SECTION 2 - WATER AND SEWERAGE SERVICES

2-01. Policy.

The owners of all houses, buildings or properties used for human occupancy, employment, recreation, or other purposes, currently existing or constructed subsequent to the passage of these Rules and Regulations and situated within the jurisdictional areas of the Authority and abutting on any street, alley or right-of- right-of-way in which there is located a public sanitary sewer and/or water main at a distance not greater than 200 feet from such houses, buildings or properties, shall be required to install suitable toilet and other disposable liquid waste facilities therein and to connect such facilities directly with the public sewer and water main.

The developer of any new subdivision, limited subdivision, or development intended for residential or commercial use or any combination thereof, or the developer of any industrial site shall construct all sanitary sewers and laterals and domestic water distribution lines, service connections, and appurtenances within his subdivision or development at his own expense. The developer or owner shall initially construct all water and sewer facilities in entirety that will serve the whole subdivision or development. Immediately upon completion and acceptance of the construction work, the sanitary sewer and water facilities shall become the property of the Rockbridge County Public Service Authority.

Where construction of a trunk sewer or water line is deemed to be either necessary, feasible or advisable to connect the applicable systems of the subdivision, limited subdivision, or development to the suitable facilities of the Authority, the financial responsibility, location and details of such construction shall be determined in conference by the developer and Authority. Each such proposed item of construction shall be a separate matter for discussion and agreement.

The Authority, in conjunction with it's Engineers, shall review and approve, or reject prepared plans for all projects for developing, extending or constructing water mains and sanitary sewer lines for the construction of all pumping facilities, force mains, treatment works or storage facilities (water) and all pertinent connections, structures and accessories proposed thereto within the jurisdictional areas, prior to any construction of such projects.

The approval of plans and specifications for water and sewerage shall be contingent upon approval of these same plans by the Virginia Department of Highways and Transportation or the Virginia Department of Environmental Quality, as necessary.

As the Authority is authorized to approve certain projects that do not require pumping under the provisions of a memorandum of understanding, the developer may obtain Department of Health /Department of Environmental Quality approval in one (1) of two (2) ways.

> **Option 1:** Submit the project to the department for their review and approval. This option can take from 4 to 6 weeks if there are no comments. Approval of the project will be made after receipt of the state approval.
>
> **Option 2:** Submit the project to the Authority for review by their consultant. This option is estimated to take 15 days. Approval under this method will be made after receipt of payment from the developer, for the cost of review plus $50. The cost to review a complete submittal is estimated to be $400 to $500.

Materials, workmanship and procedures used in the work shall be in accordance with the standards and specifications established or approved by the Authority. Prior to construction, shop drawings shall be submitted to the Authority for approval.

During progress of the work, the members of the Authority or their authorized Engineers, inspectors or others who are directly concerned with the work shall have access to the locations of construction for the purpose of establishing to their satisfaction that the projects are being constructed to the Authority's requirements and in accordance with approved plans and specifications. Proper notification shall be given the Authority so that a representative of the Authority can inspect all water and sewer line trenches before backfilling.

After completion of the facilities and upon written request of the developer or owner responsible for the construction, the Authority shall make a final comprehensive inspection of the completed projects and shall be satisfied as to conformance to plans and specifications before accepting the facilities to become a part of the public utilities system of the Authority.

Any developer or owner who proposes to submit an application to the Authority for review and approval of plans and specification for construction of facilities classified hereinafter Sub Section 2-02B, C, or D, shall be required to procure from the Authority one (1) set of this publication of Rules and Regulations and Construction Specifications and Standards approved by the Authority for use in the jurisdictional areas. The developer or owner shall acknowledge in writing, the receipt of same, prior to submitting his application. The Authority shall furnish the publication and drawings, on a bona-fide request, for $10.00 per set. The Rules and Regulations may also be downloaded from the PSA's website.

2-02. Application for Services.

The Authority shall accept, review and render decision on applications for water and/or sanitary sewer service to the premises described in the application from any person, group, firm, corporation or association, who are owners of or legally represent the owners of the premises or who are tenants of premises within the jurisdictional area.

The Authority reserves the right to approve, revise, require additional data, design or information on, or to disapprove any such application or plans thereto, that in the opinion of the Authority is to the best interest of the Authority.

