

WATER SPECIFICATIONS

SPECIAL CONDITIONS		ADDITIONAL REQUIREMENTS	
1. A minimum cover of three (3) feet over the proposed lines is required.	2. No work shall begin without notifying Franklin County 24 hours in advance. The contractor is responsible for obtaining any and all necessary permits.	A. GENERAL	
3. No work shall begin without written approval of construction plans.	4. Work shall be subject to inspection by the County Inspectors and design engineer.	1. No water main shall be laid within thirty (30) feet of a sewage drainfield.	
5. Contractor shall be responsible for locating and uncovering all valve boxes after surface treatment of roads and adjusting boxes to final road grades, if necessary.	6. All existing utilities may be shown or may not be shown in the exact location. The contractor shall comply with the State Water Works regulations, section 12.05.03 where lines cross.	2. If rock is encountered in the water main trench, the rock shall be removed to a level where six (6) inches of gravel bedding can be installed for the water main.	
7. The contractor shall notify the County of any field connections to the approved plans prior to such construction. Contractor shall maintain a set of red-lined plans showing location of all installations. As-built information shall be submitted to the design engineer for proper action of as-built plans.	8. All trenches within the existing or future Virginia State Department of Highways and Transportation right-of-way must be compacted in six inch layers.	B. SEPARATION OF WATER MAINS AND SEWERS	
9. All lines to be staked prior to construction.	10. Contractor to coordinate with the Engineer to provide as-built plans.	1. Parallel Installation	
11. All construction shall be in accordance to approved construction practices of the applicable trades.	12. Unless noted otherwise herein all construction shall be in accordance to the latest edition of AWWA standards.	a. Normal conditions - Water mains shall be laid at least ten feet horizontally from a sewer or sewer manhole. The distance shall be measured edge-to-edge.	
EXCAVATION, STABILIZATION AND BEDDING		b. Unusual conditions - When local conditions prevent a horizontal separation of ten feet, the water main may be laid closer to a sewer or sewer manhole provided that:	
A. TRENCHING	1. Excavation for trenches shall include the removal of all material encountered regardless of classification in accordance with the elevations and grades at the locations and stations indicated on the plans or specified herein.	1. The bottom (invert) of the water main shall be least eighteen inches above the top (crown) of the sewer.	
2. Excavation, unless otherwise specified, shall be open cut. The Contractor shall open no more than two hundred (200) feet of trench at one time during the laying of pipe, unless approved by the Engineer.	3. Trenches shall be excavated in straight lines and shall be accurately graded in order to establish a true elevation for the invert of the pipe.	2. Where the vertical separation cannot be obtained, the sewer shall be constructed of AWWA approved water pipe, pressure tested in place without leakage prior to backfilling. The sewer manhole shall be of watertight construction and tested in place.	
4. The width of trenches, from existing grade to one (1) foot above the top of the pipe shall be of sufficient width to permit the proper installation of bracing, shoring or sheeting.	5. The sides of the trenches shall be as vertical as practical.	3. Sewers passing over or under water mains shall be constructed of the materials described in Item 1, b, 2	
6. Excavation for structures shall allow a minimum of twelve (12) inches clear between the structure and the sides of the trench or any required bracing, shoring or sheeting.	7. Excavated materials suitable for backfill shall be stockpiled in an orderly manner at a sufficient distance from the sides of the trench in order to avoid overloading the banks of the trench and to prevent slides or cave-ins.	2. Water lines passing under sewers shall, in addition, be protected by providing:	
8. Excavated materials which are not required or approved for backfill shall be removed from the site and disposed of by the Contractor, at his expense.	9. Contractor shall adhere to all local, state and federal construction laws, including D.S.H.A. trench safety regulations.	a. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line.	
B. TRENCH STABILIZATION	1. Trench stabilization material shall be coarse aggregate size Number 2 and shall conform with VDOT Section 203 and/or ASTM C 33.	b. Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the waterline.	
2. Whenever excessively wet or unstable material is encountered in the bottom of the trench, which in the opinion of the Engineer is incapable of properly supporting the pipe or structures, such material shall be removed and backfilled with trench stabilization material and shall be graded to allow for the compacted bedding material.	3. All unauthorized overdepths of excavation shall be backfilled with trench stabilization material and shall be graded to allow for the compacted bedding material.	c. That the length of the water line be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer.	
