

SECTION 8 - GENERAL CONSTRUCTION STANDARDS

8.1.1 Summary of Work.

- A. Work covered consists of providing all work indicated on Construction Drawings approved for the project.

8.1.2 Work in County Roads.

- A. Construction operations in public streets, roads or alleys, shall be confined to as small a space as is practicable and shall be subject at all times to the approval of the Department of Public Works (DPW). Unless otherwise approved by the Department of Public Works, the Contractor shall perform the proposed construction as follows:
 - (1.) Contractor shall apply for and obtain all construction permits required. Contractor shall obtain same from the Department of Public Works.
 - (2.) Prior to any work, a preconstruction conference should be scheduled with DPW's Construction and Traffic Engineering Divisions to discuss the scope of work, traffic control and restoration requirements.
 - (3.) Notify the Construction Engineer (DPW) and Traffic Engineer not less than 48 hours before work is to start.
 - (4.) Contact the Traffic Engineer in regard to the permitted working hours and the required signing and barricading which shall be used while working in the roadway.
 - (5.) Proper signs and barricades shall be used at all times. All signs and barricades shall conform to the standards indicated in the Henrico County Maintenance Manual entitled Traffic Control Through Construction Areas and the Virginia Work Area Protection Manual. Additional signs, barricades, flaggers, other traffic control devices and off-duty police officers shall be used on heavily traveled roads when required by the Director of Public Works and/or the Traffic Engineer.
 - (6.) Unless otherwise approved by the Traffic Engineer, two-way traffic must be maintained at all times. Single lane traffic through the work zone must be controlled by flagmen in accordance with the Virginia Work Area Protection Manual. When cutting across a roadway, both lanes may be closed provided there is a nearby detour available and permission is obtained.
 - (7.) Not over 500 feet of ditch shall be open at any one time, and not more than one intersection blocked. Not more than 15 feet of ditch shall remain open over night and then only when required to expose end of pipe that will be extended the next working day, and it shall be properly barricaded or equipment parked over it.
 - (8.) All travel lanes must be open to traffic at the close of each workday.

- (9.) Temporary or permanent asphalt must be placed in roadway trenches before the close of the workday.
- (10.) Unless otherwise approved, no equipment or materials should be stored in the R/W after work hours. If approved, Group 2 channelizing devices (plastic barrels with prismatic sheeting) should be used to delineate the obstacles. Equipment and materials should be placed in areas that would not have any adverse impact to adjacent property owners or create any sight distance or other safety problems.
- (11.) Access to adjacent properties must be maintained at all times.
- (12.) Mailboxes, signs, and etc. that are disturbed or damaged during construction must be reset or replaced immediately after backfill, but no later than the end of the same workday. If disturbed, permanent markers, such as right-of-way monuments, property pins, etc. must be staked and reset by a licensed land surveyor.
- (13.) Excavation in roadway shoulders must be backfilled with suitable material in compacted lifts. If the material is deemed unsuitable for backfill by DPW, it should be hauled off-site and replaced with suitable material. Excavation within one foot of the pavement must be capped with nine inches of #21A VDOT stone and if the shoulder is maintained as a grass area two inches of topsoil shall be applied on top of the VDOT #21A stone and seeded.
- (14.) Disturbances to drainage (pipes, ditches, etc.) must be corrected and positive drainage restored by the close of each workday. If drainage pipes are removed for the installation of the utility or if damaged or disturbed, then the pipeline must be relayed to the inlet end or outfall end, whichever is the most feasible.
- (15.) Shoulders, slopes and ditches must be restored to the preconstruction condition with regard to a typical section with uniform shoulder widths, uniform slope breaks, uniform slopes and ditches. Grading must match original contours and provide positive drainage.
- (16.) Disturbances to gravel driveways, gravel shoulders and gravel mailbox turnouts must be restored to preconstruction condition with material matching existing conditions.
- (17.) The trench limits in the pavement must be saw-cut prior to excavation to avoid damage of the pavement to remain.
- (18.) The restoration of all disturbances should begin immediately after backfill and should be ongoing until complete.
- (19.) Calcium Chloride shall be used to settle dust whenever necessary and required by the Construction Engineer.
- (20.) All loose material shall be swept from hard surface immediately behind the backfilling.
- (21.) Main line trenches crossing the pavement at right angles, trenches running parallel, or nearly so, and lines within a street intersection, shall be backfilled with approved crushed material. House lateral trenches shall be mechanically tamped except on express approval of the Director of Public

Works.