A. Applications for water or sewer service for existing or proposed new individual or multiple dwellings or business establishments to which the Authority's service facility is immediately adjacent and available, shall be made in duplicate on a form prescribed and furnished by the Authority for the purpose of such application and each form shall be accompanied by measurement, maps, drawings and such other data that will clearly establish and indicate the physical location within the jurisdictional area of the Premises for which the application is submitted and location on the premise of the service or services applied for. A non-residential customer application is provided in Appendix C.

B. Where service is desired for either water or sewer facilities, or both, for any individual building or group of buildings, whether intended for use as residential or business purposes and that are NOT classified as being the development of a new subdivision, limited subdivision, or section thereof, and that will require the design and construction by the Owner of new trunk, or principal lines and any necessary appurtenances thereto in order to reach and connect onto applicable existing facilities of the Authority and that such new construction in its entirety shall ultimately be accepted as an integral part of the facilities of the Authority, application shall be made in writing to the Authority.

   Such application, stipulated above, shall be accompanied by:

1. Four (4) sets of detailed plans showing accurate plan and profile design drawings of the lines and location, design, and identification of all appurtenances and accessories pertinent thereto.

2. Such plans shall show on the same sheet, the plan and profile design of the contiguous sections of street or easement and proposed water or sewer line, or both, as is indicated by the application.

The design and detail plans stipulated above, and all subsequent revisions thereof, shall be prepared with original and all revision dates, and be properly signed, sealed and dated by a Professional Engineer registered in the Commonwealth of Virginia.

C. Where construction of water and sanitary sewer facilities is proposed by a developer or owner of any new residential subdivision, limited subdivision, or commercial area or any combination thereof, and when such facilities shall ultimately be accepted into the jurisdiction of the Authority as a part of the public utilities system of the Authority, application for review of the design and plans for all such proposed construction shall be made in writing to the Authority.

Such applications as stipulated above, shall be accompanied by:

1. Four (4) prints of the recorded plat of the subdivision, limited subdivision, or development or applicable section thereof that shall bear the approval of the Board of Supervisors.

   Plat shall designate easements specific for water and sewer.

2. Four (4) sets of detailed plans showing accurate plan and profile design drawings, the proposed lines and the location, design and the indication of all their appurtenances and accessories, signed, sealed, and dated by a Professional Engineer registered in the Commonwealth of Virginia. It is preferable that such plans show on the same sheet, the plan and profile design of the contiguous sections of new street or easement and proposed water and/or sewer facilities. If the proposed facilities require Virginia Department of Health and/or Department of Environmental Quality review, then an additional three (3) copies of water and four (4) copies of sewer plans are required for non-non-grant programs and if the program is grant related, then five (5) additional copies of the sewage plans are required.

3. If any facilities other than pipe lines and their appurtenances are proposed by the applicant or required by the Authority for the complete satisfactory operation of the proposed utilities, such as water storage or pumping equipment, sewage treatment plants, sewage pumping stations, or other like equipment the application shall be accompanied by four (4) sets of detailed plans and specifications on design, equipment, materials and construction of such facilities, signed, sealed and dated by a Professional Engineer registered in the Commonwealth of Virginia.

D. Application for proposed water and/or sewer facilities to serve any type of industrial establishment within the jurisdictional area, shall be made in writing to the Authority. Complete information regarding plant location, type of industry, raw and finished products, approximate volume of utility requirements, types of industrial wastes to be discharged, proposed facilities for pre-treatment of industrial wastes, and other data pertinent to the industry, shall be accompanied by the application (Appendix C).

The applicant for water and/or sanitary sewer services to serve industrial establishments shall conform to the requirements for application for same as previously outlined in Subsection 2-02 A or B, as may be governed by the location of the proposed industrial site.

Any design, plans and specifications, required as stipulated and all subsequent revisions thereof, shall be prepared and properly sealed, signed and dated by a Professional Engineer registered in the Commonwealth of Virginia.

2-03. Disposition of Applications

A. On receiving application as prescribed herein in Sub-Section 2-02 A, the Authority will approve with or without revisions, or disapprove the application and return one (1) of the submitted forms to the applicant so marked to indicate the action taken by the Authority.

Construction of any such approved service facilities shall conform strictly with the returned application form and notations indicated thereon by the Authority.

B. On receiving applications as described in Sub-Section 2-02 B, C, or D, the Authority will review all data, design, plans and/or specifications and indicate thereon any revisions, additions, changes or deletions, as is considered necessary in order that the proposed construction shall conform to the standards and best interest of the Authority. One (1) marked set of the submitted plans and/or specifications shall be returned to the applicant.