C. COMPACTED BEDDING MATERIAL	1. Bedding material shall be coarse aggregate size Number 57 and shall conform with VDOT Section 203 and/or ASTM C 33.	3. Sewers or Sewer Manholes - No water pipes shall pass through or come in contact with any part of a sewer manhole.	
2. The bottom of the pipe trench shall be excavated to a minimum overdepth of four (4) inches below the bottom of the pipe, to provide for the compacted bedding material. Bedding material shall be placed, shaped and compacted.	3. Bell holes and depressions required for the jointing of the pipe shall be dug after the compacted bedding material has been graded and shaped and shall be only of the length, depth and width required to make the joint properly.	All testing will be performed in accordance with the AWWA C600-82 or current revision.	
PIPE, JOINTS AND FITTINGS		Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.	
A. SCOPE OF WORK	1. All materials and appurtenances required for the work shall be new, of first class quality and shall be furnished, delivered, erected, connected and finished in every detail as specified or indicated. All materials found defective, regardless of the circumstances, shall be replaced with new material at the expense of the Contractor.	Test pressure restrictions. Test pressures shall:	
2. The materials specified for the construction shall comply with the latest revisions of the applicable American Society for Testing Materials (ASTM), American National Standards Institute (ANSI) and/or the Virginia Department of Transportation (VDOT) standards.	3. The materials specified for the construction shall comply with the latest revisions of the applicable American Society for Testing Materials (ASTM), American National Standards Institute (ANSI) and/or the Virginia Department of Transportation (VDOT) standards.	a. not be less than 1.50 times the working pressure at the highest point along the test section)	
B. OPTIONAL PIPE SELECTIONS	1. The Contractor shall install only one (1) type of pipe	b. not exceed pipe or thrust restraint design pressures)	
2. Water line shall be either PVC or ductile iron.	3. Service laterals shall be either copper or polyvinyl chloride pipe, at the Contractor's option, unless specified or indicated otherwise.	c. be of at least 2-hour duration)	
C. TYPES OF PIPE (X)	1. Polyvinyl chloride (PVC) pipe shall conform to ASTM D2241, SDR 21 2000 PSI as a minimum unless specified or indicated otherwise. All PVC pipe must bear the National Sanitation Foundation Portable Water (NSFPW) stamp. Only bell and spigot with elastomeric gasket joints shall be used. To facilitate future locating of PVC water pipe, a metallic wire or locator tape shall be laid with the pipe and in contact with all fittings and valves.	d. not vary by more than + 5 psi)	
2. Ductile iron pipe shall conform with AWWA C 151/ANSI 21.51 and fittings shall conform with AWWA C 110/ANSI 21.10. The pipe and fittings shall be bituminous coated and cement lined in accordance with AWWA C 104/ANSI 21.40. The pipe thickness shall conform with AWWA C 150/ANSI 21.50 and shall be Class 51, as a minimum, unless specified or indicated otherwise.	3. Joints COUPLINGS, AND APPURTENANCES	e. not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants)	
1. PVC pipe and fittings shall be bell and spigot type joints. The bell and spigot joint shall be sealed with elastomeric gaskets conforming to ASTM D 3212. The joints shall be made in strict accordance with the recommendation of the pipe manufacturer.	2. All PVC pipe fittings must meet pipe specifications for SDR-21 pipe and be of the same manufacturer as the pipe. All in accordance with AWWA specification C-110 and ANSI specification A21.10.	f. not exceed the rated pressure of the valve.	
3. Gate Valves shall be iron-body, bronze-mounted, double-disc, parallel-seal, D-ring sealed, inside-screw, non-rising stem, fitting with 2 inch square operating nut for valve vault service until a favorable laboratory report has been achieved. Any tested section of water line failing to meet the requirements specified shall be repaired by the Contractor and retested until the results are within the limits specified.	4. Valve vaults shall be precast concrete with cast iron frame and covers. The cover shall be marked as shown on the details. Sizes and dimensions shall meet those shown on plans and details.	Each valved section of pipe shall be filled with properly disinfected water slowly and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer.	
