

SECTION 7
WATER SUPPLY SERVICES

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SECTION 7

WATER SUPPLY SERVICES

701 SCOPE

This Section provides guidance to persons who are submitting development proposals to the Authority and outlines the requirements for the provisions of water supply services for these developments. It is recommended that persons wishing to construct developments for buildings used by the public or housing developments of more than 10 units contact the Ministry of Health for advice on the appropriate regulations affecting such developments, in addition to the requirements of this Section.

The Water and Sewerage Regulations, Saint Lucia, (Statutory Instrument, 1995, No. 47) govern the installation and maintenance of water supply and sewerage systems. These Regulations are administered by the Water and Sewerage Authority under the Water and Sewerage Authority Act 1984, No 18. Developers should ensure that the design of the sewerage and water systems are in accordance with these Regulations and with this Section. The Regulations take precedence.

702 GENERAL

- a) The developer is responsible for providing an adequate and potable water supply to his development. This will include the provision, as may be necessary, of a source(s) of supply, treatment facilities, pipeline system and storage facilities. Developers shall satisfy the Authority that there are adequate provisions for the operation and maintenance of such systems.
- b) In areas where there is a centralised water supply adjacent to or in close proximity to the development, the developer will carry out such work and under such conditions as may be required by the Authority and by the Water and Sewerage Authority for connection to the development.
- c) The provisions in this Code regarding submission of plans, payment of fees and approvals shall apply as well as fees charged by the Water and Sewerage Authority for connecting to a public supply.

703 ADEQUACY OF WATER SYSTEM

703.1 Source of supply

Where there is no public supply, the source of supply must be established with the approval of the Authority as below:

- a) Every building shall be provided with a water supply system and storage facility in accordance with the Water and Sewerage Regulations and to the approval of the Authority.
- b) Where a piped water supply is available, the design must provide for individual storage facilities of a minimum capacity of 40 imperial gallons for each person regularly occupying the building, or in the case of buildings of public occupancy such as churches or theaters or industrial buildings, storage facilities which in the opinion of the Authority are adequate. The installation of storage facilities shall be in accordance with the section 14 of the Water and Sewerage Regulations.
- c) The Authority may permit private residences in Group E (Sub-section 301.6) which are wholly dependent on rain water catchment to install catchment and storage facilities which would provide on average less than the 40 gallons per person per day recommended.
- d) Where no piped water supply is provided to serve the development, or unless a desalination plant is, or will be installed, the design submitted with the application for buildings in Groups B (Institutional Buildings) and E (Residential Buildings) must provide for individual rain water storage to the extent of 10 imperial gallons for each square foot of roof surface, except that for multi-family dwellings the capacity of the tank must be based on a minimum storage of 4,000 gallons per bedroom.
- e) Sub-section 703.1 d) will not apply if:
 - (i) the building is to be supplied with potable water by means of desalination of non-potable water or by any other means such as to avoid the occupants of the building needing to rely on water being supplied from any existing public well or borehole, public tank or cistern or to extract potable water from any lens or underground water; and
 - (ii) adequate back up system fed from an alternative source or 3 days storage, whichever is greater, is provided against the possible break down of the primary supply. The back up system is required to be in full working order at all times.
- f) A fault or breakdown in the primary system referred to in e) shall be repaired without delay.
- g) Abstraction from a ground water source requires prior approval of the Authority. Full details are to be supplied of the proposed borehole to be established including the intended rate of abstraction and available information on the aquifer.

- h) Pumping levels in the borehole will not be allowed to fall below 1.0 feet above mean sea level and the rate of abstraction must take into account the water needs of other developments, proximity to potential source of pollution such as a sewage outfall, and the characteristics of the aquifer in which the borehole is located.
- i) Desalination plants must be designed and constructed with the approval of the Authority and of the Ministry of Health. Full details of the proposed plant must accompany the application.

The details must include:

- i) location of the source of raw water,
 - ii) analysis of the raw water,
 - iii) capacity of the plant,
 - iv) main features of the treatment process,
 - v) method of disposing of the effluent and
 - vi) future arrangements for operation and maintenance
- j) There shall be no cross connection between a potable supply and a non-potable supply. The Water and Sewerage Regulations provides details for prevention of:
 - i) prevention of contamination by contact with unsuitable substances
 - ii) prevention of waste or contamination of stored water
 - iii) prevention of waste of water from damage to fittings from causes other than corrosion
 - iv) prevention of waste from contamination by unsuitable or improperly installed water fittings

The developer should consult the Regulations before designing the water system so as to avoid the problems of contamination referred to in the Regulations.

