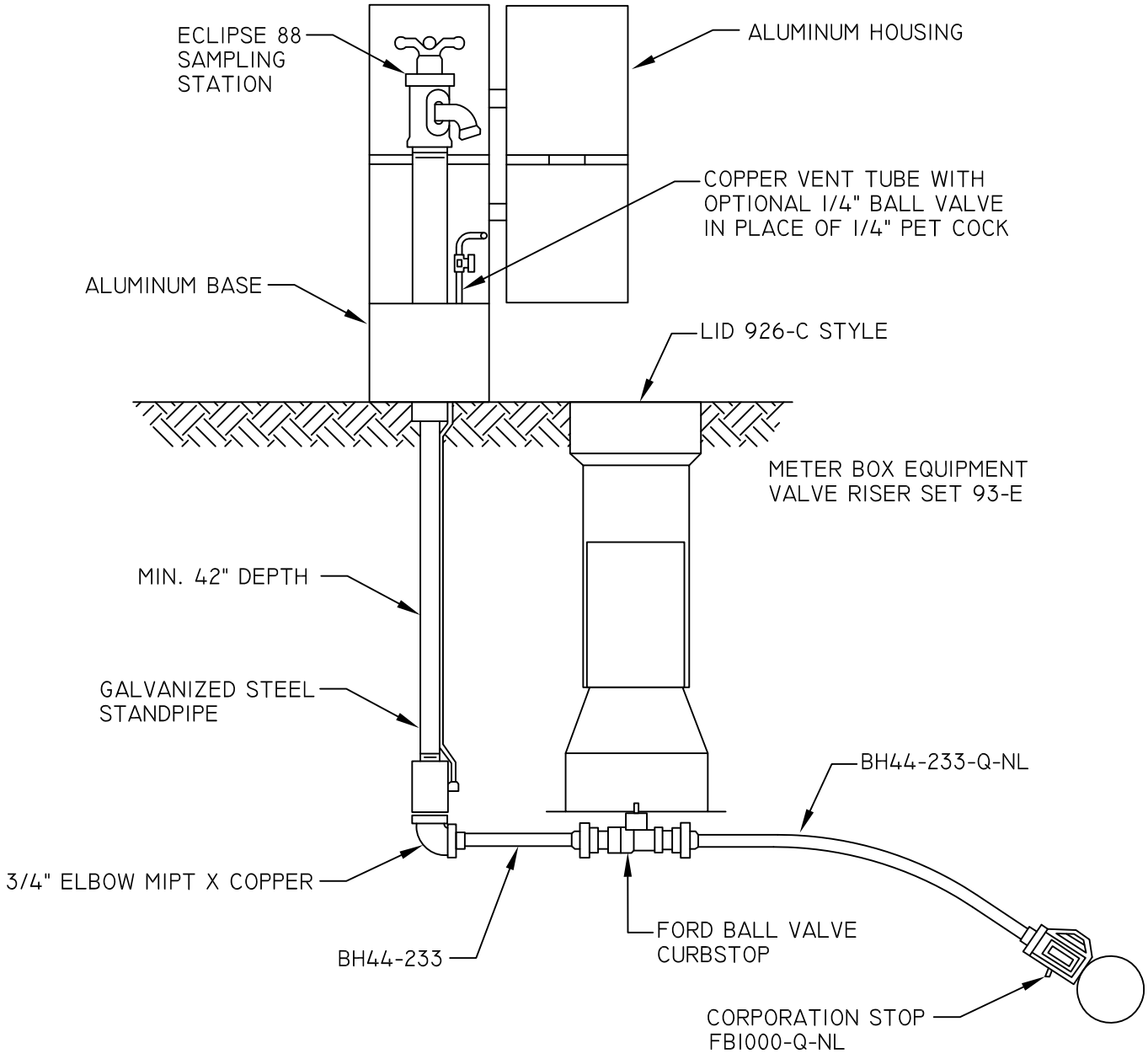
BLOW-OFF HYDRANT/ VAULT DETAIL

Standard Detail No.
W-6

NOT TO SCALE

APRIL 2015



SAMPLING STATION DETAIL

NOT TO SCALE

NOTE: CURB BOX TYPE IS 93-E, BH44-233-Q-NL, FB1000-Q-NL

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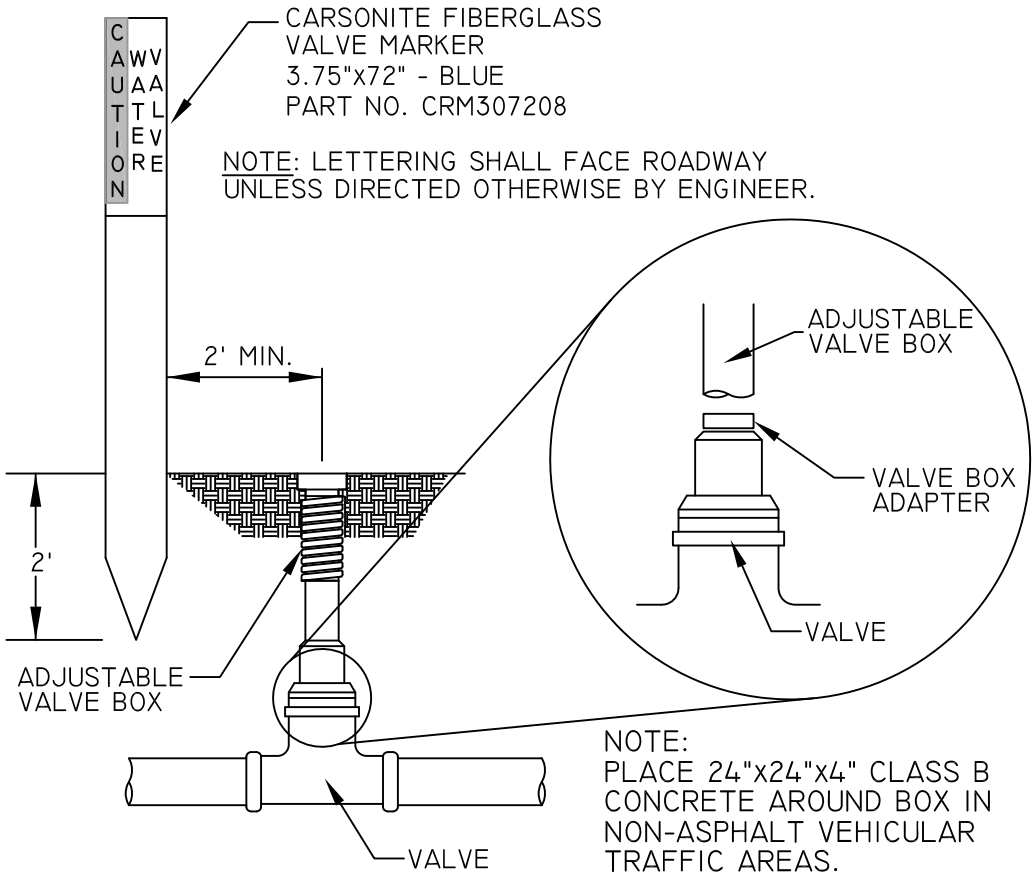
SAMPLING STATION DETAIL

Standard Detail No.
W-7

NOT TO SCALE

APRIL 2015



VALVE MARKER DETAIL

NOT TO SCALE

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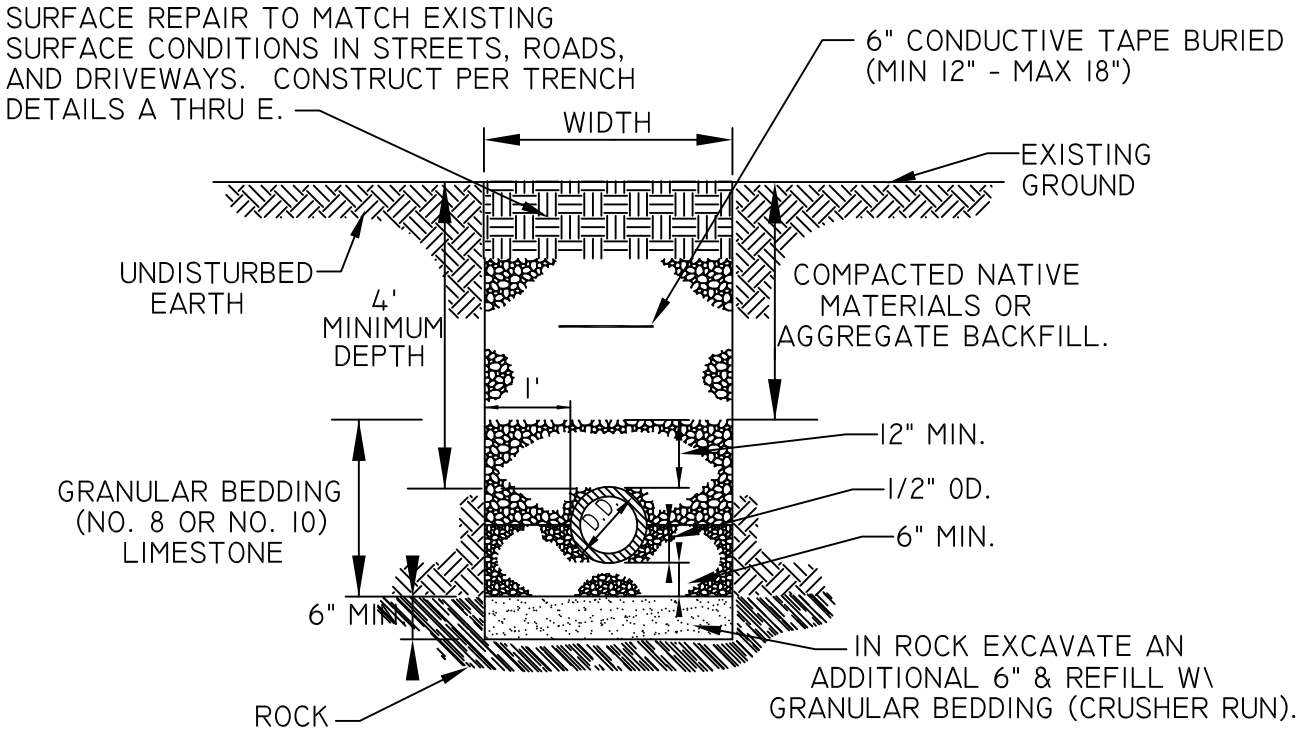
VALVE MARKER DETAIL

