NATIONAL RESEARCH COUNCIL
CANADA

Associate Committee on the
National Building Code

A National Code for

Plumbing Services

(Authorized Preprint of Part 7 of the National Building Code, 1953)

This document supersedes "A Standard Plumbing By-law" published in 1940 as N.R.C. No. 924

OTTAWA
1953

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This Part has been preprinted in this form as a service to the building industry, as a guide to modern plumbing practice. It will be printed in final form as a regular Part of the National Building Code, 1953.

Ce document sera disponible en français d'ici quelque temps. Toutes demandes doivent être adressées au Secrétaire, Comité Associé sur le Code National du Bâtiment, Conseil National de Recherches, Ottawa, Canada.

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PART 7: PLUMBING SERVICES

PLUMBING BY-LAW OBJECTIVES

Plumbing is an integral part of man's environment and, as such, influences his health, welfare, and standard of living. Any plumbing by-law, to be effective, must combine modern standards of sanitation and health protection with that economy of installation which will make these facilities available to the greatest possible number of persons.

Specific objectives have been followed in the preparation of this Plumbing By-law. It is intended to serve as a guide for modern plumbing practice. Minimum requirements are specified for design, installation, and operation of *plumbing systems** for all *buildings* intended for human occupancy.

Basic principles in plumbing are the same everywhere but certain modifications may be necessary to meet local climatic or other conditions. Some of the objectives or basic principles which should be associated with plumbing are listed herewith:

(1) The provision of modern plumbing facilities to all premises having human occupancy;

(2) The provision of an adequate supply of *potable water* protected at all times against conta-

*NOTE: Words which are in italics in this Part are defined. Definitions relating particularly to plumbing services are contained in Section 7.1, Plumbing Services, Definitions. General definitions are contained in Part One, Administration, of this By-law.

mination for premises intended for human occupancy;

(3) The extension of public sewers as early as possible to serve all *buildings* for human occupancy;

(4) The temporary provision of *private sewage disposal systems* until sewers can be constructed;

(5) The provision of adequate plumbing facilities in a *dwelling* to ensure personal hygiene and good sanitation, along with convenience and comfort for the occupants;

(6) The use of plumbing *fixtures* which have a smooth, non-absorbent surface, connected to a *drainage system* so constructed as to ensure easy cleaning and a free flow of wastes throughout;

(7) The use of piping in the *plumbing system* which is durable, of adequate size, and in all respects suitable to provide sanitation and the protection of health through the provision of *potable water*, drainage of wastes, and ventilation of the system;

(8) The use of a *plumbing system* adequate to meet recognized tests for leaks and defects and which minimizes danger and inconvenience to the occupants under conditions of ordinary usage;

(9) The installation of pumbing *fixtures* to prevent contamination of or damage to food and other materials in the premises;

(10) The design of rooms, in which plumbing *fixtures* are installed, which are convenient and which can be readily ventilated and cleaned.

SECTION 7.1: DEFINITIONS

In this By-law:

Air gap means, in a *water supply system*, the unobstructed vertical distance between the outlet of any faucet or pipe and the *flood level rim* of the water-supplied *fixture* or receptacle;

Area drain means a drain installed to collect surface or rain water from an open area;

Back-flow means such flow of

(a) water, polluted or non-polluted, from any place other than the source of supply of *potable water*, or

(b) any solid, liquid, or gaseous substance, or any combination thereof,
into a potable water distributing pipe as may make the water in that pipe non-potable;

Back-flow preventer means a device for installation in a water supply pipe to prevent *back-flow* from the connections on the outlet end of the *water supply system;*

Back vent means a pipe installed to vent a *trap*, *soil pipe*, or *waste pipe*, and connected to the general vent system at a point above the *fixture* served by the *trap*, *soil pipe*, or *waste pipe* or terminating in the open air; *back vented* has a corresponding meaning;

Branch means that part of a pipe system which extends from a water distribution pipe, or from a main *soil* or *waste pipe*, to one or more *fixtures*, or

the pipe connecting one or more individual vents with a *vent stack;*

Branch interval means a length of soil or waste *stack*, not less than 8 feet long, into which the horizontal *branches* from one floor or *storey* of a *building* are connected;

Branch vent means a *vent pipe* connecting one or more individual *vent pipes* to a *vent stack* or a *stack vent;*

Building drain means that part of the lowest horizontal piping which receives the discharge from *soil*, *waste*, and other drainage *pipes* within a *building* and conveys it to the *building sewer* beginning 3 feet outside the buiding wall;

Building sewer means that part of a *drainage system* outside a *building* commencing at a point 3 feet from the outer face of the wall of the *building* and connecting the *building drain* to the *main sewer* or place of disposal of *sewage;*

Building sub-drain means that part of a *drainage system* which cannot drain by gravity into the *building sewer;*

Building trap means a *trap* installed in the *building drain* to prevent circulation of air between the *plumbing system* and the street sewer;

Circuit vent means a *branch vent* that functions for two or more *traps* and extends from a point on a horizontal *branch* in front of the last fixture connection to a *vent stack; circuit-vented* has a corresponding meaning;

Cleanout means a pipe fitting that has a removable cap and is so constructed that it can be installed at the end of a pipe or on a Y so that the cap can be removed to permit pipe cleaning;

Combined sewer means a sewer which carries both *storm water* and *sewage;*

Continuous vent means a continuation of a *vertical waste pipe* above the connection of the waste fitting;

Continuous waste means a *waste* or *soil pipe* from two or more *fixtures* connected to a single *trap;*

Cross-connection means a physical connection through which a *potable water* supply could be contaminated;

Crown weir means the highest portion of the inside lower surface of a *trap;*

Dead end means any pipe that is 2 feet or more in developed length and terminates with a cap, plug, or other closed fitting;

Developed length means the length along the centre line of pipe and fittings;

Double offset means two offsets installed in succession in the same line;

Drainage system means any system of piping that conveys *sewage* or run-off water to a *building sewer;*

Fixture means a receptacle, including a *floor-drain,* that receives water, liquids, or water-borne wastes, and discharges any of them into a *drainage system;*

Fixture unit means a design factor for drainage piping in which the rate of discharge from a wash basin having a 1¼-inch outlet is taken as unity, and the rate of discharge from all other *fixtures* is related to it;

Flood level when used with reference to a *fixture* means the level at which water begins to overflow the top or rim of the *fixture;*

Flood level rim means the top edge of a *fixture* from which water overflows;

Floor drain means a *fixture* used to receive water from the floor of a *building;*

Frost-proof closet means a closet that has no water in the bowl and has the *trap* and the water control valve installed below the frost line;

Horizontal pipe means a pipe installed in a horizontal position, or which makes an angle of less than 45 degrees with the horizontal;

Indirect waste means a *waste pipe* not directly connected to a *drainage system* but which discharges freely into or over a trapped *fixture;*

Individual vent has the same meaning as *back vent; individually vented* has a corresponding meaning;

Interceptor means a grease *trap* or other receptacle designed to intercept and prevent the passage of grease, oil, sand, or similar materials into the *drainage system;*

Leader means any pipe or conduit carrying rain or *storm water* from a roof to the *storm sewer* or other point of disposal;

Loop vent means a *circuit vent* except that the *vent pipe* loops back over the flow line of the *fixtures* and re-connects with the main soil or waste *stack vent;*

Main means any system of horizontal, vertical, or continuous pipe which receives the wastes, vent, or vents, from *fixtures,* directly or through branch pipes;

Main sewer or *sewer main* means the public sewer in a street, lane, or other location;

Main vent (see *vent stack*);

Plumbing contractor means any person, corporation, or firm, undertaking to construct, reconstruct, or extend, any *plumbing system;*

Plumbing system means the arrangement of drains, pipes, *fixtures,* and other appurtenances, for the complete carrying off of all *sewage* from a *building* together with the necessary ventilating system and the *water supply system* to *fixtures;*

Potable water means water which is safe for human consumption;

Private sewage disposal system means a private system consisting of one or more settling or septic tanks and an absorption field or some other *approved* method of liquid disposal;

Relief vent means a vent connected to a horizontal *waste* or *soil pipe* at a point between the soil *stack* and first or nearest *fixture* and carried above the flow line of the highest *fixture* to the *main vent* or *stack vent;*

Riser means a water supply pipe which extends vertically one full *storey* or more to convey water to *branches* or *fixtures;*

Sanitary sewer means a sewer which carries any waste except *storm water;*

Seepage pit means a covered pit through which septic tank effluent or other settled *sewage* may seep or leach into the surrounding soil;

Sewage means any liquid waste containing animal, vegetable, or mineral matter, in suspension or solution;

Sewer main (see *main sewer*);

Soil pipe means any pipe which conveys the discharge of one or more *water-closets* or *fixtures* having similar functions with or without the discharge from other *fixtures;*

Stack means the vertical *main* of any system of soil, waste, or *vent pipe;*

Stack vent means the extension of a soil or waste *stack* above the highest horizontal drain connected to the *stack;*

Storm sewer means a sewer which carries only *storm water;*

Storm water means water resulting from or following rainfall or snowfall but not containing *sewage;*

Subsoil drain means a drain installed for collecting or conveying subsurface or seepage water;

Sump means a pit or receptacle to which liquid wastes are drained and from which the waste is

pumped, ejected, or overflows to the *plumbing system;*

Trap means a fitting or device so designed as to provide a liquid seal which will prevent the back passage of air without materially affecting the flow of *sewage;*

Trap dip means the lowest portion of the inside upper surface of a *trap;*

Trap seal means the vertical distance between the *crown weir* and the *trap dip* of a *trap;*

Vent pipe means a pipe or system of pipes installed to provide a circulation of air within such system to protect *trap seals* from siphonage and back pressure;

Vent stack or *main vent* means a vertical *vent pipe* installed to provide a flow of air to or from a *drainage system;*

Vertical pipe means a pipe installed in a vertical position or which makes an angle of not more than 45 degrees with the vertical;

Waste pipe means any pipe which receives the discharge from any *fixture* except *water-closets* or similar *fixtures*, and conveys it to the *building drain*, soil, or waste *stack;*

Water-closet means a *fixture* commonly so known;

Water service pipe means the pipe, with necessary controls, extending from the water *main* or other source of supply to the *building* served;

Water supply system means the pipe, fittings, control valves, and all appurtenances, in or adjacent to a *building*, for conveying water from the *water service pipe* to plumbing *fixtures* or other apparatus or devices;

Wet vent means a *soil* or *waste pipe* which serves also as a vent;

Yoke vent means a pipe connecting upward from a soil or waste *stack* to a *vent stack* for the purpose of preventing pressure changes in the *stacks*.

SECTION 7.2: GENERAL REQUIREMENTS

7.2.1. Application

All plumbing installations, including alterations and additions, shall be subject to the requirements of this By-law.

7.2.2. Workmanship

All plumbing shall be installed in a workmanlike manner and shall be subject to inspection and testing.

7.2.3. Existing Buildings

In existing *buildings* in which the *plumbing system* is altered, repaired, or renovated, deviations from this By-law are permitted, provided such deviations are found necessary, conform to the intent of this By-law, and are *approved* in writing by the *administrative official*.

7.2.4. Connection to Sewerage System

Every *building* in which plumbing *fixtures* are installed shall have a connection to a public sewer or a *private sewage disposal system.*

7.2.5. Changes in Direction

(1) Changes in direction in *horizontal soil pipe* or *waste pipe* shall be made by the appropriate use of 45-degree Y's, long-sweep quarter bends, sixth, eighth, or sixteenth bends or by a combination of these, or by the use of equivalent fittings.

(2) Short-sweep quarter bends may be used to effect change from horizontal to vertical drop.

(3) T's and crosses may be used in a *vent pipe* and in a water distributing pipe.

(4) Single sanitary TY's may be used in vertical sections of a drain or *stack.*

7.2.6. Prohibited Fittings and Connections

(1) No pipe or fitting with double hubs on the same run, and no double T shall be used on *soil* or *waste pipe.*

(2) The drilling, tapping, or welding of *building drains, soil, waste,* or *vent pipes,* and the use of saddle hubs or bands shall be prohibited.

(3) Any fitting or connection that offers abnormal obstruction to flow through a drain shall be prohibited.

(4) Double Y fittings shall not be used on any horizontal line.

(5) The *waste pipe* from a bath tub or other *fixture* shall not discharge into a water-closet bend or stub.

7.2.7. Dead Ends and Unused Pipes

(1) Where a *dead end* is installed it shall be graded so that all moisture accumulating in it drains back into the system.

(2) No unused open end in *waste* or *vent pipes* shall be permitted within the *plumbing system*, and all *dead ends* shall be so arranged as to permit drainage therefrom.

(3) When a *waste pipe* for future use is roughed in, the required *vent pipe* shall also be roughed in.

7.2.8. Hangers and Supports

(1) *Vertical pipe* shall be supported and anchored with strong iron rests, set at least at the floor level of alternate *storeys* or 25 feet apart, whichever is the lesser distance, and where pipes are offset or are branched, the rests shall be placed at closer intervals to keep the pipe in alignment and to carry the weight of the pipe and its contents.

