

Construction Standards

(Available on disk; Use with the Materials Listing)

Updated May 2020

PIPE LAYING

- A. Each pipe or fitting shall be carefully inspected immediately before it is laid and defective pipe shall be rejected unless otherwise allowed by the Engineer for use elsewhere on the Project.
- B. Laying of pipe and fittings and jointing of pipe shall be executed in accordance with the manufacturer's recommendation while at all times providing the pipe with a foundation which produces and provides an uniform bearing surface for the pipe.
- C. Proper facilities shall be provided for lowering sections of pipe into trenches as recommended by the manufacture.
- D. At times when work is not in progress, open ends of pipe shall be securely closed so that no trench water, earth, or other substance will enter the pipe line.
- E. Precautions shall be taken at all times to prevent the pipe from being filled with foreign matter. All pipe and fittings shall be clear of foreign matter before acceptance of the line is given.
- F. Where conditions are unsuitable for laying pipe because of weather or trench conditions, the Contractor will stop work until at such time as conditions improve.
- G. During back-filling/top-soiling of underground potable water piping, install continuous underground-type metallic line markers, located directly over buried lines at 12" below finished grade.

RELATION OF WATER MAINS TO STORM DRAINAGE LINE

- A. Crossing a Water Main over a Storm Sewer
 - 1. Whenever it is necessary for a water main to cross over a storm drainage line, the water main shall be laid at such an elevation that the bottom of the water main is at least 12 inches above the top of the storm drainage line.
 - 2. Where local conditions or barriers prevent a 12-inch vertical separation, the Contractor shall provide that the water main be constructed of Ductile Iron Pipe, of a class directed by the Engineer, with joints that are equivalent to water main standards for a distance of ten (10) feet on each side of the point of crossing.
- B. Crossing a Water Main Under a Storm Drainage Line
 - 1. Whenever it is necessary for a water main to cross under a storm drainage line, the Contractor shall provide for the water main to be constructed of Ductile Iron Pipe, of a class directed by the Engineer, with joints equivalent to water main standards for a distance of ten (10) feet on each side of the point of crossing.
 - 2. A section of water main pipe shall be centered at the point of crossing.

TRENCHING AND BACKFILLING

- A. Work within the right of way of any North Carolina Department of Transportation road or street shall be done in coordination with the requirements set forth by the Department of Transportation. All work shall be subject to the approval of the Department of Transportation. The Contractor shall pay for and furnish any bond required by the Department of Transportation. Work shall be done in accordance with the requirements of North Carolina Division of Highways, "Policies and Procedures for Accommodating Utilities on Highway Rights of Way", latest revision.

- B. The Contractor shall do all clearing and grubbing necessary for the performance of trenching. The Contractor shall be responsible for the removal and disposal of any debris for clearing and grubbing. Clearing and grubbing should include the removal of crops, weeds and other annual growth. Permanent above ground features such as fences, walls, trees, shrubs, mail boxes, etc. along the trench shall not be disturbed unless called for in drawings. Existing improvements that are to remain, but are damaged during construction shall be restored to their original condition.
- C. During the process of trenching, the Contractor shall maintain methods of preventing surface water from entering into trench.
- D. The Contractor shall remove any water which accumulates in the trench by pumping or by an approved method.
- E. The trenching shall be to the line and grade shown on the plans.
- F. Trench depth shall be enough to give adequate cover for the placed pipe. Three feet is the minimum cover in most cases, except in the case of crossing a drainage ditch when the cover can be a minimum of two feet.
- G. When trenching is for the placement of water lines the profiles are drawn as straight grade lines. The Contractor shall conduct his trenching to provide a vertical curve with cords that will provide the pipe with a foundation, which will not cause the pipe to exceed the permissible deflection of each pipe joint.
- H. The Contractor shall conduct his trenching such that the bottom of the trench provides uniform bearing and support for each section of the pipe.
- I. Care shall be taken not to over-excavate. When over- excavation has occurred, the Contractor shall fill to the required grade and compact the material to the same density as the surrounding material.
- J. When material is encountered that is incapable of supporting pipe design loads, the Contractor shall remove such material to a depth determined by the Engineer and backfill it to the proper grade with material approved by the Engineer.
- K. Compaction shall be to 95% of standard density as determined by AASHTO Method T-99 in paved areas. (85% shall be sufficient in lawn or unpaved areas.)
- L. During the backfilling of pipe, care shall be taken to maintain alignment and prevent damage to the joints. The backfill shall be kept free from stones, frozen lumps, chunks of highly plastic clay, or other objectionable material.
- M. All pipe or structure backfill areas shall be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill.
- N. Heavy equipment shall not be operated over any pipe until it has been properly backfilled and has a minimum cover as required by the plans.