703.2

Quantity of water to be supplied

- a) The applicant is to include in his proposal complete arrangements for providing an adequate quantity and quality of water to meet fully the needs of his development. The per capita consumption rate assumed for design purposes must be approved by the Authority.

- b) Minimum daily potable water consumption rates are as follows:

Dwelling house	40 gallons/person/day
Hotels	150 gallons /room/day
Offices	8 gallons/employee/day

703.3 Treatment Facilities

- a) Where the developer is providing water from a source other than the public supply, the water supply must be treated as necessary and disinfected by chlorination or other approved process to ensure that the quality satisfies the Guidelines for Drinking Water Quality as published by the World Health Organization in 1984, or other acceptable standard guidelines that are approved in writing by the Ministry of Health.
- b) The treatment facilities shall be designed and constructed to the satisfaction of the Authority and the Ministry of Health.

703.4 Design of Storage Facilities

- a) Unless exempted by the Authority, buildings in Occupancy Groups A (Public Buildings) and B (Institutional Buildings) should be provided with at least 3 days storage of treated water based on the consumption estimates given in Sub-sections 703.1 and 703.2. This is in addition to any storage provided at the source of a public water supply.
- b) The location and design of the storage facilities, (tanks or cisterns) must be approved by the Authority and the Ministry of Health and in accordance with section 14 of the Water and Sewerage Regulations. The applicant should provide the Director with drawings and calculations showing that the storage facilities are adequate and that the structure can safely support the water in the facility.

704 INSTALLATION OF WATER SUPPLIES

704.1 General

As far as possible all pipelines should be laid underground and in a manner as not to interfere with future development and other services. All installations shall be carried out in accordance with the Water and Sewerage Regulations.

704.2 Supply Pipes to Individual Fixtures

Table 7-1 shall determine the minimum size of water supply pipe to a sanitary fixture provided that no supply pipe shall be smaller than the connection to a fixture and this shall determine the minimum size of supply pipe to fixtures not listed in Table 7-1.

704.3 Distribution Pipes

Table 7-2 establishes the maximum fixture unit load permitted for a given size of water distribution pipe and shall be used to determine the minimum sizes of water distribution pipe provided that:

- (a) Individual fixture unit ratings shall be taken from the Table.
- (b) Where the incoming central water supply pressure regularly falls below 50 lb. per sq. in. the next large size of pipe shall be used.
- (c) Where flush valve operated water closets are installed the minimum size of the main incoming supply shall be 1-1/2"
- (d) No section of distribution pipe shall be smaller than the largest branch pipe taken from it.
- (e) Not more than three fixtures shall be supplied by one 1/2" cold water pipe.

Table 7-1

Minimum Size of Water Supply Pipes to Individual Fixtures

Description	Size of Pipe (in)	Description	Size of Pipe (in)
Bath tub	1/2	Water closet (cistern operated)	3/8
Bidet	1/2	Laundry tub	1/2
Drinking fountain	3/8	Shower	1/2
Flushing sink (cistern operated)	1/2	Slop sink	1/2
Flushing sink (flush valve operated)	1	Urinal (cistern operated)	3/8
Hose connection (flush valve operated)	1/2	Urinal (flush valve operated)	1
Kitchen sink (domestic)	1/2	Water closet (flush valve operated)	1
Kitchen sink (commercial)	3/4	Water heater	1/2
Washing machine	1/2		

Table 7-2**Minimum Size of Water Distribution Pipes**

No. of fixture units served	Size of pipe (in)	No. of fixture units served	Size of pipe (in)
1 - 10	1/2	76 - 150	1 - 1/2
11 - 25	3/4	151 - 300	2
26 - 50	1	301 - 600	1-1/2
51 - 75	1-1/4	101 - 1,200	3

705**PIPELINE SYSTEM****705.1****General**

The pipeline system must be designed and constructed to the satisfaction of the Authority.

