

## SECTION 500

### SANITARY SEWER SYSTEMS

	<u>Page</u>
<b>501.00 SANITARY SEWER SYSTEMS - GENERAL POLICY AND REQUIREMENTS</b>	
501.01 General Policy .....	500-1
501.02 Reference Manuals .....	500-1
501.03 Easements .....	500-1
501.04 Service Connections .....	500-2
501.05 Water Supply Interconnections .....	500-2
<b>502.00 SANITARY SEWER SYSTEMS - PLANNING AND DESIGN</b>	
502.01 Commonwealth of Virginia Sewerage Regulations .....	500-2
502.02 Pump Stations .....	500-2
502.03 Sewer Systems in Relation to Streams, Estuaries, Lakes, and Reservoirs .....	500-2
502.04 Sewer Systems in Relation to Waterworks Structures .....	500-3
502.05 Design Calculations .....	500-3
<b>503.00 SANITARY SEWER SYSTEMS - SUBMISSION REQUIREMENTS</b>	
503.01 Plan Submission .....	500-3
503.02 Plan Elements .....	500-3
<b>504.00 SANITARY SEWER SYSTEMS - CONSTRUCTION STANDARDS</b>	
504.01 General Requirements .....	500-4
504.02 Deviations .....	500-4
504.03 Line and Grade Stakes .....	500-4
504.04 Cut Sheets .....	500-4
504.05 Service Connections .....	500-4
504.06 Water Crossings .....	500-4
504.07 Inspections .....	500-4
<b>505.00 SANITARY SEWER SYSTEMS - SPECIFICATIONS</b>	
505.01 General Policy .....	500-4

**550.00 ON-SITE SEWAGE DISPOSAL SYSTEMS**

550.01	Applicability . . . . .	500-4
550.02	State Regulations . . . . .	500-5
550.03	Additional Regulations . . . . .	500-5
550.04	Review Authority for Final Subdivision Plans . . . . .	500-5
550.05	Health Department Approval of Sewage Disposal Sites . . . . .	500-6
550.06	Sewage Effluent Pump Installations Associated With On-site Disposal Systems . . . . .	500-6

**TABLES**

Table 5-1	Average Daily Wastewater Flows . . . . .	500-9
Table 5-2	Peak Flow Factors . . . . .	500-10

## SECTION 500

### SANITARY SEWER SYSTEMS

The purpose of this section is to address the minimum requirements for design and construction of public sanitary sewer systems and on-site sewage disposal systems. This section is supplemented by the Prince William County Service Authority Utility Standards Manual (PWCSA-USM) where detailed information on the standards is provided.

The authority for discretionary provisions for design and construction of public sewer systems in areas served by the Service Authority shall vest with the Service Authority general manager. For areas outside the purview of the Service Authority, authority for discretionary provisions shall vest with the director of Public Works, who will consult with the company providing the service before rendering a decision.

#### **501.00 SANITARY SEWER SYSTEMS - GENERAL POLICY AND REQUIREMENTS**

##### **501.01 General Policy:**

A. Sewer systems shall be designed in accordance with the densities and intensities reflected in the Long Range Future Land Use Plan and Map of the adopted Comprehensive Plan.

B. New development located in the development area, as designated by the Comprehensive Plan, shall connect to a public sewer system, when available. Availability of public sewer is defined by the Zoning Ordinance. New developments located in the rural area shall be served by private on-site sewage disposal systems.

C. The approximate location and character of proposed public sewer facilities shall correspond with the Existing and Proposed Sewer System Map, as amended.

D. Sewer systems shall be designed for the estimated future population from all contributing points in the development area under consideration. The estimated future population shall be based on the adopted Comprehensive Plan and/or the existing zoning of the land for the watershed to be sewerred, whichever is greater.