- (22.) Unless otherwise approved, all excavation within the roadway and roadway shoulders must be backfilled with 21B stone in uniform lifts with each lift compacted to the proper design criteria. The road shoulders must be smooth and uniformly graded back to original contours and capped with 2 inches minimum of topsoil and seeded if the shoulder is maintained as grass area.
- (23.) Contractor shall maintain trenches for a period of 12 months from the completion of work unless sooner relieved by the Director of Public Works.
- (24.) All walks, driveways and lawns shall be maintained and restored to their original condition by the applicant and maintained for the 12 month period unless sooner relieved by the Director of Public Works or the interested property owner.
- (25.) All paving disturbed by the Construction work must be restored and approved by the Construction Engineer as listed below.
- (26.) The installation of utilities within the roadway bed of any public street will require the roadway to be repaved for the entire length of construction activities. This repaving would be completed under the following pavement criteria.
 - a. All utilities which are installed within the paved surface parallel to the centerline will provide a pavement overlay for the entire length of construction activities and the entire width of the roadway unless the Construction Engineer establishes alternative repaving.
 - b. Any multiple installation of utilities perpendicular to the roadway centerline will be required to provide repaving of the entire width of the roadway for the distance between the first and last multiple utility cut.
 - c. Installation of a single utility perpendicular to the roadway centerline will be required to provide repaving by placing an approved base course asphalt concrete, which shall conform to the requirements of Section 211 of the VDOT "Road and Bridge Specifications", even with the existing pavement. The approved surface course asphalt concrete, which shall conform to the requirements of Section 211 of the VDOT "Road and Bridge Specifications", will be extended 25 feet on each side of the trench and rolled down so that no ridges or bumps remain.
 - d. In curb and gutter sections, it will be necessary to mill the curb lanes, throughout the length of disturbance, to a depth of 2 inches prior to the full width overlay. If the road has been previously overlaid, it may be necessary to mill the entire width of the roadway throughout the length of disturbance to prevent undesirable cross-slopes in the restored pavement.
 - e. This resurfacing requirement does not eliminate any other requirements such as full depth asphalt of 12 inches, etc., which are normal requirements of the permit.
 - f. Approval of the paving does not relieve the contractor of the responsibility of the damage due to settlement during the 12 month

period.

- (27.) Pavement on plant mix streets shall be replaced with eleven inches of an approved base course asphalt concrete, which shall conform to the requirements of Section 211 of the VDOT “Road and Bridge Specifications”, and one inch of an approved surface course asphalt concrete, which shall conform to the requirements of Section 211 of the VDOT “Road and Bridge Specifications”, or the depth of the existing pavement whichever is greater depth.
 - (28.) In the event that these conditions are not complied with after reasonable notice has been given, the County will correct the defective work at the Contractor's expense.
- B. A permit from VDOT is required for any work within the VDOT right-of-way. Comply with all provisions of the VDOT permit.

8.1.3 Coordination.

- A. Phases of construction which involve the temporary interruption of essential services shall be scheduled in consultation with the Owner and the County or their representative and shall not be of longer duration than essential to accomplish the purpose of such interruptions. Liaison in this matter shall be required before beginning work. The Contractor shall notify the Construction Division at 727-8730 not less than 48 hours in advance of commencing work. The Contractor shall give not less than 48 hours notice in advance of the time and date of making any connections to the existing water or sewer system. The County may disapprove the time and date of any and all connections and will advise the Contractor as to a suitable time and date.
- B. The Contractor shall not operate any valves on the County system or make connections to existing sewer and water lines before proper notification is made to the County so that inspection of this work can be made.

8.1.4 Field Engineering.

- A. The Engineer has established baseline and control points. From these points, the Contractor shall furnish necessary personnel and equipment to establish line and grade as required for the work. The Contractor shall furnish construction cut sheets to the County before beginning construction. The data on the cut sheets shall include centerline elevations (existing and proposed), centerline cut, centerline invert, manhole location, manhole top and invert elevations, grade between manholes, and bench mark locations and elevations. Stations shall be every 50 feet except where there are unusual conditions.