(2) Subject to items (3) and (4), *horizontal pipe* shall be supported at points sufficiently close to

(a) prevent the pipe from sagging when it is full of liquid; and

(b) keep it in alignment.

(3) No interval between supports for *horizontal pipe* shall be greater than 8 feet for pipe sizes from $\frac{3}{4}$ inch to $3\frac{1}{2}$ inches, and not greater than 12 feet for pipe sizes of 4 inches or more.

(4) Lead pipe in horizontal runs shall be supported throughout its entire length and horizontal cast-iron pipe shall be supported at each hub.

(5) Strap hangers shall not be used to support *horizontal pipe* larger than 4 inches in diameter, but ring hangers may be used for pipe of any size.

(6) Where a hanger of either type is attached to stone, brick, cement, concrete, or other similar material, the attachment shall be made by means of metal or expansion-type plugs inserted into the material.

(7) Hangers shall be of metal and of sufficient strength to support the weight of the pipe and its contents.

(8) Underground pipe shall be laid in such manner that undue stress in the pipe and joints shall be avoided.

(9) Where a drain is laid on an unstable base, it shall be of cast iron, and supported by a layer of concrete, or piers of brick, stone or concrete.

(10) Where a layer of concrete is used, it shall be not less than 4 inches thick, and 6 inches wider than the nominal diameter of the pipe.

(11) Where piers are used, they shall

(a) have a cross-sectional area each of not less than 110 square inches;

(b) be at intervals not greater than 8 feet; and

(c) extend down to a solid base.

7.2.9. Protection of Pipe

(1) A ferrous pipe passing under or through cinders or other corrosive material shall be protected against external corrosion by a heavy coat of bituminous or similar material.

(2) A pipe passing under or through a wall shall be protected against breakage caused by weight or settling of the wall bearing on the pipe.

(3) Every water supply pipe, *soil pipe*, or *waste pipe* shall be protected from freezing.

7.2.10. Industrial Waste

Waste which may be injurious to any portion of the *plumbing system*, public sewerage system, or to the functioning of the sewage treatment works, shall be treated or processed as required by a local by-law covering such matters, or in the absence of a by-law, as directed by the *administrative official.*

7.2.11. Location of Fixtures

Water-closets and urinals shall be located in a room adequately ventilated and lighted in accordance with the provisions of this By-law.

7.2.12. Mezzanine Floor

A mezzanine *storey* or floor in or upon which a *fixture* is installed shall be deemed a separate *storey* or floor.

7.2.13. Size of Pipe

The size of pipe or tubing, unless otherwise stated, is the nominal size by which pipe or tubing is commercially designated.

SECTION 7.3: MATERIALS

7.3.1. Quality of Material

Material used in any part of a *plumbing system* shall be free from defects which may affect its usefulness for purposes of sanitation.

7.3.2. Specification for Material

(1) Material for *plumbing systems* shall comply with the standards specified in this Section.

(2) Material for special conditions or material not provided for in this Section may be used only as provided for in Part 5, Materials.

7.3.3. Non-metallic Pipe

(1) Asbestos-cement pipe and couplings shall be sound; rubber rings for couplings shall consist of a moulded and vulcanized rubber compound.

(2) Asbestos-cement sewer pipe shall comply with the provisions of Table 7.1; where tapered-end couplings are used they shall be asphalt-lined and a primer shall be used in assembling pipe to coupling.

(3) Bituminized-fibre pipe, bends, and couplings shall be of dense homogeneous material without seams or laminations, and the interior

surfaces of pipe and bends shall be smooth and free from obstructions, rough or flaky areas. The pipe, bends, and couplings shall have a 2 per cent taper at each end. Bituminized-fibre pipe shall comply with the provisions of Table 7.2.

(4) Clay sewer pipe shall be first quality, vitrified earthenware, free from fractures, deep cracks, laminations, and surface roughnesses and shall comply with the provisions of Table 7.3.

(5) Concrete sewer pipe shall be substantially free from fractures, large or deep cracks, laminations, and interior surface roughnesses and shall comply with the provisions of Table 7.4. Branches on concrete sewer pipe shall have the connections securely and completely fastened, in the process of manufacture, to the barrel of the pipe.

7.3.4. Ferrous Pipe

(1) Cast-iron *soil pipe* shall be not lighter than medium classification, sound and free from cracks, sand holes, and blow holes. Cast-iron *soil pipe* shall comply with the provisions of Table 7.5.

(2) Every cast-iron pipe and fitting shall be finished with a corrosion-retarding coating inside and outside.

(3) Every cast-iron fitting shall be of a quality corresponding to that of the straight pipe.

(4) Threaded cast-iron pipe and fittings shall comply with the provisions of Table 7.6.

(5) Screwed cast-iron drainage fittings shall be recessed to provide a smooth channel.

(6) Wrought-iron pipe may be butt-welded or lap-welded for sizes up to 2 inches but larger sizes shall be lap-welded. Wrought-iron pipe shall comply with the provisions of Table 7.7.

(7) Welded and seamless steel pipe may be butt-welded for sizes up to 4 inches, but larger sizes shall be lap-welded.

(8) Steel pipe shall comply with the provisions of Table 7.8. Couplings for steel pipe shall be wrought iron or steel.

(9) Open-hearth iron pipe shall comply with the provisions of Table 7.9.

7.3.5. Non-ferrous Pipe

(1) Brass and copper pipe, iron pipe size, used in a *plumbing system*, shall comply with the provisions of Table 7.10.

(2) Copper tube for vent, waste, and water distribution pipe within a *building* shall be drawn (hard) and shall be at least type "L" grade as provided in Table 7.11.

(3) Copper tube for underground *water service pipe* shall be annealed (soft) and shall be at least type "K" grade as provided in Table 7.12.

(4) Lead *water service pipe* shall have a wall thickness and density so that each yard of length of piping weighs not less than that prescribed in Table 7.13.

(5) Lead *waste pipe* shall weigh not less than prescribed in Table 7.14.

7.3.6. Ferrules and Nipples

(1) Brass caulking ferrules shall comply with the provisions of Table 7.15.

(2) Brass soldering nipples shall comply with the provisions of Table 7.16.

(3) Brass soldering hubs shall comply with the provisions of Table 7.17.

7.3.7. Sheet Lead

Sheet lead shall weigh not less than 5 pounds per square foot.

7.3.8. Floor Flanges

Floor flanges for *fixtures* having an integral *trap* shall be not less than 3/16-inch thick, of brass, designed for soldering to lead pipe, and all floor flange bolts, washers, and nuts shall be of heavy brass.

7.3.9. Galvanizing

All steel and wrought-iron pipe and fittings used for *waste*, *vent* or *water pipe* shall be galvanized inside and outside.

7.3.10. Identification of Materials

Every length of pipe and every fitting used in a *plumbing system* shall have cast, stamped or indelibly marked on it, the maker's name or mark and the weight and class or quality of the product.

7.3.11. Used Material

(1) Pipe or fittings which have been used for any purpose other than the distribution of *potable water* shall not be installed for distributing *potable water.*

(2) Used pipe or fittings shall not be reinstalled in a new location except on written consent of the *administrative official* and of the owner of the *building* in which it is to be installed.

SECTION 7.4: PLUMBING FIXTURES

7.4.1. Installation

(1) A *fixture* shall be so installed as to be readily accessible for cleaning.

(2) Where feasible, all pipes from a *fixture* shall be run to a wall and any pipe or *trap* of a type subject to damage shall be adequately protected if it extends to within 12 inches of the floor.

(3) A suitable access door shall be provided in the construction to facilitate repairs and replacements of the connection of built-in bath tubs and other built-in *fixtures* which have a concealed union, slip-joint, or gasket water or waste connection.

7.4.2. Materials

Every plumbing *fixture* shall be made of materials with smooth, hard, impervious, corrosion-resistant surfaces, free from flaws or blemishes that would tend to interfere with ready cleaning.

7.4.3. Water-closet Bowls

(1) A water-closet bowl shall be made of vitreous china, or vitreous glazed earthenware, or any material having an equally smooth, hard, impervious, corrosion-resistant surface.

(2) A *water-closet* may be siphon jet, washdown, reserve *trap*, or blow-out type with floor outlet; or a siphon jet, or blow-out type with wall outlet.

(3) A water-closet bowl shall be in one piece, and so constructed that when the bowl is filled with water to the point of trap overflow, the volume will be sufficient to prevent fouling of the surface of the bowl, and the bowl shall have an integral flushing rim so constructed as to flush the entire surface.

(4) A water-closet bowl shall be securely attached to the floor or wall, and a wall-hung closet shall be so supported that no strain is transmitted to the piping.

(5) A water-closet bowl shall be equipped with a seat of an elongated open-front type in any *building* which may be used by the public.

7.4.4. Water-closet Tanks

A water-closet tank shall have a water capacity sufficient to flush properly the water-closet bowl to which it is connected, and shall be adjusted to provide that capacity. The flush pipe shall have an inside diameter not less than that of the spud on the tank, and on low tanks the spud shall be not less

than 2 inches in diameter, but on high tanks the spud may be 1½ inches in diameter.

7.4.5. Direct Flush Valves

(1) A direct flush valve shall be so installed that it is readily accessible for repairing.

(2) When the valve is operated it shall complete its cycle of operation automatically, opening fully and closing positively under the service pressure. At each operation the valve shall deliver water in sufficient volume and at a rate that will thoroughly flush the fixture and refill the fixture *trap*.

(3) Means shall be provided for regulating the flow to direct flush valves.

7.4.6. Frost-proof Closets

The use of a *frost-proof closet* is prohibited.

7.4.7. Urinals

(1) A urinal shall be made of material similar to that prescribed for water-closet bowls.

(2) A urinal of a siphon jet, blow-out, or pedestal type shall have its flushing rim and its *trap* integral with it, and the water seal shall be not less than 2 inches.

(3) Stall-type urinals shall be connected to the *waste pipe* by a strainer and spud and shall be so installed that water does not accumulate on the walls or flooring or under the *fixture*.

(4) The use of trough urinals is prohibited.

7.4.8. Urinal Tanks

A urinal tank shall have a water capacity, flush valve, and pipe connections such as will ensure at all times a supply of water sufficient to flush the urinal thoroughly. Where urinal tanks of the chain and pull type are used, a separate tank shall be provided for each urinal.

7.4.9. Urinal Flush Valves

(1) A flush valve may be of the goose-neck siphon type.

(2) No manually operated direct flush valve shall be used to flush more than one urinal.

7.4.10. Wash Basins

A wash basin shall be of material similar to that prescribed for water-closet bowls and shall be provided with a waste fitting having an opening of not less than $1\frac{1}{4}$ inches in diameter.

7.4.11. Sinks

(1) Except as hereinafter provided a sink shall comply with the conditions prescribed in Subsection 7.4.2.

(2) A sink, other than a laboratory sink, shall be provided with a waste fitting having a size not less than that of the *trap* to which it is connected, but in no case less than $1\frac{1}{2}$ inches in diameter.

(3) No concealed overflow shall be provided on sinks except those for laboratory purposes.

7.4.12. Laundry Trays

(1) A laundry tray shall comply with the conditions prescribed in Subsection 7.4.2.

(2) Each compartment of a laundry tray shall be provided with a waste fitting of not less than 1½ inches in diameter and with a stopper.

(3) A concrete laundry tray may be installed provided

(a) the tray is made of strong, dense concrete, moulded in one piece with edges and corners rounded inside and out; and

(b) the top edges are protected with a rim of zinc-coated steel securely bonded to the tray and corners of the rim are rounded; and

(c) the sides and partitions are not less than 1⅛ inches thick at the top and 1¼ inches thick at the bottom, and the bottom slab is not less than 1¼ inches thick.

7.4.13. Shower Baths

(1) A shower receptor, except a bath tub, shall be provided with a waste fitting not less than 2 inches in diameter, and with a strainer constructed to permit a full 2-inch discharge.

(2) A shower drain shall be considered a *fixture* and shall be provided with a *trap* having a water seal of not less than 2 inches.

(3) A shower bath that does not discharge into a tub or other fixture shall have provision made against leakage through the floor.

7.4.14. Bath Tubs

A bath tub shall have a smooth, hard interior surface impervious to water, and shall be equipped with a waste fitting not smaller than $1\frac{1}{2}$ inches in diameter.

7.4.15. Drinking Fountains

(1) A drinking fountain shall be of such materials and design that it may be readily cleaned.

(2) The orifice shall be of the shielded type. All drinking fountain nozzles with orifice diameter not greater than 7/16 (0.440) inch or 0.150 square inch area shall be placed so that the lower edge of the nozzle orifice is at an elevation not less than $\frac{3}{4}$ inch above the *flood level rim* of the receptacle.

(3) The orifice shall direct the water at an angle of approximately 45 degrees upwards from horizontal and means shall be provided for regulating the flow of water.

7.4.16. Floor Drains

(1) A *floor drain* in any room where food or beverage is stored, prepared, or served, or where a plumbing *fixture* other than a laundry tray or wash basin is installed shall be considered a *fixture* and shall have a proper *trap* and vent in accordance with the provisions of this By-law.