**501.02 Reference Manuals:** All manuals or standards referenced in this section shall refer to the latest version.

**501.03 Easements:** To provide for maximum utilization of public sewer systems, appropriate easements shall be provided to adjacent properties for access to, or extension of, said utilities. Such easements shall be dedicated to the Prince William Board of County Supervisors or the Service Authority, depending on the location of the project.

**501.04 Service Connections:** All sewers and service laterals located outside of state rights-of-way or public easements are regulated by the Virginia Uniform Statewide Building Code (VUSBC), and shall be privately maintained.

**501.05 Water Supply Interconnections:** There shall be no physical connections between a drinking water supply and a sewer or appurtenance thereof.

## **502.00 SANITARY SEWER SYSTEMS - PLANNING AND DESIGN**

### **502.01 Commonwealth of Virginia Sewerage Regulations:**

A. The design of sanitary sewer systems shall be governed by the Commonwealth of Virginia sewerage regulations or the more stringent requirements of the PWCSA-USM. The Service Authority has state local review authority for sewers up to 24 inches in diameter from the Virginia Department of Health (VDH). Accordingly, the Virginia sewerage regulations shall be augmented by the PWCSA-USM, unless such augmentation is specifically waived by the general manager of the PWCSA or the director of Public Works, depending upon where the project is located.

B. Specific parameters of the proposed project's sewer system, e.g., lift stations and facilities with capacities larger than 1 million gallons per day, must be reviewed both locally and by the Virginia Department of Health. The developer or the engineer must coordinate with the Service Authority or the director of Public Works to ensure that the appropriate agencies review the various portions of the sewer utility plan.

**502.02 Pump Stations:** All sanitary sewer pump stations will be designed in conformance with the Commonwealth of Virginia sewerage regulations and the PWCSA-USM. Additionally, all sewage pump stations within the Occoquan Basin will comply with the design requirements of the Occoquan policy.

### **502.03 Sewer Systems in Relation to Streams, Estuaries, Lakes, and Reservoirs:**

A. Sewer lines crossing streams or standing bodies of water, both above and under water, present special problems. Construction shall conform to the requirements of the Chesapeake Bay Preservation area standards as found in Section 740 of this manual and should be discussed with the Department of Public Works and the Service Authority before final plans are prepared.

B. Sewers located along streams shall be located outside of the stream bed wherever possible and sufficiently removed therefrom to protect the natural stream channel. Reasons for requesting sewer lines to be located within stream beds shall be given in the site development plan application.

C. Sewers laid on piers across ravines or streams shall be allowed only when it can be demonstrated that no other practical alternative exists.

#### **502.04 Sewer Systems in Relation to Waterworks Structures:**

- A. Sewer systems shall meet the requirements of the Virginia waterworks regulations as well as private well regulations with respect to minimum distances from water supply wells or water supply sources and structures.
- B. No sewer line shall pass within fifty (50) feet of a water supply source or structure unless special construction and/or pipe materials are used to obtain adequate protection.
- C. The proposed design shall identify and adequately address the protection of all water supply structures within one hundred (100) feet of the proposed project.

#### **502.05 Design Calculations:**

- A. Sewer systems shall be designed to carry the peak flows generated by the estimated future population from all contributing points in the development area under consideration. The estimated average daily flow will be computed using the unit flows from Table 5-1.
- B. Peak flows will be determined using Table 5-2.
- C. Consideration will be given to domestic, commercial institutional and industrial wastes, plus groundwater infiltration in determining the necessary capacity of the sewer system.

#### **503.00 SANITARY SEWER SYSTEMS - SUBMISSION REQUIREMENTS**

**503.01 Plan Submission:** All site development plans proposing a sewer system shall be submitted to the Office of Planning. The Office of Planning shall coordinate the review and approval of all elements of the plan in accordance with Section 100.00 of this manual and the Administrative Procedures Manual.

