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**WATER DISTRIBUTION SYSTEM - STANDARDS AND EXTENSIONS**

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**SECTION A - PREFACE**

**A-1.** The Design and Construction Standards presented in Sections B and C are the minimum standards to be followed by the Loudoun County Sanitation Authority, hereinafter referred to as the "Authority", in the design and construction of the local component water distribution system of its integrated water system for Loudoun County. The Standards are not intended to be used as a substitute for actual construction specifications and design computations.

**A-2.** The Rules and Regulations Governing Extensions within Specified Areas presented in Section D prescribe the procedure to be followed by developers desiring water service for certain specified areas or tracts that can be served by the Authority.

**A-3.** All materials, equipment and construction not currently covered in these Standards shall be in accordance with the applicable American Waterworks Association Standards or other recognized Standards acceptable to the Authority.

### **SECTION B - DESIGN STANDARDS**

**B-1. Capacity to Serve:** The water distribution system and any extensions thereof shall have adequate capacity to supply the normal (average) and peak hour demands of all customers -domestic, public, commercial and industrial - while maintaining a pressure of not less than 30 pounds per square inch at all points of delivery. In addition, the system shall be capable of delivering on the day of maximum customer demand, flows required for fire protection to at least one (1) point within 300 feet of each building to be served or proposed to be served by such system and extension, while maintaining a residual pressure of not less than 20 pounds per square inch at the point of service. Flows required for fire protection shall be determined in accordance with the "Standard Schedule for Grading Cities and Towns of the United States" of the American Insurance Association, New York, New York, but shall not be less than the following:

(a)	Industrial and Mercantile Districts	3,000 gpm
(b)	Apartments and Town Houses	2,000 gpm
(c)	Schools, Elementary	2,500 gpm
(d)	Schools, Secondary and High	3,000 gpm
(e)	Residential	1,750 gpm
(f)	Minimum (applicable to sparsely developed residential areas)	1,000 gpm

The Virginia Insurance Rating Bureau shall be consulted regarding fire protection flows required for high value regional mercantile districts, university campuses, etc.

**B-2. Capacity Design Criteria:** The following criteria will be used in estimating demands for water and accomplishing hydraulic design of the system.

**B-2.1.** Average day, maximum day and peak hour demands to be used in system hydraulic design will be estimated using the following parameters:

- (a) Residential Population

$$= N = \text{number of dwelling units} \times 3.5$$

(b) Average daily water demand of residential population in gallons per day (g.p.d.)

$$= R = N \times 100$$

(c) Average daily commercial and industrial water demand in g.p.d.

$$= C = \text{number of commercial and industrial employees} \times 100^*$$

(d) Average daily school water demand in g.p.d.

$$= S = \text{number of staff employees and students} \times 20$$

(e) Average daily water demand in g.p.d.

$$= A = R + C + S$$

(f) Maximum daily water demand in g.p.d.

$$= M = A \times 2$$

(g) Peak hour demand in g.p.d.

$$= P = M \times 2$$

(h) Peak hour demand in gallons per minute (g.p.m.)

$$= \frac{P}{1440}$$

\* Note: Appropriate additional water demand allowance shall be made for commercial and/or industrial establishments of types having water demands in excess of 100 g.p.d. per employee.

**B-2.2.** When water distribution system extensions are to be made in accordance with the procedures prescribed in Section C, the applicant shall first determine the quantity of water required and then obtain from the Authority the hydraulic gradient available at the point of connection to the Authority's system while providing said demands. Distribution piping design will be based upon providing capacities and service pressures in accordance with these standards from the supply design gradient furnished by the Authority.

**B-2.3.** Hydraulic design of distribution piping will be based on pipe carrying capacities consistent with head losses determined in accordance with the following:

<u>Pipe Diameter</u>	<u>Hazen-Williams Coefficient "C"</u>
6"	100
8"	110
10"	115
12" and greater	120

**B-3. Distribution System Layout Criteria:** Insofar as practicable, distribution systems developed for local areas shall be compatible with the Authority's plan for an integrated water system for Loudoun County. The Authority is developing a system of transmission mains and secondary feeders from which the local components of the distribution system will be supplied. Distribution mains will be laid on a loop or grid system with primary grids of 12-inch diameter at approximately one (1)-mile intervals. Secondary loops and cross mains of smaller diameter shall be spaced not more than 1,000 feet apart with no dead end length exceeding 500 feet. All dead end mains over five (5) feet in length and not terminating with a hydrant shall have adequate blowoff valves at the ends thereof. No mains shall be less than six (6)-inch I.D. (inside diameter).