(2) Where *sanitary sewers* are available no floor drain shall be connected to a *storm sewer.*

7.4.17. Special Fixtures

Sinks and special-use *fixtures* may be made of soapstone, chemical stoneware, or may be lined with lead, copper-base alloy, nickel-copper alloy, corrosion-resistant steel, or other materials especially suited to the use for which the *fixture* is intended.

7.4.18. Used Plumbing Fixtures

(1) A used plumbing *fixture* shall not be reinstalled in a new location unless it is found upon inspection to conform in all respects to the requirements of this By-law, and to be in satisfactory physical and sanitary condition, and then only on written consent of the owner of the *building* in which it is to be installed.

(2) A used *fixture* which is to be installed on premises other than where originally installed shall be plainly labelled "used fixture" before delivery to the other premises, and such label shall be maintained until after installation and final inspection and *approval* by the *administrative official.*

7.4.19. Fixture Overflow

(1) The overflow pipe from a *fixture* shall be connected on the building or inlet side of the *trap* and be so arranged that it can be readily and effectively cleaned.

(2) The overflow fitting shall be so designed that the standing water in the *fixture* cannot rise in the overflow when the stopper is closed nor remain in the overflow when the *fixture* is empty.

7.4.20. Fixture Strainers

A *fixture*, other than a *water-closet*, full flush urinal, clinical service sink, bed-pan washer or similar *fixture*, shall be provided with a strong metallic or porcelain strainer with an outlet area not less than that of the interior of the *trap* and *waste pipe*.

SECTION 7.5: SOIL AND WASTE PIPE

7.5.1. Materials

(1) *Soil* and *waste pipe* within a *building* shall be of cast iron, galvanized wrought iron, galvanized open-hearth iron, galvanized steel, brass, copper or lead. The pipe and fittings for each type of pipe shall comply with the specifications set out in Section 7.3.

(2) All pipe under a *building* and to a point 3 feet beyond the exterior wall shall consist of cast-iron pipe, asbestos cement, bituminized fibre, concrete, non-ferrous metal, or vitrified clay.

(3) All pipe under a *building* except cast-iron pipe shall be surrounded with not less than 3 inches of concrete having a mix of 1 part portland cement, 2 parts sand and 4 parts gravel or equivalent aggregate.

7.5.2. Underground Pipe

No black or galvanized wrought-iron or steel *vent, soil* or *waste pipe* shall be used underground.

7.5.3. Building Sewer Pipe

Building sewer pipe shall be of vitrified clay, concrete, asbestos cement, bituminized fibre or cast iron, and the minimum size shall be 4-inch diameter.

7.5.4. Multiple Sewers and Drainage Systems

Unless otherwise *approved* by the *administrative official*, no *sanitary sewer* shall pass under any *building* other than the *building* it serves, and the *plumbing system* of every *building* or premises shall be separate from and independent of that of every other *building* or premises as far as the street or property line.

7.5.5. Slope of Pipes

(1) A slope of not less than $\frac{1}{4}$ inch per foot shall be provided for

(a) a fixture *waste pipe* or fixture drain; and

(b) a horizontal *branch* not larger than 3 inches in diameter.

(2) A horizontal drain pipe larger than 3 inches in diameter shall have a slope of not less than $\frac{1}{8}$ inch per foot.

(3) Where conditions do not permit a *building sewer* to have the slope prescribed in Paragraph

(2), it may have a lesser slope but the rate of flow of the liquid shall not be less than 2 feet per second.

7.5.6. Fixture Units

(1) A *fixture* itemized in Table 7.18 shall be considered to produce a hydraulic load equal to the number of *fixture units* specified, and this Table shall be used in estimating the total load carried by *soil* or *waste pipes.*

(2) A *fixture* not itemized in Table 7.18 and having a *waste pipe* or *trap* itemized in Table 7.19 shall be considered to produce a hydraulic load equal to the number of *fixture units* prescribed therein.

(3) The maximum number of *fixture units* that may be connected to a given size of horizontal or vertical *waste* or *soil pipe* or drain shall comply with Table 7.20 or 7.21, whichever one is applicable, provided however that no *water-closet* shall be connected to a pipe of less than 3-inch diameter.

7.5.7. Future Fixtures

When provision is made for the future installation of *fixtures*, those to be provided for shall be included in calculating the required sizes of drain pipes. Construction to provide for such future installation shall be terminated with a plugged fitting or fittings and shall be vented as required in Section 7.8.

7.5.8. Drainage below Sewer Level

(1) All *building subsoil drains* carrying *sewage* or similar wastes shall discharge into a leak-proof *sump* or receiving tank, so located as to receive the *sewage* by gravity. The *sewage* shall be lifted and discharged into the *building sewer* by a pump, an ejector, or other equally efficient method.

(2) Potable water supplies shall not be used for ejectors.

(3) Such *sumps* or tanks shall discharge automatically, or shall be of sufficient capacity to hold the maximum accumulated *sewage* and waste for a period of not less than 24 hours.

(4) If a main *building trap* is used, the discharge from the *sump* or receiving tank shall be connected on the sewer side of the *trap*.

7.5.9. Basement and Subsoil Drainage

(1) A basement or cellar shall be drained into a trapped catch basin or *floor drain*.

(2) Where premises may be subject to reverse flow, the *trap* shall have a screw cap on its inlet and the cap shall be kept closed when the *trap* is not being used. A manually operated gate valve may be substituted for the screw cap.

7.5.10. Fixtures below Grade

Where premises may be subject to reverse flow, all plumbing *fixtures*, other than *floor drains*, set below the grade of the adjoining street or property, but not draining into a *sump*, shall have fixed on

the discharge pipe a gate valve which shall be closed during periods of storm or danger of floods.

7.5.11. Overflow from Rainwater Tanks

The overflow from a rainwater tank shall be connected to the building storm drain where such is available, and the connection shall be trapped.

7.5.12. Hot Water and Steam Connections

No direct connection of a system discharging steam or hot water at a temperature in excess of 170 degrees Fahrenheit shall be made with the building *drainage system.* When higher temperatures exist, proper cooling methods shall be provided.

SECTION 7.6: JOINTS AND CONNECTIONS

7.6.1. Tightness

All joints and connections used in a *plumbing system* shall be air-tight and water-tight, and shall be capable of meeting the tests specified in Section 7.12.

7.6.2. Caulked Joints

(1) A caulked joint for cast-iron *soil pipe* shall be

(a) made with the spigot-end downstream from the hub-end in the direction of flow;

(b) firmly packed with oakum or hemp or other recognized packing material; and

(c) secured only with caulking lead not less than 1 inch deep, caulked tight.

(2) No paint, varnish, putty or other coating shall be applied on the jointing material until the joint has been tested.

7.6.3. Screw Joints

(1) Pipe threads shall be as prescribed in the tables for the various pipe classifications.

(2) Pipe ends shall be reamed or filed out to the size of bore and all chips and cuttings shall be removed.

(3) Pipe-joint cement and paint shall be permitted only on external threads.

7.6.4. Wiped Joints

(1) Wiped joints in lead pipe or between lead pipe and other metals shall be made of solder with an exposed surface on each side of the joint not less than $\frac{3}{4}$ inch in width and a thickness at the thickest part of the joint of not less than $\frac{3}{8}$ inch.

(2) Wiped flanged joints shall be reinforced with a lead flange not less than $\frac{1}{4}$ inch wide.

7.6.5. Soldered or Sweat Joints

All soldered joints for tubing shall be made with standard fittings provided with shoulders; surfaces to be soldered shall be cleaned bright. The joints shall be properly fluxed and made with solder.

7.6.6. Flared Joints

All flared joints for soft copper water tube shall be made with fittings meeting *approved* standards and the tube shall be expanded with a proper flaring tool.

7.6.7. Hot-poured Joints

(1) Material for hot-poured joints for vitrified clay or concrete sewer pipe shall not soften sufficiently to destroy the effectiveness of the joint when subjected to a temperature of 160 degrees Fahrenheit, nor be soluble in any of the wastes carried by the *drainage system.*

(2) Hot-poured joints shall be caulked closely with twisted oakum and rammed; the asphaltic compound shall be at least 1 inch deep all around the pipe.

7.6.8. Cement Joints

(1) A cement joint for vitrified clay sewer pipe or for cement concrete pipe shall be made by ramming a closely twisted hemp or oakum gasket or other recognized packing material, of suitable size to pass around the annular space between the pipes, except in sizes of 6 inches or less. The remaining space shall be filled with portland cement paste for sizes of 6 inches or less, and for larger than 6 inches shall be filled with mortar compound of not more than an equal part of clean sharp mortar sand to one part of portland cement. The portland cement paste or mortar shall first be

tempered for a minimum of 20 minutes and a maximum of 1 hour before using.

(2) Each joint shall be carefully banked and the joint and pipe thoroughly swabbed and cleaned inside.

7.6.9. Burned Lead Joints

Lead "burned" or welded joints shall be lapped and the lead shall be fused together to form a uniform weld at least 1½ times as thick as the lead being joined.

7.6.10. Welded Joints

Welded joints are prohibited unless otherwise *approved* by the *administrative official*, but in no case shall such joints be permitted for cast-iron or galvanized-iron pipe or fittings or on *soil*, *waste*, or *vent pipes*.

7.6.11. Slip Joints and Unions

(1) Slip joints and unions may have metal-to-metal or gasketed seats.

(2) Slip joints and gasket unions may be used only in the *trap seal* or in the *waste pipe* between the *trap seal* and the *fixture*, and must be readily accessible.

7.6.12. Trap Standard Joints

Joints between drains and trap standards of cast iron shall be soldered, screwed, or caulked to the *waste pipe*.

7.6.13. Cast-iron Pipe Joints

(1) Cast-iron pipe shall have either caulked or screwed joints as specified herein.

(2) Joints between cast-iron pipe and wrought-iron, steel, brass, or copper pipe shall be either caulked or screwed joints made as specified herein.

7.6.14. Lead Joints

(1) Joints between lead and cast-iron, wrought-iron, or steel pipe shall be made by means of wiped joints to a caulking ferrule or soldering nipple as specified in this Section.

(2) Soldering nipples shall not be used on a *waste* or *soil pipe*, but may be used on a *vent pipe*.

7.6.15. Copper Water Tubing

All concealed joints for copper water tubing below ground or within *buildings* shall be soldered, sweated, or flared.

7.6.16. Urinals, Trap Standards, and Water-closets

(1) The connection between drainage pipes, floor outlet service sinks, pedestal urinals, and earthenware trap standards, shall be made by means of a flanged trap connection. The floor flange shall be securely set on a firm base and bolted to the trap flange. The joint shall be sealed with a natural or synthetic rubber or asbestos graphite gasket or with a closet setting compound.

(2) Except in the case of concrete floor construction, the connection from urinals, trap standards and *water-closets* to cast-iron *soil pipe* shall be made of lead, and to copper *soil pipe* shall be made of lead, or copper. The length of lead or copper connection shall be not less than 3 inches between the joint and the under-side of the floor. In concrete floor construction where cast-iron pipe is used, the floor flange may be caulked to the pipe and shall be bolted to the trap flange.

7.6.17. Vitrified Clay Sewer Pipe

(1) All joints between vitrified clay pipe and between such pipe and iron pipe shall be as specified for cement joints or hot-poured joints.

(2) The connections between iron and vitrified clay pipe shall be made with a vitrified clay taper fitting.

7.6.18. Concrete Sewer Pipe

All joints between concrete pipe, or between such pipe and iron pipe shall be as specified for cement joints or hot-poured joints.

7.6.19. Increasers and Reducers

Where different sizes of pipe or pipe and fittings are to be connected in *soil*, *waste*, or *vent*, proper size increasers or reducing fittings shall be used between the two sizes.

7.6.20. Prohibited Joints and Fittings

Any fitting or connection which has an enlargement, chamber, or recess, with a ledge, shoulder, or reduction of the pipe area in the direction of flow on the outlet or waste side of any *trap* which might affect the flow shall be prohibited.

SECTION 7.7: TRAPS, INTERCEPTORS, AND CLEANOUTS

7.7.1. Separate Traps

(1) Each *fixture* shall be separately trapped by a water seal *trap* placed as close to the *fixture* as possible, except that a set of not more than two laundry trays immediately adjacent to each other, or a two-compartment or three-compartment sink with outlets at the same level, may connect with a single *trap*, provided the *trap* is located not more than 24 inches from the farthest fixture outlet, and the horizontal *waste pipe* is one size larger than the outlet.

(2) The distance from a *trap* to a fixture outlet shall be measured along the *developed length* of the pipe, including fixture outlet tailpiece, if any, from the water level of the *trap* to the point where the *waste pipe* leaves the *fixture*.

(3) A grease *interceptor* may serve as a *trap* under conditions defined in Paragraph 7.7.9.(1).

(4) The *waste pipe* from permanently connected laundry machines shall be trapped and vented.

7.7.2. Type and Size of Traps

(1) Every *trap* shall be self-cleaning, and shall be of at least the same nominal size as the fixture waste opening to which it is connected. The size of the *trap* for a given *fixture* shall not be less than the size specified in Table 7.22.

(2) The fixture *waste pipe* for *water-closets* and other *fixtures* with integral *traps* shall not be smaller than the fixture outlet.

