

## SECTION 1 - GENERAL DESIGN STANDARDS

### 1.1 GENERAL REQUIREMENTS

#### 1.1.1 Definitions

##### A. COMPLETION:

Completion of work indicates that all sewer pipe, water pipe, valves, appurtenances, buildings, equipment and any other required items have been installed and appropriately tested in accordance with the plans, specifications and contract, all submittals including any O&M manuals have been made, all punch list items, right-of-way, easement, property and pavement restoration work has been completed as required. The use of water or wastewater lines by the contractor for the purpose of completing the testing of equipment or piping, the tie-in of water or wastewater lines, or the continued necessary use of equipment or piping because of tie-ins or testing shall in no way be construed as completion of work until the conditions of the first sentence of this definition has been satisfied.

##### B. CONTRACTOR:

The Developer's Agent, acting directly or through his agents, who has been contracted by the developer to perform the work.

##### C. COUNTY:

The party of the second part to the County/Developer Agreement, Goochland County, acting through the Director of Public Utilities or his duly authorized agents.

##### D. DEVELOPER:

The Party who is in contract with the County to install the subdivision development or general utility improvements.

##### E. ENGINEER:

The Consulting Engineer who has been designated by the Developer as the Engineer of record in relation to the project, whether acting directly or through properly authorized agents, inspectors or representatives.

##### F. FINAL INSPECTION:

An inspection by the county inspector and contractor of all items covered by the County/Developer contract which results in a punch list of items remaining to be completed or submitted to satisfy the County's specifications.

G. FINAL ACCEPTANCE:

A written statement from the County to the Developer stating that as of a certain specific date all punch list items from the final inspection have been corrected and all necessary submittals have been made and the conditions of the County/Developer contract have been satisfied.

H. INSPECTOR:

The person appointed by the County's Director of Public Utilities to carry out instructions given by the County and to inspect the materials and work performed under this Agreement.

I. SUBCONTRACTOR:

Any individual, firm or corporation having a direct contract with the Contractor for the performance of any part of the work.

J. WARRANTY PERIOD:

A one year guarantee of equipment and labor by the Developer that begins on the date of final acceptance (with a three year warranty on road work or in accordance with VDOT's latest requirements). Warranty periods of more than one year if mentioned in the specifications shall prevail to the specific equipment, service or system.

K. OTHER:

Other definitions applicable may be found in the County's latest Utilities and Subdivision Ordinances and all Parts of the County's Construction Specifications.

1.1.2 General

A. The design of all utility systems and extensions or modifications thereto shall be performed under the direction of a registered professional engineer with a current registration in the Commonwealth of Virginia in accordance with Title 54.1, Chapter 3 of the Code of Virginia, 1950, as amended. Where applicable, design may be performed under the direction of a certified land surveyor in accordance with Sec. 54.1-408 of the above- cited code.

B. All design shall conform to the latest Virginia Department of Environmental Quality Sewage Regulations (12VAC5-580), the Virginia Department of Health Waterworks Regulations (12VAC5-590) and to the requirements of other State and Federal Agencies having jurisdiction.

- C. Additionally, all designs shall conform to the requirements of the Goochland County Department of Public Utilities (hereinafter referred to as "Department"). Where the requirements of the State and County are in conflict, the more restrictive requirements shall govern.
- D. The engineer shall be responsible for obtaining the review and necessary approvals of all drawings and specifications by applicable County, State, and Federal agencies having jurisdiction. Copies of such approvals shall be submitted to the Department at the time of final review by the Department.
- E. Sanitary sewer lines and water lines are to be designed to serve the entire sewer shed or service area of which the subdivision or development is a part. This necessitates consideration of property beyond the development or subdivision in question.
- F. The developer is required to design and construct his system, properly sized and at an appropriate location, to permit future extensions to be made at the limits of the subdivision or development in question. Elevation of the sewer system must be designed such that future extensions can serve the entire area that naturally drains towards the system.
- G. The design shall include documentation of the adequacy of the downstream facilities. This should include all downstream gravity sewers, Pump Stations and the receiving Wastewater Treatment Plant. Drawings shall include the Name and address of any pump stations and the Wastewater Treatment Plant.

### 1.1.3 Laws and Regulations

- A. The Contractor shall keep fully informed of all State and Federal laws and local ordinances, and regulations in any manner affecting those employed or engaged in the work, or in any way affecting the conduct of the work, and of all such orders or decrees of bodies or tribunals having jurisdiction or authority over same.
- B. The Contractor shall protect and indemnify the County and its officers and agents against any claim or liability arising from or based on the violation of such laws, ordinances, regulations, orders or decrees, whether by himself or his employees.
- C. Attention is called to Rules and Regulations Governing the Safety and Health of Employees Engaged in Construction as adopted by the Safety and Health Codes Commission of the Commonwealth of Virginia and all latest revisions thereto and issued by the Department of Labor and Industry.
- D. The Contractor shall perform all construction operations in accordance with the U.S. "Occupational Safety and Health Act of 1970", the Standards of the U.S. Department of Labor, Occupational Safety and Health Administration and the latest amendments thereto.

#### 1.1.4 Permits

- A. The Contractor must obtain all required licenses and permits and pay all charges and expenses connected with the work, and be responsible for all damages to persons or property which may occur in connection with the prosecution of the work.
- B. Misunderstanding or ignorance of these laws on the part of the Contractor will not be considered as a valid excuse for his failure to secure the necessary permits.