#### **503.02 Plan Elements:**

- A. All site development plans shall include horizontal and vertical views of all of the proposed sewer lines and appurtenances.
- B. The diameter, length, material and slope of all proposed sanitary sewer lines shall be shown on the plan profiles.
- C. Sanitary sewer design calculations shall be submitted for all proposed sewer mains as part of the site development plans along with a sewer shed map.
- D. Deviations from the flow rates of Table 5-1 shall be included in the submission of the site development plan, with a description of the procedure used for the calculations, and must be approved by the general manager or the director of Public Works, depending upon the location of the project.

E. Design information and details of sewers crossing watercourses shall be submitted.

#### **504.00 SANITARY SEWER SYSTEMS - CONSTRUCTION STANDARDS**

**504.01 General Requirements:** The construction of all public sanitary sewer systems shall conform with the Virginia Department of Health regulations and the PWCSA-USM, unless waived by the general manager or the director of Public Works, depending on the service area where the project is located.

**504.02 Deviations:** Substantial deviations from approved plans in line locations shall be submitted to the Office of Planning as a plan revision for the coordination of the review and approval before changes are constructed.

**504.03 Line and Grade Stakes:** Prior to the construction of the approved sanitary sewer, adequate line and grade stakes shall be placed in order that the layout of the sanitary sewer mains, clean-out laterals (located at the property line), and other appurtenances can be constructed in accordance with the approved plans.

**504.04 Cut Sheets:** After the placement of line and grade stakes, legible cut sheets shall be prepared and submitted for approval.

**504.05 Service Connections:** Proposed service connections to in-line manholes must be approved by the company providing service.

**504.06 Water Crossings:** The water crossings shall be tested in place, and shall exhibit no infiltration or exfiltration. Pipes and joints shall be constructed so as to be protected against anticipated hydraulic and physical impact, longitudinal, vertical and horizontal loads and erosion impact. Construction methods and materials of construction shall be such that sewers shall remain watertight and free from change in alignment or grade.

**504.07 Inspections:** All sanitary sewers, including manholes, shall be inspected prior to acceptance testing and any water leakage into the system sufficient to constitute any noticeable trickle or dribble shall be corrected and eliminated prior to undertaking the acceptance test.

#### **505.00 SANITARY SEWER SYSTEMS - SPECIFICATIONS**

**505.01 General Policy:** The construction materials listed in the PWCSA-USM are for general information. Engineers and contractors should contact the company providing the service to determine what materials are acceptable.

#### **550.00 ON-SITE SEWAGE DISPOSAL SYSTEMS**

**550.01 Applicability:** Developments located in the rural area, as designated by the Comprehensive Plan shall be served by on-site sewage disposal systems. On-site disposal systems are also allowed to serve developments on individual lots in the development area where

a public sewer system is not available. Availability of the public sewer is defined by the Zoning Ordinance.

**550.02 State Regulations:** This section supplements the minimum rules and regulations of Virginia governing the on-site disposal of sewage, as contained in the latest amendments to the State Board of Health Sewage Handling and Disposal Regulations, the AOSE regulations and the Private Well Regulations.

**550.03 Additional Regulations:**

A. A reserve sewage disposal site with a capacity at least equal to that of the primary sewage disposal site shall be provided in accordance with Section 740 of this manual and Chapter 23 of the County health code. This requirement shall not apply to any lot or parcel recorded prior to October 1, 1989 if such lot or parcel is not sufficient in capacity to accommodate a reserve sewage disposal site, as determined by the local health department, provided however, that such lots or parcels meet the requirements of Chapter 23.

B. Construction of sewage disposal sites shall conform to the requirements of the Chesapeake Bay Preservation standards as found in Section 740 of this manual.

C. Building or installation of impervious surfaces shall be prohibited in the area of all sewage disposal sites until the property is served by public sewer or until an alternative discharging treatment system operating under a permit issued by the Department of Environmental Quality is provided.