**B-3.1.** Automatic combination air-vacuum release valves shall be installed at the high points of water mains 16-inch I.D. and larger, where accumulation of air may interfere with flow. Blowoffs will be required at low points of lines 16-inch I.D. and larger. Air-vacuum release valves and blowoffs will be installed in all other main sizes as required. Water mains 16-inch I.D. and larger shall not be tapped for individual services. Services shall be supplied from distribution mains connected to these secondary feeders.

**B-3.2.** Valves shall be installed at appropriate points in all mains to permit shutting off water from as small a portion of the system as practicable. The supply branch serving a hydrant shall include a valve.

**B-3.3.** Fire hydrants shall be located on the distribution system as follows:

- (a) In water systems and extensions serving one- or two-family residential areas, fire hydrants shall be installed at such locations that there will be at least one (1) hydrant within 300 feet of the nearest wall of any building (existing or proposed in ultimate development) served by said system or extension.
- (b) The total number of fire hydrants in each such one- or two-family residential area shall be not less than the total acreage of the area divided by 2.75.
- (c) Hydrants along streets or roads on which such one- or two-family residences front shall be spaced not more than 500 feet apart.

- (d) In commercial, industrial, apartment, and town house areas, fire hydrants shall be provided as required to meet the fire protection standards of the American Insurance Association. In no case shall more than 300 feet of fire hose be required to reach any point at the base of any exterior building wall from the nearest fire hydrant or from each of the hydrants required to supply the stipulated fire flow.
- (e) Not more than one (1) fire hydrant shall be located on any six (6)-inch I.D. dead end main and said fire hydrant shall be located not more than 300 feet from a looped main.

**B-3.4. Separation of Waterlines and Sanitary and/or Combined Sewers:**

- (a) General: The following factors shall be considered in providing adequate separation:
  - (1) Materials and types of joints for water and sewer pipes.
  - (2) Soil conditions.
  - (3) Service branch connections into the waterline and sewer lines.
  - (4) Compensating variations in the horizontal and vertical separations.
  - (5) Space for repairs and alterations of water and sewer pipes.
  - (6) Offsetting of pipes around manholes.
- (b) Parallel Installation:
  - (1) Normal Conditions - Waterlines shall be laid at least ten (10) feet horizontally from a sewer or sewer manhole whenever possible. The distance shall be measured edge-to-edge.
  - (2) Unusual Conditions - When local conditions prevent a horizontal separation of ten (10) feet, the waterline may be laid closer to a sewer provided that:
    - (A) The bottom of the waterline is at least 18 inches above the top of the sewer.
    - (B) Where this vertical separation cannot be obtained, the sewer shall be constructed of mechanical joint water pipe, pressure tested in place to 50 psi without leakage prior to backfilling.
- (c) Crossing:

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- (1) Normal Conditions - Waterlines crossing sewers shall be laid to provide a separation of at least 18 inches between the bottom of the waterline and the top of the sewer whenever possible.
  - (2) Unusual Conditions - When local conditions prevent a vertical separation described in B-3.4.(c).(1). the following construction shall be used:
    - (A) Sewers passing over or under waterline shall be constructed of the materials described in B-3.4.(b).(2).
    - (B) Waterlines passing under sewers shall, in addition, be protected by providing:
      - (i) A vertical separation of at least 18 inches between the bottom of the sewer and the top of the waterlines.
      - (ii) Adequate structural support for the sewers to prevent excessive deflection of the joints and settling on or breaking waterline.
      - (iii) The length of the waterline be centered at the point of the crossing so that joints shall be equidistant and as far as possible from the sewer.
  - (d) Sanitary and/or Combined Sewers or Sewer Manholes: No water pipes shall pass through or come in contact with any part of a sewer or sewer manhole.