After receiving the returned set of plans and/or specifications, the applicant shall prepare revised plans and/or specifications to conform with such revisions indicated by the Authority and submit four (4) sets of the revised plans and/or specifications to the Authority.

On receipt of the revised plans and/or specifications, the Authority shall check them for conformity with the initially marked revisions. If satisfactory, one (1) of the revised sets of plans and/or specifications shall be returned to the applicant with written approval for construction.

Construction of any public utility facility within the jurisdictional areas, and all their appurtenances and accessories, shall be in strict conformance with the final approved set of plans and/or specifications stipulated in paragraph immediately above.

C. In the event that an applicant desires to deviate from the plans and/or specifications that have been approved by the Authority for construction, or to make any changes or revisions therein, the applicant shall make such request to the Authority in writing and state the reasons for the request.

Prior to construction or installation of any equipment or materials that deviate from the approved plans, specifications or Authority standards, shop drawings and samples (if required) shall be submitted. With each submittal, applicant shall give Authority specific written notice of any variations that the shop drawings or sample may have from the

approved plans, specifications or Authority standards. This notice shall be both a written communication separate from the shop drawings or sample submittal; and, in addition, by a specific notation made on each shop drawing or sample submittal to Authority for review and approval of each such variation.

Revised plans, specifications and other substantiating data, shall accompany the request in such manner, form and quantity as was required for the original application.

The procedure for all parties concerned for processing any such request for deviation from, or changes and revisions in initially approved plans and/or specifications for construction shall be the same as stipulated for the original application for the project.

2-04. Record Drawings.

After completion of construction of the public utility facilities from approved plans on any project classified in Sub-Section 2-02 B, C, or D, the developer or owner responsible for the construction shall prepare record drawings, based on accurate, field-obtained information, to show actual conditions of the finished construction. The record drawings shall be revisions in, and permanently indicated changes on, the original tracings or master sheets from which were made the plans and/or specifications approved by the Authority for construction.

The record drawings shall show, but may not be limited to, the following:

A. Water Line Construction

1. Scale accuracy location in plan, of the line and all installed fittings, such as elbows, tees, crosses and reducers, and all cradle, encasement, or special construction.

2. Exact measurements to show positive location of all valve boxes, fire hydrants, meter boxes, blow-offs, blind or blank-flanged fittings and plugged terminals of lines.

   The measurements taken for these positive locations shall be taken from at least TWO (2) reasonable adjacent and available, fixed and permanent objects such as fire hydrants, centers of sanitary or storm sewer manhole casting covers, corners of lines extended of buildings, power poles, etc. (If a power pole is used the I.D. Number shall be recorded on the record drawings).

   In lieu of recording the positive locations indicated above, on the plans, the Authority will accept such locations, shown by neat, legible and separate no-scale sketches with all measurements thereon, when all such sketches or diagrams are recorded in a progressive sequence and clearly identified in a hard-cover, permanently bound field-type note book.

B. Sewer Line Construction

1. Scale accuracy location of manhole invert and top casting elevations and numerical notation of the exact elevations of same as determined by field survey after construction.

2. Scale accuracy indication of lengths and grades of lines between manholes, and numerical notation of the exact lengths and grades, as determined after construction.

3. Scale accuracy location of concrete cradle, encasement, or special construction.

4. Scale accuracy location of sewer service laterals including invert elevation in reference to top of cleanout.

C. Sanitary Sewage and Water Treatment Plants and Pumping Stations, All Other Comparable Construction and Building Structures.

1. Record drawings shall indicate accurately all approved deviation from or changes in location type of equipment installed and material used.

2. Accurate listings of the name of the manufacturer of all operating equipment installed, together with model or style numbers, ratings, capacities, and other pertinent information shall be provided as part of the record drawings on the project.

3. At least three (3) complete sets of shop drawings and operation and maintenance manuals of all operating equipment, and all Certificates of Inspections, Approvals, Warranties and Guarantees of Equipment. Materials and Installations thereof, required by the project specifications that were approved by the Authority, shall be provided as a part of the record drawings on the project.

2-05. Final Inspections.

At the completion of construction of any project of public utility facilities on any project classified in Sub-Section 2-02 B, C, or D, the developer or owner responsible for the construction, shall notify the Authority, in writing, that the work has been completed. Together with the notification of completion, there shall be submitted to the Authority all record drawings, specifications, and such other data and addenda relative thereto that is required in Sub-Section 2-04.