705.2**Excavation of Pipe Trenches**

- (a) The centre line of the pipe trench should be within the right of way but not under the road surface. The width of the trench should be 18 inches minimum and otherwise the minimum width required to enable the work to be done but not less than 12 inches greater than the diameter of the pipe. The depth of the trench should be such as to provide the minimum cover over the crown of the pipe under any carriage way measured from finished road surface as shown in Table 7-3.

Table No. 7-3**Minimum Depth of Cover to the Crown of the Pipe**

Pipe Diameter	Depth of Cover (ft-in)
Up to 6"	2-6
Over 6" and up to 10"	2-9
Over 10" and up to 20"	3-0

- (b) The trench should be excavated in straight lines between changes in direction and be carefully graded so that there is a minimum number of substantially high points along its length. Air valves are to be installed at high points in the line subject to prior approval of the location and size of the air valve in

each case Where the trench has been excavated too deep, it shall be filled to grade with thoroughly rammed approved granular material, subject to paragraph (c) below.

- (c) Subject to para. (e) below a 4 inch depth of the bottom of the trench should be of selected material having no particle larger than that indicated in Table 7-4 for pipelines of the material as shown in the Table.
- (d) In peaty or boggy ground the bottom of the trench should be excavated to an approved depth below grade and refilled with broken stone, and a bedding of chips should be laid over the broken stone and thoroughly rammed to grade.
- (e) In rocky ground the bottom of the trench should be filled to a depth of 6" with material no larger than that given in Table 7-4.

Table 7-4

Maximum Particle Size

Pipe material	Maximum particle size of selected material (in)
Grey Cast Iron or Ductile Iron	1
Steel or Copper	3/4
PVC	1/4

705.3

Pipe Laying

- a) Pipes must be laid in straight lines between changes in direction. The entire length of the barrel of the pipe must be supported on the bottom of the trench. Care must be taken to ensure that the inner surface of each pipe is left clean after laying. When pipe laying is not in progress the ends of the pipeline should be plugged to prevent ingress of foreign matter.
- b) Pipes laid under high ground water conditions must be plugged and backfilled between joints before testing so as to avoid floating of pipelines. The location of pipes must be marked.
- c) Pipes laid under drains, water courses, channels, concrete slabs, culverts, or other conduits should be laid in a sleeve extending at least two feet on each side of the conduit, beyond the side wall of the conduit or toe of embankment supporting the conduit. The sleeve may be of steel or ductile iron pipe or other material approved by the Director and be surrounded in

concrete if the cover to the pipe is less than 18 inches or provided with such other protection as maybe required by the Authority.

705.4 Jointing of the Pipe

The developer must conform to the manufacturers' instructions as regards the procedure for proper laying and jointing of the particular type of pipe and joint being used in the development. Other basic requirements for a satisfactory joint are:

- a) Cleanliness of all parts
- b) Correct location of components
- c) Centralization of spigot and socket sleeve.
- d) True alignment in vertical and horizontal planes.

705.5 Anchoring of Pipes

- a) Thrust blocks must be provided at tees, crosses, dead ends and at all bends (except concave vertical bends). In the case of bends, the blocks should be located symmetrically with the pipe fitting which should be symmetrical with the radial centre line. The thrust blocks should be constructed of 2,500 lb. concrete, reinforced if required, and must rest firmly on the solid ground.
- b) The required area of bearing on the solid earth will vary with the type of soil, and the area of bearing on the pipe fitting must be sufficient to safely transmit the thrust through the block. Information on the soil bearing and shear capacity must be submitted with the request for design approval.
- c) Pipelines of PVC or other flexible materials must use thrust blocks as required by the manufacturers' specifications.

705.6 Hydraulic Testing of Pipe Lines and Joints

- a) After all work in connection with the laying of the pipeline system has been completed, the developer shall issue to the Director a certificate of final inspection and testing. The testing shall be carried out by qualified engineers or technicians approved by the Authority.
- b) The developer shall be responsible for meeting the cost and carrying out the testing of the pipeline system as required by the Authority and as set out hereunder.
- c) Air vents must be provided at the upper end of the section of pipeline to be tested and at other locations as required. The

line should be slowly filled, preferably from the lower end. The pressure should be increased to 150 percent of the anticipated working pressure and be sustained for 2 hours.