TESTING

- A. The Contractor will be required to furnish, set up, and service a suitable pump and test equipment (to accurately measure water pressure).
- B. The Contractor shall test each section between valves of the pipe line to a hydrostatic pressure of one hundred fifty (150) pounds per square inch, making sure that there is no air in the pipe, valves and hydrants. This can be done with corporation cocks being placed at the high spots in the line.
- C. Where water is not readily available the Contractor shall provide a sterilized tank of such capacity to provide sufficient water for the test.

D. The Contractor shall perform the test for a period of time not less than two (2) hours or for a period considered necessary by the Engineer to ensure tightness of the joints and to detect any defective material.

E. Leakage - No installation will be accepted if the leakage is greater than that determined by the formula: $L = \frac{ND\sqrt{P}}{7,400}$

L-is the allowable leakage in gallons per hour

N-is the number of joints in the length of pipeline tested

D-is the nominal diameter of the pipe, in inches

P-is the average test pressure during the leakage test, in pounds per square inch gauge.

F. If any portion of the pipe line proves to be defective, the Contractor shall correct the defect and re-test the line for compliance. Such action shall be maintained until the line complies to the leakage requirements. All costs for correcting any defects and retesting shall be at the Contractors expense.

G. Initial Flushing of Lines

1. After hydrostatic testing, the new lines are to be flushed thoroughly to remove all dirt and debris, which has collected inside the pipe line.
2. The Contractor shall provide and maintain adequate provisions for water runoff and erosion control.

H. Sterilization of Water Main

1. The Contractor shall conduct or have conducted the work of sterilization by chlorinating in strict accordance with "American Water Works Association Standard C-651 for Disinfecting Water Mains", using the Continuous Feed Method, unless otherwise directed.
2. Chlorinating shall be performed only in the presence of the Engineer or their designated representative and only after the line is complete and has tested satisfactorily for leakage.
3. Sufficient chlorine solution shall be applied to bring the concentration within the main to a minimum of 100 mg/L free chlorine residual.
4. The chlorine solution shall be introduced to the main in such a manner that the required concentration of chlorine is achieved throughout.
5. All valves within the section of the main being chlorinated shall be operated at least once during the contact period.
6. The chlorine solution shall remain in the pipe at least 24 hours.
7. Sterilization shall include the pipe, fittings, valves, hydrants, services and other apparatus contained in the system.
8. Extreme care shall be taken to prevent contamination of existing water mains during the test period. If, an existing main is contaminated, the section of main subjected to the possible contamination shall be flushed and chlorinated in accordance with the requirements for new mains.
9. The main shall be flushed thereafter in the presence of the Engineer or their designated representative. The flushing of the main shall be considered complete

when the chlorine concentration with the main is less than or equal to the lesser of the following values:

- a. One (1) part per million (ppm) free chlorine.
 - b. The free chlorine concentration within the existing main to which the extension has been connected.
10. The Contractor shall be responsible for insuring that high-strength chlorine solution is contained on-site and not allowed to make its way to any watercourse, stream, creek, lake, or other body of water.