Standard Detail No.
W-8

NOT TO SCALE

APRIL 2015



WATER LINE TRENCH

NOTES:

1. W = MAXIMUM PERMISSIBLE TRENCH WIDTH, BASED UPON, W = O.D. + 24", UNLESS APPROVED BY THE ENGINEER.
2. TRENCHES TO BE SHEETED AND BRACED AS REQUIRED.
3. PROVIDE BEARING FOR FULL LENGTH OF BARREL, DIG HOLES FOR THE BELL.
4. BACKFILL TO BE COMPACTED IN 6" LAYERS TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE (+2%) IN ROADS AND STREETS. COMPACT TO MATCH EXISTING GROUND IN OTHER AREAS.
5. MAINTAIN MINIMUM OF 4' OF COVER TO THE TOP OF PIPE.
6. A CASING PIPE SHALL BE REQUIRED IN ROAD CROSSINGS WHERE SHOWN ON PLANS
7. ALL WATER LINES REQUIRE PERMIT FROM APPLICABLE REGULATORY ENTITIES. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

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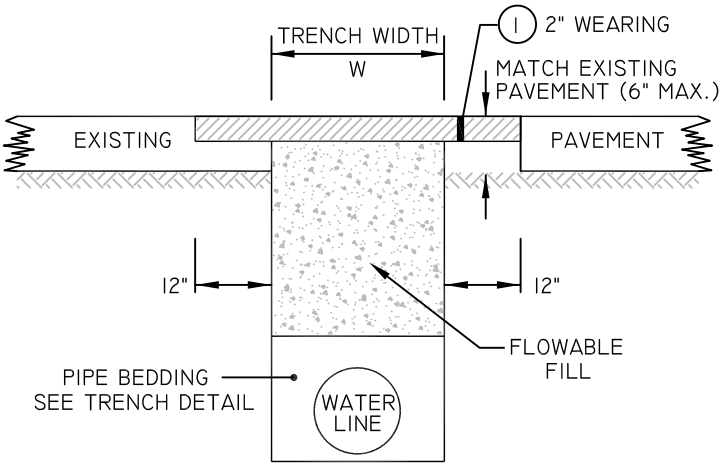
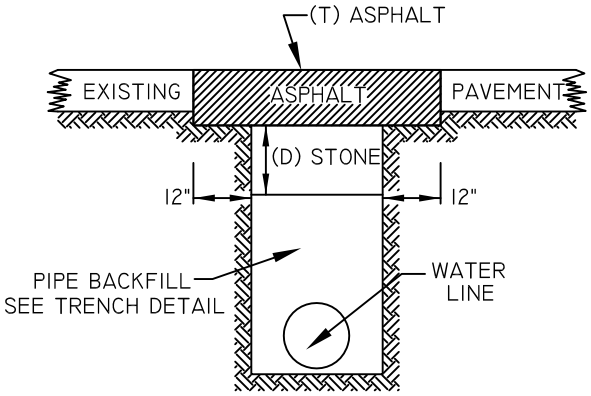
WATER LINE TRENCH DETAIL

Standard Detail No.
W-9

NOT TO SCALE

APRIL 2015





"T"

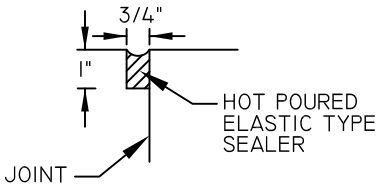
5" STATE HIGHWAY - 3" BASE, 2" WEARING
3" CITY STREETS & ALLEYS - 2" BASE, 1" WEARING
3" DRIVEWAYS - 2" BASE, 1" WEARING

"D"

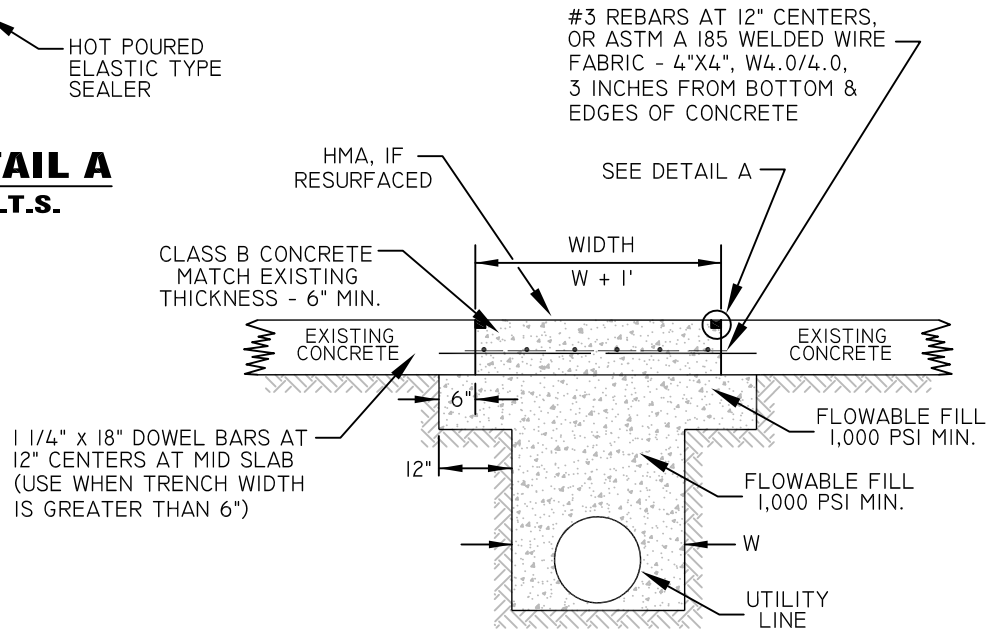
PAVED STATE HIGHWAY - 6" LIFTS TO BEDDING
PAVED CITY STREETS & ALLEYS - 6" LIFTS TO BEDDING
6" DRIVEWAYS (UNPAVED)

TYPE A TRENCH REPAIR
ASPHALT PAVEMENT
W/ FLOWABLE FILL

TYPE B TRENCH REPAIR
ASPHALT PAVEMENT



DETAIL A
N.T.S.



TYPE D TRENCH REPAIR
CONCRETE SIDEWALK OR
DRIVEWAY TRENCH REPAIR

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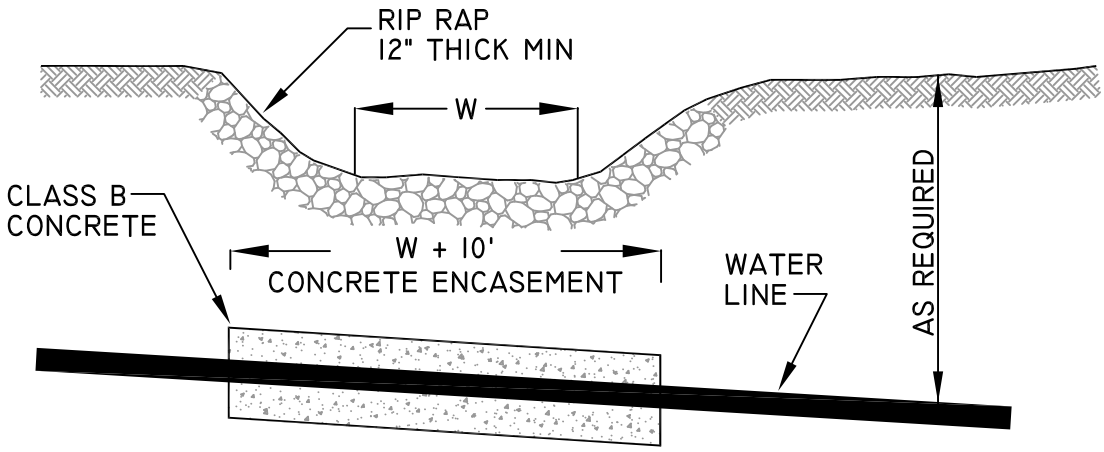
TYPES A, B, & D TRENCH REPAIR DETAILS

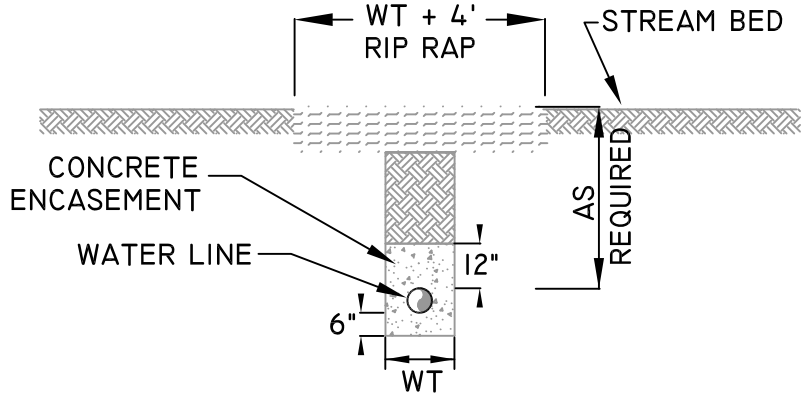
Standard Detail No.
W-10

NOT TO SCALE

APRIL 2015



ELEVATION



TYPICAL SECTION

NOTES: STREAMS TO BE DIVERTED DURING CONSTRUCTION TO PREVENT GREEN CONCRETE FROM GETTING INTO WATER.

