DINWIDDIE COUNTY WATER AUTHORITY

VOLUME I
DESIGN STANDARDS
FOR
WATER AND SEWER FACILITIES

March 2024

TABLE OF CONTENTS

FOREWORD

These Standards have been developed for use by persons working on water and sewer utility projects within Dinwiddie County and for the Dinwiddie County Water Authority personnel who review those projects. The standards are not intended as a regulation but should be used as a guide which will establish a degree of uniformity for drawings and specifications for all water and sewer utility projects.

The Standards consist of two volumes as follows:

- Volume I - design standards for water mains, pump stations and sewer lines, force mains and pump stations.

- Volume II - specifications for construction and materials for water and sewer lines.

Persons working on water and sewer utility projects should recognize the fact that State and Federal regulations must be satisfied on all projects. In the event the Dinwiddie County Water Authority Standards differ from State or Federal Requirements, the more restrictive standard shall be utilized.

It is very difficult to generalize when addressing matters of engineering design without endangering the final product; therefore, persons should strive for designs which show consideration of details presented herein. However, these details are secondary to good engineering judgment. The design of water mains, pump stations, force mains, and gravity sewers is a matter which requires special consideration for each specific project and cannot be generalized for all jobs. Therefore, the design engineer is responsible for checking the specific requirements of each project against these standards and making any additions, deletions or changes necessary for the project being designed.

The work described herein is under the jurisdiction of the Dinwiddie County Water Authority, hereinafter referred to as the DCWA.

DCWA will review all plans and specifications; however, all such documents for new construction must be submitted to the appropriate state agencies for review and a certificate of construction must be issued before construction can begin.

SECTION 1 - GENERAL DESIGN STANDARDS

1.1 General Requirements

1.1.01 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, Chapter 3 of the Code of Virginia, 1950, as amended. Where applicable, design may be performed in accordance with Sec. 54-17.1(3)(b) of the above cited code, under the direction of a certified land surveyor,

B. All design shall conform to the Commonwealth of Virginia "Sewerage Regulations", the "Waterworks Regulations" and to the requirements of other State and Federal Agencies having jurisdiction.

C. Additionally, all design shall conform to the requirements of the Dinwiddie County Water Authority. Where the requirements of the State and the Dinwiddie County Water Authority are in conflict, the more restrictive requirements shall govern.

1.1.02 Engineering Report

A. An engineering report shall be submitted to and approved by the DCWA before the preparation of drawings and specifications, except in the case of minor sewer extensions. The report shall contain an overall plan that 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. 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 DCWA.

1.1.03 System Layout

A. Layout maps shall be prepared which delineate sewer shed area boundaries and/or water pressure zone boundaries. The map shall clearly define the areas pertinent to interim and ultimate development of the area proposed to be served. The 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.

1.1.04 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 Dinwiddie County Land Use Map or existing Zoning. The tabulation shall be incremental areas for evaluation purposes.

B. Minimum, average and maximum flows shall be developed for areas and subareas and tabulated in the report.

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 factors for a sound evaluation used in development of the report.

E. Where an alternate design is proposed that would incorporate interim or staged construction, the report shall include an alternate design and shall present a thorough investigation and justification for consideration of the alternate design.

1.2. Drawing Organization and Format

1.2.01 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) Plan Sheets

(4) Plan and Profile Sheets

(5) Standard Sheets and Special Details

(6) Erosion and Sediment Control Details

B. Projects consisting of structures may require plan sheets only and projects for the construction of gravity sewers, force mains, or water lines require plan/profile sheets with the use of plan sheets for special details.

1.2.02 Sheet Format

A. All construction drawings shall be on sheets 24-inches x 36-inches.

B. The cover sheet shall contain the Owner's name and project description in large, distinctive letters, a vicinity map with a minimum area of 144 square inches drawn where possible on a scale or 1 inch equals 2,000 -feet to indicate the general vicinity of the contemplated construction, an index to the plan sheets and the signed stamp of the Owner or principal of the engineering firm.

C. An Index 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. All elevations will be based on USC&G datum.

E. Plan sheets or Plan/Profile Sheets shall show horizontal, vertical and topographic data as outlined in Section 1.2. of these Standards.

F. Drafting Conventions

(1) Follow the symbols shown on the Standard Symbols Sheet at the end of this Tab No. 1.

Line weight for existing facilities shall be no heavier than 0.021 -inch.

(2) Standard Symbols - Proposed Facilities

Symbols shall be as shown above except that solid lines shall be used for pipes, line weight shall be no lighter than 0.026 -inch and no heavier than 0.035 -inches.

(3) Drafting Standards for Good Reproduction

Letters will be no smaller than 0.1 inch. All drawings must be capable of producing legible second generation prints after being reduced to half size.

G. Additional Information

(1) Drawings for utility extensions shall include estimated materials quantities and current DCWA standard notes.

(2) Horizontal scale for Plan and Profile Sheets shall be no smaller than 1-inch equals 50 -feet.

(3) Vertical profile scale shall be no smaller than 1 inch equals 5 -feet.

(4) All existing and proposed underground utilities shall be shown in plan and profile.

(5) Benchmarks shall be set no more than 500 -feet apart along the lines of construction outside the limits of construction. Datum for elevation shown shall be USGS (Mean Sea Level).

(6) Permanent Benchmarks shall conform to those of the Standard GIS platform and tied into the two County approved Bench Marks.

1.3. Easement Requirements

1.3.01 All sewer and water lines under the jurisdiction of the Dinwiddie County Water Authority shall be located either in public right of way or in easements.

A. Private owners developing water and sewer facilities which will be under the control of the Dinwiddie County Water Authority shall prepare plats and convey easements to DCWA.

B. Easement plats shall be prepared for the Dinwiddie County Water Authority for all water and sewer facility construction outside of public right of way.

1.3.02 Permanent easements shall be a minimum of 20 -feet in width with consideration for wider easements where more than one utility may occupy an easement, or where, because of line size or access requirements, wider easements are desirable. Where sewer lines have more than 10 – feet of cover, the minimum easement width shall be 25 -feet between manholes.

1.3.03 Construction easements shall be acquired for all DCWA contracts. Developers constructing facilities are not required to have construction easements where work is on the property of the developer. Construction easements shall provide a minimum working width of 50 -feet, including the 20 -feet permanent easement. Generally, it is desirable to provide more construction easement on one side than the other. This allows room for construction traffic and material storage.

1.3.04 Easement plats shall be on sheets 8-1/2 inches x 14 inches or 16 inches x 24 inches where longer easements are required, multiple sheets may be utilized.

A center line for the easement shall be shown together with the limits of both the proposed permanent and construction easement widths referenced to the center line of the easement. Bearings and distances shall be shown on the center line of the easement and on the right-of-way or property lines where they intersect the center line. Distances shall be shown from fixed points on both the center line and the property lines to the intersection of the two. Bearings, distances and closures shall be to the degree of accuracy of 1 in 8,000 except those 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 be shown where applicable.

1.4. Review Procedure

1.4.01 General

A. The engineer shall be responsible for reviewing and approving all drawings and specifications by applicable DCWA, State and Federal agencies having jurisdiction. Copies of approvals shall be submitted to the DCWA at the time of final review by the DCWA.

1.4.02 DCWA Review

A. Six sets of plans shall be submitted with the current Utility Checklist (Form F-6 - “Dinwiddie County Water Authority Review Sheet for Sewage Pumping Station”) and Information Sheet to the DCWA for review and if found acceptable shall be marked "Approved" by the DCWA.