**B-4. Strength Design Criteria:** Water mains and fittings of 16-inch I.D. and larger shall be cylinder type prestressed reinforced concrete pipe, cement-mortar-lined ductile iron pipe, or other pipe material approved by the Authority. Mains and fittings of less than 16-inch I.D. shall be cement-mortar-lined cast iron or other material approved by the Authority.

**B-4.1.** Valves 16-inch I.D. and larger shall be rubber seated butterfly type conforming to the American Water Works Association Standard C-504 of latest revision and shall open to the left.

**B-5. Valves:** All valves shall be accessible for operation only with standard valve key through a valve box approved by the Authority, extending to the ground surface. Valves shall be of one of three manufacturers named by the Authority.

- (a) Valves over 16-inch I.D. shall be rubber seated butterfly type conforming to the American Water Works Association Standard C-504 of latest revision and shall open to the left.
- (b) Valves smaller than 16-inch I.D. shall be gate valves conforming to the American Water Works Association Standard C500 of latest revision and shall open to the left.

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**B-6. Fire Hydrants:** All fire hydrants shall conform to the American Water Works Association Standard C502 of latest revision and shall open counterclockwise. Said hydrants shall have two (2) 2 1/2-inch nozzles and one (1) 4 1/2-inch pumper nozzle with National Standard fire hose coupling screw threads. Nozzle caps shall be provided for all outlets with suitable gaskets to provide a tight seal with the nozzles. Said caps shall be securely chained to the barrel of the hydrant. Cap nuts shall have the same dimensions as the operating nut of the hydrant. The size of the main valve opening of the hydrant shall be not less than five (5) inches. Hydrants shall be one of three specified by the Authority and shall be a Traffic Model Type.

**B-6.1.** In water systems and extensions serving one-family and/or two-family residential subdivisions, fire hydrants shall be installed at such locations that there will be at least one (1) hydrant within 300 feet of the nearest wall of any building (existing or future at ultimate development) served by said systems or by said extension. The total number of fire hydrants in each such subdivision shall be not less than the total acreage of the subdivision divided by 2.75. Hydrants along streets or roads on which residences of such subdivisions front shall be spaced not more than 500 feet apart.

**B-6.2.** In commercial, industrial, and apartment house areas, fire hydrants shall be provided as required to meet the fire protection standards of the American Insurance Association. In no case shall more than 300 feet of fire hose be required to reach any point at the base of any exterior building wall from the nearest fire hydrant or from each of the hydrants required to supply the stipulated fire flow.

**B-6.3.** All fire hydrants shall be painted with at least two (2) coats of fire hydrant red from the bonnet down. The bonnet shall be painted with 1460 Alert Bright White Light Reflective Coating, manufactured by Axon Aerospace, Inc.

**B-7.** All mains smaller than 16-inch I.D. shall be laid with a minimum cover of 36 inches from top of pipe to finished ground surface grade, except that at obstructions which cannot be relocated or modified, the cover may be reduced as necessary for short lengths (ten (10) to 20 feet) to pass over said obstruction using three flexible joints in the offset within a length of approximately eight (8) feet, but in no case shall depth of cover be less than 24 inches. Approved bedding material shall be used wherever cover is less than 36 inches and shall completely encase pipe. No tees, valves, or house service corporation cocks shall be installed in mains with less than 36 inches of cover. All mains 16-inch I.D. and over shall be laid with a minimum cover of 42 inches.

**B-8.** Where depth of cover would be less than 24 inches over top of pipe at obstruction, the water main shall pass under the obstruction, clearing the obstruction at least one (1) foot and shall be completely encased up to bottom of obstruction in concrete with not less than six (6) inches of concrete on bottom and sides.

**B-9.** All mains, branches and dead ends shall be equipped with blowoffs and/or hydrants of adequate size and number to develop a velocity in the main of at least 2.5 feet per second. Branches of five (5) feet in length or less from tee or cross to valve, or blind flange or plug need not be equipped with a blowoff provided a tablet of chlorine releasing compound is installed and fixed in place in the branch during construction.

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**B-10. Surface Water Crossings:** Surface water crossings, both over and under water, present special problems and should be discussed with the Authority before final plans are prepared.