ALL STREAM CROSSINGS REQUIRE PERMIT FROM THE STATE AND ARMY CORP OF ENGINEERS. PERMIT REQUIREMENTS SUPERCEDE REQUIREMENTS SHOWN ON THIS DETAIL.

NOTE: ROCK RIP RAP AND GABION STONE SHALL BE NON-ACIDIC AND OF ADEQUATE HARDNESS WITH SIZES AS FOLLOWS:

CLASS 0 (GABION)	4" TO 7"
CLASS I	3" TO 12"
CLASS II	6" TO 24"
CLASS III	36" TO 42"

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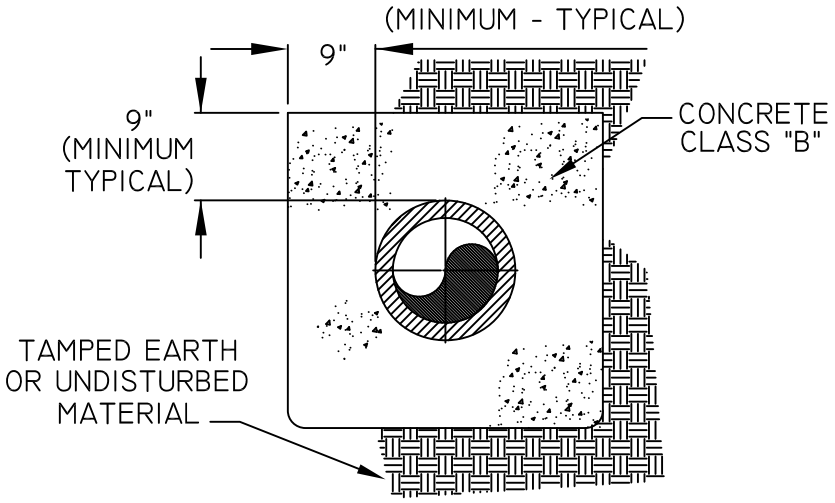
STREAM CROSSING DETAIL

Standard Detail No.
W-11

NOT TO SCALE

APRIL 2015

NOTE: FOR STREAM CROSSING, PLACE 12" MINIMUM CONCRETE OVER PIPE.



SECTIONAL ELEVATION

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CONCRETE ENCASEMENT DETAIL

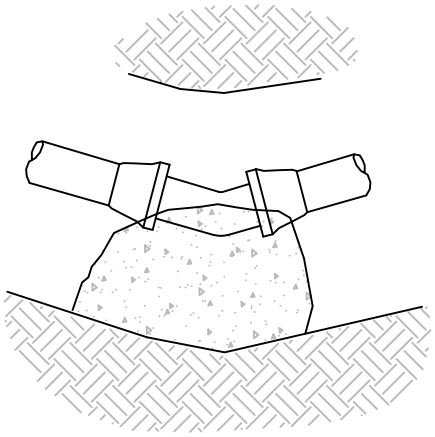
Standard Detail No.
W-12

NOT TO SCALE

APRIL 2015

22.5 & 45 DEGREE CONTACT AREA (SF)

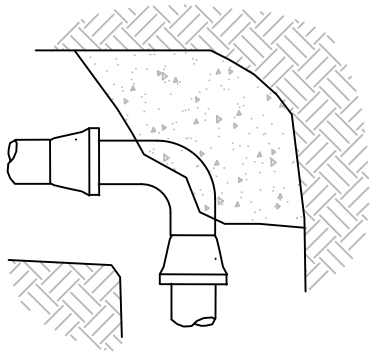
PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	1	1	2	2	2
6	2	2	3	4	5
8	3	4	5	7	8
10	4	6	8	10	12
12	5	9	12	15	18
14	8	12	16	20	24



22.5° & 45° BENDS

90 DEGREE BEND CONTACT AREA (SF)

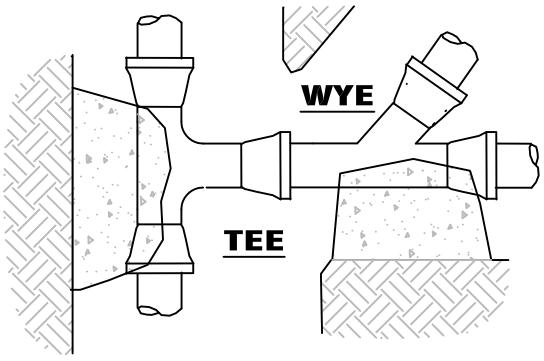
PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	2	2	3	3	4
6	3	4	5	7	8
8	5	7	10	12	15
10	7	11	15	19	22
12	9	16	21	27	32
14	12	22	29	36	44



90° BEND

TEE CONTACT AREA (SF)

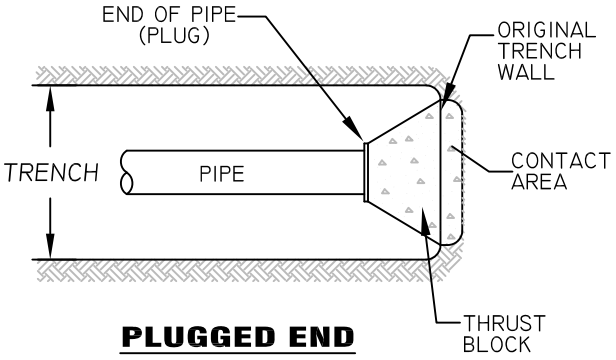
PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	1	2	2	2	3
6	2	3	4	5	6
8	4	5	7	9	10
10	5	8	11	13	16
12	7	12	15	19	23
14	10	16	21	26	31



SAME CONTACT AREA AS TEE

PLUGGED END CONTACT AREA (SF)

PIPE SIZE	PRESSURE CLASS				
	100	150	200	250	300
2	1	1	1	1	1
4	1	2	2	2	3
6	2	3	4	5	6
8	4	5	7	9	10
10	5	8	11	13	16
12	7	12	15	19	23
14	10	16	21	26	31



PLUGGED END

THRUST BLOCK GENERAL NOTES

1. ALL CONCRETE SHALL BE 3000 P.S.I. (AE)
2. THRUST BLOCKS SHALL BE IMBEDDED IN UNDISTURBED SOIL.
3. SOIL BEARING CAPACITY IS ASSUMED AT 3000 LB. SQ. FT. FOR WEAKER SOILS THRUST BLOCK AREAS SHALL BE INCREASED AS REQUIRED.
4. WRAP PIPE WITH POLYETHYELENE TO PREVENT CONTACT BETWEEN PIPE AND THE CONCRETE.

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PIPE BUTTRESS DETAILS

Standard Detail No.
W-13

NOT TO SCALE

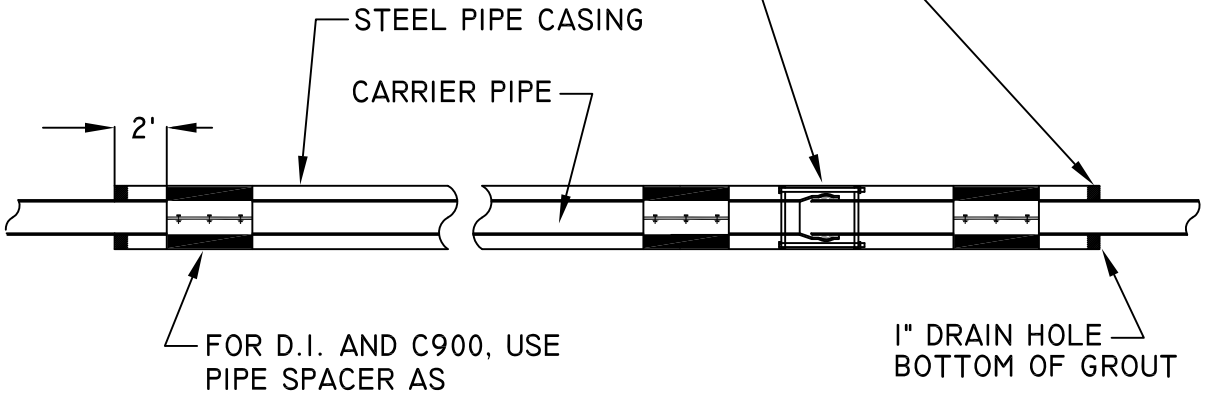
APRIL 2015

CASING SCHEDULE FOR C900, DI, OR DI TR FLEX RESTRAINED JT 350 PSI		
CARRIER PIPE DIA. (IN.)	MIN. CASING PIPE DIA. (IN.)	NOM. WALL THICKNESS
4	10	0.313
6	12	0.313
8	16	0.313
10	18	0.375
12	20	0.375

NOTE: SDR 35 PVC, CASING FOR 4" CARRIER IS 12" DIA. AND FOR 6" CARRIER IS 16" DIA. OTHER SIZE SDR 35 ARE SAME AS ABOVE. STEEL CASING SHALL BE USED WITH SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI.

FOR C900 OR D.I. FORCEMAIN, USE EBBA 1500 TD OR UNFLANGE 1390 SERIES TYPICAL AT EACH JOINT. FOR SDR 35 PVC, USE FORD UFRCS 1390 HARNESS RESTRAINT WITH SPACERS.

GROUT ENDS OF CASING CLOSED OR USE RUBBER BOOT END CLOSURE CASCADE STYLE CCES OR EQUAL.