B. Additional sets of plans shall be required when backflow conditions are considered as a potential source of contamination of public water supply.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 2 - DESIGN STANDARDS FOR GRAVITY SANITARY SEWERS

2.1. General Requirements

2.1.01 Sanitary sewers are to be provided solely for the removal of sanitary waste. Under no circumstances shall any roof drains, foundation drains, surface or subsurface drains be either directly or indirectly connected to sanitary sewers. The following design parameters include an adequate allowance for normal infiltration but will not accommodate the above prohibited connections.

2.2 Technical Design

2.2.01 System Layout

A. The overall layout and general design shall conform to the parameters set forth in the approved Engineering Report.

B. All sanitary sewers shall be located in:

(1) Legally established road rights-of-way. Construction within right-of-way is subject to approval by appropriate jurisdiction.

(2) Legally established permanent easements for such purpose, either existing or as proposed by the engineer, shall be in accordance with Section 1.3. "Easement Requirements" of these Standards.

C. Construction shall be along rights-of-way or centerline of easements except (See section 1.3) when this location has been previously used by another utility, or when the width of a road right-of-way justified the use of two sewer lines. Exception to this specified location will be allowed only when it can be established that it is not practical to adhere to the standard location.

D. All sewers shall be on continuous grade between manholes.

E. Sewers should intersect in manholes at angles not greater than 90 degrees. In the event that this is impractical, the designer must satisfy the DCWA that adequate losses have been provided in the hydraulic analysis.

F. Sewer mains and manholes shall be a minimum of 10 -feet horizontally from any part of a building or structure.

G. No sewer shall be constructed within 50-feet of a drinking water supply well, source, or structure unless special construction and materials are used to obtain adequate protection.

2.2.02 System Design

A. The overall design shall be in accordance with the provisions of the approved Engineering Report in accordance with Section 1.1.02 "Engineering Report" of these Standards.

(1) Design carrying capacities of lateral, trunk and interceptor sewers shall be based upon the total drainage area served by the line or lines. The design flow shall be based on acreage density, using the Dinwiddie County Land Use Plan or approved zoning, whichever allows higher densities.

(2) Equivalent flows from motels, schools, hospitals, etc. shall be based upon that of the Commonwealth of Virginia "Sewerage Regulations".

(3) In the absence of information on densities or equivalent flow, the designer shall supply sufficient information, substantiated by sound engineering judgement to verify the design. This information shall be subject to approval by the DCWA.

2.2.03 Capacity Design

A. Laterals shall be designed to carry ultimate tributary population with a 50-year projection as an upper limit. Proper allowance for peak flow, as shown on Peak Flow Chart, in Section 6, Form F-2 shall be included.

B. Trunks and interceptors shall be designed on the same basis as laterals except in cases where capacities of system or parts thereof can be readily increased by future relief, allowing for shorter capacity design life of initial or subsequent lines.

C. Computations of all lines shall be shown on form similar to the sewer design form in Section 6, Form F-1, including anticipated future relief lines that may be required.

Computations shall be accompanied by a Drainage Area Map, conforming to requirements of Index Map, 1.2.02 C. Map(s) shall show entire drainage area involved, location(s) of line(s) in system and points of entry of flows, including any flows being received from other areas. Drainage Area Map shall be keyed to computation sheet (hydraulic analysis, Form F-1 - “Sewer Design Form”). Computations and maps shall be submitted to the DCWA for approval.

2.2.04 Hydraulic Design - Sewers

A. Minimum grades shall not be less than those required to produce a velocity of approximately two and one quarter (2.25) -feet per second when the sewer size selected is flowing full or half full. Pipe sizes shall not be arbitrarily increased in order to take advantage of a flatter grade.

B. The minimum size pipe to be used in systems shall be 8-inches.

C. Allowable minimum grades shall be as follows:

Sewer Size (Inches)	Minimum Slope in Feet/100 Feet
8	0.40
10	0.32
12	0.24
14	0.20
15	0.16
16	0.16
18	0.12
21	0.10
24	0.08
27	0.07
30	0.06
33	0.06
36	0.05

D. Computations for velocity of flows shall be based upon the following values of "N" as used in the Kutter or Manning formula for velocity of flow.

(1) Concrete Pipe: N equals 0.013
(2) Ductile Iron Pipe: N equals 0.012
(3) PVC Pipe N equals 0.009

E. In cases where the calculated depth of flow is less than pipe flowing full, the velocity at actual depth of flow shall be computed.

F. For sewage flow depth less than 1/4 full, an allowance shall be made for increased value of "N" and in no case shall velocities of less than 2.0-feet per second be permitted for non-settled sewage. Improved velocities shall be accomplished by steeper grades and not by changing pipe diameter.

G. Generally, the sizes of pipe shall be continually increasing with increase of tributary areas. However, when steep grades are available and length is

such that a significant cost savings will result without jeopardizing the system, the size of pipe may be reduced a maximum of two (2) normal diameters, but not below 12-inches. Proper hydraulic allowances must be made for resulting head loss.

H. Miscellaneous head losses at manholes and curves shall be computed as follows. Junctions of more than two (2) pipes will require special consideration.

(1) Manholes where radius in turn is less than 2 pipe diameters:

$$H_L = 0.50 \frac{V^2}{2g} \sqrt{\frac{\Delta}{90°}}$$

(2) Manholes were radius of turn is greater than 2 pipe diameters.

$$H_L = 0.25 \frac{V^2}{2g} \sqrt{\frac{\Delta}{90°}}$$

Where:

g = acceleration due to gravity

Δ = is horizontal deflection angle.

H_L = head loss.

V = is velocity in influent pipe.

(3) Loss for straight run manhole shall be 0.05 -foot. In no case shall loss less than 0.05 -foot be allowed.

I. Where pipe diameters increase at manholes, in direction of flow, effluent invert shall be lowered below influent invert, a distance of:

$0.8 (D^1 - D^2)$:

D^1 equals downstream diameter

D^2 equals upstream diameter

This adjustment shall be in addition to computed miscellaneous head loss.

J. Special consideration shall be given to cases where pipe diameters decrease in direction of flow.

2.2.04 Structural Design

A. Structural requirements must be considered in the design of all sewers and appurtenances.

B. The proper strengths shall be determined and indicated for sewer pipe materials being specified. Strength shall be based upon pipe size, proposed depth, width of trench, bedding conditions, existing ground conditions, etc. This is a matter of detail design not subject to simple generalizations. Minimum bedding shall be Class C. Submittal of design calculations may be required on a case by case basis.

C. In deep cuts, it is generally preferable to change pipe strengths to obtain proper design rather than vary bedding conditions. However, pipe strength or class shall be shown on plans with stations that indicate the location.

D. No change in pipe strength or material shall be made between manholes unless it can be substantiated that a considerable cost savings would result and integrity of system would not be jeopardized. Proper precautions shall be taken regarding correct location(s) of varying strength of pipe.

E. The thickness of precast concrete manhole walls shall be increased when total depth of manhole exceeds 30-feet. Manholes shall conform to Standard Drawings. The minimum manhole diameter shall be increased to 60-inches when the total depth exceeds 24-feet.

F. Gravity systems receiving pumped flows shall be protected against sulfide attack for a distance of 1200 -feet downstream and 600 -feet upstream from point of pumped flow entry. This shall be accomplished by the use of acid-resistant pipe and manholes. The DCWA shall approve the materials and design for the conditions at each individual location.