- B. The Contractor shall be responsible for the preservation of all stakes and marks established by the Engineer, and if any of the stakes and marks are carelessly or willfully disturbed, the cost of replacing them shall be charged against the Contractor.
- C. A Licensed Professional Engineer or Licensed Surveyor shall certify that all streets are to subgrade, or curb and gutter must be installed prior to acceptance of utility construction by County.

8.1.5 Measurement and Payment Definitions.

For purposes of measurement and payment, the following terms shall have the meaning assigned to each:

- A. Main Trench: A trench essentially parallel to rights-of-way or property lines and in which the proposed utility lines are to be installed.
- B. Service Trench: A trench essentially perpendicular to main trenches and in which the proposed utility service pipes are to be installed.
- C. Classified Excavation: The removal and disposal of earth, hardpan, or rock materials according to the following:
 - (1.) Earth Excavation: The removal and disposal of pavement, less than 4 inches thick, underground structures, and utilities indicated to be demolished and removed, and all other materials encountered not classified as hardpan or rock excavation.
 - (2.) Hardpan Excavation: The removal and disposal of material that cannot be removed from the trench without the use of an air spade or blasting. Indurated (hardened) clay, shale, or sand with cementitious material are typical of this material.
 - (3.) Rock Excavation: The removal and disposal of all solid rock that cannot be excavated without continuous and systematic drilling and blasting or continuous use of rock excavation equipment. Boulders 1/2 cu.yd. or more in volume, solid rock, and rock in ledges are typical of this material.
 - (4.) Hand Excavation: Excavation made with hand tools when in the opinion of the Engineer such excavation is necessary.
 - (5.) Test Hole Excavation: Excavation made at the direction of the Engineer for any purpose related to work.
 - (6.) Concrete Paving Removal: Removal of paving greater than 4" thickness, including concrete curbs, gutters, and sidewalks.

D. Measurement and Payments for Excavation:

- (1.) Maximum Pay Width: Maximum pay width shall be 36 inches for 4, 6, 8, and 12-inch diameter water main pipe, 42 inches for 16-inch diameter water pipe and 48 inches for 24-inch diameter water pipe. For water lines greater than 24 inches, the maximum pay width shall be the nominal pipe diameter plus 24 inches. The maximum pay width for sanitary sewer main trench excavation shall be 60" for pipe up to 36" diameter. For sanitary sewer greater than thirty-six inches (36") in nominal diameter, the trench width shall be the outside diameter plus thirty-six inches (36"). The maximum pay width for sanitary sewer service trench excavation shall be 36" and water service trench excavation shall be 24". If the actual trench width exceeds the maximum pay width, no payment will be made for the additional excavation, backfill or asphalt outside the maximums. The cost for such excess shall be borne by the contractor.
- (2.) Earth - Main line trench, force main trench, and service trench, when payment is to be computed on a volumetric basis shall be computed as set forth for Rock and Hardpan except that the depth shall be in accordance with the cut sheet, which is the bottom of the pipe for force mains, and the invert of the pipe for gravity lines. When excavation payments are on a depth basis or on cut increments, measurements shall be from the ground surface of the center line of the trench to be invert of the pipe line.
- (3.) Bedding in rock, hardpan, or earth: Bedding required for pipe laid in rock, hardpan, or earth shall be included in the unit excavation price for these items.
- (4.) Unauthorized excavation consists of removal of materials beyond indicated elevations or specified widths, without written approval of Engineer. Unauthorized excavation shall be replaced at Contractor's expense.
- (5.) Hardpan or rock excavation shall not be backfilled until Engineer has verified that such excavation was required and has determined the hardpan or rock profile.

E. Lowering excavation: Excavation made to permit the lowering or raising of water main and accessories.

F. Water main accessories shall consist of all valves, retainer glands, fittings, boxes, and the like, other than pipe that are a part of the water system.

G. Shoring consists of sheeting and/or braces used to prevent earth movement. The Owner reserves the right to require shoring to protect existing building or facilities.

- (1.) Price per thousand board feet for Sheeting and Shoring ordered left in place. This item shall include all of the cost of furnishing, placing and cutting the sheeting as well as the braces. The entire cost of placing and

removing sheeting and/or bracing not left in place shall be at the Contractor's expense.