Upon receipt of the notification and record requirements, the Authority shall make a final comprehensive inspection of the constructed facilities, examining in detail for conformance of the work with approved plans and specifications, alignment of sewer lines, infiltration, leakage, workmanship, operation of equipment, and other factors to the satisfaction and best interest of the Authority.

The Authority will notify the Virginia Department of Health (VDH) or Department of Environmental Quality (DEQ), as appropriate, when a final inspection is scheduled on a project that they have reviewed. The Authority will submit an annual report to VDH and DEQ of system improvements.

It shall be required that a responsible representative of the developer or owner accompany the Authority or its agent on the final inspection. The developer or owner shall furnish whatever labor is necessary for conducting the final inspection.

Deficiencies that are found to exist during the inspection shall be pointed out to the developer or owner's representative. Subsequent to the inspection, the developer or owner shall be furnished, in writing, a summary of the deficiencies found and corrections of which are required.

Upon notification that all construction deficiencies have been completed, the Authority will inspect all such work.

2-06. Acceptance of New Construction.

A. The Authority shall accept new constructed water and sanitary sewer service facilities, classified Sub-Section 2-02 B, C, and D , on satisfaction of the following conditions:

1. That all requirements of the foregoing Sub-Section 2-05 have been fulfilled in the opinion of the Authority.

2. That all matters relative to specific contract between the developer or owner and the Authority are in order.

3. That payment has been made by the developer or owner for all fees relative to applications and inspections.

4. That explicit understanding exists between developer or owner and the Authority that the developer or owner shall be responsible for and obligated to correct any deficiencies in construction for a period of one (1) year from the date of acceptance of the facilities by the Authority. This condition shall be stipulated in the written form of acceptance issued by the Authority.

5. The professional engineer for the project must submit a letter upon completion of the project stating that work was completed in accordance with approved plans and specifications.

6. The developer has submitted certification of actual construction costs.

B. Acceptance of the new constructed facilities, when approved by the Authority, shall be made in writing to the developer or owner responsible for the construction.

The issuance of the written form of acceptance of any such facilities shall constitute an irrevocable agreement between the developer or owner responsible for construction and the Authority and the Board of Supervisors, and any of their officers, agents, servants and employees shall be held harmless by the developer or owner from liability and responsibility of any nature and kind for costs of, or payments on, labor, equipment, or material used in construction of the accepted facilities or on account of any patented or unpatented inventions, process, article or appliance manufactured for or used in construction of, or for the intended operation of the accepted facilities.

2-07. Design of Sanitary Sewers.

A. Per Capita Flow

New sewer systems shall be designed on the basis of an average daily per capita flow of sewage in accordance with the guidelines set forth in the Sewage Collection and Treatment Regulations of the Virginia Department of Health and State Water Control Board/Department of Environmental Quality. These figures are assumed to cover infiltration. Peak hourly flow calculations shall be submitted with plans. When deviations from the foregoing per capita rates are proposed, a description of the procedure used for sewer design shall be included with the submission.

B. Peak Flow - Lateral and Sub-Main Sewers

1. Lateral - a sewer that has no other common sewer discharging into it.
2. Sub-Main - a sewer that receives flow from one (1) or more lateral sewers.
3. Minimum Peak Design Flow shall be 400 percent of the average design flow.

C. Peak Flow - Main, Trunk and Interceptor Sewers

1. Main or trunk - a sewer that receives sewage flow from one (1) or more sub-main sewers.
2. Interceptor - a sewer that receives sewage flow from a number of gravity mains, trunk sewers, or sewage force mains, etc.
3. Minimum Peak Design Flow for main and trunk sewers shall be 250 percent of the average design flow.
4. Minimum peak design for interceptor sewers shall be 200 percent of the average design flows.

2-08. Details of Gravity Sewer Line Design and Construction.

A. Minimum Size

No public sewer shall be less than 8 inches in diameter except that sub-mains serving 6 connections or fewer on cul de sacs or as sidewalk collector lines may be 6 inches provided that engineering calculations and justifications indicate that such line size is adequate.

B. Depth

In general, sewers should be sufficiently deep so as to receive sewage from basements and shall be sufficiently deep to prevent freezing. If sewer service laterals are not deep enough to receive sewage from basements, then this service lateral invert elevation shall be noted on the plat as referenced in Section 2-04 B 4.