7.7.3. Trap Seal

Each fixture *trap* shall have a water seal of not less than 2 inches and the seal of a *floor drain* shall be 4 inches.

7.7.4. Trap Cleanouts

Each fixture *trap*, except those in combination with *fixtures* in which the *trap seal* is visible or accessible, shall be provided with an accessible brass trap screw of ample size, protected by the water seal, except that when a portion of a *trap* can be completely removed for cleaning purposes no trap screw is required.

7.7.5. Building Traps

(1) Where a main *building trap* is used it shall be placed inside the *building* it serves and close to the wall through which the *building drain* passes.

(2) Every *building trap* shall be vented by a fresh-air inlet of not less than 4-inch diameter,

located not more than 4 feet from the inlet side of the *trap* on the building side.

(3) Every *building trap* shall be provided with an accessible *cleanout* at a point between the *trap* and the wall.

7.7.6. Laboratory Sinks

Any group of laboratory sinks may be connected to a single vented *trap* except when used in connection with food or other organic matter.

7.7.7. Prohibited Traps

(1) No form of *trap* with partitions except those integral with *fixtures*, nor one whose seal depends upon the action of movable parts, shall be used.

(2) No water-jacketed grease *trap* shall be used.

(3) No fixture shall be double-trapped, but where a *building trap* is used it shall not be considered as a second *trap* for the *fixture*.

(4) No crown-vented or bell *trap* shall be installed.

7.7.8. Cleanouts

(1) An easily accessible *cleanout* shall be provided at or near the foot of each vertical waste *stack* or soil *stack*, and at the wall through which the drain leaves the *building*. Where the soil *stack* is within 10 feet of the point where the

building drain leaves the *building*, the *cleanout* at the *stack* shall be sufficient.

(2) *Cleanouts* shall not be more than 50 feet apart in horizontal drainage lines of 4-inch nominal diameter or less, and not more than 100 feet apart for larger pipe sizes.

(3) A *cleanout* shall be installed at each change of direction of the *building drain* greater than 45 degrees.

(4) *Cleanouts* shall be of the hub and ferrule type, with brass nuts or screwed plugs. The body of a cleanout ferrule shall conform in thickness to that required for pipe and fittings of the same metal, and shall extend not less than $1\frac{1}{2}$ inches above the hub.

(5) The cleanout plug shall be of heavy brass not less than $\frac{1}{8}$ inch thick and shall be provided with a solid raised nut or a recessed socket. The nut shall be not less than $\frac{3}{4}$ inch high and not less than 1 inch in smallest horizontal dimension.

(6) A *cleanout* shall be of the same nominal size as the pipe up to 4 inches, and not less than 4 inches for larger pipes.

(7) A *cleanout* on a *building drain* shall be formed by a Y and, where necessary, shall be extended without change of direction and made accessible.

7.7.9. Interceptors

(1) A gasoline, oil, grease, or grit *interceptor* shall be provided on the waste outlet from all public

garages, automobile wash floors, cleaning establishments and elsewhere as required by the *administrative official.*

(2) An *interceptor* shall be so designed that it will not become airbound and shall be so located as to be readily accessible for cleaning. All *interceptors* shall be vented as prescribed by this By-law.

(3) A grease or oil *interceptor* shall be of sufficient capacity to intercept all grease or oil likely to flow into it under normal conditions. The *trap* for automobile wash floors shall have a capacity sufficient to retain the sand or grit reaching the *trap* during any 10-hour period.

(4) A grease *interceptor* may serve as the *trap* for a two- or three-compartment sink or a dishwashing machine.

SECTION 7.8: VENTING SYSTEM

7.8.1. Protection of Trap Seal

The seal of every fixture *trap* in a *plumbing system* shall be protected against siphonage and back pressure, and air circulation shall be assured throughout the *drainage system* by a properly installed individual vent, or system of venting, except as otherwise provided in this Section.

7.8.2. Materials

Vent pipes shall be of cast iron, galvanized wrought iron, galvanized steel, brass, or copper.

7.8.3. Noxious or Explosive Gases

Any device containing or giving off noxious or explosive gases shall be vented in a safe manner directly to the outside air.

7.8.4. Main Stack

Every *building* in which plumbing is installed shall have at least one *main vent stack* or *stack vent* not less than 3 inches in diameter.

7.8.5. Stack Vents

(1) Every soil or waste *stack* shall be extended vertically as a *stack vent* above the *flood level rim* of the highest *fixture*, then to the open air through the roof; or the *stack vent* and *vent stack* may be connected together within the *building* above the *flood level rim* of the highest *fixture* with a single extension from the connection to the open air through the roof.

(2) A *vent stack* or *main vent* shall be installed with a soil or waste *stack* whenever *back vents*, *relief vents* or other vents are required in three or more *branch intervals*.

(3) The *vent stack* or *main vent* shall connect full size at its base to the main *soil* or *waste pipe* at or immediately below the lowest horizontal *branch* and shall extend to the roof and to open air, or it may be connected with the *stack vent* as described in this Subsection.

7.8.6. Roof Terminals

(1) Except as provided in Subsection 7.8.9., every terminal of a *soil*, *waste*, or *vent pipe* having a diameter of 4 inches or less shall be increased at least 2 inches before passing through the roof, by means of an increaser which shall project to the outer air not less than 1 inch and not more than 3 inches. Where the roof is used for any purpose other than weather protection, the extension shall be carried at least 6 feet above such roof and firmly braced, and shall be insulated if so directed by the *administrative official.* All roof terminals shall be properly flashed and made water-tight.

(2) The discharge end of a *stack vent*, *vent stack*, or *vent pipe*, terminating in open air shall be located a distance not less than 3 feet above or 12 feet horizontally away from any air inlet, window, or door of the *building* or of any adjacent *building.*

7.8.7. Distance of Vent from Trap

(1) The maximum *developed length* of the *soil* or *waste pipe* from the trap weir to the vent fitting shall conform with Table 7.23.

(2) Except for *water-closets*, pedestal urinals, trap standards, and other *fixtures* which depend on siphoning action for the proper functioning of the *fixture* and except for connections which do not exceed one Y and one-eighth bend between the trap outlet and the vent, each fixture *trap* shall have a protecting vent so located that

(a) the total fall in the fixture *waste pipe* from the trap weir to the *vent pipe* is not greater than the diameter of the *waste pipe;* and

(b) the *developed length* of the *waste pipe* from the trap weir to the *vent pipe* is not less than twice the diameter of the *waste pipe.*

7.8.8. Dual Vents

An *individual vent* or *continuous vent,* installed vertically, may be used as a dual vent when both fixture *waste pipes* connect on the same level with a *vertical waste pipe.* The *developed length* and total fall of each of the two fixture *waste pipes* shall be within the limits stated in Subsection 7.8.13. and Table 7.23.

7.8.9. Wet Vents

(1) Subject to items (2) and (3), the *waste pipe* for a wash basin may serve as a *vent pipe* for a bath tub or a shower bath.

(2) The *waste pipe* serving a *wet vent* shall be not smaller than

(a) $1\frac{1}{4}$ inches when venting a bath tub; or

(b) $1\frac{1}{2}$ inches when venting a shower bath.

(3) The *waste pipe* for the bath tub or shower bath shall have a *developed length* of not less than 18 inches between the *trap* and the *wet vent pipe.*

(4) Where there are no *fixtures* on the floor above, a *wet vent pipe* may be installed in connec-

tion with a *water-closet*, urinal, wash basin, or sink where

(a) the diameter of the *waste pipe* of the *fixture* being vented is not less than 2 inches; and

(b) the diameter of the *vent pipe* is not less than $1\frac{1}{2}$ inches.

7.8.10. Circuit, Loop, and Relief Vents

(1) A *branch*, *soil* or *waste pipe* to which two and not more than eight *water-closets* or urinals are connected in series on the same floor level, may be vented by a *circuit* or *loop vent* which shall be taken off above the centre line of the *soil* or *waste pipe* and in front of the last fixture connection.

(2) Where other *fixtures* discharge above such *branch*, or when the *branch* is connected to a *building drain*, each *branch* shall have a *relief building vent* taken off above the centre line of the *soil* or *waste pipe* and in front of the first fixture connection.

(3) Two or more *circuit-vented* horizontal *branches* serving a total of not more than 8 *fixtures* as specified in (1), and in the same *branch interval*, may have a combined *relief vent*. Where the vents are joined, the point of joining shall be not less than 2 inches above the *flood level rim* of the highest *fixture* connected to either *branch*.

(4) A bend of not greater than standard length shall be used coming out of a Y on a *loop* or *circuit-vented waste pipe*.

(5) A *relief* or *circuit vent* shall not be used to serve other *fixtures* unless increased in size according to the *fixture units* connected thereto.

(6) The vertical leg of a *waste pipe* on battery-vented *fixtures* shall not exceed 3 feet in length and must be not less than the size of the horizontal *branch.*

7.8.11. Sump Vents

Every *sump* receiving *sewage* shall be vented by a *vent pipe* not less than one size smaller than the largest inlet pipe of the *sump.*

7.8.12. Venting of Offsets

An offset in soil or waste *stacks* at an angle greater than 45 degrees from the vertical, serving *fixtures* below and on 2 or more floors above the offset shall be

(a) provided with a *yoke vent,* equal in diameter to the *main vent stack* or soil *stack,* and the lower end of the *yoke vent* shall connect to the soil or waste *stack* through a Y below the lowest horizontal *branch* above the offset, and the upper end shall connect to the *vent stack* not less than 3 feet above the floor level; or

(b) vented as two separate soil or waste *stacks,* namely, the stack section below the offset and the stack section above the offset.

7.8.13. Yoke Vents

(1) All soil or waste *stacks* in *buildings* over five floors in height, shall be provided with a *yoke vent* at each five-storey interval measured from the top floor down. The size of the *yoke vent* shall be equal to the size of the *vent stack* to which it connects.

(2) The lower end of the *yoke vent* shall connect to the soil or waste *stack* through a Y below the horizontal *branch* serving that floor, and the upper end shall connect to the *vent stack* not less than 3 feet above the floor level.

7.8.14. Vent Headers

(1) A *stack vent* or a *vent stack* may be connected into a common vent header at the top of the *stack* and extended to the open air at one point through the roof.

(2) The header shall be sized in accordance with Table 7.24, the number of *fixture units* being the sum of all *fixture units* on all *stacks* connected thereto, and the *developed length* shall be that of the longest *vent pipe* calculated by beginning at the base of the *stack* most distant from the header and continuing through that *stack* to the header and thence to its terminal in the open air.

7.8.15. Vent Pipe Grades and Connections

(1) *Vent pipes* shall be as direct as possible and shall be free from drops or sags and be so graded and connected as to drip back to the *soil* or *waste*

pipe, or *vent stack* by gravity through the fixture connections.

(2) Where a *vent pipe* is connected to a *horizontal soil* or *waste pipe* the *vent pipe* shall be taken off above the centre line of the *soil* or *waste pipe* and the horizontal length shall not exceed 2 feet, after which it shall rise vertically to a point not less than 6 inches above the *flood level rim* of the *fixture* it is venting.

(3) The connection between a *vent pipe* and a *vent stack* shall be above the *flood level rim* of the highest *fixture* served by the vent.

(4) A *horizontal vent pipe* forming a *branch vent*, *circuit vent*, or *loop vent* shall be above the *flood level rim* of the highest *fixture* served by such vent.

7.8.16. Size and Length of Vents

(1) The minimum size of piping for trap vents shall be in accordance with Table 7.24, and no *vent pipe* shall be less than 1¼ inches in diameter.

(2) The diameter and the maximum length of a *vent pipe* shall be in accordance with Table 7.25.

(3) The length of a *vent stack* or *main vent* shall be its *developed length* from the lowest connection of the vent system with the soil *stack*, waste *stack*, or with the *building drain* to

(a) the *vent stack* terminal if it terminates separately in the open air through the roof; or

(b) the connection of the *vent stack* with the *stack vent*, plus the *developed length* of the *stack vent* from that connection to the terminal in the open air, if the two vents are connected with a single extension to the open air.

(4) The length of a *branch vent* shall be the *developed length* from its connection with the *vent stack* or *stack vent*, to the fixture drain or horizontal soil or waste *branch* served by the vent.

(5) The length of a *stack vent* shall be the *developed length* from the highest horizontal or fixture *branch* connected to the *stack* to the terminal of the *stack vent* in the open air.

(6) A *stack vent* shall be of at least the same diameter as the soil or waste *stack*.

(7) The diameter of a *relief vent* shall be at least equal to one-half the diameter of the soil or waste *branch* it serves.

7.8.17. Vents Not Required

(1) Where one *fixture* only is connected at the topmost waste opening and is within a *developed length* of 5 feet from the soil *stack* it shall be considered as *individually vented*.

(2) When two *fixtures* are set back-to-back on the same floor and the distance from the *traps* to the soil or waste *stack* complies with Table 7.23, no vent shall be required provided that each *fixture* wastes separately into an *approved* double fitting and no *water-closet* discharges into the *stack* above such connection.

(3) No vent shall be required where the installation consists of not more than one *water-closet* and three smaller *fixtures*, all such *fixtures* being installed on the same floor, provided that

(a) the distance between the soil *stack vent* and fixture *traps* complies with Table 7.23; and

(b) the *waste pipes* are connected directly and separately to the soil *stack* at a point above the *water-closet* connection.