G. Anchor sewers on slopes of 20% or greater. Anchor spacing shall not exceed: 36-feet for slopes of 20% to 35%, 24-feet for slopes of 35% to 50% and 16-feet for slopes greater than 50%.

H. Steel casing pipe shall be sized in accordance with Volume II Section 00870.

I. Where velocities greater than 15 -feet per second are anticipated, provisions shall be made to protect against internal erosion of the sewer.

2.2.05 Sewer Appurtenances

A. Standard and drop manholes, service connections and other appurtenances shall be constructed in accordance with Volume II, Section 00870, Standard Details.

B. Manholes shall be installed at the end of each line, at all grade, size or alignment changes, and at all sewer line intersections.

C. Sewer connections serving more than one building shall be made by construction of a manhole on the DCWA sewer and an 8-inches sewer line terminating in another manhole at the uppermost building connection. Such construction shall be in accordance with the DCWA Standards.

D. Manholes shall be spaced at distances not greater than 400 feet for sewer 15 inches or less in diameter and 500 feet for sewers 18 inches to 30 inches in diameter.

E. Sewer lines shall be protected from a 100-year flood by raising manhole tops above flood plain or by the use of watertight frames and covers. Where watertight frames and covers are used, unventilated length of sewer cannot exceed 1000 -feet. Manhole covers shall be no more than 30 -inches above ground level.

F. Vandal proof manhole frames and covers shall be used in unpaved areas as directed by DCWA unless watertight covers are required.

G. All new food preparation facilities, such as restaurants and bakeries, shall be required to construct an outside grease trap for the retention of grease, fats, and oils generated by that business. The design of the grease trap shall be approved by the DCWA. The grease trap shall be operated and maintained properly by the discharger.

H. A monitoring manhole shall be required on all new construction or renovations or modifications to existing facilities, where the discharge originating in the new, renovated, or modified facility is, or will have the potential to be non-domestic in nature.

I. Where possible in unpaved areas, manhole castings shall be approximately 12-inches above final grade.

J. All sewer laterals for connections shall be a minimum of 6-inches. Connections shall be made as detailed in Volume II, Section 00870.

K. Where a sewer enters a manhole at an elevation greater than 24-inches above the exit invert, a drop manhole is required.

L. No manhole shall be constructed within 10 feet of an existing waterline.

2.2.06 Depth of Sewers

A. All sewers shall be of sufficient depth to provide service to lowest sewer elevation of structure to be served, allowing proper service connection grade. However, a greater depth may be required for future extension or possible future lowering of existing road grade or utilities, minimum depth of cover over sewers shall be 5.5-feet in rights-of-way and 3.5-feet in easements.

B. Sewer service connections shall be per Standard Details and shall have clean-outs at the discretion of the Director.

C. Exceptions to the above requirements will be considered only if impractical to provide required depths, in which case, special approval must be secured, in writing, from the DCWA. In the special case of less than minimal cover, ductile iron pipe of adequate thickness shall be provided.

D. Sewers over 18-feet deep shall be of ductile iron.

E. Sewers crossing streams must have 1-foot of cover if the streambed is rock and 3-feet of cover if the streambed is other material. Where sewers have less than 3-feet of cover, pipe crossing stream to be concrete encased or concrete capped as detailed in Volume II, Section 00870 – Standard Details.

2.3. Drawings

2.3.01 In addition to requirements in Section 1.2. "Drawing Organization and Format" of these Standards, drawings shall also have:

A. Stationing, pipe size and material, bearings, direction of flow, deflection angles, grade and distance between center lines of manholes.

B. All manholes numbered, drop manholes identified, and top, influent, and effluent elevations clearly shown.

C. The plans shall indicate the following information to provide service to elevation of the connection as follows:

(1) Lowest sewer structure elevation.

(2) Low ground corner of structure with first floor service only.

(3) Ground level at building line on unoccupied parcel.

(4) The elevation and location of any existing structure to have sewer service shall be clearly shown.

D. Existing, and if applicable, proposed water mains shall be shown in plan and profiles and shall indicate points where crossings occur, clearly indicating vertical clearance between utilities.

E. Location of all erosion control devices shall be shown on the plans. These devices shall be in conformance with the Virginia County Erosion and Sedimentation Control Handbook.

F. Any other pertinent details.

(1) Developers shall show the appropriate Sewer or Water Notes on the drawings (see Section 6, F-4 - “Erosion Control Notes”).

SECTION 3 - DESIGN STANDARDS FOR SEWAGE PUMPING STATIONS AND FORCE MAINS

3.1. General Requirements

3.1.01 The design of sewage pumping stations and force mains is an engineering matter and is not subject to detailed recommendations or requirements.

3.1.02 Sewage pumping stations and force mains are to be provided solely for the conveyance of sanitary wastes. Under no circumstances shall any roof, foundation, surface or sub-surface or any other form of storm drainage be allowed to pass through the proposed facilities.

3.1.03 A detailed engineering report shall be submitted to and approved by the DCWA before design. The report shall fully evaluate the proposed sanitary drainage area and the overall effect upon present and future DCWA facilities.

3.1.04 The design must conform to the minimum standards set forth in the Commonwealth of Virginia "Sewerage Regulations". DCWA requirements for specific equipment and submittals will be detailed during engineering review.

3.2. Technical Design

3.2.01 System Layout

A. The sizing and configuration of the pumping station and the sizing of the force main shall be within the parameters set forth in the engineering report. The facilities to be provided shall be based on ultimate flows unless an interim flow design shall have been incorporated in the approved engineering report.

B. The type of equipment to be installed in the pumping station will be influenced by the interim and ultimate capacity of the station and an evaluation of the period of time that the service of the station will be required.

C. Pumping equipment, in general, shall conform to the following types:

Pump Type	Flow Range
Grinder Pumps	Up to 30 gpm
Wet pit or submersible	30 to 250 gpm
Dry pit or suction lift	250 gpm and over

D. An ample, all-weather road, including surface treatment, storm drainage and parking, shall be provided for easy access to the pumping station.

E. The architecture of the pumping station shall be considered. Site grading, seeding or sodding, trees or shrubs shall be provided to present a finished appearance, as approved by the DCWA, consistent with the zoning and general appearances of the surrounding area. Approved fencing with gates shall be provided to properly protect the facility.

F. The Design Engineer shall determine the availability of electric service and coordinate the available electrical service required for the facility. The engineer shall also determine the need for primary service extension and advise the DCWA if an extension is necessary.

G. The Design Engineer shall determine the "Reliability Class" in accordance with the State "Sewerage Regulations" and shall comply with the requirements thereof. Each pumping station shall have a permanently installed emergency generator or an emergency pump connection.

H. The Design Engineer shall consider the need for protection of the pumping station and force main against hydrogen sulfide attack and shall provide the proper equipment if such protection is necessary.

I. All motor control and other electrical equipment shall be housed in a building or weatherproof structure. Adequate provisions shall be incorporated for the proper ventilation, drainage and flood protection in order to insure maximum reliability, electrical and personnel safety.

J. All pumping station wet wells shall be considered explosion hazardous. All electrical equipment installed therein shall be approved for Nema 7 (Indoor) or Nema 8 (outdoor), Class I, Group D installation in accordance with Article 500 of the National Electric Code (NFPA No. 70). The use of intrinsically safe controls in accordance with NFPA No. 493 is satisfactory and their use is encouraged.