H. Standard Payment Items shall be computed as follows:

- (1.) Hardpan Excavation and Rock Excavation: Price per cubic yard of excavation determined using the actual trench width (not to exceed the maximum pay width), the pay depth and the measured length of trench. Pay depth for water lines, force main, and gravity sewers shall be depth to invert plus 6 inches. The payment for hardpan excavation and rock excavation, whether in main or service trenches, shall include the specified bedding of crusher run stone or gravel, furnishing and placing of approved select backfill material, and disposal of unapproved material.
- (2.) Hand Excavation: Price per cubic yard for hand excavation when specifically authorized by the Engineer. Hand excavation shall be classified as Excavation with hand tools rather than excavating machines when in the opinion of the Engineer such excavation is necessary. Work done under this item will normally be limited to that required to protect trees, utility poles or structures that would otherwise be removed during the course of machine excavation. No allowance shall be made under this item for Hand Excavation necessary to locate or protect culverts and underground utilities.
- (3.) Shoring Left in Place: Price per thousand board feet (MBM) for shoring ordered left in place. This item shall include all of the cost of furnishing, placing, and cutting the sheeting as well as the braces. The entire cost of placing and removing ordinary sheeting and/or bracing installed primarily to protect workmen and to facilitate construction and not ordered left in place, shall be at the Contractor's expense.
- (4.) Removal of Unstable Soil and Replacement with Select Material: Price per cubic yard of select material furnished and installed as directed by the Engineer. **The unit price for select backfill shall also include costs for hauling and disposal of unsuitable excavated material.** Work under this item includes furnishing and installing compacted crushed road base material in accordance with Standard County Specifications and as directed by the County Engineer, providing pipe bedding because of unstable foundation below the pipe line, backfilling of trench because the excavated material is unsuitable. Payment for select material required when pipe is laid in rock and/or hardpan and for backfill because of the inability to use hardpan or rock removed from the trench shall be included in the price bid for hardpan and/or rock. Payment shall be based upon the quantity of select material required for a trench based on the maximum pay width and the actual depth provided.
- (5.) Crusher Run Stone on Road Shoulders, Private Entrances, and Driveways: Price per linear foot of pipe line trench, surfaced with approved crusher run

stone. Stone shall be placed to the same depth as the original, with a minimum of 4 inches.

- (6.) Replacement of Plant Mix Pavement, State highways, and driveways: Price per linear foot of pipe line trench for the replacement of State highways and driveways surfaced with plant mix pavement in accordance with the conditions existing prior to construction.
- (7.) Replacement of Plant Mix Pavement - County Roads: Price per square yard of pipe line trench for replacement of roadway surfacing with plant mix pavement consisting of 10" of BM-25.0 and 2" of SM-9.5A or 6" of BM-25.0 and 2" of SM-9.5A to match existing pavement removed. Payment shall be based on standard trench width or additional trench width as ordered by the Engineer. Replacement of road base cost shall be included in the line item for furnishing and installing select backfill.
- (8.) Milling of Pavement - Price per square yard of bituminous concrete pavement milled as shown on the plans or as directed by the Road Engineer. Depth of milling will range from 0 to 2 inches to accommodate the pavement overlay areas
- (9.) Overlay with Plant Mix Pavement - Price per Price per square yard of 2" SM-9.5A asphalt overlay in accordance with requirements of DPW..
- (10.) Concrete for Replacement of Sidewalks, Curbs, Gutters, etc.: Price per cubic yard for Class "A-3" concrete for the specified use, as directed by the Engineer for the replacement of sidewalks, valley gutters, curbs and gutters and similar structures in accordance with County and Virginia Department of Transportation Standards.
- (11.) Concrete for Encasement, Trench Beds, and Utility Anchors: Price per cubic yard of Class "C" concrete for the specified use, as directed by the Engineer and in accordance with Department of Utilities Specifications.
- (12.) Furnish and Install (each size) Steel Casing Pipe: Price per linear foot to furnish and install steel casing pipe for the installation of pipe lines under State highways, railroads or other obstructions. Price per linear foot includes bore pit and receiving pit. Pipe shall be installed in strict compliance with applicable regulations. Payment shall be made under this item regardless of the method employed in placing the casing pipe.
- (13.) Permanent Grading, Seeding, and Strawing of Trenches: Price per linear foot of pipe line trench for permanent grading, seeding (including fertilizing and liming), and strawing. No separate payment will be made for temporary grading, seeding, and strawing.
- (14.) Permanent Grading, Topsoiling, Seeding, and Strawing of Trenches: Price per linear foot of pipe line trench for permanent grading, topsoiling, seeding (including fertilizing and liming), and strawing. No separate payment will be made for temporary grading, topsoiling, seeding, and strawing. Topsoil and its placement shall comply with the requirements of Section 11 titled "SEEDING".