(4) No vent shall be required for a *leader trap*, an *area drain*, or subsoil catch-basin *trap*.

(5) Except as provided in Paragraph 7.4.15.(3), no vent shall be required on a cellar *floor drain* provided the *floor drain* branches into the *building drain* on the sewer side at a distance of 5 feet or more from the base of the soil *stack* and the *floor drain* is not more than 5 feet from the *building drain*.

SECTION 7.9: INDIRECT WASTES

7.9.1. Indirect Wastes

(1) Waste from the following shall not discharge directly into any *building drain*, *soil* or *waste pipe*:

(a) a refrigerator, ice-box, or other receptacle, appliance, device, or apparatus that is used for storage, preparation, or processing of food or drink; and

(b) an appliance, device, or apparatus using water as a cooling or heating medium; and

(c) a sterilizer or a water still; and

(d) a water treatment device or a water-operated device; and

(e) an outlet of a pressure, temperature or other relief valve as specified in Subsection 7.11.9.

(2) Drinking fountains may be installed with an *indirect waste pipe.*

7.9.2. Indirect Waste Pipes

(1) *Indirect waste pipes* shall be installed in accordance with Section 7.5.

(2) A refrigerator *waste pipe* shall discharge into a trapped and vented water-supplied open sink or receptacle which shall be located in an accessible ventilated place.

(3) An *air gap* as specified in Subsection 7.11.2 shall be provided between the outlet end of the *waste pipe* of each *fixture* and the *flood level rim* of the receiving tank, receptacle, or *waste pipe.* The *air gap* shall be equal to or greater than the nominal diameter of the *waste pipe.*

(4) Water lifts, expansion tanks, cooling jackets, sprinkler sytems, drip or overflow pans, or similar devices which waste clear water only, may discharge onto a roof, into a *sump*, or to a rainwater drain, or so as to drain into a trapped *fixture.*

(5) An *indirect waste pipe* receiving the discharge from drinking fountains or refrigerators on three or more floors shall be vented by being extended through the roof.

(6) Except as provided in (5), *fixtures* connected to an *indirect waste pipe* shall be trapped but need not be vented.

(7) The drip pipe from a food receptacle shall have a *trap* at each opening and a *cleanout* at all angles and shall be so arranged to permit flushing and cleaning.

SECTION 7.10: STORM SEWERS

7.10.1. General

(1) The run-off from a roof or from a paved area in excess of 20 per cent of the lot area shall be drained into a *storm sewer* system or a *combined sewer* where such is available, but not into a sewer intended for sanitary *sewage* only.

(2) All subsoil drainage shall discharge on the building side of a rainwater drain *trap* or catchbasin, or be pumped.

(3) A rainwater *leader* shall not be used for a *soil*, *waste*, or *vent pipe* and a *soil*, *waste*, or *vent pipe* shall not be used for a rainwater *leader*.

(4) A rainwater or other *waste pipe* shall not be connected to a *subsoil drain*.

(5) Where there is a back-water valve, a rainwater *leader* shall discharge to the *storm sewer* on the downstream side of the valve.

(6) No rainwater *leader* shall be connected to a horizontal drain less than 4 inches in diameter.

(7) Any *leader* or storm drain connected to a *combined sewer* shall be effectively trapped.

(8) Unless otherwise *approved* by the *administrative official*, no storm sewer shall pass under any residential *building* other than the *building* it serves.

7.10.2. Materials

(1) A storm drain within a *building* shall be cast iron, galvanized wrought iron, galvanized steel or copper (iron pipe size), but if laid below ground may be cast iron, or asbestos cement, bituminized fibre, concrete, non-ferrous metal or vitrified clay laid in accordance with provisions of Paragraph 7.5.1.(3).

(2) Every rainwater *leader* inside a *building* shall be constructed of cast iron, galvanized wrought iron, galvanized steel, copper or other pipe *approved* by the *administrative official.*

(3) A rainwater *leader* outside a *building* may be sheet metal. Where an outside *leader* is of sheet metal and connected with a building storm drain or *storm sewer*, it shall be connected to a cast-iron drain extending at least 12 inches above the finished grade, except in positions where a sheet-metal *leader* may be subject to damage in lanes or other traffic-ways where the cast-iron drain shall extend 30 inches above the finished grade.

7.10.3. Separate Systems

The sanitary and the storm *drainage systems* of a *building* shall be entirely separate, except where only a *combined sewer* is available.

7.10.4. Size

(1) A vertical rainwater *leader* shall be not less than the size prescribed by Table 7.26.

(2) A roof gutter shall be not less than the size prescribed by Table 7.27.

(3) The required size of a horizontal storm drain shall be determined in accordance with Table 7.28.

(4) The size of a *combined sewer* shall be determined as follows:

(a) When the total *fixture unit* load on the *combined sewer* is less than 256 *fixture units*, the equivalent drainage area in horizontal projection shall be taken as 1000 square feet; and

(b) When the total *fixture unit* load exceeds 256 *fixture units*, each *fixture unit* shall be considered the equivalent of 3.9 square feet of drainage area.

(5) If the rainfall to be provided for differs from 4 inches per hour the 1000 square feet equivalent in (a) and the 3.9 square feet in (b) shall be adjusted by multiplying by four and dividing by the rainfall in inches per hour.

SECTION 7.11: WATER SUPPLY AND DISTRIBUTION

7.11.1. Quality of Water Supply

No connection shall be made in a *plumbing system* whereby any foreign matter or non-potable water may enter a potable water distribution system.

7.11.2. Protection of Water Supply

(1) A potable water system shall be entirely separate from, and independent of, a supply system for non-potable water.

(2) Non-potable water shall not be distributed to any part of a food-processing establishment where food is being processed.

(3) All pipe distributing non-potable water shall be identified by distinct, easily recognizable, permanent markings, and such pipe shall not be accessible as a supply of water for drinking or for preparation of food.

(4) Water pumps, tanks, wells, filters, softeners, appurtenances, and devices shall be protected from superficial ground- or surface-water and other contamination by satisfactory covers, walls, copings, or castings.

(5) Every well shall be provided with a watertight cover and outer casing extending at least 10 feet below the ground surface, and any pipe or other connection made therein shall be effectively sealed with an *approved* fitting.

(6) All non-pressure, potable water supply tanks shall be properly covered to prevent entrance of foreign material into the water supply, and soil, waste, or non-potable water lines shall not pass directly over such tanks, or over manholes in pressure tanks or over food handling equipment.

(7) Every water outlet to a plumbing *fixture* shall be so located that the end of the faucet, spout, or supply pipe is placed above the *flood level rim* of the fixture or other receptacle a vertical distance equal to the minimum required *air gap*, as follows:

(a) Where the spacing between the inside edge of a water supply opening and one wall is more than three times the effective opening or more than four times the effective opening from each wall in the case of two intersecting walls, the minimum required *air gap* shall be twice the effective supply opening; and

(b) Where the spacing is less than stated in (a), the minimum required *air gap* shall be three times the effective supply opening.

(8) Where it is not possible to provide the minimum required *air gap* above the *flood level rim* or top edge of a tank or vat, the following substitute may be accepted:

(a) The overflow pipe or channel of the tank or vat shall be so arranged as to allow overflow water a free discharge to the atmosphere under all conditions; and

(b) The overflow pipe shall be provided with an adequate break in the pipe as close to the tanks as possible; the area of the free opening shall be at least equal to that of the overflow pipe; and

(c) When water is entering the tank at the maximum rate, with all inlets open and all outlets closed, the size and capacity of the overflow pipe or channel shall be sufficient to keep the water level from rising to more than half of the minimum required *air gap* as specified in (7), measured above the top of the overflow; and

(d) The minimum *air gap*, as measured from the lowest point of any supply outlet to the top of the overflow opening, shall be $1\frac{1}{2}$ times the minimum *air gap* specified in (7), provided, however, that where a tank or vat cannot be supplied with an adequate *air gap* as specified above, a *back-flow* (back-siphonage) *preventer* shall be required.

(9) Where it is not possible to provide a minimum *air gap* or *back-flow preventer*, as may be the case in connection to cooling jackets, condensers, or other industrial or special appliances, a separate tank supply or other means of protection *approved* by the *administrative official* shall be provided.

7.11.3. Back-flow Preventers

(1) For those plumbing *fixtures* where an *air gap* is not possible, a *back-flow preventer*, installed between the fixture control valve and the *fixture*, shall be permissible.

(2) A *back-flow preventer* shall be installed so that its critical level is not less than four times the nominal diameter of the inlet of the control valve above

(a) the *flood level rim* of the *fixture;* or

(b) the highest possible water level in the tanks or vats,

and the elevation shall never be less than 4 inches above the *flood level rim* or highest possible water level.

(3) In this regulation, critical level means the horizontal plane at which a *back-flow preventer* functions.

7.11.4. Protection against Freezing

All water pipes, tanks, appurtenances, and devices shall be effectively protected against frost.

7.11.5. Water Distributing Pipe, Tube, and Fittings

(1) Material for water distributing pipe and tube shall be of brass, copper, lead, cast iron, wrought iron, open-hearth iron or steel with appropriate fittings.

(2) All threaded ferrous pipe and fittings shall be zinc-galvanized or cement-lined.

7.11.6. Water Piping and Shut-off Valves

(1) The *water service pipe* from the street main to the water distribution system for the *building* shall be of sufficient size to furnish an adequate flow of water to meet the requirements of the *building* at peak demand.

(2) All ferrous pipe used underground shall be not less than ¾ inch in diameter.

(3) A main shut-off valve on the *water service pipe* shall be provided outside the *building* and also an accessible stop-and-waste cock up to and including ¾-inch size and, on sizes of 1 inch or over, a shut-off valve with a drip valve on the service shall be provided on the inner side of the wall through which the service enters the *building*.

(4) The supply line taken from pressure or gravity tanks shall be valved at or near its source, and an interior stop-and-waste valve or cock shall be provided for each exterior outlet or group of outlets.

(5) Each hot water tank shall be equipped with a valve in the water supply line with a drain-off valve.

(6) Stop-and-waste cocks shall be accessible, and of such size and so installed to permit complete drainage of the entire water system they serve.

(7) All water pipes shall be so graded or pitched that the entire system or parts thereof can be drained, and the formation of *traps* or sags shall be avoided where possible, but where they occur,

such sags, *traps*, or inverts shall have provision for complete drainage.

(8) In *one-family dwellings* a shut-off valve shall be installed at the foot of each *riser*.

(9) In multiple dwellings the water supply for each family unit shall be controlled by an arrangement of shut-off valves which will permit each group of *fixtures* or the individual *fixtures* to be shut off without interference with the water supply to any other family unit or portion of the *building*. For the purpose of this regulation a group of *fixtures* means two or more *fixtures* adjacent to or near each other.

(10) In all *buildings* other than *one-family dwellings* or multiple dwellings, shut-off valves shall be installed which will permit the water supply to all equipment in each separate room to be shut off without interference with the water supply to any other room or portion of the *building*.

7.11.7. Water Supply to Fixtures

(1) The water supply to every *fixture* shall be such that a sufficient amount of water will be available to flush the *fixture* to the extent necessary to keep it in a sanitary condition.

(2) The water distribution pipe and *branches* in a *building* shall be of sizes adequate to provide a positive flow and pressure to each *fixture*, but in no case shall the sizes of water supply pipes to *fixtures* be less than prescribed in Table 7.29.

7.11.8. Water Supply Tanks

(1) Every water supply tank shall be supported, and pipes shall be connected to each tank so that no weight stress is transmitted from the tank to the pipes or pipe connections.

(2) Tanks other than pressure tanks shall be covered to prevent contamination and all tanks shall be protected from frost.

(3) An adequate overflow pipe protected from frost shall be provided for water supply tanks and in no case shall such overflow be connected directly to any drainage system.

(4) Every water supply tank shall be provided with a valved drain line located at its lowest point and discharged above *flood level rim* of the receptacle into which the drain water flows, and as required for overflow pipes in this Section.

7.11.9. Safety Devices

(1) Where a check valve is installed in the cold water line between the source of supply and a hot water tank, a combination pressure and temperature relief valve or a separate pressure relief and a temperature relief valve shall be installed.

(2) A temperature relief valve shall be placed directly above the tank served and in no case more than 3 inches from such tank.

(3) A pressure relief valve may be located adjacent to the equipment served.

SECTION 7.12: INSPECTION AND TESTS

7.12.1. New Work

(1) All new plumbing work and such portions of existing systems as may be affected by new work, or by any changes, shall be subject to inspection by the *administrative official.*

(2) Where plumbing has been constructed, repaired, renewed, or altered, such plumbing shall not be put into use until it has been inspected and found to conform with this By-law.

7.12.2. Existing Plumbing

(1) The existing *plumbing system* in any *building* shall be subject to inspection by the *administrative official.*

(2) If any part of an existing *plumbing system* is found to be in such condition that it is or may become injurious or dangerous to health, the medical health officer may, by written order, require the owner to make such changes, alterations, or replacements as may be necessary.