K. Where structurally separate wet well and dry wells are provided, adequate provision for differential settlement shall be incorporated by means of flexible pipe joints consisting of a minimum of at least two standardized mechanical joint bell connections or their approved equivalent.

L. All pumping stations shall be of sufficient size and contain adequate clearances to provide ample room for maintenance and equipment replacement.

M. Consideration shall be given to the need for a water supply well in locations where a public water supply is not available.

N. Force main locations shall generally conform to Section 2.2.01 - "System Layout" of these Standards. Force mains shall have a positive slope from the pumping station to the point of discharge unless unusual conditions make it impractical. Extra depth of bury shall be provided instead of air or air/vacuum relief valves wherever feasible. Every effort shall be expended to maintain the force main below the hydraulic gradient. Where a relief valve is required, an automatic valve shall be provided and installed inside a standard manhole with adequate means of drainage.

O. Every effort shall be made to maintain a full force main under operating conditions.

P. Sizing of main shall be such that velocity shall not be below two ft/sec flushing facilities.

Q. All force mains shall be ductile iron or polyvinylchloride (PVC) pipe.

R. Design Engineer shall consider ground conditions in the case of metallic conduits and provide suitable cathodic protection where necessary.

S. Steel casing pipe shall have minimum yield strength of 35,000 psi and a minimum internal diameter of 4-inches greater than the largest external diameter of the carrier pipe. The wall thickness of casing pipe shall be sufficient to resist loads to which it will be subjected, but in no case less than 0.250 inches.

T. Conduits of non-ferrous material buried underground shall have a detectable tracer buried in the trench approximately 18-inches above the conduit, but no less than 24-inches below grade.

3.2.02 Capacity Design

A. Capacity design for the pumping station and force main shall be based on Section 2.2.02 - "System Design" of these Standards, and shall take into consideration such parameters as minimum, average and peak station inflows as well as minimum, average and maximum pumping rates.

B. Pump selection and force main sizing shall be based on a hydraulic analysis of the required flows, pipeline velocities and receiving gravity sewer capacities.

C. Calculations shall be prepared and a system friction chart prepared that will show static head and total dynamic head for both single and multiple

pump operation. The chart shall also show the pump performance curve for both single and multiple pump operation. Where variable speed pumping is contemplated, pump performance curves shall show performance at maximum speed, minimum speed just above static head and several intermediate speeds that will clearly indicate pump operation. The system friction curves shall illustrate the effect of wet well level on system friction. Particular attention shall be given to the available versus required net positive suction head (NPSH).

D. Consideration must be given to designs that produce minimum power requirements to accomplish the functions required. If requested supporting data shall be furnished to the DCWA.

3.2.03 Structural Design

A. In addition to conventional design procedures, there are several specific areas that must be considered.

(1) The effect of hydraulic thrust must be countered by the use of thrust blocking, pipe anchorage or other suitable means to prevent movement of pumping equipment and pipelines.

(2) Structural requirements for force mains include the proper selection of materials and strengths of pipe and pipe accessories. This will involve a study of anticipated trench conditions and bedding methods. The minimum depth of cover shall be governed by depths of other utilities and hydraulic gradient; however, not less than 3.5-feet of cover shall be provided.

3.2.04 Drawings

A. Drawings for pumping stations and plan and profiles for force mains shall be prepared in accordance with Section 1.2. - "Drawing Organization and Format".

B. Drawings and specifications shall be of such quality and contain sufficient details so that no misunderstanding may reasonably arise as to the extent of the work to be performed, the materials to be used, the equipment to be installed or the quality of the workmanship. Manufacturers of major items of equipment shall be specifically approved. No deviation from the approved manufacturers will be permitted.

C. Drawings for pumping stations shall include a site plan drawn to a scale of not less than 1 inch equals 20-feet and shall contain existing and proposed contours on a no greater than 2-feet contour interval. The boundaries of

the site shall be clearly shown on the site plan and shall be permanently marked in the field before completion of construction.

D. Drawings for pumping stations shall be drawn on a scale of not less than 1/4-inch equals 1-foot, 0-inches. Drawings required to clarify construction details shall be drawn on an appropriately larger scale.

E. Drawings for force mains shall show stationing, pipe size, bedding, direction of flow, deflection angles and curve data.

F. Profiles for force mains shall show the ground line, force main profile, underground utility lines and structures that might affect force main depth. It shall also show areas where additional depth will be required, any required vertical curve data and locations of all relief valves and appurtenances. All crossings of existing and proposed water mains shall be shown to clearly indicate vertical clearance between utilities.

G. Details shall be shown for all blocking, pipe restraints, and for relief valves.

H. Consultants shall show the location of erosion control devices on the plans. These devices shall be in conformance with DCWA and the Virginia Erosion and Sedimentation Control Handbook.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 4 - DESIGN STANDARDS FOR WATER DISTRIBUTION FACILITIES

4.1. General Requirements

4.1.01 Water and fire protection distribution facilities are to be provided solely for the purpose of supplying potable water and fire protection. Under no circumstances shall cross-connections be allowed to unapproved water facilities. The following design parameters should be used in the design of water distribution facilities. Water transmission facility design parameters are not included herein, and such criteria will be established on a case by case basis.

4.1.02 Prior to submitting plans for new water distribution facilities or extensions to existing facilities the designer shall coordinate with the DCWA and determine the available flow and pressure from the existing system.

4.2. Technical Design

4.2.01 System Layout

A. The overall layout and general design shall conform to the parameters set forth in the approved Engineering Report.

B. Generally, all water mains shall be located, where practical, in:

(1) Legally established road rights-of-way.

(2) Legally established permanent easements for such purpose and immediately adjacent to legally established road rights-of-way or paved areas, either existing or as proposed by the designer in accordance with Section 1.3. - "Easement Requirements" of these Standards.

C. Construction shall generally be parallel to the center line of roads or easements. The same offset shall be used throughout except when existing utilities dictate a change in offset along the proposed line.

D. Water mains shall be installed a minimum of 10-feet horizontally from a sewer or sewer manhole whenever possible.

E. In general, main line valves are required at intervals of 1000-feet and at tees and crosses to allow adequate control of the system without major system shutdowns.

4.2.02 System Design

A. The proposed facilities together with the pertinent existing facilities shall

be evaluated based on the hydraulic design, demand design and fire protection design requirements contained herein.

B. The Design Engineer shall submit to the DCWA a neat and orderly set of design calculations to illustrate normal and fire flows, pipe size selection and fire protection requirements.

C. Non-ferrous mains shall have a detectable tracer buried in the trench 18-inches above the main but no less than 24-inches below grade.

D. Dead end lines shall be minimized by looping mains. Where looping is required the minimum size pipe shall be 8-inches. All dead end lines shall terminate at a fire hydrant.

E. No flushing device shall be directly connected to a sewer.

4.2.03 Hydraulic Design

A. Hydraulic design shall be accomplished by use of the Hardy-Cross Network Analysis Method or similar method acceptable to the DCWA. A Hazen-Williams coefficient of friction equal to 120 shall be used for purposes of design unless the DCWA has data to indicate a lesser coefficient should be used for existing lines.