- (a) Above Water Crossing: A pipe above water crossing shall be:
  - (1) Adequately supported
  - (2) Protected from damage from freezing
  - (3) Accessible for repair or replacement
  - (4) Above 100-year flood level
  
- (b) Underwater Crossing:
  - (1) The pipes shall be of special construction, having flexible watertight joints.
  - (2) Valves shall be provided at both ends of the water crossing so that the section can be isolated for tests or repairs; the valves shall be easily accessible and not subject to flooding.
  - (3) Sample taps shall be available at each end of the crossing and at a reasonable distance from each side of the crossing.
  - (4) Permanent taps shall be made for testing and locating leaks.

### **SECTION C - CONSTRUCTION STANDARDS**

**C-1. Installation of Water Mains, Fittings, and Appurtenances:** All installations shall be made in accordance with the American Water Works Association Standards C600 of latest revision for "Installation of Cast-Iron Water Mains" and with any special applicable supplementary instructions issued by the manufacturers of the equipment being installed. Pertinent parts of AWWA Standards C600 shall also be applicable along with manufacturers' instructions for installation of reinforced concrete pipe, copper pipe, or other pipe material specified by the Authority.

#### **C-2. Excavation, Bedding and Backfill:**

**C-2.1. Clearing:** The site of all excavation shall be first cleared of all lumber, stumps, trees, brush and rubbish which shall be removed or disposed of in a satisfactory manner.

**C-2.2. General:** During excavation operations, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated material not suitable and/or required for backfill shall be removed and disposed of in an approved manner. Such grading shall be done as may be necessary to prevent water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by approved methods. All excavation shall be made by open cut unless otherwise specified.

**C-2.3. Trench Excavation:** The width of the trench at any point below the top of the pipe shall not exceed the structural design assumption width. The width of the trench above the top of the pipe may be as wide as necessary for sheeting and bracing and the proper performance of the work. All trench walls shall be kept as nearly vertical as possible. Excavation at valve vaults and similar structures shall be sufficient to leave at least 12 inches clear between their outer surface and the embankment or sheeting. Minimum clearance between side of trench and pipe shall be six (6) inches.

**C-2.4. Pipe Installed in Trenches:** Pipe to be located at elevations below the existing ground level shall be installed in trenches with Class A, B, or C pipe bedding as shown in Figure VII of the Sewer System - Standards and Extensions. Granular material under and around the pipe shall be placed in six (6)-inch layers and compacted by rodding, spading or with approved vibratory equipment to obtain not less than 80 percent (80%) relative density as determined by ASTM Method D2049.

**C-2.5. Pipe Installed in Embankment:** Pipe to be located at elevations above the existing ground level shall be installed in trenches excavated after embankment has been constructed to a minimum elevation of one (1) foot above the proposed top of pipe.

**C-2.6. Pipe Bedding Material:** The pipe shall be bedded from the trench subgrade to the pipe springline in granular material consisting of gravel, crushed gravel, or crushed stone meeting the requirements of ASTM Designation C33, Gradation 67 (three-fourths (3/4)-inch to No. 4).

**C-2.7. Foundation in Poor Soil:** Whenever the soil at the trench subgrade elevation is soft, unstable, or saturated with water, such unsuitable material will be removed and the trench sub-grade stabilized with a granular stabilization material. Maximum size of granular material shall be two (2) inches. Depth of stabilization shall be as required to construct a firm subgrade for pipe bedding material. Concrete cradle shall be provided when necessary to bridge highly unstable soils.

**C-2.8. Backfill:** All material used for backfilling of trenches shall be free of excessive amounts of deleterious materials such as all organic matter, frozen clods and sticky masses of clay and gumbo which are difficult to properly compact. Any rock materials used for backfill shall be no longer than four (4) inches in greatest dimension, and shall not be placed within 12 inches of the installed pipe in any direction. Material as specified for pipe bedding may be substituted for backfill material defined above from top of pipe bedding to 12 inches above top of pipe.

- (a) Backfill shall be placed in six (6)-inch layers from top of pipe bedding to a point at least 12 inches above the top of pipe. Above this point, backfill shall be deposited in layers of a thickness which will permit compaction to a density as specified hereinafter.
- (b) The layers of material shall be compacted to a density of at least 90 percent (90%) of the maximum density as determined by the AASHO Standard Test (AASHO Designation T99) wherever the pipe is installed in open fields or areas which carry no vehicular traffic. The top portion of the backfill areas which are to be resodded shall be composed of topsoil at least six (6) inches in depth and corresponding to that of the adjoining sodded areas.