C. Slope

All gravity sewers shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second, based on Manning's formula using "n" value of 0.014. Use of other practical "n" values may be permitted by the plan-reviewing agency if deemed justifiable on the basis of research of field data presented. The following are the minimum slope that should be provided; however, slopes greater than these are desirable:

Table 2-07.1 Minimum Slope Chart

Sewer Size	Minimum Slope in Feet per 100 feet	Conversion Chart (in=ft)
8 inch	0.40	1” = 0.08
10 inch	0.28	2” = 0.17
12 inch	0.22	3” = 0.25
14 inch	0.17	4” = 0.33
15 inch	0.15	5” = 0.42
16 inch	0.14	6” = 0.5
18 inch	0.12	7” = 0.58
21 inch	0.10	8” = 0.67
24 inch	0.08	9” = 0.75
27 inch	0.067	10” – 0.83
30 inch	0.058	11” = 0.91
36 inch	0.046	12” = 1.0

Under special conditions, if detailed, justifiable reasons are given, enlarging pipes to reduce slopes may be permitted. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. Whenever such decreased slopes are selected the design engineer must furnish within the report, computations of the depth of flow in such pipes at minimum, average and daily or hourly rates of flow. It must be recognized that decreased slopes may require additional sewer maintenance. Sewers shall be laid with uniform slope between manholes. Sewers on 20 percent slope or greater shall be anchored securely with concrete anchors or equal, spaced as follows and as detailed (Figure 1):

1. Not over 36 feet center to center on grades 20 percent and up to 35 percent.
2. Not over 24 feet center to center on grades 35 percent and up to 50 percent.
3. Not over 16 feet center to center on grades 50 percent and over.

D. Velocity

Where velocities greater than 15 feet per second are expected, special provisions shall be made to protect against internal erosion by high velocity. The pi4pe shall conform to applicable ASTM, AWWA, ANSI, or other appropriate standards or specifications, which provide protection against internal erosion.

2-09. Use of Sanitary Sewers.

A. Unpermitted Discharges

1. No person shall discharge or cause to be discharged any storm water, surface water, ground water, roof run-off, sub-surface drainage, cooling water, or unpolluted industrial process waters into any public sanitary sewer.

2. Except as hereinafter provided, or under conditions specifically approved and detailed, in writing, by the Authority, no person shall discharge or cause to be discharged into any public sanitary sewer any of the following described waters or wastes:

   a. Any water or waste that may contain more than 100 parts per million, by weight, of fat, oil, or grease.

   b. Any gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid or gas in excess of 10 ppm.

   c. Any garbage resulting from preparation, cooking, and dispensing of food that has not been properly shredded.

   d. Any ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, or any other solid or viscous substance capable of causing obstruction to the flow in sewers or other interference with the proper operation of the sewage works.

   e. Any water or wastes having a pH value lower than 5.5 or higher than 9.0 or having any other corrosive property capable of causing damage or hazard to structures, equipment and personnel of the sewage works.

   f. Any waters or wastes containing a toxic or poisonous substance in sufficient quantity to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, or create any hazard in the receiving water of the sewage treatment plant.

   g. Any waters or wastes containing suspended solids in excess of 300 parts per million and of which the Biochemical Oxygen Demand is in excess of 250 parts per million.

   h. Any noxious or malodorous gas or substance capable of creating a public nuisance.

   i. Wastes of domestic, industrial, commercial, garbage or other origin discharge into the system and which have characteristics that add unduly to the cost of maintenance and operation will be subject to surcharges as described hereinafter in the Administrative Policies**.**

B. Grit, Oil and Grease Traps

Grease, oil and sand traps shall be provided, when in the opinion of the Authority, they are necessary for the proper handling of liquid wastes containing such ingredients or any other of a flammable or harmful nature; except that such waste interceptors shall not be required for private living quarters or dwelling units. All establishments that prepare food for sale or distribution shall have grease traps (Figure 2). All commercial buildings that will have floor drains connected

to sanitary sewer must contact the Authority regarding possible requirements for an oil and water separator (Figure 2A).

All grease, oil and sand traps shall be of a type and capacity approved by the Authority. They shall be of substantial construction, watertight and equipped with easily removable covers that when bolted in place shall be gas and watertight.