4.2.04 Demand Design

A. Maximum rates of water consumption shall be calculated and used as a basis of hydraulic design. Average daily water consumption rate values for the number and type of consumers anticipated to be served shall be based on those contained in the State of Virginia "Waterworks Regulations". Any such rates not given or any deviations from tabulated rates shall be estimated and justified by the Design Engineer and approved by the DCWA. The average annual daily water consumption rates shall be adjusted by a multiplier to arrive at the maximum daily water consumption rate by the application of a multiplier, expressed as follows:

$$Q_m = Q_a \times C$$

Q_m is maximum daily water consumption rate.

Q_a is average annual daily water consumption rate.

C is constant varying from 1.5 to 1.75

Q_m shall be used as the basis for hydraulic design.

4.2.05 Fire Protection

A. Rates of flow for fire protection shall be estimated based on the 1980 I.S.O. Fire Suppression Rating Schedule, Section I, Public Fire Suppression, Subsection 300, Needed Fire Flow, including Definitions Extracted from The CFRS and including Occupancy Classifications, Non-Manufacturing and allowance of 50% reduction in needed fire flow may be allowed for buildings with automatic sprinkler systems that provide full protection.

B. The minimum fire flow from any individual fire hydrant shall be 500 gpm. The minimum flowing pressure at maximum flow shall be 20 p.s.i.

C. During maximum rated fire flow conditions, the residual pressure in the system shall not be less than 20 psi.

D. The minimum size water line used for fire protection to properties zoned agricultural or single family residential shall be 8-inches in size. The minimum size water line used for fire protection to properties zoned multi-family residential, commercial or industrial shall be 8-inches in size.

E. The minimum sized fire service lines above shall be looped to provide feed from at least two directions. The sizing of minimum-sized fire services lines and larger than minimum fire service lines shall be determined by Sections 4.2.03 - "Hydraulic Design". Not more than one fire hydrant shall be installed on an 8-inch dead end line.

F. Dead end lines shall not contain more than 600-feet of the minimum sized line. Additional lengths required shall be provided by increasing the line size.

G. Fire hydrants shall be located no further from edge of roadway shoulder than 10-feet.

H. Fire hydrants shall be placed on legal rights-of-way and shall generally be placed in line with street intersections. This shall be deemed to be the P.T. of the returns on the rights-of-way. Where long block lengths require the use of intermediate fire hydrants, they shall be placed in line with the property boundary between adjacent lots or parcels of land.

I. Fire hydrant spacing for properties zoned agricultural or single family residential shall not exceed 1000-feet or require a hose lay of over 650-feet from the hydrant to any part of any structure to be protected.

J. Fire hydrant spacing for properties zoned multi-family residential, commercial or industrial shall not exceed 500-feet or require a hose lay of

over 350-feet from the hydrant to any part of any structure to be protected. Where multiple fire hydrants are needed to supply the required fire flow, all necessary hydrants must be located within the specified hose lay.

K. No fire hydrant shall be placed closer than 50-feet from the face or overhang of any building to be protected.

L. The above criteria for spacing fire hydrants may be modified by the DCWA to improve fire hydrant accessibility for firefighting purposes.

M. Structures protected by automatic sprinkler systems require installation of a detector check, dedicated fire hydrant, and a Siamese connection. The detector hydrant is not credited toward external protection requirements. Siamese connections must be located within 50-feet of the dedicated hydrant.

4.2.06 Structural Design

A. Structural requirements must be considered in the design of all water mains and appurtenances.

B. The proper strengths shall be specified for the pipe material being specified. Strength shall be based on operating pressures, depth of bury, trench width and foundation conditions. This is an engineering matter and not subject to generalization.

C. Proper blocking and/or restraints must be provided and shown on the drawings. Where blocking is not detailed on the drawings, restrained joints shall be used.

D. Proper support shall be provided for aerial or suspended lines.

E. Any potable waterline crossing above surface water must be:

(1) Adequately supported.

(2) Protected from freeze damage.

(3) Accessible for repair or replacement.

(4) Above the 100-year flood plain elevation.

F. Any potable waterline crossing under surface water must meet the following requirements:

(1) The pipe shall be of special construction having flexible watertight joints.

(2) Valves and sample taps shall be provided at both ends of the water crossing so that the section can be isolated for testing or repair; the valves and sample taps shall be easily accessible and not subject to flooding.

(3) Permanent sample taps shall be available at each end of the crossing and at a reasonable distance from each side of the crossing, for the purpose of testing the section of line crossing the surface water, and for locating leaks in that section.

4.2.07 Miscellaneous Considerations

A. The minimum size water line pipe to be used for normal domestic water shall be 6-inches and be capable of supplying 3 gpm per residential connection at 20 p.s.i. except where fire protection lines are to be provided.

B. Air, air/vacuum or pressure reducing valves, blow-off tees and related fittings shall be provided. The type, size, etc., shall be specified by the Design Engineer, subject to approval by the DCWA.

C. The minimum depth of cover for water mains shall be 3½ -feet. Additional depth shall be provided where required for thrust restraint or to clear underground obstructions.

D. The profile of water services at ditch lines shall have a minimum of 24-inches cover at the ditch invert.

E. Service lines larger than 3/4 -inch, with meters larger than 5/8 -inch shall be sized in accordance with AWWA Manual M-22 "Sizing Water Service Lines and Meters" except as follows:

(1) Use constant pressure factor of 1.

(2) Include all outside hose bibs in combined fixture value total.

(3) Irrigation System shall be excluded from domestic meter sizing criteria except as follows:

a. Exclusion meters shall be at least one (1) size smaller than the domestic meter.

b. If metered separately, the irrigation meter shall be sized based on demand criteria furnished by the Engineer.

(4) For non-residential facilities with flush-valve fixtures, the meter will be sized as follows:

METER SIZE INCHES	COMBINED FIXTURE VALUE TOTAL
1	41-100
1½	101-400
2	401-1200

(5) For residential facilities and office buildings with tank type water closets, the meter will be sized as follows:

METER SIZE INCHES	COMBINED FIXTURE VALUE TOTAL
5/8	0-40
1	41-400
1½	401-5500

(6) Plumbing Fixtures Values shall be shown in AWWA No. M-22 for 35 PSI.

(7) Meter installations requiring a flow of greater than 160 gpm or greater than the total fixture values indicated above shall be reviewed and/or approved on a case by case basis in accordance with AWWA Manual M-22.

(8) Steel casing pipe shall be sized in accordance with Volume II, Section 00870.

(9) A 5/8-inch meter may be used for non-residential facilities with tank type water closets and a combined fixture value total of 0-40. A 1-inch meter will be the minimum size used for any facility with flush valve fixtures.

F. Where water lines are subject to extreme variations in temperature (i.e., attached to bridges or box culverts) consideration shall be given to expansion and contraction of pipe materials and the freezing of the line contents.

G. Cathodic Protection - Design Engineer shall consider ground conditions in the case of metallic conduits and provide suitable cathodic protection where necessary.

4.3. Drawings

4.3.01 In addition to the requirements of Section 1.2. - "Drawings Organization and Format" of these Standards, the drawings shall incorporate the following features:

A. Drawings for water lines shall show stationing, pipe size, bearings, deflection angles and curve data.

B. The drawings shall also show all fire hydrant and water service connections. Fire hydrants and water services over 3/4 inch in size shall be shown in plan and profile views which are labeled by stations.

C. Profiles shall be provided for all water lines excluding service connections. Profiles shall also show all air, air/vacuum relief valves, fire hydrants, and blow off locations.