#### 1.1.5 Materials and Workmanship

- A. It is the intent of the County's specifications to describe definitely and fully the character of materials and workmanship required with regard to all ordinary features, and to require first-class work and new materials in all aspects of the project.
- B. For any unexpected features arising during the progress of the work and not fully covered in the County's specifications, the County will require first class work to be performed and first class materials to be used by the Contractor. It is understood that the County/Developer contract includes any and all work that may be necessary to connect the work done with the adjoining work in a proper and workmanlike manner.
- C. The County reserves the right to employ an independent testing laboratory to conduct tests of materials, etc. as the County may deem necessary to assure complete compliance with the requirements of the County's specifications. The Contractor shall offer full cooperation with personnel in the employ of the County in making these tests.

#### 1.1.6 Deviation from Plans

- A. The Contractor shall not deviate from the plans, profiles, cross-sections and specifications in any particular except on written consent of the County. If deviation occurs on the part of the Contractor, he shall correct the error at his expense in a manner satisfactory to the County.

#### 1.1.7 Other Plans and Working Drawings (Shop Drawings)

- A. All materials and equipment used in the project or is required for completion of the project shall be submitted for approval in accordance with the shop drawing procedures. No payment will be made for materials purchased or installed that have not been approved.
- B. Such information as is necessary to give a comprehensive idea of the construction contemplated, shall be shown on the plans. Contractor shall submit to the County Inspector and Engineer, for their approval, all equipment and materials

incorporated in the project and such additional detailed shop or working drawings as may be required for the construction of any part of the work. Pending the approval of such drawings, any work done or materials ordered shall be at the risk of the Contractor.

- C. Working drawings shall consist of such detailed drawings as may reasonably be required for successful prosecution of the work, and which are not included in the plans furnished by the Engineer. These may include drawings for anchor bolts, centering and form work, masonry, layout diagrams, flanged pipe spool drawings, etc.
- D. It is expressly understood that the approval of working drawings relates to the general concept and not the detail and such approval will not relieve the Contractor from any responsibility for errors or omissions in dimensions or quantities.
- E. It is understood that Shop Drawings or Working Drawings processed by the Engineer are not Change Orders; that the purpose of Shop or Working Drawing submittals by the Contractor is to demonstrate to the County that the Contractor understands the design concept, to demonstrate his understanding by indicating which equipment and material he intends to furnish and install, and by detailing the fabrication and installation methods he intends to use.
- F. If deviation, discrepancies, or conflicts between Shop Drawing submittals and the plans and specifications are discovered either prior to or after Shop Drawings submittals are processed, the plans and the County's specifications shall control and shall be followed. All Shop or Working Drawings and blueprints shall be made at the expense of the Contractor.

#### 1.1.8 Discrepancies

- A. Any discrepancies found between the plans and the County's specifications and site conditions or any inconsistencies or ambiguities in the plans or specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

#### 1.1.9 Correction of Work

- A. The Contractor shall promptly remove from the premises all work rejected by the Engineer or County Inspector for failure to comply with the County's specifications, whether incorporated in the construction or not, and the Contractor shall promptly replace and re-execute the work in accordance with the County's specifications and shall bear the expense of making good all work of other Contractors that may potentially be destroyed or damaged by such removal or replacement.

- B. All removal and replacement work shall be done at the Contractor's expense. If the Contractor does not take action to remove such rejected work within ten (10) days after receipt of Written Notice, the County may remove such work and store the materials at the expense of the Contractor.

#### 1.1.10 Character of Workmen and Equipment

- A. The Contractor shall employ such superintendents, foremen and workmen as are careful and competent.

#### 1.1.11 Superintendent

- A. The Contractor shall personally supervise the work and when not personally present shall be represented by a Superintendent who shall have full authority to act as the Contractor's representative and all orders and instructions given to the Superintendent shall have the same force and meaning as if given to the Contractor in person. The Superintendent or Contractor shall be on duty at all times while the construction work is being done. Superintendent shall be on duty at all times that subcontractors are working.

#### 1.1.12 Responsibility of Contractor

- A. The Contractor shall take all responsibility for the work, and take all precautions to prevent injuries to persons and property in or about the work.
- B. Until final acceptance of the work by the County, it shall be under the charge of the Contractor, and he shall take every care and necessary precaution against injury or damage to the work or any part thereof by the action of the elements or any other cause whatsoever, whether arising from the execution or the non-execution of the work.
- C. The Contractor shall rebuild, repair, restore and make good, at his expense, all injuries or damage to work occasioned by any of the above causes before it will be accepted.

#### 1.1.13 Work In Bad Weather

- A. 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.

#### 1.1.14 Work Outside Regular Hours

- A. If the Contractor desires to perform work outside the regular hours or on Saturday, he shall request permission to work 48 hours in advance to allow arrangements to be made for proper inspection. The County may refuse the

Contractor permission to work if the 48-hours notice is not given or for other just cause. Reasonable efforts shall be made by the Contractor to avoid undue noise during the night and on Sundays, if it is necessary to work at such times. Under normal circumstances the Contractor will not be permitted to work on Sundays or County holidays.

- B. The County reserves the right to schedule the Contractor to work outside normal working hours in the interest of public safety or convenience. Normal working hours are defined as 8:00 A.M. to 5:00 P.M., Monday through Friday.

#### 1.1.15 Use of Water

- A. No water shall be drawn from the County's facilities for testing or other purposes until suitable arrangements have been made with the County Inspector.

#### 1.1.16 Conflicts

- A. Should any requirements of the County's specifications conflict with the requirements of governmental or private authority having jurisdiction, then and to the extent of such conflict, these specifications shall be superseded.

#### 1.1.17 Job Safety

- A. The County shall not be responsible for the Contractor's safety precautions or to means, methods, techniques, sequences or procedures required for the Contractor to perform his work; such precautions include but are not limited to shoring, scaffolding, underpinning, temporary retainment of excavation and any erection methods and temporary bracing.