**550.04 Review Authority for Final Subdivision Plans:** A plan depicting all sewage disposal sites shall be incorporated into the final site development plan to be reviewed by the County. The final sewage disposal plan shall show the following:

A. All lots shown on the final plan shall contain a site or sites for onsite sewage systems documented and certified as being in compliance with state regulations, Chapter 23 of the Prince William County Code and this manual by an Authorized Onsite Soil Evaluator (AOSE) in good standing. An AOSE is an individual so licensed by the Virginia Department of Health.

B. Topography.

C. A correlation of preliminary drainfield site numbers and final lot numbers.

D. Proposed house locations.

E. Proposed well locations with class designation number.

F. Reserve sewage disposal areas, consistent with state regulations, Chapter 23 of the Prince William County Code, and applicable sections of this manual, shall be provided.

G. The location and disposition of existing wells, septic systems, utilities and easements within the subdivision and the location of all existing wells and septic systems within one hundred (100) feet of the subdivision boundary.

H. Road construction detail where any portion of such construction shall be within twenty (20) feet of the perimeter of any delineated sewage disposal site. This requirement includes roadways constructed to access storm water management facilities and roadways constructed in ingress/egress easements.

I. A signed certification statement from the project AOSE, attesting that he/she has evaluated the sewage disposal sites shown on the plan and to the best of his/her knowledge the sites comply with applicable state and county requirements.

J. A signed certification statement from the project engineer or surveyor attesting that, to the best of his/her knowledge, the sewage disposal sites depicted on the plan are those established in the field by the project AOSE .

K. Final lot configurations with all property lines identified by bearing and distance.

**550.05 Health Department Approval of Sewage Disposal Sites:** Final approval of sites for sewage disposal systems may only be granted by the Health Department after recordation of the subdivision plat.

**550.06 Sewage Effluent Pump Installations Associated With On-site Disposal Systems:**

A. The provisions of this sub-section shall be administered by the Director of the Prince William Health District or his designee. For aspects of onsite systems with pumps not addressed herein, consult the Health District.

B. In general, all pumps and pump stations, with all appurtenances, are considered to be part of an individual on-site sewage disposal system and, therefore, may only be lawfully installed by individuals or companies that are in compliance with sections 23-38 and 23-39 of the Prince William County Code.

C. General System Specifications:

1. All pumps used in onsite sewage disposal system applications must be of the appropriate size and design type required by the specific application and shall be rated for use in a sewage environment.

2. Individual pump system specifications, including make and model of the pump, manufacturer's pump curve, total computed dynamic head, float switch type and model, control panel make and model, dose volume calculations, etc., shall be submitted to the Health District by the system designer. For systems involving pumping downhill, total dynamic heads in excess of fifty (50) feet or force main lengths in excess of five hundred (500) feet, the designer shall be a professional engineer. The Health District shall review the

written specifications and verify the proposal or request revisions as indicated. When the Health District is the designer, specifications as described above shall be submitted by the septic system contractor at the time of installation.

3. Float switches must be of a design that controls the direction of the rise of the float, thereby allowing their use in confined spaces. Float switches shall use a cable weight or cable tie-down for a pivot point.

4. Systems requiring pumping shall employ timed dosing and be designed to deliver no more than the Average Daily Flow (60% - 70% of the design flow) to the disposal area during a 24-hour period. A pump control panel shall be utilized to achieve this which incorporates a programmable timer, pump cycle counter and elapsed time meter which records total pump run time. The pump motor circuit and the pump motor control circuit within the panel shall each be powered by a separate electrical supply circuit. Each supply circuit shall be provided with a circuit breaker of adequate capacity located in the control panel.

The control panel shall contain a manual (hand) -off automatic switch and a run light to permit operational tests of equipment functions. Multicolored circuitry shall be used within the control panel to facilitate trouble shooting. The timer shall be activated by a remote sensing float switch positioned in the pump chamber. (Control panels shall not contain active provisions for the automatic override of the normal programmed dosing regime except in the case of a proprietary system to which an override feature is integral and essential to the proper operation of the system and necessary to protect basic components of the system. When an override is present the panel shall incorporate an override event counter and provisions for the override event to activate an alarm in the panel.