D. Water lines shall be referenced by distances from right-of-way lines, buildings and other utilities.

E. The drawings shall show blocking and/or restraint details.

F. All drawings for water mains crossing sewers, force mains or other utilities, shall show points where crossings occur. Crossings shall be shown in both Plan and Profile. The Profile shall clearly indicate vertical clearance between utilities.

G. Meter sizing form, backflow prevention details and ISO calculations shall be shown on the plans.

H. All fittings to include valves, bends, tees, etc. shall be shown on the plan and profile.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 5 - DESIGN STANDARDS FOR WATER PUMPING STATIONS AND WELLS

5.1. General Requirements

5.1.01 The design of water pumping stations and wells is an engineering matter and is not subject to detailed recommendations or requirements.

5.1.02 A detailed engineering report shall be submitted to and approved by the DCWA before design. The report shall fully evaluate the proposed service area and the overall effect upon present and future DCWA facilities.

5.1.03 The design must conform to the minimum standards set forth in the Commonwealth of Virginia. Dinwiddie County Water Authority requirements for specific equipment and submittals will be detailed during engineering review.

5.2. Technical Design

5.2.01 System Layout

A. The sizing and configuration of the pumping station and the sizing of the attendant water lines shall be within the parameters set forth in the engineering report. The facilities provided shall be based on ultimate flows unless an interim flow design shall have been incorporated in the approved engineering report.

B. The type of equipment to be installed in the pumping station will be influenced by the interim and ultimate capacity of the station and an evaluation of the period of time that the service of the station will be required.

C. An all-weather road, including surface treatment, storm drainage and parking, shall be provided for easy access to the pumping station.

D. The architecture of the structure shall be considered. Site grading, seeding or sodding, trees or shrubs shall be provided to present a finished appearance, as approved by the DCWA, consistent with the zoning and general appearances of the surrounding area. Approved fencing with gates shall be provided as deemed necessary to protect the facility.

E. The Design Engineer shall determine the availability of electric service and coordinate the available electrical service with that required for the facility. The engineer shall also determine the need for primary service extension and advise the DCWA if an extension is necessary.

F. The Design Engineer shall determine need for standby electric service. If necessary, the facility shall have an emergency generator or an alternate source feed.

G. Adequate provisions shall be incorporated for the proper ventilation, drainage and flood protection in order to insure maximum reliability, electrical and personnel safety.

H. Water pumping stations and well buildings shall be of sufficient size and contain adequate clearances to provide ample room for maintenance and equipment replacement.

5.2.02 Capacity Design

A. Hydraulic design for water pumping stations shall be based on Sections 4.2.03 - “Hydraulic Design”, 4.2.04 - “Demand Design” and 4.2.05 - "Fire Protection" of these Standards, and shall take into consideration such parameters average and maximum pumping rates, and fire flow.

B. Pump selection shall be based on a hydraulic analysis of the required flows.

C. The hydraulic analysis shall show static head and total dynamic head for both single and multiple pump operation. It shall also show the pump performance curve for both single and multiple pump operation. Where variable speed pumping is contemplated, pump performance curves shall show performance at maximum speed, minimum speed just above static head and several intermediate speeds that will clearly indicate pump operation.

D. Consideration must be given to designs that produce minimum power requirements to accomplish the functions required. If requested supporting data shall be furnished to the DCWA.

5.2.03 Drawings

A. Drawings for pumping stations and plan / profiles for force mains shall be prepared in accordance with Section 1.2. - "Drawing Organization and Format".

B. Drawings and specifications shall be of such quality and contain sufficient details so that no misunderstanding may reasonably arise as to the extent of the work to be performed, the materials to be used, the equipment to be installed or the quality of the workmanship. Manufacturers of major items of equipment shall be specifically approved. No deviation from the approved manufacturers will be permitted.

C. Site Plans for water pumping stations and wells shall be drawn to a scale of not less than 1-inch equals 20-feet and shall contain existing and proposed contours on no greater than a 2-feet contour interval. The boundaries of the site shall be clearly shown on the site plan and shall be permanently marked in the field before completion of construction.

D. Pumping stations shall be drawn on a scale of not less than ¼ -inch equals 1-foot, 0-inches. Drawings required to clarify construction details shall be drawn on an appropriately larger scale.

E. Consultants shall show the location of erosion control devices on the plans. These devices shall be in conformance with the Virginia/County Erosion and Sedimentation Control Handbook.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 6