- (c) The layers of material shall be compacted to a density of at least 95 percent (95%) of the maximum density at optimum moisture content as determined by the AASHTO Standard Test (AASHTO Designation T99) under all pavements and for future pavements.

Pavement shall not be restored over trenches until the backfill material has been tested and determined as satisfactory according to the tests. Pavement restoration shall be in accordance with Figure VI of the Authority's Sewer System - Standards and Extensions.

**C-2.9. Sheeting and Bracing:** All trenches and excavations shall be properly sheeted and braced for the safety of personnel and/or protection of the work; and/or to maintain the maximum trench widths permitted; and/or to prevent the disturbance or settlement of adjacent foundations or structures.

When so required by the Authority, sheeting shall be left in place by cutting off no higher than one (1) foot below finished surface grade and no lower than one (1) foot above the top of the pipe. The requirement of sheeting and/or bracing left in place shall not obligate the Authority in any manner.

**C-3. Blasting:** Blasting, where required, shall be done with care in accordance with all applicable Federal, State, and local laws, ordinances, and regulations, and shall not be done within a distance of 25 feet from previously laid pipe line or a previously installed structure if, in the opinion of the Authority, the safety or soundness of existing facilities are in any manner endangered.

**C-4.** All bends and elbows of six (6)-inch I.D. or larger shall be installed with suitable concrete thrust blocks poured in place with the concrete deposited against firm, undisturbed earth.

**C-5.** Not more than 4,000 feet of main shall be installed without testing and sterilizing. Contractor shall not proceed with construction until preceding section has been accepted by the Authority.

**C-6.** All lines shall be thoroughly flushed through the blowoffs and/or hydrants provided in accordance with AWWA C601 immediately prior to testing for final acceptance by the Authority. Water used will be estimated by the Authority and charged at cost to the developer or contractor installing the main.

**C-7. Acceptance Tests:** The Authority shall be permitted access to the construction work at any time for inspection of the work and construction methods. Work not conforming to the requirements of these standards shall be adequate basis for rejection of project until corrected to the satisfaction of the Authority.

**C-7.1. Hydrostatic Testing of Water Mains:** Water mains shall be tested by the procedure as outlined in American Water Works Association Standard C600 of latest revision for installation of cast-iron water mains, Section 13 - Hydrostatic Tests, with the following modifications.

- (a) Pressure tests shall be conducted at 150% of normal operation pressure as specified by the Authority.

- (b) Leakage tests shall be conducted at the maximum operating pressure for the locality as determined by the Authority.

**C-8. Repairs:** Water mains not meeting requirements of these standards shall be replaced or repaired in a manner approved by the Authority. Defective materials shall be completely removed and replaced with new materials.

**C-9. Disinfection of Waterlines:** The Authority will sterilize the lines and test their cleanliness before permitting connection for service. Prior to disinfection, all waterlines shall be flushed unless the tablet method of disinfection is used. All valves and hydrants shall be operated during this operation. Flushing velocities should not be less than 2.5 ft./sec. The sterilization will be in accordance with the latest revisions of AWWA Standard C601. At least two (2) consecutive (24-hour interval) satisfactory bacteriological samples to be taken at regular intervals not to exceed 2,000 feet must be obtained from the distribution system before the system can be placed into service. Corporation cocks shall be provided for sterilization at locations designated by the Authority.

**C-10. Protection of Existing Improvements:** During construction operations, care should be exercised to protect, brace, support and maintain all underground pipes, conduits, drains and other underground structures uncovered or otherwise affected by the construction work being performed. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires and other surface structures, together with all sod and shrubs in yards and parkings crossed by or adjacent to the water main under construction, shall be maintained and if removed or otherwise damaged, shall be replaced or restored to the original condition thereof. All replacements of such underground and surface structures or parts thereof shall be made with new materials. All damage resulting from construction operations to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges or other public or private property or facility, regardless of location or character, which may be caused by construction and/or by moving, hauling, or otherwise transporting equipment, materials or men to or from the work or any part of site thereof, shall be the responsibility of the Applicant, his contractor or subcontractor. Satisfactory arrangements shall be made without delay with the owner or owners of, or the agency or authority having jurisdiction over, the damaged property, surface, structure or facility concerning its repair or replacement and payment of cost incurred in connection with said damage.

