

## 1.1 GENERAL DESIGN REQUIREMENTS

### 1.1.01 Definitions

- A. **COMPLETION:** Completion of work indicates that all sewer pipe, manholes, water pipe, valves, appurtenances, buildings, equipment, and any other required items have been installed and appropriately tested in accordance with the plans, and specifications. All submittals including any O&M manuals shall have been accepted by the Department. 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 this definition have been satisfied.
- B. **CONTRACTOR:** The Developer/Owner's Agent, acting directly or through his agents, who has been contracted by the developer to perform the work.
- C. **COUNTY:** The Board of Supervisors of Goochland County, Virginia, acting through the County Administrator and the Director of Public Utilities and/or other duly authorized agents.
- D. **DEPARTMENT:** The Goochland County Department of Public Utilities. May also be referred to in these Standards as “DPU” or “Department”.
- E. **DEVELOPER/OWNER:** The Party who enters into a Utility Agreement with the County to install public water and/or sewer utilities to serve a subdivision or other development or project, and his heirs, assigns and agents.
- F. The terms “Developer” and “Owner” are used together, separately, and interchangeably throughout these Standards.
- G. **DEVELOPER’S ENGINEER/DESIGN ENGINEER:** The Consulting Engineer who has been designated by the Developer as his Engineer of Record in relation to the project, whether acting directly or through properly authorized agents, inspectors, or representatives. May also be referred to in these Standards as “Engineer”.
- H. **DIRECTOR:** The Director of Public Utilities or his duly authorized agents.
- I. **TENTATIVE INSPECTION:** An inspection performed by the Inspector, at which the Contractor may be present, of all items covered by the Utility Agreement. The Tentative Inspection shall fully demonstrate to the Inspector that all individual project components function as required by the Utility Agreement and that all systems are internally coordinated, as well as coordinated with other systems.

Equipment shall be operated and required system tests performed. In addition, the Contractor shall demonstrate that all major Work has been brought to final configurations and finished grades, and restoration initiated. All items of deficiency noted for correction shall be completed before the Final Inspection is scheduled. The Inspector will prepare a punch list of items to be accomplished prior to Final Acceptance.

- J. TENTATIVE ACCEPTANCE: A written statement from the County to the Developer/Owner stating that as of a certain specific date, all Punch List items from the Tentative Inspection have been corrected.
- K. FINAL INSPECTION: An inspection performed by the Inspector, with the Contractor present, of all items covered by the Utility Agreement. Final Inspection is performed upon notification by the Owner or his Contractor that all Work is complete. Final Inspection may result in the issuance of a Punch List.
- L. FINAL ACCEPTANCE: A written statement from the County to the Developer/Owner stating that as of a certain specific date, all Punch List items from the Final Inspection have been corrected, that all necessary submissions have been made to the Department, and the conditions of the Utility Agreement have been satisfied. The Warranty Period commences on the date of Final Acceptance.
- M. INSPECTOR: The person or persons assigned by the County's Director of Public Utilities to inspect the materials used by and the work performed by the Developer/Owner.
- N. PROJECT: A subdivision or other development for which a Developer/Owner need approval from Goochland County.
- O. PUNCH LIST: A list of deficiencies and/or incomplete items related to construction work. A Punch List is prepared by the Inspector and presented to the Owner or his Contractor so that the items listed may be corrected to the satisfaction of the Department. A Punch List is typically prepared following both Tentative and Final Inspections.
- P. STANDARD DETAILS: The detailed drawings of materials and appurtenances included in Section 3 of these Standards or otherwise adopted by the Department. At the discretion of the Director, Standard Details may be periodically added, deleted, corrected and/or updated independently of the Standards as a whole. The latest versions of the Standard Details are available from the County's website, or from the Department upon request.
- Q. STANDARDS AND SPECIFICATIONS: This document and all the standards, specifications, and requirements contained herein, as adopted by the County for use and enforcement by the Department of Public Utilities, and which define and describe the technical requirements and administrative processes by which water

and sewer facilities in Goochland County, Virginia, shall be designed and constructed. May also be referred to as “Standards” or “these Standards”.