I. Water Line Payment Items shall be computed as follows:

- (1.) Furnish and Install (each size) Water Main: Price per lineal foot of water main furnished and installed, including installing pipe fittings, testing and sterilization, locating and abandonment of existing mains. If a tapping sleeve and valve are required, the applicable bid item will apply. Furnishing and installing of concrete anchorage will be paid for under the appropriate per item. Installation of pipe fittings shall be paid for in the lineal foot price of furnishing and installing the water main. Material costs for pipe fittings shall be paid for under the appropriate pay item.
- (2.) Main Trench Excavation for Water Pipe: Price per cubic yard of water main trench in accordance with Section 8.1.5.D. Pay width shall be 36 inches for 4, 6, 8, and 12-inch diameter water main pipe, 42 inches for 16-inch diameter water pipe and 48 inches for 24-inch diameter water pipe. Price shall also include proper trench shoring (i.e. trench boxes) as required by OSHA.
- (3.) Furnish Pipe Fittings and Accessories: Price per ton of pipe fittings (i.e. tees, elbows, glands, etc.) and other appurtenances furnished. When the connection is made by means of tapping sleeve and valve, the Contractor shall make the necessary arrangements for the tap. Installation of pipe fittings shall be paid for in the lineal foot price of furnishing and installing the water main. See Pay Weights that follow.
- (4.) Furnish and Install Tapping Sleeve & Valve: Lump sum price for each size tapping sleeve and tapping valve furnished and installed, including tap and valve boxes. The furnishing and installing of concrete anchorage will be paid for under the appropriate item.
- (5.) Furnish and Install Fire Hydrants: Lump sum price for each 4 ½ foot bury fire hydrant assembly, including furnished and installed extensions as required by the Engineer. The installation of a 6" hydrant service line will be paid for as installation of pipe of this size, and the furnishing and installing of concrete anchorage will be paid for under the appropriate item.
- (6.) Furnish and Install Flushing Hydrants: Lump sum price to furnish and install complete flushing hydrant assembly. Furnishing and installing of concrete anchorage will be paid for under the appropriate per item.
- (7.) Furnish and Install Valve and Valve Box: Lump sum price for each size valve and valve box furnished and installed.
- (8.) Furnish and Install Accessories for (each size) Water Services: Price per lineal foot for furnishing and installing each size water service connection, including excavation and backfill, from the main to the property line. Payment for service tap and meter box shall be under separate bid item.

PAY WEIGHTS (lb) - Weight includes Accessories									
	SIZE	3"	4"	6"	8"	10"	12"	16"	24"
TEE	3"	49							
	4"		58						
	6"		104	103					
	8"		106	122	137				
	10"		123	142	160	182			
	12"		143	168	191	205	217		
	16"			292	314	335	355	441	
	24"			1100	1072	1075	1098	1151	1630
CROSS	3"	63							
	4"		70						
	6"		96	131					
	8"		121	151	172				
	10"		141	162	191	218			
	12"		166	189	227	253	271		
	16"			357	384	412	435	510	
	24"			1161	1185	1233	1262	1376	2383
REDUCER	4"	32							
	6"	40	47						
	8"		55	64					
	10"		69	77	81				
	12"		84	94	96	101			
	16"			166	172	174	180		
	24"						626	703	
90 DEG BEND		33	39	64	93	135	170	322	1128
45 BEND		30	36	60	84	116	149	256	853
22 ½ BEND		29	34	58	74	99	120	232	847
11 ¼ BEND		28	32	53	70	93	112	212	871
SLEEVE (L.P.)		32	38	62	80	105	122	225	631
PLUG		15	17	32	46	59	76	135	407
MJ CAP		15	17	30	40	53	64	124	427
RETAINER GLAND		7	10	12	17	25	30	50	117
MEGA LUG RETAINER		6.5	7	12	15.5	24.3	34	56	139

- (9.) Furnish and Install Water Service Tap: Lump sum price to install water service tap including corporation stop for ¾", 1", 1½", and 2" connections. Installation of service pipe and meter box shall be paid under separate bid items.
- (10.) Furnish and Install Meter Box Complete: Lump sum price to install complete meter box assembly including coppersetter (yoke) or brass pipe

and fittings.