7.12.3. Notice for Inspection or Test

The *plumbing contractor* shall notify the *administrative official* when any plumbing work is completed and ready for inspection or test.

7.12.4. Materials and Labour for Tests

All equipment, materials, power, and labour necessary for inspection or testing shall be fur-

nished by the *plumbing contractor* and all tests shall be made in the presence and under the direction of the *administrative official.*

7.12.5. Faulty Work or Materials

If the plumbing work is not *approved* by the *administrative official,* the *plumbing contractor* shall make such alterations, connections, or replacements as may be necessary, and the work shall be subject to further inspection or test.

7.12.6. Method of Testing

All roughed-in work or pipe shall be tested with water, smoke, or air, and after the plumbing *fixtures* have been set the entire system shall be submitted to the smoke test as specified in this Section. Tests may be applied to the *plumbing* and *drainage system* in its entirety or in sections.

7.12.7. Water Test

(1) When the water test is applied to the entire system, all openings shall be tightly closed by proper testing plugs or screw caps, except the highest opening above the roof, and the system shall be filled with water to the point of overflow above the roof.

(2) If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 5-foot head of water. In

testing successive sections at least the upper 5 feet of the last preceding section shall be re-tested.

(3) The water shall be kept in the system, or the portion under test, for at least 15 minutes before inspection; the system shall then be tight at all points.

7.12.8. Air Test

The air test shall be made by attaching an air compressor or testing apparatus to any suitable opening and, after closing all other inlets to and outlets from the system, forcing air into the system until there is a uniform gauge pressure of 5 pounds per square inch (or sufficient to balance a column of mercury 10 inches in height). This pressure shall be held, without the introduction of additional air, for a period of at least 15 minutes.

7.12.9. Smoke Test

The smoke test shall be made by filling all *traps* with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof they shall be closed, and a pressure equivalent to a 1-inch water column shall be built up and maintained for a period of at least 15 minutes.

7.12.10. Covering of Work

No *plumbing system* or part thereof shall be covered until it has been inspected and *approved.* If any *plumbing system* or part thereof is covered

before being inspected or *approved*, it shall be uncovered upon the direction of the *administrative official.*

7.12.11. Rainwater Leader Pipes

Rainwater leader pipes and *branches* inside a *building* shall be tested by water, smoke, or air.

7.12.12. Test of Water Supply System

(1) On completion of a section or of the entire *water supply system*, it shall be tested and proved tight under a water pressure not less than the maximum pressure under which it is to be used. The water used for test shall be obtained from the source of supply to be used in the system, or from another *approved* source.

(2) When a *potable water supply system* or any part thereof is installed or altered, all newly installed parts shall, before the system is put into use, be thoroughly cleaned to ensure freedom from contamination.

7.12.13. Certificate of Approval

On the satisfactory completion and final test of the *plumbing system*, a certificate of approval shall be issued to the owner and, on request, to the *plumbing contractor.*

7.12.14. Inspections and Tests Not Required

No test or inspection shall be required after the repair or replacing of a *fixture*, faucet, or valve, nor after forcing out a stoppage, or repairing leaks.

TABLE 7.1
Asbestos-cement Sewer Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Item No.	Pipe size, in inches	Minimum wall thickness, in inches	Flexural strength, minimum total load, in pounds	Maximum span, in feet	Supporting strength, minimum external 3-bearing load, in pounds
1	4	.22	550	9	1740
2	5	.22	900	9	1680
3	6	.22	1290	9	1420
4	8	.35	4300	12	2500
5	10	.37			2200
6	12	.41			2200
7	14	.41			2200
8	16	.45			2200
9	18	.48			2100
10	20	.52			2200
11	24	.58			2200

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.2
Bituminized-fibre Drain and Sewer Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Item No.	Pipe size, in inches	Minimum wall thickness, in inches	Minimum flat-plate crushing load per linear foot, in pounds	Minimum length of coupling, in inches	Minimum flat-plate crushing load per coupling, in pounds
1	2	.23	1100	2.90	270
2	3	.28	1100	3.42	315
3	4	.32	1100	3.92	370
4	5	.41	1300	3.92	430
5	6	.46	1300	3.92	430
6	8	.57	1600	5.00	670

(Data in this table have been taken from Commercial Standard CS116-44 for Bituminized-Fibre Drain and Sewer Pipe of the Commodity Standards Division, National Bureau of Standards, Washington, D.C.)

TABLE 7.3
Vitrified Clay Sewer Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Item No.	Pipe size, in inches	Minimum wall thickness of barrel, in inches	Minimum inside diameter of barrel, in inches	Supporting strength, minimum 3-bearing load per linear foot, in pounds	Minimum inside diameter of socket mouth, in inches	Minimum depth of socket, in inches
1	4	1/2	4	1000	5 3/4	1 3/4
2	6	5/8	6	1000	8 1/4	2 1/4
3	8	3/4	8	1000	10 1/2	2 1/2
4	9	3/4	9	1050	11 5/8	2 1/2
5	10	7/8	10	1100	12 3/4	2 1/2
6	12	1	12	1200	15 1/8	2 3/4
7	15	1 1/4	15	1370	18 3/4	2 3/4
8	18	1 1/2	18	1665	22 1/4	3
9	21	1 3/4	21	1995	25 7/8	3 1/4
10	24	2	24	2400	29 3/8	3 3/8

(Data in this table have been taken from Specification A60–1953 for Vitrified Clay Sewer Pipe of the Canadian Standards Association, Ottawa.)

TABLE 7.4
Concrete Sewer Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Item No.	Pipe size, in inches	Minimum wall thickness of barrel, in inches	Minimum inside diameter of barrel, in inches	Supporting strength, minimum 3-bearing load per linear foot, in pounds	Minimum inside diameter of socket mouth, in inches	Minimum depth of socket, in inches
1	4	9/16	4	1000	6	1 1/2
2	6	5/8	6	1100	8 1/4	2
3	8	3/4	8	1300	10 3/4	2 1/4
4	10	7/8	10	1400	13	2 1/2
5	12	1	12	1500	15 1/4	2 1/2
6	15	1 1/4	15	1750	18 3/4	2 1/2
7	18	1 1/2	18	2000	22 1/4	2 3/4
8	21	1 3/4	21	2200	26	2 3/4
9	24	2 1/8	24	2400	29 1/2	3

(Data in this table have been taken from Standard Specification C14–41 for Concrete Sewer Pipe of the American Society for Testing Materials, Philadelphia, Pa., U.S.A.)

TABLE 7.5
Cast-iron Soil Pipe

Column 1	Column 2	Column 3
Item No.	Pipe size, in inches	Minimum weight per nominal length, in pounds
1	1½	17
2	2	20
3	3	30
4	4	45
5	5	85
6	6	100
7	7	135
8	8	167½
9	10	225
10	12	270

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.6
Threaded Cast-iron Pipe

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Pipe size, in inches	Minimum wall thickness, in inches	Minimum weight per linear foot, in pounds	Minimum thread length, in inches
1	1¼	.187	3.033	0.42
2	1½	.195	3.666	0.42
3	2	.211	5.041	0.43
4	2½	.241	7.032	0.68
5	3	.263	9.410	0.76
6	4	.294	13.751	0.84
7	5	.328	19.069	0.93
8	6	.378	26.223	0.95
9	8	.438	39.820	1.06
10	10	.438	50.234	1.21
11	12	.438	60.036	1.36

(Data in this table have been taken from American Standard A.S.A. A40.5–1943 for Threaded Cast-Iron Pipe for Drainage, Vent and Waste Services, with the permission of the publisher, the American Society of Mechanical Engineers, New York, U.S.A.)

TABLE 7.7
Wrought-iron Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Item No.	Pipe size, in inches	Minimum actual outside diameter, in inches	Minimum wall thickness, in inches	Minimum weight per linear foot, threaded and with couplings, in pounds	Minimum number of threads in each threaded inch
1	3/8	0.675	.093	0.57	18
2	1/2	0.840	.111	0.85	14
3	3/4	1.050	.115	1.13	14
4	1	1.315	.136	1.68	11 1/2
5	1 1/4	1.660	.143	2.28	11 1/2
6	1 1/2	1.900	.148	2.73	11 1/2
7	2	2.375	.158	3.68	11 1/2
8	2 1/2	2.875	.208	5.82	8
9	3	3.500	.221	7.62	8
10	3 1/2	4.000	.231	9.20	8
11	4	4.500	.242	10.89	8
12	5	5.563	.263	14.81	8
13	6	6.625	.286	19.19	8
14	8	8.625	.283	25.00	8
15	10	10.750	.284	32.00	8
16	12	12.750	.336	45.00	8

(Data in this table have been taken from Specification B62–1949 for Welded Genuine Wrought-iron Pipe (2nd edition) of the Canadian Standards Association, Ottawa.)

TABLE 7.8
Welded and Seamless Steel Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Item No.	Pipe size, in inches	Minimum actual outside diameter, in inches	Minimum wall thickness, in inches	Minimum weight per linear foot, threaded and with couplings, in pounds	Minimum number of threads in each threaded inch
1	3/8	0.675	.091	0.57	18
2	1/2	0.840	.109	0.85	14
3	3/4	1.050	.113	1.13	14
4	1	1.315	.133	1.68	11 1/2
5	1 1/4	1.660	.140	2.28	11 1/2
6	1 1/2	1.900	.145	2.73	11 1/2
7	2	2.375	.154	3.68	11 1/2
8	2 1/2	2.875	.203	5.82	8
9	3	3.500	.216	7.62	8
10	3 1/2	4.000	.226	9.20	8
11	4	4.500	.237	10.89	8
12	5	5.563	.258	14.81	8
13	6	6.625	.280	19.19	8
14	8	8.625	.277	25.00	8
15	10	10.750	.279	32.00	8
16	12	12.750	.330	45.00	8

(Data in this table have been taken from Specification B63–1949 for Welded and Seamless Steel Pipe (2nd edition) of the Canadian Standards Association, Ottawa.)

TABLE 7.9
Welded Alloyed Open-hearth Iron Pipe

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Item No.	Pipe size, in inches	Minimum wall thickness, in inches	Minimum internal hydrostatic pressure for furnace butt-welded pipe, in pounds per square inch	Minimum internal hydrostatic pressure for electric-welded pipe, in pounds per square inch	Minimum weight per linear foot, threaded and with couplings, in pounds	Minimum number of threads in each threaded inch
1	3/8	.091	700		0.57	18
2	1/2	.109	700		0.85	14
3	3/4	.113	700		1.13	14
4	1	.133	700		1.68	11 1/2
5	1 1/4	.140	800	1000	2.28	11 1/2
6	1 1/2	.145	800	1000	2.73	11 1/2
7	2	.154	800	1000	3.68	11 1/2
8	2 1/2	.203	800	1000	5.82	8
9	3	.216	800	1000	7.62	8
10	3 1/2	.226	1200		9.20	8
11	4	.237	1200		10.89	8
12	5	.258	1200		14.81	8
13	6	.280	1200		19.18	8
14	8	.322		1200	28.81	8
15	10	.365		1000	41.13	8
16	12	.375		1000	50.71	8

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.10
Copper and Brass Pipe

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Pipe size, in inches	Minimum wall thickness, in inches	Copper pipe, minimum weight per foot, in pounds	Brass pipe, minimum weight per foot, in pounds
1	3/8	.0905	0.643	0.630
2	1/2	.1075	0.957	0.938
3	3/4	.1140	1.30	1.27
4	1	.1265	1.83	1.79
5	1 1/4	.1460	2.69	2.63
6	1 1/2	.1500	3.20	3.13
7	2	.1565	4.23	4.14
8	2 1/2	.1875	6.14	6.00
9	3	.2190	8.75	8.56
10	3 1/2	.2500	11.41	11.17
11	4	.2500	12.94	12.66
12	4 1/2	.2500	14.46	14.15
13	5	.2500	16.21	15.85
14	6	.2500	19.41	18.99
15	7	.2815	25.17	24.63
16	8	.3125	31.63	30.95
17	9	.3440	38.83	38.03
18	10	.3655	46.22	45.20

(Data in this table have been taken from Specification HC64–1950 for Seamless Copper and Brass Pipes (2nd edition) of the Canadian Standards Association, Ottawa.)

TABLE 7.11

Copper Tube (Type L) for Vents, Waste, and Water Distribution within a Building

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Tube size, in inches	Minimum actual outside diameter, in inches	Minimum wall thickness, in inches	Minimum weight per lineal foot, in pounds
1	3/8	0.500	0.035	0.198
2	1/2	0.625	0.040	0.285
3	5/8	0.750	0.042	0.362
4	3/4	0.875	0.045	0.455
5	1	1.125	0.050	0.655
6	1 1/4	1.375	0.055	0.884
7	1 1/2	1.625	0.060	1.14
8	2	2.125	0.070	1.75
9	2 1/2	2.625	0.080	2.48
10	3	3.125	0.090	3.33
11	3 1/2	3.625	0.100	4.29
12	4	4.125	0.110	5.38
13	5	5.125	0.125	7.61
14	6	6.125	0.140	10.20

(Data in this table have been taken from Specification HC66–1950 for Seamless Copper Water Tubes and Drainage Tubes (2nd edition) of the Canadian Standards Association, Ottawa.)