BACTERIOLOGICAL TESTING

- A. After completion of chlorinating and flushing, the Contractor shall take the sample, witnessed by the Owner. The samples shall be tested in accordance with the latest edition of Standard Methods for the Examination of Water and Wastewater for three days for any evidence of contamination. Tests shall be performed by a laboratory certified by the State of North Carolina to conduct such testing. The bacteriological testing of the samples will be arranged and paid for by the Contractor.
- B. West Carteret Water Corporation shall determine the location of samples and the number of samples necessary to provide a test group which is representative of the section of main being tested.
- C. In the event that the tests show a need for rechlorination, the Contractor, shall at no additional cost to West Carteret Water Corporation, repeat the sterilization procedure as often as necessary to obtain satisfactory results.

THRUST BLOCKS

- A. Thrust blocks shall be placed at all plugs, caps, tees, crosses, valves, hydrants, bends and other locations as directed by the Engineer.
- B. Thrust blocks shall not come into direct contact with flanges or mechanical joints.
- C. Concrete shall conform to ACI Code. Compressive strength shall be $f_c=3000$ psi.

EROSION CONTROL

- A. Work in this section shall be performed in accordance with the requirements of the North Carolina, Department of Environment, Health and Natural Resources, and the requirements of the North Carolina, Department of Transportation.
- B. Soil erosion and sedimentation control shall be provided by the Contractor for all areas of the sites that are graded, trenched or disturbed as indicated on the drawings, or as specified herein.
- C. The Contractor shall have full responsibility for construction and maintenance of erosion and sedimentation control measures.
- D. The Contractor shall take whatever measures are necessary to minimize soil erosion and siltation, water pollution and air pollution caused by his operations. The Contractor shall also comply with the applicable regulations of all legally constituted authorities relating to pollution prevention and control. The Contractor shall keep fully informed of all such regulations which in any way affect the conduct of the work, and shall at all times observe and comply with all such regulation. In the event of conflict between such regulations and the requirements of the specifications the more restrictive requirements shall apply.

SEEDING

- A. Seeding and mulching shall be performed in accordance with all applicable provisions of Section 880 of the North Carolina State Department of Transportation's Standard Specifications for Roads and Structures, latest revision.
- B. Seeding and mulching shall be done on all earth areas disturbed by construction not destined for construction of structures or paving.

WASTE MATERIAL

- A. Waste material not utilized in the construction of the project shall be removed from the project site and disposed of by the Contractor in areas provided by him.
- B. The Contractor shall hold the Owner harmless of any damages which might occur through the disposal of the waste and debris.
- C. Construction debris and all broken pavement, concrete, masonry, etc. shall be removed from the project as soon as possible.

BORING AND JACKING

- A. When the North Carolina Department of Transportation will not allow an open-cut on a highway or road, and the scheduled size of pipe to cross the highway or road is 4" (I.D.) or greater, then a boring and jacking operation shall be used. Refer to Department of Transportation Requirements and Plan Drawings.
- B. The dry bore method shall be used.
- C. Each new section of encasement pipe shall be butt-welded to the section previously jacked into place.
- D. If voids are encountered or occur outside the encasement pipe, grout holes shall be installed in the top section of the encasement pipe at 10-foot centers and the voids filled with 1:3 portland cement grout at sufficient pressure to prevent settlement in the roadway. Spiders will be installed.
- E. In the event an obstruction is encountered during the boring and jacking operation, the auger is to be withdrawn and the excess pipe is to be cut off, capped, and filled with 1:3 portland cement grout at sufficient pressure to fill all voids before moving to another boring site.
- F. Refer to drawings for details on the carrier pipe and its installation.

BORING

- A. When the Department of Transportation will not allow an open-cut on a highway or road, and the scheduled size of pipe to cross the highway or road is 2-inch or less (I.D.), then a simple bore without casing shall be used.
- B. Traffic control shall be maintained during entire progress of installation, in accordance with DOT guidelines.
- C. Sediment and erosion control shall be maintained during the entire progress of installation.
- D. Provide signs stating "Soft Shoulders" in areas of trenching and maintain until settling has occurred sufficiently to prevent rutting.
- E. Installation, performance and field quality control shall be in accordance to North Carolina

Department of Transportation's requirements.