5. All systems involving the pumping of sewage shall include a high water alarm panel mounted inside the structures served and positioned in a location where it will be heard if activated. The alarm panel shall be equipped with visual and audible alarms and be powered from an electric circuit that is not common with the pump power circuit or the pump pilot circuit. The alarm system shall be constructed to be activated by a dedicated remote sensing float switch positioned in the pump chamber. The alarm system, when activated, shall lock in automatically and require manual resetting.

6. Pumps discharging to conventional gravity distribution septic fields shall be designed to deliver between 20 and 50 gallons per minute at system operational head.

7. All electrical connections to the pump and float switches at the pump chamber shall be accomplished within a waterproof junction box, sized and rated in accordance with the national electrical code, mounted outside the pump chamber access port and with the bottom of the junction box a minimum of twelve (12) inches above finished grade. Hard wiring only shall be approved. All cable openings or conduits which connect the inside of the pump chamber and the inside of the junction box shall be sealed against migration of corrosive gasses in the junction box. All electrical circuitry and connections shall be subject to inspection and approval by the Department of Public Works.

8. Pump chambers shall have a minimum working volume of 1,000 gallons. Pump chambers of greater volume than the minimum one thousand gallons may be required on a case-by-case basis. All pump chambers shall be manufactured and installed such that they do not allow the entry of extraneous (non-sewage) water. Permanent ready access to the pump chamber must be provided. Soil cover over the pump chamber may not exceed thirty inches.

9. All pump discharge lines (force mains) shall be constructed of a minimum Schedule 40 PVC material. Except where a proprietary system design has a different specification force mains shall have an inside diameter equal to the discharge diameter of the pump, or two (2) inches inside diameter, whichever is the larger. Pressure couplings and solvent welding shall be utilized to join sections of the force main. A check valve, capable of withstanding the forces of the specific application, must be installed in the vertical portion of all pump discharge lines, except in those instances in which a check valve is contrary to the basic system design. Anti-siphon devices and/or air release valves shall be installed in the force main as needed. The pump discharge line shall be sleeved through and protected by a four (4) inch I.D. section of PVC Schedule 40, ductile steel or heavy duty cast iron pipe which bridges the excavated area between the pump chamber wall and a point two (2) feet onto undisturbed earth. The ends of the protective sleeve shall be sealed.

**560.00 TABLES**

<b>TABLE 5-1</b>			
<b>AVERAGE DAILY WASTEWATER FLOWS</b>			
<b>Land Use Category</b>	<b>Density (Unit/Ac.)</b>	<b>Unit *</b>	<b>Flow/Unit (gpd/Unit)</b>
<b>Residential:</b>			
Suburban-High (SRH)	8-15	DU	350
Suburban-Moderate (SRM)	4-6	DU	350
Suburban-Low (SRL)	1-4	DU	390
Semirural (SRR)	0.2-1	DU	390
<b>Office:</b>			
**Regional Employment (REC)	16-30	Ac.	2,000
Community Employment (CEC)	4-8	Ac.	1,750
Office (O)		Ac.	2,000
<b>Industrial:</b>			
Heavy (EI)	--	Ac.	2,000
Light (FEC)	--	Ac.	1,500
<b>Commercial:</b>			
General (GC)	--	Ac.	2,000
Neighborhood Commercial (NC)	--	Ac.	2,000
Parks/Open Space	--	Ac.	***
Public Land	--	Ac	***
Designated Cultural Resource	--	Ac.	***
<p>* Acres refer to gross area minus the floodplain area, as established and defined in the manual.</p> <p>** The residential and retail component of REC and CEC will not exceed 25% of total area of the mixed use project.</p> <p>*** Design of sewer facilities to serve these land uses shall be on a case-by-case basis, depending on specific uses.</p>			

**TABLE 5-2**

**PEAK FLOW FACTORS**