#### 1.1.18 Existing Structures

- A. The location of existing sewers, water and gas pipes, conduits and other structures across or along the line of the proposed work are not necessarily shown on the plans, and if shown, the location, depth and dimensions of such structures may only be approximately correct. The Contractor shall have a working pipe locator on the job at all times.
- B. The Contractor shall dig the necessary test holes for the purpose of locating existing underground structures. Such excavation shall not be undertaken without 48 hours prior notice to the County or owner of the existing facility.

#### 1.1.19 Care of Existing Structures:

- A. The Contractor shall be liable for all damage done to any structure or property arising through his negligence or carelessness. He shall take care of and maintain all underground, overhead or surface utilities encountered in the performance of the work.

- B. Prior to commencing work Contractor shall contact the Utility Information Center ("Miss Utility"), telephone 1-800-552-7001 for assistance in locating existing underground utilities.
- C. The Contractor shall observe all precautions with respect to fire and avoid the indiscriminate mutilation, or cutting down trees, within and outside of project work areas or easements. Any damage to property not in the work area or easements will be the Contractor's responsibility.

#### 1.1.20 Inspectors

- A. The Inspector is authorized to inspect all work done and materials furnished. In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the Inspector will have the authority to reject material or suspend work until the question at issue can be referred to and decided.
- B. The Engineer or Inspector shall have access at all times to all parts of the work being done for the purpose of inspection, measurements and establishments of lines and grades.

#### 1.1.21 Responsibility Of Contractor's Employees

- A. Each and every employee of the Contractor, and each and every one of his Subcontractors, engaged in said work shall for all purposes be deemed taken to be exclusive servants of the Contractor. The Contractor shall in no manner be relieved from responsibility or liability on account of any fault or delay in the execution of said work, or any part thereof, by any such employee or any Subcontractor or any material supplier whatsoever.

#### 1.1.22 Final Inspection

- A. Before final inspection of the work, the Contractor shall clean up the site of the work including all rights-of-ways, leaving it in as clean, neat and sanitary condition as originally found, and shall remove all machinery, tools, surplus material, temporary buildings, and other structures from the site of the work.

#### 1.1.23 Standards for Computing Pay Items

- A. Where the Developer is eligible for refunds, all pay items shall be based on the standards as outlined in the County Water and Sewer Construction Specifications.

#### 1.1.24 Notification to Property Owners

- A. Contractor shall properly notify all property owners two (2) weeks prior to the start of any construction (including land clearing). Notification shall be in the form of a letter similar to the "sample letter at the end of this section.

#### 1.1.25 Water Line Tie-Ins

- A. All water line tie-ins to the existing distribution system including vertical and horizontal relocations shall be coordinated by the utility inspector, in conjunction with the Operations and Maintenance Section of the Utilities Department. Normal tie-ins shall be scheduled Tuesday thru Thursday from 9:00 a.m. to 4:00 p.m. Tie-ins may be permitted outside of this normal time and/or during nighttime hours only after a justified request in writing has been submitted and approved by the Goochland Department of Public Utilities.
- B. Tie-ins of water mains and sewer force mains will not be allowed during the entire weeks of Thanksgiving and Christmas. Where Christmas falls on a weekend, there will be no tie-in allowed two(2) calendar days before and two(2) calendar days after the holidays. In some cases, tie-ins may be restricted for certain situations such as graduation week of an affected public or private school, as well as, when county forces are flushing as part of their annual flushing program or other Operational requirements. The utility inspector will determine the available tie-in date, in cooperation with the Utilities Operation and Maintenance section. Scheduling of tie-ins is at the discretion of the utility inspector.
- C. The County reserves the right to require the Contractor to perform tie-ins outside of the normal working hours detailed above in the interest of public safety or customer service. No claim for additional compensation shall be made by the Contractor when such occasions occur.
- D. Proper preparation including field verification of the plans shall be accomplished to minimize shutdown time and prevent the tie-in from exceeding scheduled shutdown time. Sufficient personnel, equipment and materials shall be on site prior to the water being shut off. Where applicable, excavation and preassembling of fittings shall be performed. If, in the opinion of the inspector, sufficient resources are not available, the tie-in will be cancelled and rescheduled.
- E. Tie-ins to asbestos cement pipe shall be made to rough barrel pipe. Tie-ins to the machined section of asbestos pipe will not be permitted. Where asbestos cement pipe couplings have been removed, the machined end of the pipe shall be removed. Abandonment of cement asbestos pipe shall be per state and federal requirements.
- F. Tie-ins involving fittings shall include provisions for temporary blocking until concrete blocking has cured.

- G. All pipe and fittings used for a tie-in to the water system shall be swabbed with a 1% chlorine solution prior to connection.
- H. Before a tie-in will be allowed, all new valves, including fire hydrant valves, shall be accessible and verified fully open by the Contractor, unless there are valves designated as “normally closed”. Prior to tie-in, the Inspector shall verify that all valves, including fire hydrant valves, are fully open and accessible. Immediately after a tie-in has been made, all valves used during the shutdown shall be verified fully open by the Inspector. All fire hydrants shall be checked by the Inspector to ensure water is available and each hydrant is in working order.

#### 1.1.26 Project Meetings

- A. Contractor shall be required to attend Project Progress Meetings. Meetings shall be held at a minimum of once a month. Should the County require additional meetings the Contractor shall be required to attend without additional cost to the County.

#### 1.1.27 Responsible Land Disturber (RLD)

- A. Contractor shall provide a certified RLD for the project. Persons name shall be on the title sheet of the drawings with emergency contract information.