TABLE 7.12

Copper Tube (Type K) for Underground Water Service

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Tube size, in inches	Minimum actual outside diameter, in inches	Minimum wall thickness, in inches	Minimum weight per lineal foot, in pounds
1	⅜	0.500	0.049	0.269
2	½	0.625	0.049	0.344
3	⅝	0.750	0.049	0.418
4	¾	0.875	0.065	0.641
5	1	1.125	0.065	0.839
6	1¼	1.375	0.065	1.04
7	1½	1.625	0.072	1.36
8	2	2.125	0.083	2.06
9	2½	2.625	0.095	2.93
10	3	3.125	0.109	4.00
11	3½	3.625	0.120	5.12
12	4	4.125	0.134	6.51
13	5	5.125	0.160	9.67
14	6	6.125	0.192	13.9

(Data in this table have been taken from Specification HC66–1950 for Seamless Copper Water Tubes and Drainage Tubes (2nd edition) of the Canadian Standards Association, Ottawa.)

TABLE 7.13
Lead Water Service Pipe

Column 1	Column 2	Column 3
Item No.	Pipe size, in inches	Minimum weight per yard, in pounds
1	3/8	2 1/4
2	1/2	3
3	5/8	4 1/2
4	3/4	5 1/4
5	1	7 1/2
6	1 1/4	9
7	1 1/2	12 3/4
8	1 3/4	15
9	2	18

(Data in this table have been taken from Specification B67–1948 for Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories of the Canadian Standards Association, Ottawa.)

TABLE 7.14

Minimum Dimensions and Weights for Lead Waste Pipe

Column 1	Column 2	Column 3
Item No.	Nominal inside diameter, in inches	Minimum weight per yard, in pounds
1	1¼	7
2	1½	8
3	2	10½
4	3	16½
5	4	24

(Data in this table have been taken from Specification B67–1948 for Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories of the Canadian Standards Association, Ottawa.)

TABLE 7.15
Brass Caulking Ferrules

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Size, in inches	Minimum actual inside diameter of ferrule, in inches	Minimum length, in inches	Minimum weight, in pounds
1	2 x 1¼	1½	4½	1
2	2 x 1½	1¾	4½	1
3	2	2¼	4½	1
4	3	3¼	4½	1¾
5	4	4¼	4½	2½

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.16
Brass Soldering Nipples

Column 1	Column 2	Column 3	Column 4
Item No.	Size, in inches	Minimum length, in inches	Minimum weight of minimum length, in pounds
1	1¼	3	⅜
2	1½	3	½
3	2	3	⅞
4	2½	4	1⅜
5	3	4	2
6	4	4	3½

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.17
Brass Soldering Hubs

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Hub size, in inches	Minimum actual inside diameter, in inches	Minimum overall length, in inches	Minimum weight, in ounces
1	3 x 2	3	2 7/16	17
2	2 x 1 1/2	2 3/8	2 3/16	14
3	2 x 1 1/4	2 3/8	2 3/16	13

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.18
Equivalent Fixture Units
(load factors of fixtures)

Column 1	Column 2	Column 3
Item No.	*Fixture*	Number of *fixture units*
1	Bathroom group, consisting of 1 *water-closet*, 1 wash basin and 1 bath tub or shower stall	8
2	Bath tub with or without overhead shower	1½
3	Bidet	3
4	Combination of sink and laundry tray	2
5	Combination of sink and tray with food disposal unit	4
6	Cuspidor or dental unit	1
7	Dental lavatory	1
8	Dishwater, domestic	3
9	Drinking fountain	1
10	Floor drain	3
11	Ice-box, domestic	1
12	Kitchen sink, domestic	
	(a) with 1½-inch *trap*	1½
	(b) with 2-inch *trap*	3

Continued on next page

13	Laundry tray	3
14	Shower stall	3
15	Showers in a group, each head	3
16	Sink	
	(a) flushing rim, with valve	8
	(b) pot, scullery	4
	(c) service, trap standard type	3
	(d) service, P-trap type	2
	(e) surgeon's	3
17	Urinal	
	(a) pedestal, siphon-jet or blow-out type	4
	(b) stall, washout type	2
	(c) wall, lip type	4
18	Wash basin	
	(a) 1¼-inch *trap*	1
	(b) 1½-inch *trap*	1½
19	Wash sink, circular or multiple type, each set of faucets	2
20	*Water-closet*	
	(a) tank-operated	6
	(b) valve-operated	8

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.19
Equivalent Fixture Units for Fixtures Not Itemized in Table 7.18

Column 1	Column 2	Column 3
Item No.	Size of *waste pipe* or *trap*, in inches	Number of *fixture units*
1	1¼ or less	1
2	1½	2
3	2	3
4	2½	4
5	3	5
6	4	6

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.20

Maximum Allowable Number of Fixture Units for Horizontal Fixture Branches and Stacks (other than building drains and sewers)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
		Maximum total load, in *fixture units*			
Item No.	Diameter of *branch* or *stack* pipe, in inches	For horizontal fixture *branch* (1)	For *stack* not exceeding 3 *branch intervals* or *storeys*	For *stack* exceeding 3 *branch intervals* or *storeys*	
				Total load for *stack*	Total load for each *branch interval* or *storey*
1	1¼	1	2	2	1
2	1½	3	4	8	2
3	2	6	10	24	6
4	2½	12	20	42	9
5	3	30(2)	50(3)	60(3)	16(2)
6	4	160	240	500	90
7	5	360	540	1100	200
8	6	620	960	1900	350
9	8	1400	2200	3600	600
10	10	2500	3800	5600	1000
11	12	3900	6000	8400	1500

(1) Does not include *branches* of the *building drain*.
(2) Not over 2 *water-closets*.
(3) Not over 6 *water-closets*.
NOTE: No *water-closet* shall be connected to a pipe having a diameter of less than 3 inches.

TABLE 7.21

Maximum Allowable Number of Fixture Units for Building Drains and Sewers

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Item No.	Diameter of drain or sewer pipe, in inches	Maximum total load in *fixture units*, for any portion (1) of a *building drain* or *building sewer* of various slopes			
		Slope, per foot of length			
		1/16 inch	1/8 inch	1/4 inch	1/2 inch
1	3		20	27	36
2	4		180	216	250
3	5		390	480	575
4	6		700	840	1000
5	8	1400	1600	1920	2300
6	10	2500	2900	3500	4200
7	12	3900	4600	5600	6700
8	15	7000	8300	10000	12000

(1) Includes *branches* of a *building drain*.

TABLE 7.22
Minimum Size of Traps for Fixtures

Column 1	Column 2	Column 3
Item No.	*Fixture*	Size of *trap* and fixture outlet connection in inches
1	Bath tub	1½
2	Beer cabinet	1½
3	Combination sink and laundry tray	1½
4	Dental unit or cuspidor	1¼
5	Dishwashing machine	2
6	Drinking fountain	1¼
7	*Floor drain*	2
8	Laundry tray	1½
9	Lavatory	1¼
10	Potato peeler	2
11	Shower stall	2
12	Sink, kitchen, (domestic)	1½
13	Sink, eating establishment or public	2
14	Sink, pantry or bar	1½
15	Sink, dishwasher	1½
16	Sink, service or slop	2
17	Urinal, stall	2
18	Urinal, wall	1½

TABLE 7.23
Maximum Distance of Fixture Trap from Vent

Column 1	Column 2	Column 3
Item No.	Size of fixture drain, in inches	Distance from *trap* to vent, in feet
1	1¼	2½
2	1½	3½
3	2	5
4	3	6
5	4	10

TABLE 7.24
Size of Vent Pipes for Traps

Column 1	Column 2	Column 3
Item No.	*Trap* size, in inches	*Vent pipe* size, in inches
1	1¼	1¼
2	1½	1¼
3	2	1½
4	2½	1½
5	3	1½
6	4	1½
7	5	2
8	6	2

(Data in this table have been taken from Regulations under the Public Health Act Respecting Plumbing and Sewers, of the Province of Ontario, 30 July, 1952.)

TABLE 7.25
Size and Length of Vent Pipes

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12
Item No.	Size of soil or waste *stack*, in inches	*Fixture units* connected	Maximum length of *vent pipe*, in feet, for various diameters								
			Diameter of *vent pipe* required, in inches								
			1 1/4	1 1/2	2	2 1/2	3	4	5	6	8
1	1¼	2	30								
2	1½	8	50	150							
3	1½	10	30	100							
4	2	12	30	75	200						
5	2	20	26	50	150						
6	2½	42		30	100	300					
7	3	10		30	100	200	600				

Continued on next page

8	3	30			60	200	500				
9	3	60			50	80	400				
10	4	100			35	100	260	1000			
11	4	200			30	90	250	900			
12	4	500			20	70	180	700			
13	5	200				35	80	350	1000		
14	5	500				30	70	300	900		
15	5	1100				20	50	200	700		
16	6	350				25	50	200	400	1300	
17	6	620				15	30	125	300	1100	
18	6	960					24	100	250	1000	
19	6	1900					20	70	200	700	
20	8	600						50	150	500	**1300**
21	8	1400						40	100	400	1200
22	8	2200						30	90	350	1100
23	8	3600						25	60	250	800
24	10	1000							75	125	1000
25	10	2500							50	100	500
26	10	3800							30	80	350
27	10	5600							25	60	250

TABLE 7.26
Size of Vertical Rainwater Leaders

Column 1	Column 2	Column 3
Item No.	Diameter of *leader* or conductor (1), in inches	Maximum projected roof area, in square feet
1	2	720
2	2½	1300
3	3	2200
4	4	4600
5	5	8650
6	6	13500
7	8	29000

(1) The equivalent diameter of a square or rectangular *leader* may be taken as the diameter of that circle which may be inscribed within the cross-sectional area of the *leader*.

NOTE: This table is based on gravity flow in a full pipe and a maximum rate of rainfall of 4 inches per hour. For other conditions of rainfall multiply the roof area by $\frac{4}{x}$, where x is the rate of rainfall in inches per hour.

TABLE 7.27
Size of Gutters

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Item No.	Diameter of gutter (1), in inches	Maximum projected roof area, in square feet, for various slopes of gutter, per foot of length			
		1/16 inch	1/8 inch	1/4 inch	1/2 inch
1	3	170	240	340	480
2	4	360	510	720	1020
3	5	625	880	1250	1770
4	6	960	1360	1920	2770
5	7	1380	1950	2760	3900
6	8	1990	2800	3980	5600
7	10	3600	5100	7200	10000

(1) The cross-sectional area of gutters which are not semicircular must be converted before applying this table.

NOTE: This table is based on gravity flow in a full pipe and a maximum rate of rainfall of 4 inches per hour. For other conditions of rainfall multiply the roof area by $\frac{4}{x}$, where x is the rate of rainfall in inches per hour.

TABLE 7.28
Size of Horizontal Storm Drains

Column 1	Column 2	Column 3	Column 4	Column 5
Item No.	Diameter of drain, in inches	Maximum projected roof area, in square feet, for various slopes		
		Slope of drain, per foot of length		
		1/8 inch	1/4 inch	1/2 inch
1	3	822	1160	1644
2	4	1880	2650	3760
3	5	3340	4720	6680
4	6	5350	7550	10700
5	8	11500	16300	23000
6	10	20700	29200	41400
7	12	33300	47000	66600
8	15	59400	84000	119000

NOTE: This table is based on gravity flow in a full pipe and a maximum rate of rainfall of 4 inches per hour. For other conditions of rainfall multiply the roof area by $\frac{4}{x}$ where x is the rate of rainfall in inches per hour.

TABLE 7.29

Minimum Size of Water Supply Pipe to Fixtures

Column 1	Column 2	Column 3
Item No.	*Fixture*	Minimum pipe size, in inches
1	Bath tub	½
2	Combination sink and tray	½
3	Drinking fountain	⅜
4	Dishwasher, domestic	½
5	Kitchen sink, domestic	½
6	Kitchen sink, commercial	¾
7	Lavatory	⅜
8	Laundry tray—1, 2, or 3 compartments	½
9	Shower, single head	½
10	Sink, service, slop	½
11	Sink, flushing rim	¾
12	Urinal, flush tank	½
13	Urinal, direct flush valve	¾
14	*Water-closet*, flush valve type	1
15	*Water-closet*, tank type	⅜
16	Hose bib	½
17	Wall hydrant	½

APPENDIX 7.A

ADMINISTRATION

7.A.1. Scope

The provisions of this By-law shall apply to and govern plumbing as defined in the By-law, including the practice, materials, and *fixtures* used in the installation, maintenance, extension, and alteration of all the pipe, fixtures, appliances, and appurtenances in connection with any of the following: sanitary or storm drainage facilities, the venting system, and the public or private *water supply systems* within or adjacent to any *building;* also the practice and materials used in the installation, maintenance, extension, or alteration of the storm water or sewerage system of any premises to their connection with any point of public disposal or other terminal.

7.A.2. Permits

(1) Except as provided in (3), no connection shall be made with any sewer and no construction, re-construction, replacement, alteration, extension, or disconnection of any *plumbing system* or part thereof shall be started until a *permit* to do so has been obtained.

(2) A *permit* shall be issued only to a person meeting the qualifications prescribed by the municipality.