FOR D.I. AND C900, USE PIPE SPACER AS MANUFACTURED BY CASCADE WATERWORKS MFG. CO. OR EQUAL 1 FOR EVERY 10' OF CASING

1" DRAIN HOLE BOTTOM OF GROUT

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PIPE CASING DETAIL

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W-14

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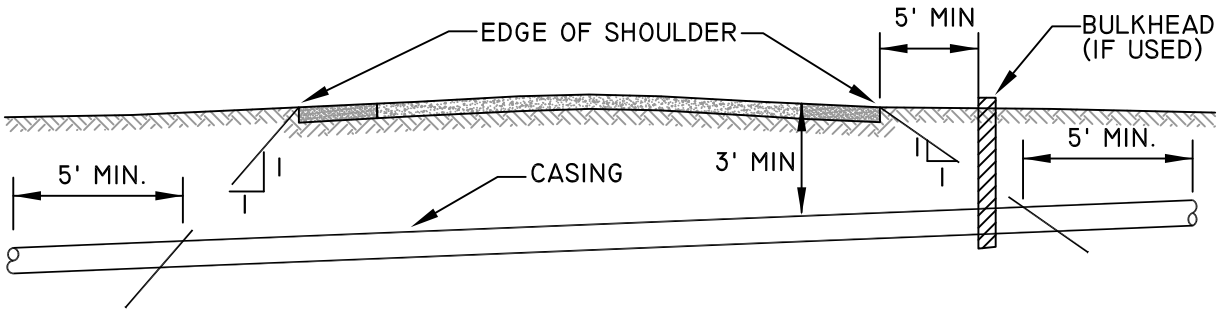

NOTE: PERMIT REQUIRED FROM WV DEPARTMENT OF HIGHWAYS IF CROSSING UNDER STATE ROAD. PERMIT REQUIREMENTS SUPERCEDE WHAT IS SHOWN ON THIS DETAIL.

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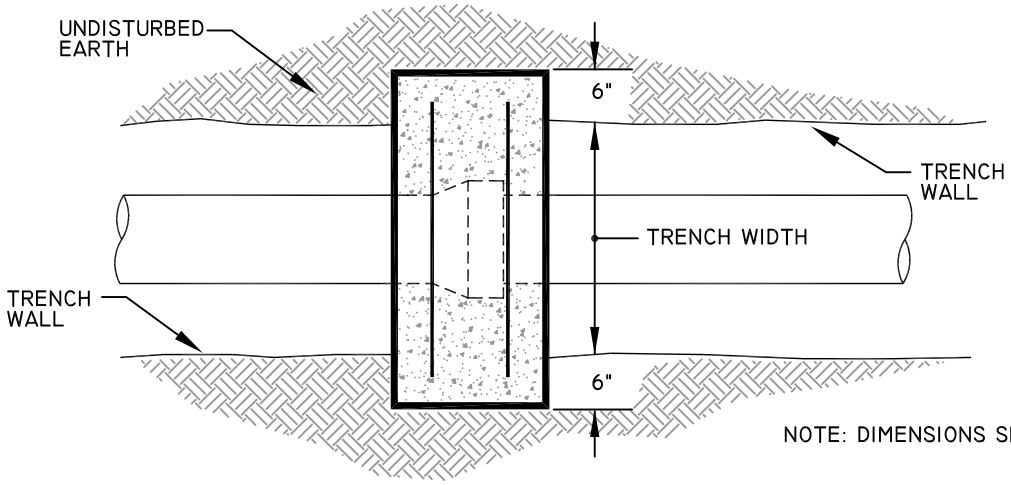
PIPE CASING TYP. ROAD CROSSING SECTION DETAIL

Standard Detail No.
W-15

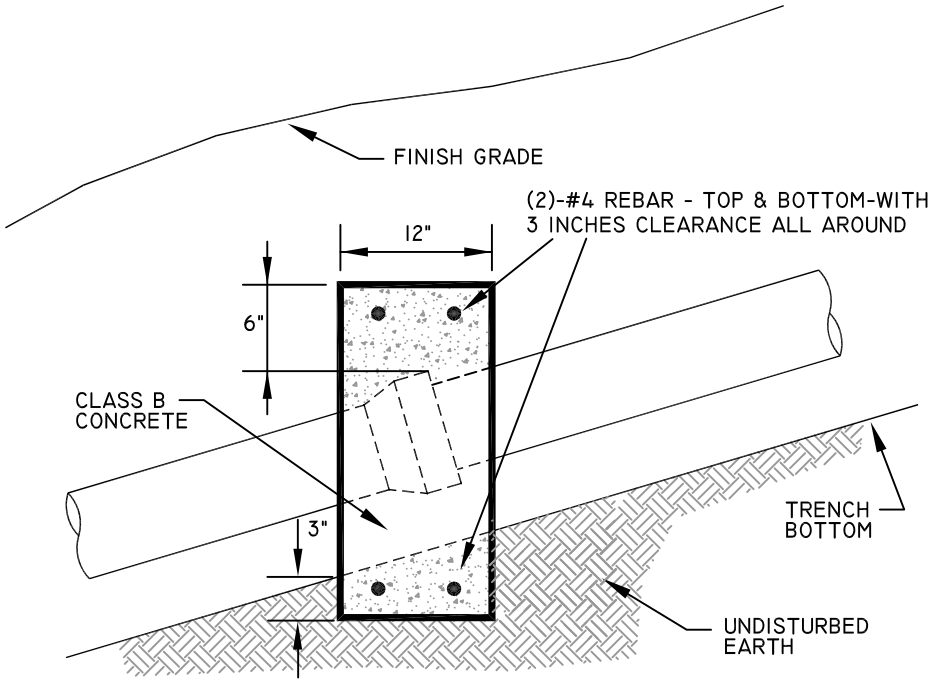
NOT TO SCALE

APRIL 2015



NOTE: DIMENSIONS SHOWN ARE MINIMUM

PLAN



SECTION

1. PROVIDE ANCHORS ON GRADES OF 20% AND GREATER OR WHERE SPECIFIED.
2. PROVIDE ANCHORS 36 FT. O.C. ON GRADES BETWEEN 20% AND 34%.
3. PROVIDE ANCHORS 24 FT. O.C. ON GRADES BETWEEN 34% AND 50%.
4. PROVIDE ANCHORS 16 FT. O.C. ON GRADES 50% OR GREATER.
5. WHEN NECESSARY EXTEND ANCHOR TO 12" BELOW FINISH GRADE TO PREVENT WASHOUT OF BACKFILL BY SURFACE WATER.
6. ANCHORS SHALL BE PLACED AT JOINTS NOT TO EXCEED O.C. DISTANCES.

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SLOPE ANCHOR DETAIL

Standard Detail No.
W-16

NOT TO SCALE

APRIL 2015

APPENDIX B

Disinfecting Water Mains

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DISINFECTING WATER MAINS

PART 1 - GENERAL

1.01 SCOPE

This standard presents essential procedures for disinfecting new and repaired water mains. All new water mains shall be disinfected before they are placed in service. All water mains taken out of service for inspecting, repairing, or other activity that might lead to contamination of water shall be disinfected before they are returned to service.

1.02 REFERENCES

This standard references the following documents. The latest current edition of each forms a part of this standard where and to the extent specified herein. In case of any conflict, the requirements of this standard shall prevail.

AWWA B300 – Standard for Hypochlorites

AWWA B301 – Standard for Liquid Chlorine

Simplified Procedures for Water Examination. AWWA Manual M12, AWWA Denver, Colorado (2002)

Standard Methods for the Examination of Water and Wastewater. APHA, AWWA, and WEF. Washington, D.C. (22nd ed. 2012)

Additional materials relating to activity under this standard include:

Material Safety Data Sheets for forms of chlorine used (provided by suppliers)

Chlorine Institute, Inc - Chlorine Manual

AWWA – *Water Quality and Treatment*

AWWA – *Introduction to Water Treatment*

Safety Practice for Water Utilities. AWWA Manual M3. AWWA, Denver, Colorado (2002)

Water Chlorination Principles and Practices. AWWA Manual M20. AWWA, Denver, Colorado (2006)

1.03 RECORD OF COMPLIANCE

The record of compliance shall be the bacteriological test results certifying the water sampled from the water main to be free of coliform bacteria contamination.

PART 2 – FORMS OF CHLORINE FOR DISINFECTION

The forms of chlorine that may be used in the disinfection operations are liquid chlorine, sodium hypochlorite solution, and calcium hypochlorite granules or tablets.

2.01 LIQUID CHLORINE

Liquid chlorine contains 100-percent available chlorine and is packaged in steel containers usually of 100-lb, 150-lb, or 1-ton net chlorine weight. Liquid chlorine shall be used only (1) in combination with appropriate gas-flow chlorinators and ejectors to provide a controlled high-concentration solution feed to the water to be chlorinated: (2) under the direct supervision of a person who is familiar with the physiological, chemical, and physical properties of liquid chlorine, and who is trained and equipped to handle any emergency that may arise; and (3) when appropriate safety practices are observed to protect working personnel and the public.

2.02 SODIUM HYPOCHLORITE

Sodium hypochlorite is available in liquid for in glass, rubber-lined, or plastic containers typically ranging in size from 1 qt to 5 gal; containers of 30 gal or larger sizes may be available in some areas. Sodium hypochlorite contains approximately 5-percent to 15-percent available chlorine, but care must be used in control of conditions and length of storage to minimize its deterioration. (Available chlorine is expressed as a percent of weight when the concentration is 5 percent or less, and usually as a percent of volume for higher concentrations. Percent x 10 = grams of available chlorine per litre of hypochlorite.)

2.03 CALCIUM HYPOCHLORITE

Calcium hypochlorite is available in granular form or in approximately 5-g tablets, and contains approximately 65-percent available chlorine by weight. The material should be stored in a cool, dry, and dark environment to minimize its deterioration.

PART 3 – BASIC DISINFECTION PRODURE

3.01 The basic disinfection procedure consists of:

A. Preventing contaminating materials from entering the water main during storage, construction, or repair.

B. Removing, by flushing or other means, those materials that may have entered the water main.

C. Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main.

D. Determining the bacteriological quality by laboratory test after disinfection.

PART 4 – PREVENTIVE AND CORRECTIVE MEASURES DURING CONSTRUCTION

Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contracting and killing such organisms. It is, therefore, essential that the procedures of this section be observed to assure that a water main and its appurtenances are thoroughly clean for the final disinfection by chlorination.