#### 1.1.28 Department Review

- A. Plan of Development
  - 1. Water and sewer plans shall be included as part of the Plan of Development (POD) application.
  - 2. The POD application shall include a Design Folder. This Design Folder shall contain any of the following documents not shown on the plans:
    - a) Engineering Report with supporting calculations.
    - b) Information Sheet for Water and Sewer Agreements
    - c) Sewer Design Form
    - d) Plan Review Checklist
    - e) Domestic Meter Sizing Form
    - f) Fire Flow Estimate Form
    - g) Notice of Intent to Discharge Non-domestic Wastewater.
  - 3. Upon receipt of the Information Sheet for Water and Sewer Agreements, the water and sewer agreements will be prepared by the Department for signature by the Owner. Since the agreements must be executed by the Owner and County prior to approval of the utility plans or building permits, it is recommended that the Information Sheet be submitted as

soon as possible to avoid delays in approval of plans or building permits. Conflicts between the completed Information Sheet and the plans may generate additional review comments.

4. For phased development, overall water and sewer plans shall be submitted to the Department and shall be approved prior to approval of any construction plans for the first phase of the development.
5. When all of the technical requirements are satisfied, the Department will proceed with signature of the POD construction plans. This signature DOES NOT include approval for construction of water and sewer.
6. When agreements have been executed, applicable Federal, State and Local approvals received, off-site easements recorded, and Department requirements satisfactorily addressed, the plans shall be marked “Approved” by the Director of Community Development or his representative.
7. Six sets of water and sewer plans will be distributed as follows:

a)	Community Development	2 sets & 1 CD
b)	Construction Division	2 sets
c)	Public Utilities	1 set
d)	Fire	1 set
8. The owner’s contractor will contact Public Utilities to schedule a pre-construction meeting. The approved water and sewer construction plans normally will be delivered to the contractor at this meeting and authorization to proceed with construction of water and sewer facilities will be issued.
9. Proposed revisions to the approved water and sewer construction plans shall be submitted directly to the Department. The Engineer shall:
  - a) provide a transmittal letter which clearly states those changes submitted for approval.
  - b) submit the appropriate number of copies for approval.
  - c) clearly indicate, by highlighting in yellow on each copy of the plans submitted, those changes being made.

B. Subdivision Plan Review

1. The Engineer shall make application to the Department for sanitary sewer and/or water service. The Department will accept for review only those applications that are complete. A complete application includes the Water and Sewer Plans and the Design folder. This Design Folder shall contain any of the following documents not shown on the plans:
  - a) Engineering Report with supporting calculations
  - b) Sewer Design Form
  - c) Plan Review Checklist
2. Upon receipt of the Information Sheet for Water and Sewer Agreements, the water and sewer agreements will be prepared by the Department for signature by the Owner. Since the agreements must be executed by the Owner and County prior to approval of the utility plans or building permits, it is recommended that the Information Sheet be submitted as soon as possible to avoid delays in approval of plans or building permits. Conflicts between the completed Information Sheet and the plans may generate additional review comments.
3. Community Development shall sign the plans to indicate that all environmental and erosion and sediment control requirements have been satisfied.
4. When agreements have been executed, applicable Federal, State and Local approvals received, off-site easements recorded, and Department requirements satisfactorily addressed, the plans shall be marked "Approved" by the County Engineer or his representative.
5. For phased development, overall water and sewer plans shall be approved prior to the first phase of the development.
6. Six sets of water and sewer plans will be distributed as follows:
  - a) Community Development 3 sets & 1 CD
  - b) Construction Division 2 sets
  - c) Public Utilities 1 set
7. The owner's contractor will contact the County Engineer to schedule a pre-construction meeting. The approved water and sewer construction plans normally will be delivered to the contractor at this meeting and authorization to proceed with construction of water and sewer facilities will be issued.

8. When revisions to the approved water and sewer construction plans are submitted for approval, the Engineer shall:
  - a) provide a transmittal letter which clearly states those changes submitted for approval
  - b) submit the appropriate number of copies for approval
  - c) clearly indicate, by highlighting in yellow on each copy of the plans submitted, those changes being made.
  - d) include the Subdivision Certification to certify that all changes have been coordinated with the Subdivision Construction Plans and that all changes conform to the approved Subdivision Construction Plans.
  - e) without certification of conformance to the Subdivision Construction Plans, approval by the Director of Planning will be required prior to authorization to proceed with the proposed revisions.

C. Off-site Improvements

1. Plans for major off-site improvements shall be submitted to the Department. A complete application includes the Water and Sewer Plans, Engineering Report, the Information Sheet for Water and Sewer Agreements, and any supporting calculations. The Engineer shall schedule a meeting with the Department as needed to define the scope of the project and the extent of the off-site improvements required.
2. The Engineer shall submit six sets of plans for approval. For sewage pumping stations or other major facilities additional copies may be required.
3. Upon receipt of the Information Sheet for Water and Sewer Agreements, the water and sewer agreements will be prepared by the Department for signature by the Owner. Agreements must be executed before plans are approved.
4. Community Development shall sign the plans to indicate that all environmental and erosion and sediment control requirements have been satisfied.
5. When agreements have been executed, applicable Federal, State and Local approvals received, off-site easements recorded, and Department requirements satisfactorily addressed, the plans shall be marked "Approved" by the County Engineer or his representative.