Where installed, all grease, oil and sand traps shall be maintained by the Facility Owner, at its expense, in continuously efficient operation at all times. All grease, oil, or sand traps shall be cleaned on a schedule that shall be based on such factors as follows: volume of wastewater, temperature of wastewater, character of waste water, etc. All grease, oil or sand traps shall be properly cleaned to prevent violation of the established limits. Immediately after pumping and cleaning of traps, the grease trap shall be filled with cold water. Copies of cleaning records shall be available for inspection by the Authority and the Rockbridge County Health Department at all times. Proper cleaning of the traps shall be enforced by the Rockbridge County Health Department Environmental Specialist or the Inspector for the Authority. The Authority may sample the wastewater from any commercial establishment to determine compliance with the wastewater quality requirements. The cost of reasonable testing may be passed on to the Owner of the facility.

C. Pretreatment

The admission or proposed admission into the public sewers of any waters or wastes resulting from any industrial or manufacturing process, product or comparable activity shall be subject to the review and approval of the Authority.

When necessary, in the opinion of the Authority, the Owner of any such industrial or manufacturing establishment shall provide, at his expense, such preliminary treatment of his industrial waters or wastes as may be required to reduce objectionable characteristics or constituent or to satisfy any other condition that the Authority may decide is advisable in order to allow the admission of such waters or wastes into the sanitary sewers.

Plans and specifications and any other pertinent information relating to required or proposed preliminary treatment facilities shall be submitted for the review and approval of the Authority. No construction of any such facilities shall be started until such approval has been obtained in writing.

D. Sewage Flow Measurement

Premises not discharging the entire volume of water into the sewers will be allowed a reduction in charge provided the customer installs, at his expense, a meter or meters, or other acceptable means of measurement, satisfactory to the Authority, of the volume either discharged or not discharged into the sewers. Customers using private water supplies may be required to install, at their own expense, a meter or other device for determining the volume of sewage discharged into the sewers.

E. Testing Manhole

The Authority may require the construction of a testing manhole equipped with a primary flow device on the non-domestic waste of a facility for the purpose of taking flow and water quality samples.

2.10. Design of Water Systems

A. Design Capacity

New water systems/projects shall be designed on the basis of the greater of maximum hourly or maximum daily water demand plus applicable fire flows of the system/project in accordance with the guidelines set forth in the Waterworks Regulations (12 VAC 5-590-690). All waterworks shall provide at least a minimum working (under flow) pressure of 20 psi at the service connection based on the greater of maximum hour or maximum day plus fire flows. Fire flows will be considered to be 500 gpm at minimum, preferably 1000 gpm.

The design engineer must provide calculations and documentation that the total demand of the project will not cause pressures at any existing service connection to fall below 20 psi. Such documentation shall include either 1) results from a hydraulic model run specifically for the project, or 2) if the project is to be located in an area *not covered by a current hydraulic model*, the results of a flow test conducted in accordance with PSA methods (see form in Appendix D), or other method approved by the Authority. The developer is responsible for the cost of any model runs or flow tests.

B. Flow Test Procedure

The developer's engineer shall coordinate with PSA staff to determine the most sensitive areas of the system in question. PSA staff shall monitor pressures at those sensitive areas during the entire test. The test must be run using the "worst case" scenario, which includes:

- peak daily demand
- zero inputs to, and maximum outputs from, the PSA's system
- tank level at minimum daily
- fire flow assumption = maximum demand for the project

The engineer shall flow the hydrant nearest to the project and measure the residual pressure at the next hydrant toward the tank (the secondary hydrant). Hydrants must be opened and closed slowly to avoid pressure spikes. ***At no time shall the pressure in any part of the system be allowed to fall below 20 psi.*** A complete report shall contain the following information at minimum:

- Date and time of test
- Static pressure at the test and secondary hydrants prior to the test
- Tank level and elevation
- Target flow (estimated demand) and residual pressure required by the project (fire flow demand may be supplied by the sprinkler company)
- Documentation from the sprinkler company, if applicable
- Elevations of test and secondary hydrants, and of sensitive area hydrants
- Actual flow and residual pressure
- Map of system served by the tank, showing the locations of the test and secondary hydrants, sensitive area hydrants, line sizes, tank location
- Outputs from system (i.e., pump rate of any pumps pumping water out of the system at the time of the test)

A form has been provided in Appendix D

C. Minimum Pipe Size

1. Water Distribution Systems

The minimum pipe size for water distribution systems shall be six (6) inches, except as specified in Section 10-02.

2. Fire Protection

The minimum size of pipe where fire protection is to be provided or required shall be six inches in diameter. Water mains not sized to carry fire flows shall not be connected to fire hydrants.

D. Looping and Dead-ends

Mains shall be looped wherever possible to eliminate dead-ends and increase system reliability. See Section 1-03F.