- (11.) Furnish and Install (each size) Water Service Pipe Pushed or Bored in Place: Price per linear foot for furnishing and installing each size water service connection by pushing, boring or navigation.

J. Sewer Line Payment Items shall be computed as follows:

- (1.) Furnish and Install (each size) Sewer Pipe: Price per linear foot of sewer line for each type of pipe as specified including furnishing, installing and testing the pipe. Payment for excavation and backfill shall be under a separate item. Connection to existing manhole shall be a separate pay item.
- (2.) Furnish and Install (each size pipe) by 4- or 6-Inch Service Tees (DI or PVC): Lump sum price for each size 4" or 6" service tee installed. Payment under this item shall be in addition to the footage payment for the main line pipe. When service saddles are required, each shall be furnished and installed under this item and the unit price shall include the tap on the main.
- (3.) Furnish and Install 4- or 6-Inch Pipe for Service Connections: Price per linear foot of house connections of the specified material installed including an adequate plug and marker at the upper end of the line. The length of line shall be the horizontal distance from the center line of the main sewer to the upper end of the pipe, plus the length of any vertical pipe installed for stacked connections. The Engineer may direct the Contractor to tie-in a connection at the property line to the customer's pipe. If this is required the Contractor will be paid for the tie-in under a separate bid item in addition to normal service pipe and excavation.
- (4.) Excavation and Backfill for (each size) Sewer Pipe: Price per linear foot of trench according to actual depth classification. This unit price shall include the bedding specified for sewer lines since no additional payment will be allowed for this phase of the work. Depth for payment shall be measured to the invert of the pipe. Excavation shall be based on the defined maximum pay width for each size pipe. Price shall also include proper trench shoring (i.e. trench boxes) as required by OSHA.
- (5.) Excavation and Backfill for Service Connection: Price per cubic yard of excavation for house connection trenches. Volume of excavation shall be based upon width of 36", actual depth of excavation to the invert of the pipe line and length as measured from the center line of the main sewer to the upper end of the line. Payments under this item shall include the required 6" bedding for the pipe. Payment under this item shall be only for earth excavation; rock excavation or hardpan excavation will be paid for under the appropriate item.
- (6.) Furnish and Install (each size) Ductile Iron Force Main: Price per linear foot of ductile iron pipe furnished and installed, including excavation,

- backfill, accessories, and testing.
- (7.) Standard Manholes: Price per vertical foot of standard manholes. Depth for payment purposes shall be actual depth to the invert of the sewer line plus the 8" concrete base. Extra payment shall not be allowed for bedding when rock excavation is encountered nor will an extra allowance be allowed for deep manholes requiring thicker walls in accordance with the specifications.
 - (8.) Drop Connections: Price per vertical foot with payment computed as set forth on standard drawing.
 - (9.) Special Design Manholes: Lump sum price for special design manholes in accordance with drawings and specifications, complete in place.
 - (10.) Furnish and Install 4" or 6" Site Inspection Ports (Clean-outs): Lump sum price for each 4" or 6" PVC or DI clean-out installed on sewer service connection as required by standard drawings.
 - (11.) Connection of Sewer Main to Existing Manhole: Lump sum price for each sewer pipe required to be installed into an existing manhole. Payment under this item shall be in addition to pipe footage and excavation. The existing manhole shall be cored and a flexible boot installed in accordance with County Standards. Payment shall include cost of core and boot installation. If manhole cannot be cored this price will include connection to manhole acceptable to Engineer
 - (12.) Abandonment of Existing Manhole: Price per abandonment of each existing manhole and abandon any existing incoming and outgoing pipes as required by these Standards.
 - (13.) Abandonment of Sewer Main: Price per abandonment of each existing sanitary sewer pipe. This unit price shall include the cost to cut and plug existing pipes.

8.1.6 Project Meetings.

- A. A preconstruction conference with the County and the Contractor shall be scheduled before beginning any work.