**C-11. Safety of Public:**

- (a) Maintenance of Traffic: Construction operations shall be scheduled so as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross or interfere with roads, driveways or walks, whether public or private, suitable and safe bridges, detours or other temporary expedients for the accommodation of public and private travel shall be provided and maintained. Reasonable notice shall be given to owners of private drives before interfering with them.
- (b) Barricades and Lights:

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- (1) All streets, roads, highways and other public thoroughfares which are closed to traffic, under the authority of a proper permit, shall be protected by means of effective barricades on which shall be placed acceptable warning signs; such barricades being located at the nearest intersecting public highway or street on each side of the blocked section of such public thoroughfare.
  - (2) All open trenches and other excavations shall be provided with suitable barriers, signs and lights to the extent that adequate protection is provided to the public against accident by reason of such open construction. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.
  - (3) All barricades and obstructions shall be illuminated by means of acceptable warning lights at night and all lights used for this purpose shall be kept burning from sunset to sunrise. Materials stored upon or alongside public streets, roads and highways shall be so placed, and the work at all times shall be so conducted, as to cause the minimum obstruction and inconvenience to the traveling public.
  - (4) All barricades, signs, warning lights and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within public thoroughfare rights-of-way, as required by the authority having jurisdiction thereover.
- (c) Operations Along Streets and Highways:
- (1) No equipment, pipe line or excavated materials shall be stored on the pavement, or on shoulders of uncurbed roads or in ditches or at other locations obstructing traffic or drainage.
  - (2) Construction operations shall be confined to no more than 1,000 feet under construction with a maximum open trench of 300 feet. "Under Construction" shall include all operations between start of excavation of the trench to final tamping of backfill and/or restoration of pavement to public use. Traffic shall not be obstructed in more than one (1) lane during construction operations. The length of one-lane traffic shall be limited to 300 feet. Two (2) flagmen shall be provided to control traffic. Advance warning signs shall be provided. All obstructions shall be removed and the pavement cleaned at all road crossings at the end of each day's operation.
  - (3) All pipe strung along the right-of-way shall be blocked to prevent movement.

**C-12. Permits for Construction on State Highways and Streets:** The Virginia Department of Highways requires a permit for work to be performed on State Highways. Provisions for obtaining such permits are set forth in the "Manual on Permits, Virginia Department of Transportation, Richmond, Virginia", of latest revision. No work will be accepted by the Authority that has not been accepted or approved as satisfactory by the Department of Transportation.

**C-13. Cleanup and Restoration:**

- (a) The Authority will not accept any construction wherein public or private property has not been restored to a condition at least equal to its condition before commencement of construction. All debris, rock or other waste shall be removed and deposited at approved locations and covered with 12 inches of earth, where required by the Authority.
- (b) All streets, roads and highways shall be restored as required by the Virginia Department of Transportation.
- (c) Work performed on private property shall be confined to the easements obtained and the area shall be seeded or sodded, landscaping restored, fences restored and all damaged improvements replaced or restored.
- (d) A condition precedent to acceptance by the Authority shall be a release, from each Owner upon whose property work was performed, stating that the property has been restored to the satisfaction of such Owner.

**SECTION D - RULES AND REGULATIONS**

**GOVERNING EXTENSIONS WITHIN SPECIFIED AREAS**

**D-1. General:** Under special contract agreements, the Authority may permit (1) an extension of its distribution system to be installed within a specified area or (2) the installation of a local distribution system within a specified area, said local system being connected to and served by the mains of the integrated water system of the Authority. In either case, the installation shall be in accordance with the standards presented in Section B hereof, shall be made by and at the expense of the Applicant desiring to secure water services for said area, and, upon acceptance by the Authority, shall be dedicated to the Authority for ownership, operation and maintenance. No such installation shall be made until a written application for a permit and detailed plans and specifications have been filed with the Authority and written permit therefor, including approval of said plans and specifications, has been obtained from the Authority, all as hereinafter provided.