VALVES

- A. Valves shall be set to such an elevation that the top of the operating nut is no lower than thirty (30) inches below finished grade.
- B. When valves must be set at a depth that causes the standard stem to be below the required thirty (30) inches, the stem shall be extended from the valve to the required thirty (30) inch depth.
- C. All valves shall be provided with a concrete setting pad.
- D. Round (24") concrete collars shall be provided on all valves.
- E. Install valves and accessories in accordance with manufacturer's instructions unless otherwise directed.
- F. All valves placed underground shall be provided with an adjustable, screw-type valve box unless otherwise directed.

HYDRANTS

- A. Install hydrant and accessories in accordance with manufacturer's instructions.
- B. Hydrants, valves and valve boxes shall be set plumb.
- C. Hydrants shall be set with the invert of the four & one-half inch (4-1/2) nozzle 18 inches above the top of curb of the street or above the centerline of the street.
- D. The four and one-half inch (4-1/2) nozzle shall face perpendicular to the street or highway.
- E. The connecting pipe from the main to the hydrant shall be of the same depth as the main pipe.
- F. The hydrant shall be set upon a concrete slab not less than four (4) inches thick and 1 foot square.
- G. The hydrant shall be firmly braced, opposite the pipe connection, with poured-in-place concrete thrust blocks against undisturbed soil.
- I. The hydrant shall be provided with not less than seven (7) cubic feet of stone surrounding the base of the hydrant to provide adequate drainage for the drain valves.
- J. Backfill around the hydrant, valve and valve boxes shall be compacted to the grade line.

Construction Standards – Extra Note

The following notes are **emphasized** items that may be already be included in the Construction Standards. It has been noted that these items are typical WCWC comments after the initial review, which may delay construction:

- ✓ Blow Off Assembly Configuration (In order of installation):

- Water line
- 3 Piece PVC Compression Coupling
- 2" x 6" Brass Nipple
- 2" Valve (with box and collar); Solid concrete block under valve
- 2" X 24" Brass Nipple
- 2" Brass Thread 90° Elbow
- Schedule 80 2" Male Adapter
- SDR 21 PVC (length to just below ground level)
- 2" Schedule 80 Female Coupling
- 2" PVC Threaded Plug covered by valve box and collar

Concrete kickers needed behind 90° fittings.

- ✓ Piping: WCWC does have some 3-inch and C-900 piping due to assumed systems and DOT construction. This pipe is not used as a standard.
- ✓ All 2" MJ Tapped plugs will use 2" brass nipples and 3-piece PVC dresser coupling or PVC knock-on coupling
- ✓ All materials must be AWWA approved; Inspected on-site by WCWC after delivery by WCWC's agent
- ✓ Water line will be placed a minimum of 5-feet off pavement edge and 36 inches deep with detectable tape (buried 1-foot below finished grade); When burying pipe, the finished grade should be considered to avoid having pipe at depths that exceed 36 inches.
- ✓ Preconstruction meeting will be held at WCWC office prior to construction; Work only to be performed by Licensed Contractor approved by WCWC; Developer will be responsible for inspection fees as incurred by WCWC inspector

Materials Standards

The following information is provided as a guide while compiling plan documents. Prior to completing technical specifications, please contact WCWC for the latest copy (see date at bottom).