DINWIDDIE COUNTY WATER AUTHORITY

STANDARD FORMS AND NOTES

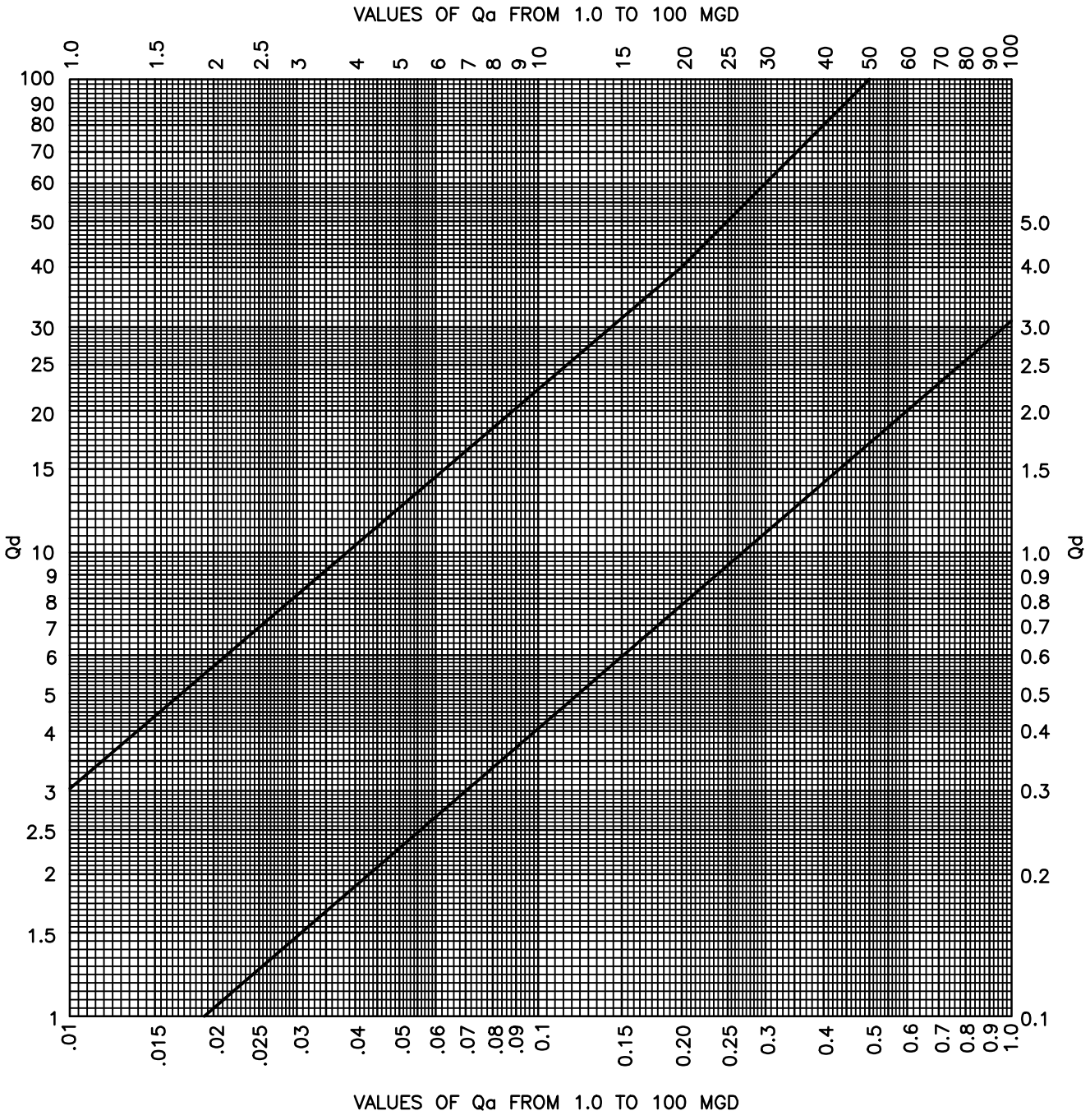
INDEX TO FORMS

DINWIDDIE COUNTY WATER AUTHORITY
DESIGN OF SANITARY SEWER

JOB NO. ______ SHEET NO. ______ OF ______
DATE ______ COMPUTED BY ______
DATUM FOR ELEVATIONS ______ CHECKED BY ______
APPROVED BY ______

LOCATION	LINE NO.	MANHOLE NUMBER		AREA (ACRES)		POPULATION DENSITY PER ACRE	DOMESTIC FLOW M.G.D.			INDUTRIAL FLOW M.G.D.		POPULATION	TOTAL FLOW		LENGTH IN FEET	SLOPE %	TYPE OF PIPE	KUTTER'S "n"	DIAMETER OF PIPE	CAPACITY OF PIPE (FULL)		FUTURE RELIEF M.G.D.	FUTURE RELIEF SIZE	VELOCITY FULL FEET/SEC.	PROPORTIONAL DEPTH OF FLOW	VELOCITY FEET/SEC.	TOP OF MANHOLE AT UPPER END	GROUND ELEVATION AT UPPER END	ELEVATION OF INVERT		REMARKS
		FROM	TO	INCREMENT	TOTAL		AVERAGE DAILY FOR YEAR	PEAK FLOW FACTOR	PEAK FLOW	AVERAGE	MAXIMUM		MAXIMUM							M.G.D.	CU.FT./SEC.								UPPER END	LOWER END	
													M.G.D.	CU.FT./SEC.																	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

DINWIDDIE COUNTY WATER AUTHORITY



$0-20$ MGD : $Qd = (3.037Qa)^{0.8606}$

$20-50$ MGD : $Qd = (2Qa)$

DCWA

REVISIONS	CHART SHOWING RELATION OF AVERAGE FLOW TO DESIGN FLOW FOR SANITARY SEWER DESIGN	DRAWING NO.
2024		FORM F-2

THIS PAGE INTENTIONALLY LEFT BLANK

FORM F-3
WATER AND SEWER NOTES

1. All construction materials and installation shall conform to the latest edition of Dinwiddie County Water Authority Standards.

2. Contractor shall be responsible for notifying the DCWA and scheduling a pre-construction meeting at least 48 hours prior to starting any work on this project. All work shall be subject to inspection by DCWA inspectors. The Contractor shall obtain all necessary permits.

3. The Contractor shall include in applicable bid price, the cost of locating and uncovering all sewer manholes and all valve boxes after completion of all paving and adjust them to the final road grades.

4. Contractor shall notify Miss Utility Information System Telephone Number 1-800-552-7001 72 hours prior to construction start-up for exact location of existing underground utilities.

5. Minimum cover over top of water pipe shall be 3 ½-feet.

6. Datum for all elevations shown is USC&G.

7. Engineer shall certify that unpaved streets are to subgrade prior to Contractor installing water system. Curb and gutter, if required, shall be installed prior to acceptance of water system by DCWA.

8. No structures or planting of trees shall be permitted in utility easements.

9. Service saddles on all water connections to PVC mains.

10. Fire hydrants shall be installed in accordance with Volume II, Section 00870, Standard Details.

11. Vandalproof covers shall be used on all manholes in easements. Watertight covers shall be used in flood plains.

12. Final Acceptance by DCWA shall not be made until all work shown on approved utility plans is completed including paving, grading, and all required adjustments.

13. A Wetlands Permit may be required from the U.S. Army Corps of Engineers for this development. For information concerning such a requirement, contact the Corps at (804) 462-5382.

FORM F-4
EROSION CONTROL NOTES

1. Developer is responsible for regular inspection and maintenance of all erosion control devices periodically and after every erodible rainfall. Any necessary repairs or cleanup to maintain the effectiveness of the erosion control devices shall be made immediately.

2. No disturbed area will be denuded for more than 30 calendar days.

3. All erosion and siltation measures are to be placed prior to or at the first step in grading.

4. All storm and sanitary sewer lines not in streets are to be mulched and seeded within fifteen days after backfill. No more than five hundred feet of trench are to be open at one time.

5. All trenches are to be backfilled, compacted, seeded and mulched within fifteen days of utility installation.

6. All temporary earth berms, diversions, soil stockpiles, and silt dams are to be mulched and seeded for vegetative cover within ten days after grading. Straw or hay mulch is required.

7. During construction, all storm sewer inlets will be protected by silt traps, maintained and modified as construction progresses.

8. Any disturbed area not paved, sodded, or built upon by November First, is to be seeded on that date with oats, abruzzi, rye, or equivalent and mulched with hay or straw mulch. Modify as applicable depending on proposed time of construction.

FORM 5

Dinwiddie County Water Authority

REVIEW CHECKLIST FOR WATER AND SEWER PLANS

Project Title

Existing utilities to be extended to service this project are shown on Sheet No.____ or Approved Utility Plan No.___.

___1. Virginia registered engineer's stamp & signature.

___2. Plan and profile sheets are on 24-inch x 36-inch paper.

___3. Project vicinity map.

___4. Owner/Developer name and address shown on plans.

___5. I.S.O. Fire Flow computations shown on plans (where applicable).

___6. Domestic water meter calculations shown on plans in accord with A.W.W.A. Manual M-22 (where applicable).

___7. Water System designed to provide adequate domestic service and fire protection to owner's property. ___-inch diameter line required to adequately serve this project in accord with DCWA standards.

___8. Sanitary Sewer Service area map submitted with plans. (Calculations shown thereon)___" diameter line required to adequately serve this project in accord with the DCWA Standards.

___9. Overall water, and sanitary sewer plan submitted for phased projects. Fire hydrants and valve locations shown on water overall plan.

___10. Deflection angles shown on all manholes.

___11. Standard water and sewer notes shown on plans.

___12. Benchmarks shown on every 500-feet.

___13. Direction of flow arrows shown on sanitary sewer.

___14. All underground utility conflicts profiled and resolved.

___15. This project has been designed in accord with the latest DCWA Standard and State Regulations (whichever is more restrictive).

___16. All proposed water and sewer lines connect to existing facilities which have been previously accepted by the DCWA for operations and maintenance.

___17. All off-site easements necessary for the completion of this project have been acquired, recorded and their Deed Book and Page references are shown on the plans.