6. For phased development, overall water and sewer plans shall be approved prior to the first phase of the development.
7. Six sets of water and sewer plans will be distributed as follows:
  - a) Community Development 3 sets & 1 CD
  - b) Construction Division 2 sets
  - c) Engineer 1 set
8. The owner's contractor will contact the County Engineer to schedule a pre-construction meeting. The approved water and sewer construction plans normally will be delivered to the contractor at this meeting and authorization to proceed with construction of water and sewer facilities will be issued.
9. When revisions to the approved water and sewer construction plans are submitted for approval, the Engineer shall:
  - a) provide a transmittal letter which clearly states those changes submitted for approval
  - b) submit the appropriate number of copies for approval
  - c) clearly indicate, by highlighting in yellow on each copy of the plans submitted, those changes being made.

D. Engineering Report

1. The engineering report which is included in the Design Folder shall be submitted to and approved by the Department before preparing drawings and specifications except for minor sewer extensions. A sewer extension shall be considered minor where less than 15 lots are served, no off-site area is served, and the line diameter does not exceed 8 inches. A water extension is considered minor where less than 15 lots are served and the line diameter is 8 inches or less. The Engineering Report shall include water requirements for and sewer flow generated by the project. The report shall contain a System Layout Map which shall incorporate all of the proposed construction together with a sufficient amount of the surrounding area in order to clearly outline the interrelationship of the two. The Report shall demonstrate that the sewer lines and water lines are designed to serve the entire sewer shed or service area. Existing and proposed development shall be shown as well as existing and proposed utilities. Where phase development is contemplated, the extent of each phase shall be clearly delineated. Additional requirements shall be imposed as detailed in other divisions of these standards and as required by the County.

E. System Layout Map

1. The System Layout Map shall delineate sewer shed area boundaries for sewer projects and pressure zone boundaries for water projects. The map shall clearly define the areas pertinent to interim and ultimate development of the area proposed to be served. The System Layout Map shall show present and future development, proposed interim and future utilities as well as those existing utilities that will be affected by or have an effect on the proposed utilities. Existing and proposed ground elevations shall be shown at contour intervals not exceeding 5 feet unless otherwise approved. Proposed utilities necessary to serve adjacent properties and associated easements shall be shown.

F. Easements

1. Off-site easements shall be recorded and the Deed Book and Page Numbers of the recordation included on the utilities plans before commencement of construction.
2. Where offsite easements are required Contractor shall video tape the property and adjacent property before starting construction to verify the condition and provide a guide line for restoration of the property after completion. Copies of the video tapes shall be submitted to the county before construction begins.
3. On-site easement plats shall be submitted to the Department with the Engineer's certification that the plats conform to the approved plans and any approved revisions and are as shown on the approved POD construction plans. The on-site easement plats with the Engineer's certification will be forwarded to the County Engineer. Any revisions to the approved plans shall be accompanied by the necessary revisions to the easement plats and the Engineer's certification that the revised plats conform to the plan revisions.
  - a) The Construction Division will notify the Engineer if any proposed field change requires revised plans and easement plats.
  - b) The Engineer shall submit all revised easement plats with his certification that the revised plats conform to the approved plans and revisions prior to Tentative Acceptance.
  - c) The Engineer shall address any comments from the Department's Construction Division prior to Final Acceptance.
4. Where easements are required on property owned by the County of Goochland, plans shall be submitted for preliminary review. After the Department agrees to the proposed alignment, the Engineer shall submit

plans and easement plats to the County Department (Agency) controlling the property. When the Agency recommends approval of the installation, the Engineer shall forward the recommendation and plats to the Real Property Department. The Real Property Department will prepare a license agreement for approval by the County Board of Supervisors. Utility Plans will be approved after the County Board of Supervisors grants permission to install the utility lines.

5. Contractor shall be responsible for obtaining all easements. Contractor is responsible for lawyer's fees, property owner's fees, survey fees and any other fees associated with obtaining easements.
6. Installation of trees, structures, buildings, stormwater BMP's, wetlands, berms or other obstruction which prevents the proper installation, maintenance, rehabilitation, operation, inspection or removal of water or sewer facilities shall not be allowed within any permanent water or sewer easement unless approved by the County.

G. Federal, State and Local Approvals

1. Permit conditions for construction and maintenance shall be shown on the plans where any Nationwide or Individual Permit, Virginia Water Protection Permit, Virginia Department of Health or Virginia Department of Environmental Quality Construction Permit, Plan of Development, Virginia Power Right-of-Way Crossing Permit, Railroad Crossing Permit, etc. is required.
2. The Department shall approve all plans for erosion and sediment control before construction of water and sewer facilities may commence. The Department may require a preconstruction meeting at the project site prior to beginning such construction.
3. To assure compliance with the applicable requirements of the Subdivision Construction Plans:
  - a) The Engineer shall certify that Water and Sewer Plans conform to the Subdivision Construction Plans approved by the County Engineer.
  - b) The Engineer shall include this certification on the title sheet of the Water and Sewer Plans and show on the plans all requirements and conditions of the Subdivision which affect the construction or maintenance of the proposed water and sewer facilities.
  - c) In the event that the required certification is not received or if the Engineer indicates that the Water and Sewer Plans do not conform to the Subdivision Plans, those water and sewer plans shall be

approved by the County Engineer prior to authorization for construction by the Department.

4. Where VDOT Right of Way (ROW) is used, the contractor shall obtain a VDOT permit before construction is started. The contractor shall video tape the ROW and adjacent properties to assess the condition and provide a guide line for restoration of the property after completion. Copies of the video tapes shall be submitted to the county before construction begins.
5. All wetlands shall be indicated on the plans. The contractor shall obtain permits, prior to going through, under or in any way impacting the wetlands, from all authorities having jurisdiction.