5. All valve boxes, base extensions, head and cover shall be of cast or ductile iron. Valve boxes shall be of the Mueller sliding type, round head marked "Water". The shaft diameter shall not be less than five inches (5"). The valve boxes shall have a minimum range of extension to fit two inch (2") to twelve inch (12") valves inclusive, placed on mains at depths of three feet, (3') to five feet (5') of cover in order that the cover of the valve box is set to finished grade. Valve boxes shall be Mueller Company 10364, or approved equal. Valve boxes shall be centered over the valve screw and set plumb.	6. The water meter box and accessories therein necessary for meter installation shall be furnished and installed by the Contractor just within the right-of-way/easement at the property line as shown on the approved subdivision or other property plat. Water meter box and meter setter shall be furnished and installed as shown on the Project Details. All meter setters shall be equipped with integral lockable valves on both sides of the meter connections. All valves, setters and boxes shall be set plumb and compacted to ensure a stable setting.	Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.	
7. All water meters shall be installed by the Contractor as directed by the Owner. Meters shall be 5/8" x 3/4" disc meter as made by Badger Meter Co. or equal.	8. All other materials and appurtenances to be in accordance with details shown on plans.	All exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, or hydrants that are discovered following the pressure test shall be repeated until it is satisfactory to the Engineer.	
PIPE INSTALLATION		A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:	
A. GENERAL	1. The Contractor shall not lay pipe or place manholes until all water has been removed from the trench, or when in the opinion of the Engineer, the trench or the weather conditions are unsuitable for work.	$L = \frac{S \cdot D \cdot \sqrt{P}}{133,200}$	
2. Pipe that may require field cutting shall be done so in a neat and workmanlike manner, so as to leave a smooth end at right angles to the axis of the pipe. Care shall be taken to avoid damaging the pipe and any coatings or linings. Ductile iron pipe shall not be cut with an acetylene torch.	3. The materials shall be visually inspected for defects before lowering the pipe or placing the manholes into the trench. During the laying operation no tools, clothing or other material shall be placed in the pipe or manhole. The interior of the pipe shall be clear of all soil, debris and superfluous materials prior to and during the installation.	In which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge. When testing against closed metal-seated valves, an additional leakage per enclosed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than the allowable amount, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.	
4. The Contractor shall exercise every precaution to prevent foreign material from entering the pipe while it is being placed in the trench. Failure by the contractor to take such precautions may result in the Engineer requiring a heavy, tightly woven canvas bag of suitable size be placed over each end of the pipe and removed only when the joint can be made properly.	5. The pipe and manholes shall be lowered carefully into the trench by suitable means and handled with care at all times to avoid damage. Under no circumstances shall the materials be dropped or dumped into the trenches.	B. BACKFILLING	
6. When work is not in progress, the Contractor shall plug the open ends of the pipe to prevent trench water or other substances from entering the pipe. The plug shall be watertight and shall remain in place until any required dewatering has been completed.	7. Water pipe shall not be laid closer horizontally than ten (10) feet from a sewer line except where the bottom of the water pipe will be at least 18 inches above the top of the sewer line and will be in a separate trench. Water pipe shall not be allowed to pass through a sewer manhole.	A. JOB CONDITIONS	
8. Before joints are made the pipe shall be well bedded on a firm foundation and no pipe shall be brought into position until the preceding length has been thoroughly embedded and secured in place. Any defects due to settlement shall be made good by the Contractor at his expense. Bell holes shall be dug sufficiently large to insure the making of proper joints.	9. Pipe shall be jointed in full accordance with	1. Prior to placing backfill, all organic, rubbish, debris or other unsuitable or objectionable material within the trench shall be removed. All concrete forms shall be removed. All shoring or sheeting shall be removed or cut off at the depth stipulated by the Engineer.	
B. BACKFILL MATERIAL		2. Prior to placing backfill, the trench, shall be removed. All concrete forms shall be removed. All shoring or sheeting shall be removed or cut off at the depth stipulated by the Engineer.	
1. Materials for backfill shall be approved excavated material or approved suitable material obtained from other sources. All material shall be approved by Soil Engineer.		3. Backfill material shall be placed in uniform horizontal layers and thoroughly compacted with proper mechanical or hand operated tampers or other equipment as approved by the Engineer to perform such work.	
2. Backfill from the top of the pipe bedding or bottom of the pipe trench to one (1) foot above the top of the pipe shall be free of stones larger than two (2) inches in diameter and shall be placed in layers not to exceed six (6) inches and compacted with hand operated tampers.		4. Backfill material shall be placed and compacted so as to not unevenly support, damage or displace the alignment of the pipe or structures.	