**D-2. Application:** Application for such installation shall be made in writing and submitted in duplicate; shall give the location and size of the area proposed to be served; shall state in detail the number, nature and location of connections to be served (including dwelling units, schools, and other public buildings, and commercial and industrial establishments, together with probable number of employees of each such establishment); and shall be accompanied by two (2) copies of a preliminary plat (measuring 23 inches by 36 inches) drawn to scale and showing the size, material and extent of proposed water distribution facilities, including mains, valves, fire hydrants, and other appurtenances, together with such other pertinent information as the Authority may require, and indicating in full detail the manner in which the Applicant proposes to meet the standards set forth in Section B hereof. Said plat shall be prepared and certified by a Professional Engineer registered in accordance with the provisions

of the Virginia Registration Law, Title 54, Chapter 3, Sections 54-17 through 54-41. Said application shall also be accompanied by a certificate from the Loudoun County Zoning Administrator that the area to be served by the proposed installation has been officially zoned for the particular type or types of land use described in the application and shown on the accompanying plat.

**D-3. Review of Application:** In making its review of the application and accompanying preliminary plat, the Authority reserves the right to require such changes, including changes in pipe size, as it may consider necessary in order (1) to meet the requirements of the standards presented in Section B and (2) to permit future extension where circumstances so indicate.

**D-4. Plans, Specifications, and Cost Estimates:** In case the Authority finds the proposed installation to be practicable from both the engineering and the economic standpoints and to be in accordance with the standards presented in said Section B, the Applicant shall submit to the Authority, in triplicate, complete plans and specifications for the project, together with an estimate of cost, all prepared and certified by a Professional Engineer registered in accordance with the provisions of the Virginia Registration Law, Title 54, Chapter 3, Sections 54-17 through 54-41. Said plans and specifications shall be in complete conformity with the design and construction standards presented in Section B.

**D-5. Contract Agreement:** After the Authority has approved said plans and specifications, and before a permit can be issued, the Applicant shall enter into a contract agreement with the Authority wherein he covenants and agrees as follows:

**D-5.1.** That the installation shall conform to said plans and specifications and shall be subject to inspection by the Authority or its designated representatives at any time as the work progresses.

**D-5.2.** That construction of the installation will be undertaken not later than a specified date and carried through to completion in an expeditious and proper manner.

**D-5.3.** That where the project or any part thereof is to be installed on private property or in a private street, the owner thereof shall provide, free of cost to the Authority, an easement and a free, unobstructed, and uninterrupted right-of-way for inspection, operation, maintenance, enlargement, replacement, alteration and extension of the installation.

**D-5.4.** That in event the construction work is to be done by contract, the Applicant will, upon letting such contract or contracts, advise the Authority as to the total cost thereof.

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**D-5.5.** That the Applicant will be responsible for all damage, loss or injury to persons or property that may arise or be incurred in or during the progress of the work, incident to said project without regard to whether or not the Applicant, his agents, employees or contractors have been negligent, and that the Authority shall be by the Applicant held and kept free and discharged of and from any and all responsibility and liability therefor of any sort or kind; that the Applicant shall assume all responsibility for risks or casualties of every description; that the Applicant shall make good any damages that may occur in consequence of the work or any part thereof, and shall assume all blame, loss and responsibility of whatsoever nature by reason of neglect or violation of any Federal, State, County or local laws, regulations or ordinances.

**D-5.6.** That the Applicant will not commence work on this project until he has obtained all insurance required under this paragraph and such insurance has been approved by the Authority and that the Applicant will not allow any contractor or subcontractor to commence work on this project until all similar insurance has been obtained and approved.

**D-5.6.1. Workmen's Compensation Insurance** for all employees employed at the site of the project.

**D-5.6.2. Public Liability Insurance** during the life of this contract agreement in an amount not less than \$150,000 for injuries, including wrongful death, to any one person and subject to the same limit for each person, in an amount not less than \$500,000 on account of any one accident.

**D-5.6.3. Property Damage Insurance** in an amount not less than \$50,000 for damages on account of any one accident and in an amount not less than \$250,000 on account of all accidents.