ITEM	DESCRIPTION		BRAND/MODEL NO. (IF APPLICABLE)
Services (Tap Size)	1"	Residential	
	>=1"	Commercial	
Corp Stops	1"	Residential	74701T-1 McDonald with AWWA tapered thread
Meters	$\frac{3}{4}$ " X $\frac{5}{8}$ "	Residential	Neptune
	$\frac{3}{4}$ " X $\frac{3}{4}$ "	Heavy Duty Application; Commercial or residential; Where warranted by demand	Neptune
	1"	Commercial; Where warranted by demand	Neptune
	>1"	Commercial; Compound Only; Test ports; Where warranted by demand	Neptune with Reader Device
Backflow Preventers	<=1"	Residential	Watts LF 7R10-U2
	>1"	Commercial; Testable	Watts, Febco, Wilkins
Angle Valves	1" X $\frac{3}{4}$ "	Residential; No reducers	74602BT – Full Port McDonald Brass
	1" X 1", 2" x 2"	1" Meter or Heavy-Duty $\frac{3}{4}$ " 2" Meter	74602BT – Full Port McDonald Brass
Saddles	See Next Page		
Tubing	$\frac{3}{4}$ "	Before 1997	
	1" P.E. CTS	After 1997; 200 psi	52737 CTS PE-Tubing 200 PSI Charter Blue or Silverline
Meter Boxes	20" L X 10.5" W X 12" D	Cast Iron	MBX-1
	17" L X 12" W X 12" D	Plastic (Approve in advance for applications such as mobile home parks)	Meter lid should NOT have center lift access
Inserts for tubing		Stainless steel; Short; Solid; Round edges	504385 Mueller
Valves	All	Resilient Seat; Square Nut; 2" will be threaded type; NO PVC male or female adapter	AWWA approved
Pipe-PVC	2"	SDR 21; Schedule 80 (if approved in advance per application)	
	4" – 12"	SDR 21 (Standard)	
Pipe-Ductile Iron	4" – 12"	Class 50	
Valve Boxes		Cast iron adjustable; Screw-type	
Flushing Hydrants		Red	Clow (4-1/2VO Med 3'6"B 6MJ L/ACC Red)
Concrete Collars	24" (Typically)	Precast; Round	
MJ Kits		Grip Ring	Romac or Ford as alternate if Romac is not available
Tapping Sleeves	Various Sizes	Stainless steel	
Pipe Dope		Pipe Thread Compound; PVC Safe; NO TEFLON TAPE	
Blow-Off Assembly	2"	See Typical	
Tracer Wire		10 Gauge – Standard Continuous Wire; 2 Inch detectable metallic "Buried Water Line"	

Additional Information:

Saddles:

- **SDR-21**
 - #3891: 2-Inch to 8-Inch X 1-Inch (Hinged, 1-Bolt) AWWA/Tapped Thread
 - #3892: 4-Inch to 8-Inch X 2-Inch (Hinged, 2-Bolt) NPT Thread
 - #3801: 10-Inch to 12-Inch X 1-Inch (2-piece, 2-Bolt) AWWA/Tapered Thread
 - #3802: 10-Inch to 12-Inch X 2-Inch (2-piece, 2 Bolt) NPT Thread

- **C-900 (By WCWC approval only)**
 - #3895: 4-Inch to 8-Inch X 1-Inch (Hinged, 1-Bolt) AWWA/Tapped Thread
 - #3896: 4-Inch to 8-Inch X 2-Inch (Hinged, 2-Bolt) NPT Thread
 - #3805: 10-Inch to 12-Inch X 1-Inch (2 Piece, 2-Bolt) AWWA/Tapered Thread
 - #3806: 10-Inch to 12-Inch X 2-Inch (2 Piece, 2 Bolt) NPT Thread

- **Ductile Iron**
 - #4855AF: 4-Inch to 12-Inch X 1-Inch (Epoxy Body, Double Stainless-Steel Bands) AWWA/Tapered Thread – Flat Gasket
 - #4856AF: 4-Inch to 12-Inch x 2-Inch (Epoxy Body, Double Stainless-Steel Bands) NPT Thread – Flat Gasket

When installing C-900 or Ductile Iron Saddles, installer must use saddles specific for each type for each type of pipe. Example: C-900 Saddles will not be used on Ductile Iron pipe.