3. Backfill from one (1) foot above the top of the pipe to the topsoil subgrade shall be free of stones larger than six (6) inches in diameter and shall be placed in layers not to exceed twelve (12) inches and compacted with mechanical tampers.		5. Backfill shall not be placed or compacted against cast in place concrete until it has obtained sufficient strength to withstand the backfilled pressure placed upon it.	
4. Drainage channels to be constructed of fill material shall be graded and shaped to the topsoil subgrade with material free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.		6. Upon the completion of backfilling, all excess soil, stones and debris shall be removed from the site and disposed of by the Contractor.	
5. Backfill from one (1) foot above the top of the pipe to the pavement subgrade shall be free of stones larger than four (4) inches in diameter and shall be placed in layers not to exceed eight (8) inches and compacted with mechanical tampers.		B. BACKFILL MATERIAL	
6. Sewers passing over or under water mains shall be laid to provide a separation of at least 18 inches between the bottom of the water line and the top of the sewer whenever possible.		1. Materials for backfill shall be approved excavated material or approved suitable material obtained from other sources. All material shall be approved by Soil Engineer.	
7. Water lines passing under sewers shall, in addition, be protected by providing:		2. Water lines passing under sewers shall, in addition, be protected by providing:	
a. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line.		a. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line.	
b. Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the waterline.		b. Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the waterline.	
c. That the length of the water line be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer.		c. That the length of the water line be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer.	
3. Sewers or Sewer Manholes - No water pipes shall pass through or come in contact with any part of a sewer manhole.		3. Sewers or Sewer Manholes - No water pipes shall pass through or come in contact with any part of a sewer manhole.	
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Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.		Pressure Test: After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing.	
Test pressure restrictions. Test pressures shall:		Test pressure restrictions. Test pressures shall:	
a. not be less than 1.50 times the working pressure at the highest point along the test section)		a. not be less than 1.50 times the working pressure at the highest point along the test section)	
b. not exceed pipe or thrust restraint design pressures)		b. not exceed pipe or thrust restraint design pressures)	
c. be of at least 2-hour duration)		c. be of at least 2-hour duration)	
d. not vary by more than + 5 psi)		d. not vary by more than + 5 psi)	
e. not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants)		e. not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants)	
f. not exceed the rated pressure of the valve.		f. not exceed the rated pressure of the valve.	
Each valved section of pipe shall be filled with properly disinfected water slowly and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer.		Each valved section of pipe shall be filled with properly disinfected water slowly and the specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer.	
Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.		Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants.	
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A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:		A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:	
$L = \frac{S \cdot D \cdot \sqrt{P}}{133,200}$		$L = \frac{S \cdot D \cdot \sqrt{P}}{133,200}$	
In which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge. When testing against closed metal-seated valves, an additional leakage per enclosed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than the allowable amount, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.		In which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge. When testing against closed metal-seated valves, an additional leakage per enclosed valve of 0.0078 gal/hr/in. of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than the allowable amount, the Contractor shall, at his own expense, locate and repair the defective material until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the amount of leakage.	
REVISION		REVISION	
DATE		DATE	
DESCRIPTION		DESCRIPTION	
DESIGNED		DESIGNED	
DRAWN		DRAWN	
CHECKED		CHECKED	
Michael S. Webb		Michael S. Webb	
No. 012656		No. 012656	
9-9-99		9-9-99	
PROFESSIONAL ENGINEER		PROFESSIONAL ENGINEER	
LUMSDEN ASSOCIATES, P.C.		LUMSDEN ASSOCIATES, P.C.	
ENGINEERS-SURVEYORS-PLANNERS		ENGINEERS-SURVEYORS-PLANNERS	
ROANOKE, VIRGINIA		ROANOKE, VIRGINIA	
PREPARED FOR		PREPARED FOR	
ALLOUF CONSTRUCTION AND DEVELOPMENT CO.		ALLOUF CONSTRUCTION AND DEVELOPMENT CO.	
GILLS CREEK MAGISTERIAL DISTRICT		GILLS CREEK MAGISTERIAL DISTRICT	
FRANKLIN COUNTY, VIRGINIA		FRANKLIN COUNTY, VIRGINIA	
COMM: 99-48		COMM: 99-48	
DATE: 6 06/1994		DATE: 6 06/1994	
SHEET 2 of 5		SHEET 2 of 5	