8.1.7 Submittals.

- A. Construction Schedules.
 - (1.) Submit a detailed construction schedule prior to the preconstruction conference.
- B. Shop Drawings, Product Data Certificate of Compliance with Standards and Samples: Submit four copies of all shop drawings for Engineer and sufficient additional copies to satisfy requirements of Contractor.

- (1.) Submit shop drawings, product data, certificates, samples, and the like as required by applicable Specification Sections. Identify each item submitted using applicable specification section number, or Drawing or Standard Detail reference.

8.1.8 Quality Control.

- A. Testing Laboratory Services: Tests called for other than by public authorities shall be made by approved independent laboratories with the full cooperation of the Contractor. The laboratory charges shall be borne by Owner unless otherwise specified.
 - (1.) Testing services other than those called for in these Contract Documents may be called for by the Owner to check compliance with specification requirements. When tests indicate compliance with specifications, the testing service charges will be borne by the Owner, but when non-compliance with specifications is indicated, the testing service charges will be deducted from the contract sum.

8.1.9 Temporary Facilities and Controls.

- A. Temporary Electricity: The Contractor shall make all necessary arrangements for obtaining electric power for construction purposes. No separate payment for electric power for construction purposes or testing shall be made.
- B. Temporary Sanitary Facilities: Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as will comply with laws and regulations.

8.1.10 Materials and Equipment.

- A. Approved Materials
 - (1.) All materials shall conform to the County of Henrico "Approved Water and Sewer Materials List" contained in Section 14. All materials to be incorporated in the work shall be new and unused as delivered from the supplier. The Contractor shall submit a notarized statement from the Supplier and/or Manufacturer to the Engineer that all materials being supplied for the work meet AWWA, ASTM and/or County Standards as appropriate. The Contractor shall provide at least three (3) copies for the County's use along with any additional copies needed to be returned to Contractor, Engineer, Suppliers, etc. after approval is made.
 - (2.) In addition, shop drawings, as defined in the General Section, and operation manuals are required [on projects where there are special structures, and on

Pump Station, Tank, Pressure Reducing Vault, and Treatment Plant projects to include pipe and accessories, manholes and appurtenances, valves, and other assorted products, etc.] to be submitted by the Contractor to the Engineer for approval. The information needs to be sent as far in advance as possible (at least 48 hours) to avoid any unnecessary delays in beginning the project. The appropriate number of copies of shop drawings needed is as defined in the above paragraph.

- (3.) The shop drawings must include manufacturer's name, type of product, location of plant, project name and number, etc. for each product.

B. Quality: Material and equipment incorporated into the work shall be new and unused and:

- (1.) Conform to applicable specifications and standards.
- (2.) Comply with size, make, type, and quality specified or as specifically approved in writing by the Engineer.
- (3.) Manufactured and fabricated products:
 - a. Design, fabricate, and assemble in accord with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard size and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
- (4.) Do not use material or equipment for any purpose other than that for which it is designed or is specified.
- (5.) Except as specifically indicated or specified, materials and equipment removed from the existing structure shall not be used in the completed work.
- (6.) For material and equipment specifically indicated or specified to be reused in the work:
 - a. Use special care in removal, handling, storage, and reinstallation, to assure proper function in the completed work.
 - b. Arrange for transportation, storage, and handling of products which require off-site storage, restoration, or renovation. Pay all costs for such work.
- (7.) Manufacturer's Instructions.
 - a. When construction plans require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to Engineer.
 1. Maintain one set of complete instructions at the job site

- during installation and until completion.
- b. Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.
 - 2. Do not proceed with work without clear instructions.
 - c. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted.
- (8.) Transportation and Handling:
- a. Arrange deliveries of products in accord with construction schedules; coordinate to avoid conflict with work and conditions at the site.
 - 1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately upon delivery, inspect shipments to assure compliance with requirements and approved submittals and that products are properly protected and undamaged.
 - b. Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.
- (9.) Storage and Protection:
- a. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - b. Exterior Storage.
 - 1. Store fabricated products above the ground on blocking skids; prevent soiling and staining. Cover products which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
 - c. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and are free from damage or deterioration.
 - d. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

8.1.11 Work in Inclement Weather:

During stormy or inclement weather, no work shall be done except as can be done satisfactorily and in a workmanlike manner to secure first-class construction throughout. If in the County's opinion satisfactory work is not being performed or cannot be performed during inclement weather, the County may issue a "stop work" order.