- R. SUBCONTRACTOR: Any individual, firm, or corporation having a direct contract with the Contractor for the performance of any part of the work.
- S. UTILITY ENGINEER: The Director of Public Works or his designee.
- T. WARRANTY PERIOD: The period of time, typically one-year minimum, following Final Acceptance by the County of newly constructed water and sewer utilities infrastructure, during which the Developer/Owner of said infrastructure shall be wholly and entirely responsible for completing repairs to and/or replacement of any/all portions of said infrastructure which may become damaged or broken, or which otherwise fail(s) to perform as intended.
- U. WATER AND SEWER PLANS: All the required engineered plans, profiles, details, computations, digital data, documents, specifications, and other pertinent information necessary to construct the water and/or sewer infrastructure associated with an Owner’s project, prepared in accordance with these Standards and bound together as a complete set of construction plans. May also be referred to in these Standards as “Plans” or “the Plans”.
- V. WORK: The entirety of the services, labor, materials, and equipment necessary and appropriate for the Developer/Owner to complete the design and construction of the public water and/or sewer utilities needed to serve a subdivision or other development or project. May be referred to in these Standards as “the Work”.
- W. OTHER DEFINITIONS: Other applicable definitions may be found in the County's latest Utilities and Subdivision Ordinances.

#### 1.1.02 General System Design

- A. Prior to designing a system or an extension to an existing system, an analysis shall be prepared that will tabulate the number of people served or proposed to be served as determined from the County Land Use Map, Comprehensive Plan and/or existing Zoning. The tabulation shall be by incremental areas for evaluation purposes.
- B. An Engineering Report shall be submitted to the Department to prior to submission of utility plans.
- C. Average and maximum flow projections shall be developed for areas and sub-areas, tabulated in spreadsheet form, and submitted to the Department for review.
  - 1. Where development is existing or proposed, average sewer flows within the sewer shed shall be calculated using actual (existing) or proposed

population densities and flow rates cited in the Virginia Department of Environmental Quality *Sewage Collection and Treatment (SCAT) Regulations (9VAC25-790)* or other published data as appropriate.

2. For undeveloped acreage where no specific development has been proposed, the following average flow rates should be used for both water and sewer line capacity design:

- |                              |              |
|------------------------------|--------------|
| a. Single Family Residential | 800 gpd/ac   |
| b. Multi-Family Residential  | 3,000 gpd/ac |
| c. Commercial                | 1,400 gpd/ac |
| d. Industrial                | 2,300 gpd/ac |
| e. Public/Government         | 600 gpd/ac   |

- D. When sizing proposed water and sewer lines, the designer shall address all present and projected future flows and shall assess the capacities of the existing infrastructure to which the lines connect.
- E. The design shall be based on ultimate development and shall present such data as deemed necessary by the Department for a sound evaluation of the information contained in the report.
- F. Where an alternate design is proposed that would incorporate interim or staged construction, the report shall include both the alternate design and the ultimate design and shall present a thorough investigation and justification for consideration of the interim or staged construction.
- G. Water and Sewer lines shall be located in public rights-of-way wherever possible. Should extenuating circumstances prevent this, the Director may allow for deviation(s) from this portion of the Standards. Such deviations will be permitted on a case-by-case basis and must receive approval prior to final system design.
- H. In subdivisions containing lots smaller than 1.00 acre, no public water line, sewer line, or utility easement may be located on a lot. Where water lines and/or sewer lines must be located outside a public right-of-way, they shall be located within easements in common areas. In such cases, the entity which owns and controls the common area shall be responsible for mowing and ground maintenance within the easement(s).
- I. Within subdivisions, water and sewer lines in public rights-of-way or private roadways shall be configured in substantial conformance with the Department's *Water and Sewer Geometry Standard*.

- J. As determined by DPU, water and sewer utilities shall be designed and constructed to the limits of the development so that future extensions to adjoining properties will not disrupt existing improvements.

### 1.1.03 Separation of Water Lines & Sewer Lines

- A. All water and sewer system designs shall comply with Virginia Department of Health *Waterworks Regulations (12VAC5-590)* for separation of water mains and sewer lines.