#### 1.1.29 System Design

- A. An analysis shall be prepared that will tabulate the numbers of people served or proposed to be served as determined from the County Land Use Map or existing Zoning. The tabulation shall be by incremental areas for evaluation purposes.
- B. Average and maximum flows shall be developed for areas and sub-areas and tabulated in the report as deemed necessary or appropriate.
  1. Where development is existing or proposed, average sewer flows within the sewer shed shall be calculated using actual (existing) or proposed population densities in accordance with flow rates cited in the Virginia Department of Environmental Quality Sewerage Regulations or other published data as appropriate.
  2. For undeveloped acreage where no specific development has been proposed, the following average flow rates may be used:

a)	Single Family Residential	800 gpd/ac
b)	Multi-Family Residential	3000 gpd/ac
c)	Commercial	1400 gpd/ac
d)	Industrial	2300 gpd/ac
e)	Public/Government	600 gpd/ac
- C. The design shall address overall present and future flows and system capacities of existing and proposed utilities as they may be affected by or may affect the facilities involved and shall develop proposed water main and sewer line sizes.
- D. The design shall be based on ultimate development and shall present such factors as deemed necessary for a sound evaluation of the several factors used in development of the report.

- E. Where an alternate design is proposed that would in-compass interim or staged construction, the report shall develop the alternate design and shall present a thorough investigation and justification for consideration of the alternate.
- F. Water and Sewer lines shall be located in the roadways. No sewer or water lines shall be in easements between houses of a subdivision. Should this not be possible due to extenuating circumstances, permission shall be obtained from the County for a deviation from this requirement.

#### 1.1.30 System Design – Miscellaneous

- A. For detailed requirements of procedures addressed below, contact the County Engineer.
  - 1. A commercial or industrial establishment that utilizes an individual private well and requests connection to the County’s sanitary sewer system is required to have a water meter installed, at its expense, on the well for the purpose of billing sewer charges. The water meter itself must be approved by the County Engineer, must be installed on the well, and the sewer connection fees paid before a plan for construction of the sewer connection is approved. Water meter shall be located at the property line and be accessible by the county to read the meter. If this is not possible, contact County Engineer for an alternate location.
  - 2. Requests for temporary water and/or sewer service for construction trailers shall be directed to the County Engineer.
  - 3. All existing water and sewer services to the property shall be shown on the utility plan. If the services will not be utilized after construction is completed, they shall be abandoned as follows:
    - a) Water services shall be abandoned at the corporation stop or tee (i.e. at the main line).
    - b) Sewer laterals shall be properly plugged at the main unless approved otherwise.
  - 4. A limited number of hydrant meters are available for construction purposes and wash downs only.

#### 1.1.31 Separation of Water Lines and Sanitary and/or Combined Sewers.

- A. Follow State Health Department Standards for separation of water mains and sewer lines.

B. Parallel Installation

1. Normal Conditions - Water lines shall be constructed at least 10 feet horizontally from a sewer or sewer manhole whenever possible. The distance shall be measured edge-to-edge.
2. Unusual Conditions - When local conditions prevent a horizontal separation of at least 10 feet, the water line may be laid closer to a sewer or sewer manhole provided that:
  - a) The bottom of the water line is at least 18 inches above the top of the sewer.
  - b) Where this vertical separation cannot be obtained, the sewer shall be constructed of AWWA approved water pipe pressure-tested in place without leakage prior to backfilling.
  - c) The sewer manhole shall be of watertight construction and tested in place.

C. Crossing

1. Normal Conditions - Water lines crossing over sewers shall be laid to provide a separation as described above.
2. Unusual Conditions - When local conditions prevent a vertical separation described in "Crossing, Normal Conditions" paragraph above, the following construction shall be used.
  - a) Sewer passing over or under water lines shall be constructed of the materials described in parallel installation, unusual conditions above.
  - b) Water lines passing under sewers shall, in addition, be protected by providing:
    - (1) A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water line.
    - (2) Adequate structural support for the sewers to prevent excessive deflection of the joints and the settling on and breaking of the water line.
    - (3) A full length of pipe shall be used at the crossings with the center of the water line pipe be centered at the point of the crossings so that joints shall be equidistant and as far as possible from the sewer.

- D. Sanitary sewers or sewer manholes - no water pipes shall pass through or come in contact with any part of a sewer or sewer manhole. A minimum of 10 feet of horizontal separation shall be maintained. If this separation cannot be maintained, the sewer manhole shall be of watertight construction and tested in place.

#### 1.1.32 Sewer in Relation to Streams, Estuaries, Lakes, or Reservoirs

##### A. Location of Sewer in Relation to Streams, Estuaries, Lakes, or Reservoirs

1. The tops of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. In general, one foot of suitable cover shall be provided where the stream is located in rock, and three feet of suitable cover shall be provided in other material. Less cover will be considered if the proposed sewer crossing is encased in concrete and will not interfere with future improvements to stream channel. Reasons for requesting less cover shall be given in the application. In paved channels, the top of the sewer lines should be placed below the bottom of channel pavement. Sewers shall remain fully operational during 25-year flood/wave action. Sewers and their appurtenances located along streams shall be protected against the normal range of high and low water conditions, including the 100-year flood/wave action. Sewers located along streams shall be located outside the stream bed wherever possible and sufficiently removed therefrom to provide for future possible channel widening. Reasons for requesting sewer lines to be located within stream beds shall be given in the application.
2. All sewer lines in the vicinity of the Waters of the United States shall be approved by Federal authorities having jurisdiction and all required permits shall be obtained before construction.