___18. A list of the approx. material quantities to be used & the following material notes shown on plans:

Sanitary Sewer	Water
PVC plastic shall be ASTM D-3034 PSM SDR 35 min; Class "B" bedding (min.) Non-reinforced conc. pipe shall be ASTM C-14 Class 2; Class "C" bedding	PVC plastic pipe shall be AWWA C-900 Table 2 Class 150 (min.) Ductile Iron pipe shall be ANSI/AWWA C151 Class 52 for 12-inch and smaller and Class 51 for 16-inch and larger

___19. A blocking detail shown on the plan as per Design Standards. Detail to show strength and quantity of concrete for each size and type of fitting used.

___20. Backflow Prevention Plan submitted in accordance with Section 6 of the Commonwealth of Virginia, State Board of Health Waterworks Regulations.

I hereby certify that I have complied with the above and do herewith submit these plans for approval.

_____ P.E. _____
Signature Certificate Number

_____ _____
Name Typed or Printed Date

FORM 6

DINWIDDIE COUNTY WATER AUTHORITY
REVIEW SHEET FOR SEWAGE
PUMPING STATION

SUBJECT:_____
SEWERAGE:_____
PROJECT NO.:_____

EPA NO.:
REVIEWED BY

DATE

CONSULTING ENGINEERS

REFERENCES AND CORRESPONDENCE

LOCATION OF PROJECT

TYPE OF PUMPS PROVIDED

NUMBER OF UNITS

PUMP CAPACITY

PUMP NO.	SIZE (INCHES)	FRIC-TION HEAD (FT)	STA-TIC HEAD (FT)	RATED CAPACITY (GPM)	RATED TDH (FT)	COM-PUTED TDH (FT)	OPERAT-ING CAPACITY (GPM)	VARIABLE OR CON-STANT SPEED

IS CAPACITY OF PUMP STATION ADEQUATE?

CAN PEAK FLOW BE PUMPED WITH LARGEST UNIT OUT OF SERVICE?
_____CAPACITY OF RECEIVING SEWER LINE__MGD ADEQUATE CAPACITY AVAILABLE

CAPACITY OF ULTIMATE TREATMENT_____MGD AVERAGE FLOW (1 YR)

BAR SCREENS & COMMINUTOR
ARE BAR SCREENS OR COMMINUTOR PROVIDED?
_____SPACE BETWEEN BARS_____INCHES EFFECTIVE AREA
___SQ.IN.
VELOCITY THROUGH BAR SCREEN
FT./SEC.
MECHANICALLY CLEANED?

COMMINUTOR PROVIDED?_____SIZE_____CAPACITY
GDM.
IS AUTOMATIC BYPASS TO BAR SCREEN PROVIDED?

REVISIONS	REVIEW SHEET FOR SEWAGE PUMPING STATION	FORM F-6 1 of 3

FORM 6

DINWIDDIE COUNTY WATER AUTHORITY

CHLORINATION

IS CHLORINATION PROVIDED?_____LIQUID OR GAS?

____CAPACITY

_____PPD

SEPARATE CHLORINATION ROOM PROVIDED?

____VIEWING WINDOW TO CHLORINATOR ROOM?

_____VOLUME OF CHLORINATOR ROOM?

_____CU. FT.

VENTILATION FAN CAPACITY_____CFM TURNOVER TIME

MIN.

IS POTABLE WATER SUPPLY ADEQUATELY PROTECTED?

PUMPS

POSITIVE SUCTION HEAD?_____ALTERNATING CONTROL?

____TYPE OF CONTROL MECHANISM?

_____SUCTION LINE SIZE_____INCHES DISCHARGE LINE SIZE

_____INCHES

IS GATE VALVE PROVIDED ON SUCTION LINE?

_____GATE VALVE AND CHECK VALVE ON DISCHARGE LINE?

_____SIZE OF SPHERES THAT PASS THROUGH PUMP

_____INCHES

VELOCITY OF DISCHARGE LINE

_FPS

VELOCITY OF SUCTION LINE

_FPS

WET WELL FILLET SLOPE_____VOLUME BETWEEN HWL AND LWL

GAL

IS VOLUME SUFFICIENT TO CAUSE ONE PUMP TO RUN CONTINUOUSLY FOR FIVE

MINUTES OF EVERY 30 MINUTE PERIOD AT MINIMUM FLOW?

____VOLUME ABOVE LWL_____CU. FT. VENTILATION FAN CAPACITY

___CFM

CONTINUOUS OR INTERMITTENT VENTILATION?

____AIR CHANGES PER HOUR_____ADEQUATE ACCESS PROVIDED?

_____ADEQUATE VENTILATION?

_____DRY WELL PROVISIONS FOR REMOVING EQUIPMENT?

_____ADEQUATE ACCESS PROVIDED?_____SUMP PUMP PROVIDED?

_____ADEQUATE DISCHARGE POINT FOR SUMP PUMP?

_____VOLUME OF DRY WELL_____CU. FT. VENTILATION FAN CAPACITY

_____CFM

CONTINUOUS OR INTERMITTENT VENTILATION?

____AIR CHANGES PER HOUR_____ADEQUATE PROTECTION OF WATER SUPPLY?

FORM 6

DINWIDDIE COUNTY WATER AUTHORITY

FLOW MEASUREMENT

DOES PUMPING STATION HAVE A CAPACITY OF 10% OF ULTIMATE TREATMENT CAPACITY?

IS ADEQUATE FLOW MEASURING DEVICE PROVIDED?

RELIABILITY

RELIABILITY CLASS

_____ADEQUATE ALTERNATIVE MOTIVE FORCE PROVIDED?

_____PROVISION FOR CONTINUOUS OPERABILITY PROVIDED?

_____TYPE OF PROVISION

_____IS ADEQUATE POWER DISTRIBUTION PROVIDED?

_____BREAKER SETTINGS OR FUSE RATINGS ADEQUATE?

_____ELECTRICAL CONTROL CENTERS LOCATIONS ADEQUATE?

_____ARE MOTORS ADEQUATELY PROTECTED?_____EMERGENCY POWER EQUIPMENT ADEQUATELY LOCATED?_____DOES ELECTRICAL EQUIPMENT COMPLY WITH NATIONAL BOARD OF FIRE UNDERWRITERS SPECIFICATIONS?_____ARE THREE PHASE MOTORS ADEQUATELY PROTECTED FROM SHORT CIRCUITS AND OVERLOADS?_____LOW VOLTAGE PROTECTION FOR LARGE MOTORS?

_____DO UNDERGROUND CONDUITS HAVE MOISTURE RESISTANT INSULATION?

_____CONCRETE, METAL AND SAFETY DEVICES ADEQUATELY PROTECTED AGAINST CORROSION?_____ADEQUATE ELECTRICAL EQUIPMENT TESTING PROVISIONS?

_____ADEQUATE EMERGENCY POWER GENERATOR STARTING SYSTEM?_____ADEQUATE ALARM SYSTEM PROVIDED?

_____FORCE MAIN PIPE DIAMETER

_____INCHES DISCHARGE VELOCITY_____FPS

ADEQUATE AIR RELIEF VALVES PROVIDED?_____ADEQUATE TERMINATION?

____PIPE MATERIAL SPECIFIED_____JOINT SPECIFICATIONS

_____ADEQUATE LEAKAGE TESTING?_____ALLOWABLE LEAKAGE

_____GALLONS/HR ADEQUATE?_____ADEQUATE BEDDING?_____THRUST BLOCKS PROVIDED?

REVISIONS	REVIEW SHEET FOR SEWAGE PUMPING STATION	FORM F-6 3 of 3