- d) The pipeline and joints will be accepted as having satisfied the test if the leakage does not exceed 1 gallon per inch of pipe diameter per mile of pipeline for each 100 feet to test pressure. The measure of leakage is the volume of water required to be pumped into the pipeline so as to re-establish the test pressure.

705.7

Disinfection of the Pipe line

- a) Newly installed pipe lines must be flushed and the water tested before being put into use. The developer must provide and fix a valve of the same diameter as the pipeline in a suitable location for the effective flushing of the line.
- b) After the pipe line has been flushed it shall then be charged with water to which has been added chlorine at the rate of 50 parts per million parts of water. After 24 hours the pipe line will be thoroughly flushed after which samples will be collected and tested by a reputable laboratory approved by the Ministry of Health. The testing regime shall be to the approval of the Ministry of Health.
- c) If the laboratory examination shows that the pipe line has not been adequately disinfected, the disinfection shall be repeated until satisfactory samples have been obtained.
- c) All tests are to be carried out at the expense of the developer and to the approval of the Ministry of Health.

705.8

Back filling of Trenches

Selected material should be firmly tamped by hand rammers around and to a height of 12 inches above the top of the pipe. Natural excavated material should then be tamped by hand rammers to a height of 24 inches over the top of the pipe, thereafter the remainder of the backfill composed of natural excavated material may be tamped by mechanical tamper.

705.9

Connection of Accessories

- a) Methods for connecting water pipes and fittings are subject to approval by the Authority and shall be in accordance with the Water and Sewerage Regulations.
- c) Service or communication pipes of ½", ¾" and 1" diameter may be either of copper equivalent to ANSI B 16.22-1980 or PVC Schedule 40 or as approved by the Authority. The pipe shall be laid to a minimum depth of 18" below the surface of the carriage way and terminate on the pavement (sidewalk), the

d) In new developments fire hydrants must be provided at locations as required by the Authority. In areas where fire engines cannot reach the building, dry mains must be provided. Cisterns should also be made accessible to fire hoses, if necessary by constructing a special basin outside of the cistern for receiving a fire hose.

Where water supply pipelines and sewers are laid in close proximity to each other a colour code or other means of identification must be adopted, with the approval of the Authority, to ensure that each can be readily identified.

- (a) Fresh ground water utilization shall normally be limited to government approved developments except where the Authority considers that a particular case merits special consideration.
- (b) No restriction shall be imposed on fresh ground water use in individual dwelling plots if the method of extraction is limited to hand pumps or buckets. However the wells must be properly sealed to the approval of the Ministry of Health to prevent contamination of the well water.
- (c) Unless otherwise approved by the Authority, pumping of any well shall not cause depression of the water level.
- (d) A well for potable water supply shall penetrate the fresh water zone only to a maximum of one third of the depth of the fresh water lens.
- (e) Wells shall be provided with surface aprons to a distance of five feet around the well, and the well-tops shall project above the surface apron to a minimum height of two feet, and be equipped with a sanitary well seal, all to be constructed of approved materials, to ensure that no direct entry of any surface water can occur through the well.
- (f) Wells shall be located a minimum of the indicated distances away from sources of pollution, as follows:
 - (i) Pit latrines, septic tank and sewers: 150 ft.
 - (ii) Cesspools: 150 ft

DOMESTIC WATER PUMPS

- a) Where a water pump is provided as part of a private domestic water supply it shall be sized to maintain a minimum of 20 lbs. pressure under all conditions of water use. A pressure tank of adequate capacity shall be installed. It is recommended that the plumbing within 3 ft. of the water pump be of galvanised steel to prevent melting of the plastic pipe fittings if the pump should run dry.
- b) Paper and charcoal filters placed in the domestic water supply line will help in reducing colour and odour in the water supply. However, no reliance shall be placed on passive filters to remove disease organisms from contaminated water.

SAFETY DEVICES

- a) A pressure relief valve shall be installed for all equipment used for heating or storing hot water. Hot water shall be run in copper or CPVC pipe. Regular PVC pipe shall not be used.
- b) Water hammer is caused by loosely fixed pipes, bends or taps such as self-closing or spring type which shut off too quickly. It is more likely to occur in long branches than when the tap is fixed close to the supply line. An air vessel or dead-end riser pipe shall be fixed as close to the pipe as possible in order to absorb the shock and thus minimize water hammer.