4.01 KEEPING PIPE CLEAN AND DRY

Precautions shall be taken to protect the interiors of pipes, fittings, and valves against contamination. Pipe delivered for construction shall be strung so as to minimize entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used where it is determined that watertight plugs are not practicable and where thorough cleaning will be performed by flushing or other means.

Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the less likelihood of contamination.

4.02 JOINTS

Joints of all pipes in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

4.03 PACKING MATERIALS

Yarning or packing material shall consist of molded or tubular rubber rings, or rope of treated paper or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination. If asbestos rope is used, it shall be handled in a manner that prevents asbestos from being introduced into the water-carrying portion of the pipe.

4.04 SEALING MATERIALS

No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. It shall be delivered to the job in closed containers and shall be kept clean.

4.05 CLEANING AND SWABBING

If dirt enters the pipe, and in the opinion of the owner's engineer or job superintendent the dirt will not be removed by the flushing operation, the interior of the pipe shall be cleaned by mechanical means and then shall be swabbed with a 1-percent hypochlorite disinfecting solution. Cleaning with the use of a pig, swab, or "go-devil" shall be undertaken only when the owner's engineer or job superintendent has determined that such operation will not force mud or debris into pipe-joint spaces.

4.06 WET-TRENCH CONSTRUCTON

If it is not possible to keep the pipe and fittings dry during installation, every effort shall be made to assure that any of the water that may enter the pipe-joint spaces contains an available-chlorine concentration of approximately 25mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench, or by treating the trench water with hypochlorite tablets.

4.07 FLOODING BY STORM OR ACCIDENT DURING CONSTRUCTION

If the main is flooded during construction, it shall be cleared of the flood water by draining and flushing with potable water until the main is clean. The section exposed to the flood water shall then be filled with a chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected using the continuous-feed or slug method.

PART 5 – METHODS OF CHLORINATION

Three methods of chlorination are explained in this section: tablet, continuous feed, and slug. Information in the foreword will be helpful in determining the method to be used. The tablet method gives an average chlorine dose of approximately 25 mg/L; the continuous-feed method gives a 24-h chlorine residual of not less than 10 mg/L; and the slug method gives a 3-hour exposure of not less than 50 mg/L free chlorine.

5.01 TABLET METHOD

The tablet method consists of placing calcium hypochlorite granules and tablets in the water main as it is being installed and filling the main with potable water when installation is completed.

This method may be used only if the pipes and appurtenances are kept clean and dry during construction.

A. *Placing of calcium hypochlorite granules.* During construction, calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500-ft intervals. The quantity of granules shall be as shown on Table 1.

WARNING: This procedure must not be used on solvent-welded plastic or on screwed-joint steel pipe because of the danger of fire or explosion from the reaction of the joint compounds with the calcium hypochlorite.

Table 1 – Ounces of Calcium Hypochlorite Granules to be Placed at Beginning of Main and at Each 500-ft Interval

Pipe Diameter *(inches)*	Calcium Hypochlorite Granules *(ounces)*
4	0.5
6	1.0
8	2.0
12	4.0
16 and larger	8.0

B. *Placing of calcium hypochlorite tablets.* During construction, 5-g calcium hypochlorite tablets shall be placed in each section of pipe and also one such tablet shall be placed in each hydrant, hydrant branch, and other appurtenance. The number of 5-g tablets required for each pipe section shall be $0.0012d^2L$ rounded to the next higher integer, where d is the inside pipe diameter, in inches, and L is the length of the pipe section, in feet. Table 2 shows the number of tablets required for commonly used sizes of pipe. The tablets shall be attached by an adhesive such as Permatex No. 1 or equal. There shall be no adhesive on the tablet except on the board side attached to the surface of the pipe. Attach all the tablets inside and at the top of the main, with approximately equal numbers of tablets at each end of a given pipe length. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the section so it can be readily determined that the pipe is installed with the tablets at the top.

Table 2 – Number of 5-g Calcium Hypochlorite Tablets required for dose of 25 mg/L*

Pipe Diameter *(in)*	Length of Pipe Section *(feet)*				
	13 Or less	18	20	30	40
	Number of 5-g Calcium Hypochlorite Tablets				
4	1	1	1	1	1
6	1	1	1	2	2
8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

**Based on 3.25 g available chlorine per tablet; any portion of table; rounded to next higher number*

C. *Filling and contact.* When installation has been completed, the main shall be filled with water at a rate such that water within the main will flow at a velocity no greater than 1 ft./s. Precautions shall be taken to assure that air pockets are eliminated. This water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41º F (5º C), the water shall remain in the pipe for at least 48 hours. Valves shall be positioned so that the strong chlorine solution in the treated main will not flow into water mains in active service.

5.02 CONTINUOUS-FEED METHOD

The continuous-feed method consists of placing calcium hypochlorite granules in the main during construction (optional), completely filling the main to remove all air pockets, flushing the completed main to remove particulates, and filling the main with potable water chlorinated so that after a 24-hour holding period in the main there will be a free chlorine residual of not less than 10 mg/L.

A. *Placing calcium hypochlorite granules.* At the option of the engineer, calcium hypochlorite granules shall be placed in pipe section as specified in Section 5.01A. The purpose of this procedure is to provide a strong chlorine concentration in the first flow of flushing water that flows down the main. This procedure is recommended particularly where the type of pipe is such that this first flow of water will flow into annular spaces at pipe joints.

B. *Preliminary flushing.* Before being chlorinated, the main shall be filled to eliminate air pockets and shall be flushed to remove particulates. The flushing velocity in the main shall not be less than 2.5 foot/s unless the owner's engineer or job superintendent determines that conditions do not permit the required flow to be discharged to waste. Table 3 shows the rates of flow required to produce a velocity of 2.5 foot/s in pipes of various sizes. Note that flushing is no substitute for preventive measures during construction. Certain contaminants, such as caked deposits, resist flushing at any feasible velocity.

In mains of 24-in or larger diameter, an acceptable alternative to flushing is to broom-sweep the main, carefully removing all sweepings prior to chlorinating the main.

Table 3 – Required Flow and Opening to Flush Pipelines (40 psi Residual Pressure in Water Main)*

Pipe Diameter *(in)*	Flow Required to Produce 2.5 ft/s (approx.) Velocity in Main *(gpm)*	Size of Tap *Inches*			Number of 2 1/2 – in Hydrant Outlets*
		1	1 ½	2	
		Number of Taps on Pipeł			
4	100	1	---	---	1
6	200	---	1	---	1
8	400	---	2	1	1
10	600	---	3	2	1
12	900	---	---	2	2
16	1600	---	---	4	2

* *With a 40-psi pressure in the main with the hydrant flowing to atmosphere, a 2 ½ inch hydrant outlet will discharge approximately 1000 gpm and a 4 ½ inch hydrant outlet will discharge approximately 2500 gpm.*

ł Number of taps on pipe based on discharge through 5 foot of galvanized iron (GI) pipe with one 90º elbow.

C. *Chlorinating the main*

1. Water from the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate into the newly laid water main. In the absence of a meter, the rate may be approximated by methods such as placing a Pitot gauge in the discharge, measuring the time to fill a container of known volume, or measuring the trajectory of the discharge and using the formula shown in Figure 1.

2. At a point not more than 10 feet downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 25 mg/L free chlorine. To assure that this concentration is provided, measure the chlorine concentration at regular intervals in accordance with the procedures described in the current edition of *Standard Methods for the Examination of Water or Wastewater or* AWWA Manual M12, or using appropriate chlorine test kits.

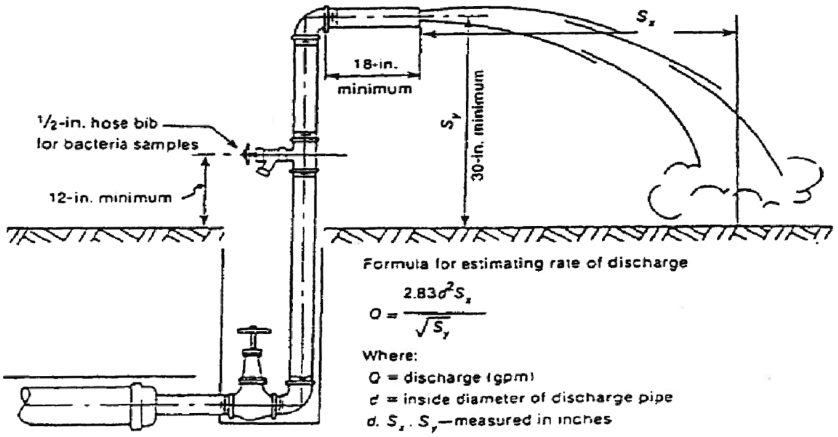

Figure 1 – Suggested Combination Blowoff and Sampling Tap

Table 4 gives the amount of chlorine required for each 100 foot of pipe of various diameters. Solutions of 1-percent chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires 1 lb. of calcium hypochlorite in 8 gallons of water.

Table 4 - Chlorine Required to Produce 25 mg/L Concentration in 100 ft. of Pipe – by Diameter.

Pipe Diameter *(Inches)*	100-percent Chlorine *(pound)*	1-percent Chlorine Solution *(Gallon)*
4	.013	.16
6	.030	.36
8	.054	.65
10	.085	1.02
12	.120	1.44
16	.217	2.60

3. During the application of chlorine, valves shall be positioned so that the strong chlorine solution in the main being treated will not flow into water mains in active service. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. The chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24 hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine.