##### B. Sewer Crossing Streams, Estuaries, Lakes, or Reservoirs

1. Sewers entering or crossing the streams shall be constructed of watertight pipe. The pipe and joints shall be tested in place; shall exhibit zero infiltration; and shall be designed, constructed, and protected against anticipated hydraulic and physical, longitudinal, vertical and horizontal loads and erosion and impact. Sewers laid on piers across ravines or streams shall be allowed only when it can be demonstrated that no other practical alternative exists. Such sewers on piers shall be constructed in accordance with the requirements for sewer entering or crossing under streams. Construction methods and materials of construction shall be such that sewers will remain watertight and free from change in alignment or grade.

### 1.1.33 Protection of Water Supplies

#### A. Water Supply Interconnections

1. There shall be no cross connection between a drinking water supply and a sewer, sewage pumping station, or appurtenances thereto.

#### B. Relation to Water Works Structures

1. No general statement can be made to cover all conditions; however, for public wells or other public water supply sources and structures, sewers shall meet the requirements of the Virginia Department of Health Waterworks Regulations with respect to minimum distances from water supply wells or other water supply sources and structures. For all other potable water supply wells or potable water supply sources and structures, sewers should meet the requirements of the Virginia Department of Health Waterworks Regulations with respect to minimum distances from water supply sources and structures. No sewer line shall pass within 50 feet of a potable water supply well or other potable water supply source or structure unless special construction and/or pipe materials are used to obtain adequate protection. The designer is referred to current editions of the Virginia Department of Health Waterworks Regulations, Sewerage Regulations, and Sewage Handling and Disposal Regulations (Waterworks Regulations) and the requirements contained in “Rules and Regulations of the Board of Health, Commonwealth of Virginia, Governing the Disposal of Sewage”) as basic design references. The proposed sewer design shall identify and adequately address the protection of all potable water supply structures within 100 feet of the proposed project.

### 1.1.34 Backfill and Compaction

- A. Fill: Place and compact fill material in layers to required elevations. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within plus or minus 2 percent of optimum moisture content.
- B. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.
- C. All subgrades shall be proof rolled prior to installation of structures, slabs, or pavements. Proof rolling shall be performed by the contractor and observed by the geotechnical engineer of record, or his representative, using a loaded tandem-axle dump truck or approved construction equipment.

- D. Compaction: Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers. Only light hand-operated equipment should be used to compact backfill against walls.
- E. Compact soil to not less than the following percentages of maximum dry density according to ASTM D 698:
1. Under structures, building slabs, steps, and pavements, compact all lifts of fill soils to 95 percent of maximum dry density. The top 12 inches of fill shall be compacted to 98 percent of maximum dry density. For existing subgrades, scarify and re-compact top 12 inches (150 mm) below subgrade to 98 percent of maximum dry density.
  2. Under walkways, compact all lifts of fill materials to 95 percent of maximum dry density. For existing subgrades, scarify and re-compact top 6 inches (150 mm) below subgrade to 95 percent of maximum dry density.
  3. In lawn, landscaped or unpaved areas, compact all lifts of fill materials to 85 percent of maximum dry density.
- F. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade lawns, walks, and unpaved subgrades to tolerances of plus or minus 1 inch (25 mm) and pavements and areas within building lines to plus or minus 1/2 inch (13 mm).
- G. Sub base and Base Courses: Under pavements and walks, place sub-base course on prepared subgrade. Place base course material over sub-base. Compact to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
- H. Under slabs-on-grade, place drainage course on prepared subgrade. Compact to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
- I. The Engineer shall include compaction requirements on the plans:
1. Minimum compaction requirements will be specified.
  2. Compaction requirements for roads and pavement areas will be specified.
  3. Compaction requirements adjacent to structures will be specified.
  4. Compaction requirements in non-structural areas will be specified.
- J. The Engineer shall indicate on the plans those areas where greater than minimum compaction requirements are specified.

- K. Where compaction greater than 85% is required, test reports must be submitted to the County Engineer before Tentative Acceptance will be made.
  - 1. Where stone backfill is used, test reports are not required.

## 1.2 DRAWING ORGANIZATION AND FORMAT

### 1.2.1 Drawing Organization

- A. Drawings shall consist of the following types of sheets arranged in the order listed:
  - 1. Cover Sheet
  - 2. Index Sheet (if necessary)
  - 3. Notes and Legends
  - 4. Erosion and Sediment Control Details/Environmental Site Assessment
  - 5. Index Sheet or Sheets
  - 6. Plan and Profile Sheets
  - 7. Standard Sheets and Special Details
- B. Projects consisting of only structures may not require plan and profile sheets.
- C. Projects for construction of gravity sewers, force mains or water lines require plan and profile sheets except for special details.
- D. All projects impacting public utility infrastructure will require plans submitted and approved by the Department of Public Utilities.

### 1.2.2 Sheet Format

- A. All construction drawings shall be on sheets 24 inch x 36 inch.
- B. The cover sheet shall contain the Owner's name and project description in large, distinctive letters, a vicinity map on a scale of 1 inch equals 2000 feet to indicate the general vicinity of the contemplated construction, an index to the plan sheets and the signed stamp of the design engineer or principal of the engineering firm. The vicinity map shall include the north arrow and scale. The cover sheet shall also include the Owner/Developer's address, contact, and phone number and the Responsible Land Disturber.
- C. An Index Map (Key Map) shall be prepared for sewer line, sewage force main and water line projects. The Index Map shall be to a scale of not less than 1 inch equals 600 feet and shall show all proposed utility construction with ties to existing utilities. The lines of proposed construction together with proposed utility structures shall be indexed to the drawings to indicate the extent of coverage on each drawing, or, in the case of structures, to the group of drawings involved.