**D-5.7.** That this contract agreement shall continue in full force and effect until the project has been completed and turned over to and accepted by the Authority.

**D-5.8.** That ownership of the completed installation shall, upon acceptance by the Authority, be in the Authority, its successors and assigns.

**D-5.9.** That the materials and/or equipment and work performed are guaranteed to be free of defects in material and workmanship, and further agrees to provide all maintenance repairs or reconstruction of defective construction, materials, and/or workmanship including all shrinkage or settlement or other faults arising therefrom at his own expense, promptly when notified in writing to do so by the Authority and to the satisfaction of the Authority for a term of one (1) year from date of acceptance by the Authority. The guarantee shall be secured by a bond of a surety company acceptable to the Authority, in the amount of five percent (5%) of the estimated construction cost of work, for faithful performance of the guarantee.

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**D-6. Performance Bond:** Simultaneously with his delivery of the executed contract agreement, the Applicant shall deliver to the Authority an executed performance bond in the amount of One Hundred Percentum (100%) of the estimated cost of the project, including a contingency item, the amount of said bond to be satisfactory to the Authority, conditioned upon the fulfillment of the contract agreement and upon payment of all persons supplying labor and furnishing materials on the construction of the work, and having as surety thereon such surety company or companies approved by the Authority. In event the Applicant has the work done by contract and the contract price is greater than the estimated cost of the project, the amount of the performance bond shall be increased accordingly.

**D-7. Issuance of Permit:** Upon delivery to the Authority by the Applicant of the executed contract agreement and performance bond, as hereinbefore provided, the Authority will issue the official permit for the installation of the project. The Applicant is hereby placed on notice that any installation work he may do on the project prior to the issuance of said permit is done entirely at his own risk.

**D-8. Notice of Construction:** The holder of a permit hereunder shall notify the Authority of the actual installation of any water main or other facilities covered by said permit at least 48 hours prior to installation of such mains or facilities in order to permit inspection of construction and witnessing of acceptance tests and flushing operations.

**D-9. As-Built Drawings:**

- (a) As-built drawings, on linen or a polyester film type base (Mylar or equal), original or reproducible showing the facilities as actually built and deed book references of easements prepared by a surveyor or engineer duly authorized by the State of Virginia to prepare same, shall be submitted to the Authority as a condition precedent to the use of the facilities.
- (b) Drawings shall meet all requirements of Section C-2 and C-4 of these standards. Any branches and dead ends which may require location at a future date, shall be located by references and dimensions.
- (c) When the as-built information differs from the approved construction plans, a justification for the modified conditions may be required.

**D-10. Extension of Water Distribution System by Authority:** Nothing contained herein shall be construed as limiting or preventing the Authority from extending its water distribution system whenever and wherever it may determine that circumstances so warrant.

**D-11. Resident Supervision of Construction:** Installation of all water mains, fittings, and appurtenances shall be under the direct supervision of a Resident Engineer. The Resident Engineer shall be (1) a registered professional engineer duly authorized in the State of Virginia to perform such work, (2) approved by the Authority, and (3) employed by the Applicant.

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**D-11.1.** Resident Engineer shall be specifically authorized to inspect or cause to be inspected by his subordinates all phases of construction and installation included in the permit issued by the Authority, for compliance to these standards, approved specifications and plans, and the terms of any contract or agreement between the Authority and the Applicant.

**D-11.2.** Resident Engineer shall report in writing daily to the Authority on progress of work and any problems as to compliance as specified in paragraph C-11.1. He shall have the authority to stop work of any contractor or subcontractor failing to comply with requirements, withhold payments until corrections are made to satisfaction of Authority, and/or to require discharge of any employee not producing satisfactory workmanship.

**D-11.3.** Resident Engineer shall be free of intimidation, coercion, or pressure to lower his professional standards or to not perform his duties as provided herein.

**D-11.4.** Resident Engineer shall serve to the satisfaction of the Authority and shall be replaced within 30 days of written notice by the Authority that approval of said Resident Engineer is terminated.

**SECTION E - AMENDMENT AND INTERPRETATION**

**E.1.** The Authority reserves the right to amend or modify this publication without notice, and to interpret the meaning of all statements made herein.