4. Direct-feed chlorinators, which operate solely from gas pressure in the chlorine cylinder, shall not be used for application of liquid chlorine. (The danger of using direct-feed chlorinators is that water pressure in the main can exceed gas pressure in the chlorine cylinder. This allows a backflow of water into the cylinder, resulting in severe cylinder corrosion and escape of chlorine gas.) The preferred equipment for applying liquid chlorine is a solution-feed, vacuum-operated chlorinator and a booster pump. The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump injects the chlorine-gas in solution water; the booster pump injects the chlorine-gas solution into the main to be disinfected. Hypochlorite solutions may be applied to the water main with a gasoline or electrically powered chemical-feed pump designed for feeding chlorine solutions. Feed lines shall be of such material and strength as to safely withstand the corrosion caused by the concentrated chlorine solutions and the maximum pressure that may be created by the pumps. All connections shall be checked for tightness before the solution is applied to the main.

5.03 SLUG METHOD

The slug method consists of placing calcium hypochlorite granules in the main during construction, completely filling the main to eliminate all air pockets, flushing the main to remove particulates, and slowly flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. The slow flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours.

A. *Placing calcium hypochlorite granules.* Same as 5.02.A

B. *Preliminary flushing.* Same as 5.02.B

C. *Chlorinating the main.*

1. Same as Section 5.02.C.1

2. At a point not more than 10 feet downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 100 mg/L free chlorine. To ensure that this concentration is provided, the chlorine concentration should be measured at regular intervals. The chlorine shall be applied continuously and for a sufficient period to develop a solid column, or "slug," of chlorinated water that will, as it moves through the main, expose all interior surface to a concentration of approximately 100 mg/L for at least 3 hours.

3. The free chlorine residual shall be measured in the slug as it moves through the main. If at any time it drops below 50 mg/L, the flow shall be stopped, chlorination equipment shall be relocated at the head of the slug, and, as flow is resumed, chlorine shall be applied to restore the free chlorine in the slug to not less than 100 mg/L.

4. As the chlorinated water flow past fittings and valves, related valves and hydrants shall be operated so as to disinfect appurtenances and pipe branches.

PART 6 – FINAL FLUSHING

6.01 CLEARING THE MAIN OF HEAVILY CHLORINATED WATER

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

6.02 DISPOSING OF HEAVILY CHLORINATED WATER

The environment to which the chlorinated water is to be discharged shall be inspected. If there is any question that the chlorinated discharge will cause damage to the environment, then a reducing agent shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. Where necessary, federal, state, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

PART 7 – BACTERIOLOGICAL TESTS

7.01 STANDARD CONDITIONS

After final flushing and before the water main is placed in service, a sample or samples shall be collected for the end of the line. Shall be rested for bacteriological quality in accordance with *Standard Methods for the Examination of Water and Wastewater,* and shall show the absence of coliform organisms. A standard plate count may be required at the option of the owner. At least on sample shall be collected from the new main and one from each branch. In case of extremely long mains, it is desirable that samples be collected along the length of the line as well as at its end.

7.02 SPECIAL CONDITIONS

If, during construction, trench water has entered the main, or if in the opinion of the owner or owner's representative, excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at intervals of approximately 200 feet and shall be identified by location. Samples shall be taken of water that has stood in the main for at least 16 hours after final flushing has been completed.

7.03 SAMPLING PROCEDURE

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate as required by *Standard Methods for the Examination of Water and Wastewater.* Two (2) consecutive samples are required to be taken over a 48 hour period. No hose or fire hydrant shall be used in collection of samples. A suggested combination blowoff and sampling tap useful for mains up to and including 8-inch diameter is shown in Figure 1. A corporation cock may be installed in the main with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use.

PART 8 – REDISINFECTION

If the initial disinfection fails to produce satisfactory bacteriological samples, the main may be reflushed and shall be resampled. If check samples show the presence of coliform organisms, then the main shall be rechlorinated by the continuous-feed or slug method of chlorination until satisfactory results are obtained.

NOTE: High velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is well to sample water entering the new main.

PART 9 – DISINFECTION PROCEDURES WHEN CUTTING INTO OR REPAIRING EXISTING MAINS

The following procedures apply primarily when mains are wholly or partially dewatered. After the appropriate procedures have been completed, the main may be returned to service prior to completion of bacteriological testing in order to minimize the time customers are without water. Leaks or breaks that are repaired with clamping devices while the mains remain full of pressurized water present little danger of contamination and require no disinfection.

9.01 TRENCH TREATMENT

When an old main is opened, either by accident or by design, the excavation will likely be wet and may be badly contaminated from nearly sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from such pollution. Tablets have the advantage in such a situation because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

9.02 SWABBING WITH HYPOCHLORITE SOLUTION

The interiors of all pipe and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a 1-percent hypochlorite solution before they are installed.

9.03 FLUSHING

Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant locations permit, flushing toward the work location from both directions is recommended. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.

9.04 SLUG CHLORINATION

Where practical, in addition to the procedures above, a section of main in which the break is located shall be isolated, all service connection shut off, and the section flushed and chlorinated as described in 5.03, except that the dose may be increased to as much as 300 mg/L and the contact time reduced to as little as 15 minutes. After chlorination, flushing shall be resumed and continued until discolored water is eliminated and the water is free of noticeable chlorine odor.

9.05 SAMPLING

Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, samples shall be taken on each side of the main break. If positive bacteriological samples are recorded, the situation shall be evaluated by a qualified engineer who can determine corrective action, and daily sampling shall be continued until two consecutive negative samples are recorded.

PART 10 – SPECIAL PROCEDURE FOR CAULKED TAPPING SLEEVES

Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned, and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder.

Tapping sleeves are used to avoid shutting down the main to be tapped. After the tap is made, it is impossible to disinfect the annulus without shutting down the main and removing the sleeve. The space between the tapping sleeve and the tapped pipe is normally ½ inch, more or less, so that as little as 100 mg of calcium hypochlorite powder per square foot will provide a chlorine concentration of over 50 mg/L.

APPENDIX C

Alternative Mainline Extension Agreement

WV BPH OEHS EW-77C Form

WV BPH OEHS EW-100 Form

WV BPH OEHS EG-5 Form

Acceptance of Installed Water Lines

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ALTERNATIVE MAINLINE EXTENSION AGREEMENT

This _____ day of _____, comes _____ (UTILITY), whose address is _____ (hereinafter referred to as the "UTILITY"; and, _____ whose address is _____(Hereinafter referred to as the "DEVELOPER"); AND AGREE TO ENTER INTO AN Alternate main Line Extension Agreement for the purpose of providing a water distribution system extension to serve _____ (Name of development), located at _____ (Detailed description of location including Route ##'s, Streets, County and State).

WHEREAS, the UTILITY wishes to make facilities available to the greatest number residents as expeditiously as possible and in as prudent a manner as possible; and

WHEREAS, the DEVELOPER is planning to develop certain lands within Mineral County; and

WHEREAS, the planned development of DEVELOPER's property is contingent upon DEVELOPER having proper water facilities; and

WHEREAS, it is in the best interest of the future users of the DEVELOPER's property to have water facilities; and

WHEREAS, it is in the best interest of the UTILITY's and the DEVELOPER's customers to expand the UTILITY's facilities to anticipate future developments and growth; and

WHEREAS, the UTILITY has the reserve capacity to serve the DEVELOPER's extension, without jeopardizing service to existing customers and possible future customers; and

WHEREAS, the DEVELOPER has/have read the Public Service Commission's Water Rule 5.5 or Sewer Rule 5.3 or both in their entirety, understands the Rule of Rules, and chooses to enter into this Alternate Main Line Extension Agreement.

WHEREAS, the DEVELOPER understands that the extension covered by this agreement is being constructed at this time to enhance the profitability of the DEVELOPMENT and waives reimbursement for all costs associated with the materials and labor to construct the extension as provided in the Commission's Rules and Regulations. A copy of the applicable Commission Rule or Rules is attached to this agreement.

WHEREAS, the DEVELOPER understands that the UTILITY is required to provide per the Commission's Rule and Regulations a cost estimate for the UTILITY to construct the extension described in this agreement and the DEVELOPER waives his right to provide such a cost estimate.

WHEREAS, the extension to be constructed by the DEVELOPER under this agreement consists of the following: _____
_____
_____
_____ (Description of the extension including: approximate lengths of each diameter of main, number of major components such as fire hydrants, manholes, booster pumps and lift stations. Hydraulic calculations are required if small diameter mains are used for any extensive length) (Drawings may be substituted).

WHEREAS, the number of customers or lots to be served by the UTILITY once this extension is completed is _____.

WHEREAS, the DEVELOPER is willing to bear the expense of constructing the extension within the DEVELOPMENT and back to a point on the UTILITY's nearest existing main which as sufficient excess capacity to provide service at maximum demand.

WHEREAS, the UTILITY will install service connections to the lots, once the security deposit and the approved tap fee as stated in the UTILITY's tariff which is on file with the Public Service Commission is paid. The UTILITY shall not charge a tap fee if the service connection is installed by the DEVELOPER.

NOW, THEREFORE, and in consideration of the covenants and agreements set forth herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the UTILITY and DEVELOPER agree:

ARTICLE I

CONDITIONS PRECEDENT

Section 1.01 This agreement and respective terms and obligations of the parties are neither binding nor effective until the Public Service Commission of West Virginia's (PSC) Final Order approving it is issued.

Section 1.02 Neither party to this agreement will be obligated to carry out its obligations hereunder, in the event conditions beyond the control of either party prevents one party to this agreement from meeting its obligations hereunder.

ARTICLE II

DESIGN

Section 2.01 The DEVELOPER hereby agrees to employ a registered professional civil engineer, licensed by the State of West Virginia to design the extension. The DEVELOPER will provide the PSC with copies of all drawings and hydraulic calculations upon request.

Section 2.02 The UTILITY shall bear no financial responsibility for the design of the extension or appurtenances thereto.