(3) No *permit* shall be required for the repair of the working parts of a faucet or valve, the

clearance of stoppages, repairing of leaks, or replacement of defective faucets or valves, provided no changes are made in the piping to the *fixtures*.

7.A.3. Application for a Permit

(1) Application for a *permit* shall be made by the *plumbing contractor* on a form provided by the municipality and shall be accompanied by the required fee in accordance with the schedule of fees prescribed by the municipality.

(2) Application for a *permit* shall be made to the plumbing inspector or such other official appointed by the *administrative official*.

7.A.4. Plans and Specifications

(1) Every application for a *permit* shall be accompanied by a specification or abstract of the proposed work, and where the installation consists of more than five *fixtures*, by a plan showing the location and size of the *building drain* and any *traps* or inspection pieces thereon, and a sectional drawing showing the size of the *vertical soil pipe* or pipes with the size and location of *branches* and all necessary *vent pipes* and *traps*.

(2) After a plumbing *permit* has been issued, no departure shall be made from the plan or description submitted with the application for such *permit*, without the written permission of the *administrative official*.

7.A.5. Duration of Permits

A *permit* shall be valid for six months or such other period determined by the *administrative official.*

7.A.6. Responsibility

Neither the granting of a *permit*, nor the *approval* of plans and specifications, nor inspections made by the *administrative official* shall in any way relieve the *plumbing contractor* from full responsibility for carrying out the work in strict accordance with this By-law.

APPENDIX 7.B
REQUIRED PLUMBING FACILITIES

7.B.1. General

(1) In any *building* situated on property which fronts on a public or municipal water main,

(a) every *dwelling unit* shall be supplied with, and

(b) all *floor areas* other than *dwelling units* shall be supplied with or shall have convenient access to,

a *plumbing system* including an adequate supply of *potable water* and suitable sanitary facilities to the extent required in Table 7.B.1, with drainage to a public *sanitary sewer*, *private sewage disposal system*, or other *approved* means of sewage disposal.

(2) These requirements shall apply to new *buildings*. For existing *buildings* these requirements

may be relaxed at the discretion of the *administrative official* if in his opinion their relaxation does not create a health hazard.

(3) When such public or municipal water supply is not available, a *plumbing system* shall not be mandatory. When no *plumbing system* is installed, there shall be provided sanitary privies, chemical closets, or other means for the disposal of human excreta, *approved* by the *administrative official.*

7.B.2. Type of Occupancy and Plumbing Requirements

(1) The number of plumbing *fixtures* required for any room shall be related to the use or *occupancy* of that room as shown in Table 7.B.1. The number of *fixtures* required in a *building* shall be calculated using the total population engaged in each *occupancy*. This population may be obtained by dividing the total area of rooms classed in that *occupancy* by the appropriate area per person given in Table 7.B.1.

(2) Where a *building* contains rooms which will be occupied simultaneously, the total number of *fixtures* required for the *building* shall be the total of *fixtures* required for each *occupancy*, calculated separately.

(3) Where a *building* contains rooms which will not be occupied simultaneously, the total number of *fixtures* may be reduced appropriately.

TABLE 7.B.1
Required Plumbing Fixtures

Column 1	Column 2	Column 3	Column 4
Types of Use or *Occupancy* of Rooms	Area per Person (square feet)	Plumbing *Fixtures* Required (number of persons per *fixture*)	
		Male	Female
Assembly, fixed seats	6	300	150
Assembly, non-fixed or temporary seats	8	300	150
Assembly, concourse and waiting rooms	15	300	150
Stadia and grandstands	6	300	150
Classrooms	20	30	20
Vocational shops	50	30	20
Institutions	125	C	C
Reading and writing rooms, lounges*	20	30	20
Dining rooms*	12	1 *fixture* for each sex	
Kitchens*	100	1 *fixture* for each sex	
Rooms for sleeping*	100	C	C
Dormitories	50	C	C
Retail sales floors	30–60	C	C
Manufacturing	50	C	C
Offices	100	C	C
Cleaning and repair of goods	50	C	C
Personal service establishments	50	C	C
Dwelling units	—	see note below	

* In other than *dwelling units*.

Notes on Table 7.B.1.

(1) C indicates a relationship between number of persons and required number of *fixtures* as follows:

Number of persons	*Number of fixtures*
1-9	1
10-24	2
25-49	3
50-100	5
over 100	one for each additional 30 persons

(2) Whenever more than one *water-closet*, one wash basin or sink, or one bathtub or shower is installed in a single room other than in a *dwelling unit*, the use of such room shall be restricted to one sex only.

(3) Whenever separate water-closet rooms or bathrooms are provided for each sex separately, they shall be closed by a full-sized door and shall be clearly and properly marked.

(4) Whenever water-closet rooms are required, urinals may be substituted for one-half of the required number of *water-closets*. A wash basin should be installed for each *water-closet*.

(5) *Dwelling unit* shall mean a room, or suite of two or more rooms, occupied or intended for the domestic use of one household.

A *dwelling unit* shall be supplied with a sink, bath, *water-closet*, and wash basin, subject to the provisions of Section 7.B.1.

APPENDIX 7.C
PRIVATE SEWAGE DISPOSAL SYSTEMS

Recommended Procedures for Installing Residential and Other Small Sewage Disposal Systems

7.C.1. General

(1) The design of an individual or *private sewage disposal system* should take into account the location of wells or other sources of water supply, topography of the groundwater table, soil characteristics, area available, and use and maximum *occupancy* of the *building* served.

(2) The system should be designed to receive all *sewage* including laundry and kitchen wastes, but not roof water or other storm water drainage. It should consist of a septic or settling tank with or without a siphon compartment, discharging into either a subsurface disposal field or one or more *seepage pits*. Where soil or other conditions are such that neither a field nor *seepage pit* can be used, the *approval* of an alternative design should be obtained from the *administrative official*.

7.C.2. Septic Tank Location

(1) Septic tanks should be so located that surface drainage therefrom is away from all sources of domestic water supply; the elevation must be such as to permit a minimum fall of $\frac{1}{8}$ inch per foot in the *building sewer*.

(2) The distance between a septic tank and any source of domestic water supply should be 50 feet, or more in the case of a porous subsoil or fissured rock, and the minimum distance between the tank and any *building* should be 3 feet.

7.C.3. Septic Tank Design

(1) The walls and floors of septic tanks should be of water-tight construction. Metal tanks are recommended only for short periods of use and the metal should be at least 12-gauge in thickness and coated suitably to retard excessive corrosion. Any abrasion or defect in the coating of metal tanks should be recoated before the tank is installed or put into service.

(2) The minimum liquid capacity of septic tanks serving *dwelling units* should be 400 imperial gallons in the sedimentation compartment. The inside liquid depth below the outlet should not be less than 4 feet.

The length of the sedimentation compartment of a rectangular septic tank should be not less than approximately 2 and not more than 3 times the width. The direction of sewage flow should be parallel to the longest dimension of the tank.

When circular tanks are used they should be laid horizontally and should comply with the requirements of (1); or they may be placed vertically in series if each settling compartment has a minimum liquid capacity of 100 imperial gallons, and the combined capacities of all compartments are not less than 400 imperial gallons.

(3) Inlets and outlets should be baffled or otherwise controlled to provide a quiescent flow and to prevent the escape of scum or floating solids. Baffle walls should extend the full width of the tank and be located 12 inches from the end walls. They should extend at least 6 inches above the flow line, and not less than 12 inches nor more than 18 inches below the flow line.

(4) Submerged pipe inlets and outlets may be used instead of baffle walls. They should be tile or cast-iron T's or TY's with the long leg extending downward as indicated in (3).

(5) The invert of the inlet pipe should be at least 3 inches above the invert of the outlet pipe.

(6) Each compartment of a septic tank should be provided with a removable cover, or with one or more access manholes at least 20 inches in inside diameter. When manholes are used and only one is provided in the sedimentation compartment, it should be placed over the inlet end. Manholes should be extended to the ground surface or within 6 inches therefrom.

(7) The liquid capacity of a septic tank for a *dwelling unit* should provide for a retention period of approximately 24 hours, with adequate additional space for sludge storage. Minimum septic tank capacities for *dwelling units* are shown in Table 7.C.1.

The retention period in the design of septic tanks for other than *dwelling units* should be selected with care to provide for the wider fluctuations in the water use and related sewage flow.

TABLE 7.C.1

Septic Tank Sizes for Dwelling Units

Based on a sewage flow of 35 gallons per capita per day, with sludge storage of 6 cubic feet per capita

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Number of bedrooms	Maximum number of persons served	Inside width (feet)	Inside length (feet)	Liquid depth (feet)	Minimum total depth (feet)
2 or less	5	3	5½	4	5
3	6	3	6	4	5
4	8	3½	7	4	5
5	10	3½	7½	4½	5½
6	12	4	8	4½	5½
7	14	4	9	4½	5½
8	16	4	10	4½	6

The design for other than minimum capacities should be based on a minimum sewage flow of the following:

Dwelling units and boarding schools*—

35 gallons plus 6 cubic feet per capita sludge storage.

Small hospitals (up to 15 beds)—

100 gallons plus 8 cubic feet per bed sludge storage.

Day schools—

10 gallons plus 2 cubic feet per pupil sludge storage.

Tourist camps and motels—

20 gallons plus 3 cubic feet per capita sludge storage.

*Boarding schools include communal residences.

7.C.4. Siphons and Dosing Chambers

Siphons are recommended for the best distribution of septic tank effluent, and also where sub-zero temperatures are common. Whenever a siphon is installed the liquid capacity of the dosing chamber should be sufficient to fill all pipes of the distribution system between one-half and three-quarters full at each discharge.

7.C.5. Subsurface Disposal Fields

(1) A subsurface disposal field should not be placed under a roadway and it is recommended

that the field be at least 100 feet from any well and 25 feet from any *dwelling unit*. The safe distance from wells will depend on local conditions; in the case of drilled wells a minimum distance of 50 feet may be permissible where the casing extends to a depth of not less than 25 feet from the surface.

(2) A distribution box with a removable cover may be provided at the inlet end of the distribution system if it is considered necessary because of slop- in ground or other unusual conditions. The inlet to the box should be about 2 inches above the outlets and all outlets should be at the same elevation.

(3) Drainage pipe in the distribution system should be at least 4 inches in diameter and laid on a flat slope not exceeding 4 inches per 100 feet. Lines of pipe should be not less than 3 feet apart and the maximum length of any line should not exceed 100 feet.

(4) When field tile is used it should be laid with joints $\frac{1}{4}$ to $\frac{1}{2}$ inch wide and the top half of the joint should be covered with asphalt-treated paper or gravel or other suitable material to prevent entrance of soil. Gravel should range in size from 1/2 to 2 1/2 inches and should be carried to a height of 2 inches above the pipe joint. The joints of bell and spigot pipe should be 1/2 inch wide and the pipe laid with the invert of spigot ends in a straight line.

(5) The depth of cover on distributing pipe in moderately cold areas should be at least 18 inches. Where the ground freezes to a considerable depth specially designed trenches are recommended.

(6) Except in very porous subsoil all drainage pipe should be laid in a trench on a bed of gravel or crushed rock. In such cases there should be not less than 6 inches of gravel or crushed rock beneath the drainage pipe.

(7) The trench width at the bottom should be not less than 18 inches. The effective absorption area is dependent on the bottom width of trench but no installation should have less than a total of 150 lineal feet of drainage pipe.

(8) Unless already known, the effective absorption area required may be based on a percolation test. Percolation tests should be made as follows:

Excavate a 1-foot square or 4- to 6-inch round hole to the depth of the proposed disposal trenches. Fill the hole with water to a depth of at least 6 inches and allow the water to seep away. Repeat this procedure until the drop in water level is at a constant rate. When a constant rate has been reached, observe the time in minutes required for the water level to drop 1 inch. The effective absorption area may be then determined from Table 7.C.2.

TABLE 7.C.2

Trench Requirements from Percolation Test

$$\text{Based on } G = \frac{29}{(t \times 6.24)\ 1.2}$$

where G = rate of sewage application in gallons per day per square foot of bottom trench area,
t = percolation time as determined above, in minutes per inch.

Column 1	Column 2	Column 3	Column 4
Time required for water level to fall 1 inch (minutes)	Loading per square foot of trench (imperial gallons)	Loading per lineal foot of 18-inch trench (imperial gallons)	Length of 18-inch trench required per person for 35 gallon per day flow (feet)
1	3.5	5.2	6.7
5	2.1	3.1	11.3
10	1.5	2.2	15.5
20	0.9	1.3	27.0
30	0.7	1.0	35.0
40	0.6	0.8	44.0
50	0.5	0.7	47.0
60	0.4	0.6	58.0

(9) Seepage Pits—*Seepage pits* may be used either to supplement the subsurface disposal field or in lieu of such field where conditions are favourable and *approval* is obtained from the *administrative official.* Care must be taken to avoid extending the *seepage pit* into the groundwater table, and the design of the pits should be in accordance with the instructions of the *administrative official.*

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The National Building Code will be continually under review, revised editions being issued when necessary. Comments will, therefore, be welcomed. All correspondence should be addressed to:

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