- B. Parallel Installation

1. Normal Conditions: Water lines shall be aligned at least 10 feet horizontally from a sewer or sewer manhole whenever possible. The distance shall be measured outside edge to outside edge (“edge-to-edge”).
2. Unusual Conditions: When conditions prevent normal horizontal separation, the water line may be located closer than 10 feet to a sewer or sewer manhole provided that:
  - a. The bottom edge of the water line shall be at least 18 inches above the top edge of the sewer line.
  - 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. Pipe Crossings

1. Normal Conditions - Water lines shall be designed to cross over sanitary and storm sewers with 42-inches of cover and at least 18-inches of vertical edge-to-edge separation between pipes. If necessary to accommodate a particular water line crossing, and with written approval from the Department, cover over the water line may be reduced to 36-inches and vertical edge-to-edge separation between pipes reduced to 12-inches at the crossing point, but this shall not be the design standard.
2. Unusual Conditions - When conditions prevent water lines from crossing over sewer lines, or the vertical separation described in the previous paragraph cannot be met, the following construction shall be used:

- a. Sewer lines passing over or under water lines shall be constructed of AWWA approved water pipe which shall be pressure-tested in place without leakage prior to backfilling.
- b. Water lines passing under sewers shall be constructed as follows:
  - (1) Vertical edge-to-edge separation of at least 18 inches must be provided between the bottom of the sewer and the top of the water line.
  - (2) Adequate structural support must be provided for the sewer line to prevent excessive deflection of joints and/or settling over the water line.
  - (3) Bends shall be used to divert the water line under the sewer. Upper bends shall be placed at least 10 feet on either side of the sewer line. Water line shall be CL 52 DIP restrained in accordance with Standard Detail WAT-13.

D. No water line shall pass through or touch any part of a sewer or sewer manhole.

#### 1.1.04 Sewer in Relation to Streams, Estuaries, Lakes and Reservoirs

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

- 1. All sewer pipes entering or crossing streams shall be ductile iron or PVC C900, DR14 and at a sufficient depth below the bottom of the streambed to protect the sewer line. All joints shall be restrained. In general, one foot of suitable cover shall be provided where the stream is located in rock and three feet of suitable cover 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 the stream channel. Reasons for requesting less cover shall be submitted to the Director.
- 2. In paved channels, the top of the sewer line shall be placed at least one foot below the bottom of channel pavement. Sewers must remain fully operational during 25-year flood/wave action.
- 3. Sewers and their appurtenances located near or 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 and sufficiently away from the edge of the stream to provide for future channel widening. Requests to locate sewer within stream beds must be provided in writing to the Director.

4. All sewer lines in the vicinity of the Waters of the United States shall be approved by 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 against erosion and impact.
2. 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.

1.1.05 Road and Railroad Crossings

A. Casing Pipe

1. Steel casing pipe shall be sized in accordance with the appropriate Standard Detail or as otherwise required by the authority having jurisdiction.
2. Steel casing pipe shall have minimum yield strength of 35,000 psi and a minimum internal diameter at least 4 inches greater than the largest external diameter of the carrier pipe and its appurtenances.
3. The wall thickness of casing pipe shall be sufficient to resist loads to which it will be subjected, but in no case less than 0.500 inches. Steel casing shall be ASTM A139, Grade B with sufficient corrosion protection.
4. Standard installation detail shall be as shown in VDOT Road and Bridge Standards except that the leak detector pipe shall be eliminated.
5. For a casing pipe crossing a road, pipe thickness shall be as required by VDOT for State Roads, or the requirements in these standards, whichever is more stringent.
6. For a casing pipe crossing a railroad, casing requirements shall be as specified in the permit issued by the affected railroad, or the requirements in these standards, whichever is more stringent.

#### 1.1.06 Protection of Water Supplies

##### A. Water Supply Interconnections

1. There shall be no physical 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, 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.
2. The sewer design shall identify and adequately address the protection of all potable water supply structures within 100 feet of the proposed project.

END OF SECTION 1.1