Section 2.03 The UTILITY shall have the design of the extension approved by a professional engineer or other qualified person, prior to the start of construction, including all plans, designs and specifications of the extension and all appurtenances thereto, to ensure that the extension provides sufficient water pressure or sewage line force main pressure I gravity main slope to the DEVELOPMENT and extensions therefrom in accordance with the current specifications, regulatory or UTILITY requirements, and the terms of this Agreement and minimizes line loss. The UTILITY may require such revisions of said plans and specifications by the DEVELOPER as necessary before giving final approval.

Section 2.04 After approval by the UTILITY, the DEVELOPER shall, at his own expense, submit the plans and specifications for the extension to the UTILITY and to the appropriate State, Federal and local regulatory agencies for their approval.

Section 2.05 The DEVELOPER shall, consistent with the terms of Article VI of this agreement, administer, design and construct the extension to serve the DEVELOPMENT and existing and future customers of the UTILITY which may result from the development of the extension.

Section 2.06 The DEVELOPER shall have the extension designed by a Registered Professional Engineer, licensed by the State of West Virginia, to meet both the service requirements of the DEVELOPMENT at full planned capacity, and the service requirements of all other imminent customer growth or reasonably anticipated and projected customer growth on the extension that may include additional water or sewer line capacity sufficient to accommodate future main line extensions that will connect to the extension, as defined by the UTILITY.

Section 2.07 The UTILITY reserves the right to further extend its main line from and beyond the terminus of each main line extension constructed per this agreement. In such event, the DEVELOPER shall not be entitled to any reimbursement for the attaching of customers to any extension constructed beyond the main(s) constructed per this agreement.

ARTICLE III

PERMITS AND EASEMENTS

Section 3.01 The DEVELOPER shall, at its own expense, obtain all necessary permits, authorizations and approvals of Federal, State and local agencies prior to

the construction phase of the extension and shall make such changes as required by said agencies.

Section 3.02 The DEVELOPER shall grant the UTILITY construction and permanent easements for the distribution system within the DEVELOPMENT as shown on the plats signed and sealed by a Professional Land Surveyor, licensed by the State of West Virginia which are made part hereof.

Section 3.03 In order that the UTILITY may provide service to adjoining properties of the DEVELOPER's project, the UTILITY shall require and the DEVELOPER shall agree to provide all necessary easements on the DEVELOPER's property from the DEVELOPMENT to adjoining properties, at the locations specified by the UTILITY. Such easement locations shall take into consideration the DEVELOPER's future development plans for this property.

ARTICLE IV

CONSTRUCTION AND INSPECTION AND FINAL TESTING

Section 4.01 The DEVELOPER will construct the extension under this Agreement, for all residential, commercial or other customers, either proposed or existing, within the area of the DEVELOPMENT.

All construction shall be done in accordance with the approved plans and specifications for the DEVELOPMENT and in accordance with accepted universal standards and codes.

Section 4.02 The UTILITY shall bear no financial or other responsibility for the design and construction of the extension. The UTILITY will provide an inspector to ensure that the construction including the placing of mains, service lines, meter boxes and setters, to connect dwellings to extension.

Section 4.03 The DEVELOPER shall provide to the UTILITY a complete set of plans and specifications and shop drawings of the extension and continually update these plans through the design and construction of the system as needed. Upon completion of construction, the DEVELOPER shall provide to the UTILITY copies of record drawings also known as "as built plans" of the extension.

Section 4.04 At all Times during construction of the extension, the DEVELOPER shall maintain sole ownership of said system.

Section 4.05 The DEVELOPER is to commence construction within 12 months after UTILITY's acceptance and the PSC's approval of this Agreement unless the DEVELOPER and UTILITY agree in writing to an extension of this

Agreement. This Agreement shall apply to future sections of the DEVELOPMENT performed by the DEVELOPER or his assigns.

Section 4.06 Inspection and Testing

The DEVELOPER and UTILITY agree to the following:

1. Testing shall be done by the DEVELOPER at his expense under the observation of the UTILITY. All the necessary equipment and labor for the testing shall be provided and paid for by the DEVELOPER.
2. Testing shall be done not less than five (5) days after the extension or portion thereof, has been installed.
3. The DEVELOPER agrees to give the UTILITY at least 48 hours' notice of any test to be done and the UTILITY agrees to provide a qualified representative to witness and approve the test.
4. If the extension fails any of the tests then the DEVELOPER shall remedy the defect at his expense. And the repairs and tests shall be repeated under the supervision of the UTILITY.
5. The UTILITY agrees to notify the DEVELOPER, in writing within five (5) days of the test(s), as to whether the extension is acceptable and if not, what parts are defective and what remedies are requir5ed. As soon as the DEVELOPER realizes a failure in testing, he may commence any repairs or changes immediately.

Section 4.07 The UTILITY shall have the right to inspect and approve, prior to the implementation of service, the construction of the DEVELOPER's extension to ensure that water/sewer will be transported thru the DEVELOPER's extension in accordance with current Federal, State and Local regulations and the terms of the Agreement, line loss is minimized, and that the system is constructed in accordance with Plans and Specifications, using materials in compliance with Federal, State and UTILITY's standards. A one-year guarantee of materials and workmanship shall be provided by the DEVELOPER from the date ownership of the extension is transferred.

Section 4.08 Disinfection (Water extensions only)

1. All pipelines shall be pressure and leak tested, flushed, and cleaned of debris and dirt prior to application of disinfectant. Flushing shall continue until all debris and turbidity are removed.
2. Methods to be used for disinfection are those detailed in ANSI/AWWA C-651-92 (water mains).
3. The DEVELOPER shall be responsible for contacting the State Health Department Laboratory for procedures to be used to collect

samples from the extension for analysis. The samples shall pass the bacteriological test requirements of the West Virginia State Health Department.

4. In the event the sample does not pass, the DEVELOPER shall take whatever steps necessary to remedy the problem. After correction the problem testing shall be repeated.

Section 4.09 Final Testing and Inspection

The UTILITY shall have the right to visually inspect and conduct tests upon the extension before it takes possession of the system. If defects are found, the UTILITY shall notify the DEVELOPER in writing of such defects as soon as possible but in no event, not later than four (4) working days, of such defects and prescribe the action necessary to remedy the problem. Any defects will be repaired by the DEVELOPER Testing will be done by the DEVELOPER at his expense under the supervision of the UTILITY.

Section 4.10 The UTILITY shall have the right to conduct, at UTILITY expense, final test of the system to include but not limited to hydrostatic, bacteriological, and visual inspection tests in accordance with UTILITY specifications. DEVELOPER is not to make final hook up to any customers until such time as record (as built) plans are submitted to the UTILITY, all aspects of the extension have been inspected and approved by the UTILITY.

ARTICLE V

TRANSFER OF OWNERSHIP

Section 5.01 Upon completion of the construction of the entire extension, or specific phases or portions of the extension as agreed to by the DEVELOPER and the UTILITY, and when the DEVELOPER shall have obtained such Federal, State, and required local certifications, authorizations or approvals at the DEVELOPER's expense, the DEVELOPER shall provide the UTILITY with written notice of completion that the entire or specific phase of the extension is completed in all respects. As used in this and subsequent Sections, "completed in all respects" includes, but not limited to, the system or phase of the system being completed, all engineers, material men, contractors and subcontractors of the DEVELOPER have been paid for their work on the extension or specific phase of the extension, and a legal certification from the DEVELOPER that all legal disputes regarding the extension or specific phase of the extension are resolved, and no outstanding liens or potential liens exist regarding the extension or specific phase of the extension, the same be certified in writing by the DEVELOPER. Transfer of ownership may take place in phases as areas of the development are built, provided all conditions as stated in this Section are met.

Section 5.02 If, after receipt of the notice set forth in Section 5.01, the UTILITY determines that the DEVELOPER's entire extension or specific phase of the extension is in good and proper working condition, that no changes, repairs or additions are necessary, and that the entire extension or specific phase of the extension is complete in all respects in accordance with the plans and specifications and that the property and facilities to be transferred are capable of being accessed by others, the DEVELOPER shall deliver, and the UTILITY shall acquire, in accordance with the terms outlined herein, ownership of the entire extension or specific phase of the extension, including easements, piping equipment and appurtenances necessary for ownership, operation and maintenance of the entire extension or specific phase of the extension and all extensions thereto. At such time the UTILITY shall provide the DEVELOPER written notice of its acceptance of the phase of the distribution system.

Section 5.03 At the time of transfer of ownership, the DEVELOPER shall deliver to the UTILITY all shop drawings, operating manuals, and written warranties that were required by the construction specifications and drawings.

Section 5.04 Nothing in this Article shall be construed to prevent the UTILITY from acquiring ownership of the system a section at a time or any portion less than the completion of the entire system.

ARTICLE VI

REPRESENTATIONS AND WARRANTIES

Section 6.01 The UTILITY represents and warrants that the execution, delivery and performance of this Agreement by the UTILITY will have been duly authorized, and this Agreement constitutes a valid and binding obligation of the UTILITY enforceable in accordance with its terms.

Section 6.02 The DEVELOPER represents and warrants that the extension will be designed and constructed in accordance with the plans and specifications. The DEVELOPER hereby warrants the DEVELOPER's work on all aspects and components of the extension for one (1) year from the date of transfer of ownership to the UTILITY and will make such changes, repairs and additions, at the DEVELOPER'S expense, as are needed to maintain the extension in a proper working condition. However, the UTILITY will be obligated to accept the extension only if a Representative of the UTILITY inspected the extension during construction.

ARTICLE VII

SUBSEQUENT CONNECTIONS

Section 7.01 The DEVELOPER shall provide to the UTILITY connection and user agreements for each structure that is to be connected to the extension.

Section 7.02 The DEVELOPER hereby agrees that in the event that the DEVELOPER transfers any portion of the DEVELOPER's property within the development to any individual, corporation, or other entity, the new owner's duties and responsibilities under this agreement will not be reduced or diminished in any way.

ARTICLE VIII

MISCELLANEOUS PROVISIONS

Section 8.01 Nothing in this agreement shall be construed to make the UTILITY liable or responsible for any obligations of the DEVELOPER, nor shall this agreement be construed to make the DEVELOPER liable or responsible for any obligations of the UTILITY, except as specifically stated herein.