- D. Plan Sheets as well as Plan and Profile Sheets shall show horizontal, vertical and topographic data as outlined in Section 1.2 of these Standards. Plan and profile shall be shown on the same drawing with the plan view on the top half and the profile on the bottom half of the sheet. Plan and profile sheets shall have a horizontal scale of 1 inch equals 50 feet (1"= 50') and a vertical scale of 1 inch equals 50 feet (1"= 50'). For short runs of pipe profile can be shown on a separate sheet but must be clearly labeled and referenced to a plan sheet. Plan and profile sheets shall be stationed to correspond with each other.
- E. All plans shall bear a suitable title showing the name of the municipality, and institution or other Owner and shall show the scale in feet, a graphical scale, the north arrow, the date, and the name of the appropriate licensed professional. Also, each plan sheet shall bear the same general title identifying the overall project, and each shall be numbered.
- F. Drafting Conventions
1. All drawings shall be prepared using computer aided drafting (CAD).
  2. Standard Symbols to be used for drawings are as shown on Drawing No. D-50. Standard Symbols shall be included on the notes and legend sheets. Any symbols not included in the standard symbols shall be added the symbol list. Notes and Legend sheets shall also include an abbreviation list.
  3. Existing facilities shall be shaded gray. New work shall be dark lines and of sufficient width to easily distinguish new work from existing.
  4. Text, Dimensions and Notes
    - a) The minimum text height shall be 0.10 inches for notes, text and dimensions. Plan, section, profiles and detail labels shall be a minimum of 0.20 test height and of a heavier line weight.
- G. Drawing Standards
1. All plans submitted for review shall comply with the minimum format and quality control requirements of the Goochland Standards. Plans which do not substantially meet these criteria will not be accepted for review.
  2. Plans submitted for review shall be AutoCAD blackline and grayscale format.
  3. Drawings shall be clear and legible. Text shall be open so that it is readable when drawings are reduced to half size. All drawings must be

capable of producing legible second generation prints after being reduced to half size.

4. The contrast of the printed material shall be high, with blank areas being as white as possible, and all information being as dark as practicable, while remaining clear and distinct.
5. Shading, such as on plan views for paving, shall not be used on the drawings where it will hide any information when the drawing is photocopied or scanned.
  - a) Screening and hatching shall be in accordance with conventionally accepted standards. Screening and hatching shall not block pertinent information.
6. It is the intent of these Standards that all submitted plans will be scanned for archiving. If there is any question regarding plan legibility, the plan will be scanned and acceptability determined upon printing of the scanned image at ½ size.

#### H. Additional Information

1. Drawings shall include estimated materials quantities and current Goochland Standard Water and Sewer notes.
2. Horizontal scale in Plan and Profile Sheets shall be no smaller than 1 inch equals 50 feet.
3. A bar scale shall be included on each sheet.
4. Vertical profile scale shall be no smaller than 1 inch equals 10 feet.
5. All existing and proposed underground utilities, both above ground and below ground, which might interfere with the proposed construction, particularly water mains, sewer mains, gas mains, storm drains, utility service lines, etc. shall be shown in plan and profile.
6. Bench Marks shall be set no more than 500 feet apart along the lines of construction but outside the limits of construction. Datum for elevations shown shall be USGS (Means Sea Level).
7. All drawings shall be in the Virginia State Plane NAD 83 coordinate system.
8. All manholes, wet wells, valve vaults, underground fittings, fire hydrants, fence corners and gate posts, buildings and any and all other structures,

equipment and appurtenances must be located with Northern and Easting coordinates.

### 1.3 EASEMENT REQUIREMENTS

- 1.3.1 Easement surveys shall be made and easement plats prepared in all cases where proposed construction limits exceed the limits of public rights-of-way or properties under the ownership of the developer. These surveys shall tie the lines of proposed construction to existing property lines and property corners, where the property may be identified by corners. Where readily identifiable corners are not found, fence lines and corners, and other indications of property lines may be used. In the absence of any such identifications, the surveyor shall exert maximum effort to tie the survey to boundaries as set forth on existing plats and in descriptions.
- 1.3.2 Permanent easements shall be a minimum of 20 feet in width with consideration for wider easements where more than one facility may occupy an easement, or where, because of line size or access requirements, wider easements are desirable. Where lines have cover in excess of 10 feet, the minimum easement width may be increased between manholes. Buildings or other structures, and trees shall not be placed in easements.
- 1.3.3 Construction easements shall be acquired for all County contracts. Developers constructing facilities are not required to have construction easements where work is on the developer's property. Construction easements shall provide a minimum working width of 50 feet, including the 20-foot permanent easement, unless otherwise approved. Generally it is desirable to provide more construction easement on one side than the other. This allows room for construction traffic and material storage.
- 1.3.4 The standard size of easement plats shall be on sheets 8-1/2 inch x 13 inch or 8-1/2 inch x 26 inch. Where longer easements are required, multiple sheets may be utilized. A sample plat sheet is shown on Form No. F-3.
- 1.3.5 Easement plats of different sizes may be used if the overall size of the sheet does not exceed 18 inch x 24 inch. The easement centerline shall be shown together with the limits of both the proposed permanent and construction easement widths referenced to the centerline of the easement. Bearings and distances shall be shown on the centerline of the easement and on the right-of-way or property lines where they intersect the centerline. Distances shall be shown from fixed points on both the centerline and the property lines to the intersection of the two. Bearings, distances and closures shall be to the degree of accuracy of 1 in 8000 except that approximations will be permitted where it is considered impractical to delineate existing property lines. The body of the plat shall show the name of the property owner and the deed or will book reference for the source of title. The names of all adjacent property owners and a north arrow shall also be shown. Street names or highway route numbers shall also be shown where applicable.

END OF SECTION 1