The DEVELOPER hereby agrees to save and indemnify and keep harmless the UTILITY against all liability claims and judgments or demands for damages arising from accidents to persons or property occasioned by the DEVELOPER, his agents or employees, and against all claims or demands for damages arising from accidents to the DEVELOPER, his agents or employees, resulting from construction of the extension contemplated herein, whether occasioned by said DEVELOPER or his employees or any other person or persons and the DEVELOPER Will defend any and all suites that may be brought against the UTILITY for any expenditures that the UTILITY may take by reason for such accidents.

The DEVELOPER hereby agrees to save and indemnify and keep harmless the UTILITY from all claims, demands, causes of action, or suits of whatever nature arising out of liens upon the extension or upon the DEVELOPMENT property upon which the extension is located, arising out of labor and materials used by the DEVELOPER and his contractors and subcontractors resulting from construction of the extension and said DEVELOPMENT.

Section 8.02 Upon transfer of ownership to the UTILITY, nothing in this agreement shall be construed to provide the DEVELOPER with any ownership or other interest in the extension, which shall become the exclusive property of the UTILITY.

Section 8.03 This agreement constitutes the entire agreement between the UTILITY and the DEVELOPER with respect to the matters addressed and may be amended only in a subsequent writing executed by both parties.

Section 8.04 This agreement may not be assigned by any party without mutual written consent and is binding upon all purchasers, heirs or assigns. The parties hereto agree that the consent to such assignment shall not be unreasonably withheld.

WITNESS the following signatures this _____ Day of _____.

_____

[Utility] CHARLES TOWN UTILITY BOARD

By: _____

Its: _____

_____

[Developer]

By: _____

Its: _____

EW-77C
06/2010

WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES
Bureau for Public Health
Office of Environmental Health Services
350 Capitol Street, Room 313
Charleston, WV 25301-3713
Phone: 304-558-2981 Fax: 304-558-0691

WATER TREATMENT AND/OR DISTRIBUTION SYSTEMS
Forms and Required Information

Please read carefully and submit FOUR (4) COPIES of the required information. Omission of any of the required information will result in needless delay. **PLEASE ENCLOSE A CHECK for the application fee in the amount of $300, payable to *WV Department of Health and Human Resources.***

PROJECT NAME: _____

COUNTY: _____ DATE: _____

APPLICATION FORMS AND DESIGN DATA SHEETS

Forms

____ Completed Form EW-100
____ Completed Form EW-100, Addendum-Capacity Development Questionnaire
____ Completed Form EG-5 and/or Engineering Report With Calculations
____ Completed Mobile Home Park Forms EG-1 & EG-2, if applicable

REQUIRED INFORMATION TO ACCOMPANY APPLICATION

Location Maps

_____ US Geological Survey (USGS) topographic map or county road map showing the project location (8½" x 11" photocopy is acceptable).

Plans

_____ Plans **must be signed and sealed** by a WV Registered Professional Engineer.
_____ Scale for plan view of water lines: 1"=200' or less.
_____ Size of plans: Plans shall not be less than 18" x 24" in size, nor greater than 27" x 40", for microfilming purposes. Recommend 24" x 36" plans.
_____ Provide a site plan showing:
- _____ Layout with dimensions and property lines.
- _____ Proposed home sites, mobile home sites, camping trailer or camp sites, schools, or other buildings.
- _____ Location of and distances to known water intakes or wells.

_____ Location of existing and proposed water lines, valves, storage tanks, meter stations, pressure reducing stations, booster stations and water treatment facilities.

_____ Location and size of existing and proposed sewer lines, manholes, cleanouts, sewage lift stations and sewage treatment facilities.

_____ Plans, in addition to the site plans, provide plans of all new and existing water treatment facilities; new booster stations, meter stations; pressure reducing stations; and storage tanks, with dimensions (lengths, heights, widths, areas, volumes and elevations, including the 100 year flood elevation.)

Report and Specifications

_____ Provide a report and specifications setting forth:

- _____ General description of the proposed project and location.
- _____ Number of units to be served and possible expansion of the facility.
- _____ Specifications of all new water treatment equipment and structures.
- _____ Specifications of pipe, valves, booster stations, storage tanks, meter stations, and pressure reducing stations.
- _____ Hydraulic calculations for the water distribution system. (Note that a minimum 20 psi pressure must be maintained in the distribution system under all flow conditions, including fire flows plus peak demand flows.)
- _____ 100-year flood elevations.

Documentation

_____ Provide documentation consisting of:

- _____ Letter granting permission to connect to public or privately owned water distribution system when such is the proposal.
- _____ Legal document (rights of way or easements) granting permission to cross land of adjacent property owners with water lines. This is not required if the applicant has the right of eminent domain.
- _____ Contract documents, if the project is to be bid, particularly if the project has WV Infrastructure and Jobs Development Council funding or WV Bureau For Public Health Drinking Water Revolving Fund funding.
- _____ Documentation from a municipality or public service district if they are going to assume responsibility for the long term operation and maintenance of the water facilities (Not required, if the applicant is a municipality or public service district).
- _____ If the water facilities are **not** going to be operated and maintained by a municipality or public service district, **will require**:
  - _____ Articles of Incorporation and By-Laws of a Property Owners Association, particularly where lots or housing units are sold, such as in a subdivision or townhouse complex, **or**
  - _____ Articles of Incorporation of a Private Utility regulated by the WV Public Service Commission, **or**
  - _____ Legal document (notarized) stating who shall be responsible for the operation and maintenance of the water facilities, if the project being served by the water facilities will be owned by the owner of the water facilities. (Examples would be a mobile home park, travel trailer park, rental apartment complex, school, campground, church, restaurant, shopping complex or office building.)

EW-100

06/2010

Office Use Only

Date Received _____

Date Approved _____

Approved by _____

Permit Number _____

WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES

Bureau for Public Health
Office of Environmental Health Services
350 Capitol Street, Room 313
Charleston, WV 25301-3713
Phone: 304-558-2981 Fax: 304-558-0691

PUBLIC WATER SUPPLY SYSTEM APPLICATION FOR A PERMIT TO CONSTRUCT, ALTER, OR RENOVATE

(Please Prepare in 4 Copies)

APPLICANT: _____

STREET OR PO BOX: _____

CITY: _____ STATE: _____ ZIP: _____

TELEPHONE: _____ E-MAIL: _____

ENGINEERING FIRM: _____

STREET OR PO BOX _____ TELEPHONE: _____

CITY: _____ STATE: _____ ZIP: _____

TELEPHONE: _____ E-MAIL: _____

IN ACCORDANCE WITH TITLE 64, SERIES 3, PUBLIC WATER SUPPLY REGULATIONS OF THE WEST VIRGINIA DIVISION OF HEALTH, WE HEREBY MAKE APPLICATION TO CONSTRUCT, ALTER, OR RENOVATE AS FOLLOWS:

_____ _____

Signature of Applicant or Authorized Agent Date

NOTE: A $300 application fee must accompany a permit application ($150 application fee for a water well permit application). Make check or money order payable to *"West Virginia Department of Health and Human Resources*". Cash not accepted. Permit applications which include both water and sewer systems require only a single $300 fee.

EG-5
08/2012

WEST VIRGINIA DEPARTMENT OF HEALTH AND HUMAN RESOURCES

Bureau for Public Health
Office of Environmental Health Services
Environmental Engineering Division
350 Capitol Street, Room 313
Charleston, WV 25301-3713
Phone: 304-558-2981 Fax: 304-558-0691

WATER SYSTEM DESIGN INFORMATION AND DATA SHEET

Complete all portions of the Design Data Sheet applicable to the project. Omission of required information will result in the application being denied. When both sewer system and water system are to be constructed, Design Data Sheets for both sewage and water must be completed and attached to the application.

Applicant _____

Project Location _____

County _____

Number of customers _____ or Estimated population or population equivalent served _____

Number of home sites _____ Number of manufactured home sites _____

Estimated peak flow _____ gpm

Minimum consumer pressure (static/residual) _____ / _____ psi

Source of Supply: _____
(name of utility)

Municipal _____ Public Service District _____ Private Well _____

Other _____
(specify)

Pressure at connection to public supply (static/residual) _____ / _____ psi

Capacity of well, if applicable _____ gpm

Type of system Gravity _____ Hydropneumatic _____

Other _____
(specify)

Length of water lines of each size _____

YES	NO	
_____	_____	Details of well construction attached
_____	_____	Fire hydrants to be installed (hydraulic calculations must be included)
_____	_____	Storage tank required Size of tank _____ gallons
		Elevation of top and bottom of storage tank _____ / _____
_____	_____	Booster station required Size of station _____ gpm
_____	_____	Pressure reducing station required
_____	_____	Details of water treatment equipment (if applicable)
_____	_____	Chlorination Contact time _____ minutes

CHARLES TOWN UTILITY BOARD
ACCEPTANCE OF INSTALLED WATER LINES

Applicant Name: _____

Applicant Address: _____

_____

Project: _____

_____

To be furnished with Application:

Permits: Health Department: _____ Other: _____

Alternate Line Extension Agreement: _____

Contractor: _____

As-Built Plans: _____

Easements: _____

_____ certifies that the above described water lines have been
Applicant's Name

installed in accordance with all permits, Charles Town Utility Board Standards, and as shown on As-Built Plans submitted with this request. Applicant requests Charles Town Utility Board to accept water lines into their system subject to inspection of Charles Town Utility Board during one year warranty period from date of this certificate and acceptable correction by Applicant of any deficiencies identified during one year warranty period.

_____
Applicant's Signature

_____
Date

Based on certification of applicant and upon completion of one year warranty period, Charles Town Utility Board accepts the above described water lines into their system.

_____
Chairman

_____
Date