

ARTICLE XX

# North Carolina PLUMBING CODE



Issued by

THE NORTH CAROLINA STATE BOARD OF HEALTH



## FOREWORD

The North Carolina Building Code was adopted in accordance with the provisions of the North Carolina General Statutes, Chapter 143, Article 9.

The 1953 edition of the Code was prepared by the North Carolina Building Code Council. Article 20 of the Code, which relates to "Plumbing" and which is printed as a separate bulletin, has been approved by the State Board of Health in accordance with provisions of the North Carolina General Statutes.

The statutes state that the State Board of Health shall have general supervision of the administration and enforcement of those sections of the North Carolina Building Code relating to plumbing. It shall be the duty of the State Board of Health to renew and revise or amend the Plumbing Code, designated as Article 20 of the North Carolina Building Code, as may be deemed necessary by the State Board of Health, after consultation with the North Carolina Building Code Council.

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**PLUMBING CODE FOR THE STATE  
OF NORTH CAROLINA**

**ARTICLE XX**

**SECTION 2001**

**SECTION 2001. PLUMBING SUPERVISION.**

a. The State Board of Health shall have general supervision of the administration and enforcement of those sections of the North Carolina Building Code relating to plumbing. It shall be the duty of the State Board of Health to review and revise or amend the plumbing code, designated as Article 20 of the North Carolina Building Code, as may be deemed necessary by the State Board of Health after consultation with the North Carolina Building Code Council.

b. Plumbing work shall be of such quality as to fully secure the results sought in all sections of this chapter. Installations of new plumbing systems or alterations or additions to existing plumbing systems, shall conform in all respects to the regulations of this chapter, and in cases where deviations from this code are unavoidable, decisions shall be based on a full protection of the public health and safety.

**§ 2001. Definition of Plumbing.**

The "plumbing" of a building, as the term is commonly used, includes the pipes for distributing the water supply, the fixtures for using water, and drainage pipes for removing waste water and sewage, together with fittings and appurtenances of various kinds, all within or adjacent to the building. The "service pipes", which form the connection between the water main and the building, and the "house sewer", which conveys the waste water and sewage from the building to the street sewer or other point of disposal, are included in the "plumbing system" of a building, using the term in a broader sense. Connections for rain water are also included if the water is collected into piping inside a building and piped therefrom to outside the structure. The water supply and drainage system are mutually dependent. Drains are needed to carry away the used water; water is needed to cleanse the fixtures and transport solid wastes.

**§ 2001. Basic Plumbing Principles.**

The following basic plumbing principles have been used in the preparation of this article and must be complied with:

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1. All premises intended for human habitation or occupancy shall be provided with a supply of pure and wholesome water, such supply shall not be connected with unsafe water supplies nor cross-connected to the drainage system, and every such building shall have at least one water closet and one sink.

2. Buildings in which water closets and other plumbing fixtures exist shall be provided with a supply of water adequate in volume and pressure for flushing purposes.

3. The pipes conveying water to water closets shall be of sufficient size to supply the water at a rate required for adequate flushing without unduly reducing the pressure at other fixtures.

4. Devices for heating water and storing it in "boilers", or hot water tanks, shall be so designed and installed as to prevent all dangers from explosion and also prevent a back flow of hot water through a meter connected with a public water supply.

5. Every building intended for human habitation or occupancy on premises abutting on a street in which there is a public sewer shall have a connection with the sewer, and, if possible, a separate connection.

6. In multiple dwellings provided with a house drainage system there shall be for each family at least one private water closet and sink.

7. Plumbing fixtures shall be made of smooth non-absorbent material, shall be free from concealed fouling surfaces.

8. The entire house drainage system shall be so designed, constructed, and maintained as to conduct the waste water or sewage quickly from the fixture to the place of disposal with velocities which will guard against fouling and the deposit of solids and will prevent clogging.

9. The drainage pipes shall be designed and constructed, as to be proof for a reasonable life of the building against leakage of water or drain air due to defective materials, imperfect connections, corrosion, settlement or vibrations of the ground or building, temperature changes, freezing, or other causes.

10. The drainage system shall be provided with an adequate number of accessible cleanouts so arranged that in case of stoppage the pipes may be readily cleared.

11. Each fixture or combination fixture shall be provided with a separate, accessible, self-scouring, reliable water-seal trap, placed as near to the fixture as possible.

12. The house drainage system shall be so designed that there will be an adequate circulation of air in all pipes and no danger

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of siphonage, aspiration, or forcing of trap seals under conditions of ordinary use.

13. The soil stack shall extend full size upward through the roof and have free opening, the roof terminal being so located that there will be no danger of air passing from it to any window, and no danger of clogging of the pipe by frost or by articles being thrown into it, or of roof water draining into it.

14. The plumbing system shall be subjected to a water or air pressure test and to a final air pressure test in such manner as to disclose all leaks and imperfections in the work.

15. No substances which will clog the pipes, produce explosive mixtures, or destroy the pipes or their joints, shall be allowed to enter the house drainage system.

16. Refrigerators, ice boxes, or receptacles for storing food shall not be connected directly with the drainage system.

17. No water closet shall be located in a room or compartment which is not properly lighted and ventilated to the outer air.

18. If water closets or other plumbing fixtures exist in buildings where there is no sewer within reasonable distance, suitable provision shall be made for disposing of the house sewage by some method of sewage treatment and disposal satisfactory to the State Board of Health.

19. Where a house drainage system may be subjected to back flow of sewage, suitable provision shall be made to prevent its overflow in the building.

20. Plumbing systems shall be maintained in a sanitary condition.

**SECTION 2002. DEFINITIONS.**

1. **Administrative Authority.** The individual, official, board, department or agency set up and authorized by a state, county, city, or other political subdivision to administer and enforce the provisions of this plumbing code as adopted or amended.

2. **Air gap.** An air gap in a water-supply system is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe, or faucet supplying water to a tank or plumbing fixture, and the flood-level rim of the receptacle.

3. **Approved.** Accepted or acceptable under an applicable specification stated or cited in this code, or accepted as suitable for the proposed use under procedures and powers of administration delegated in this code.

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4. **Area Drain.** An area drain is a drain installed to collect surface or rain water from an open area.
5. **A. S. T. M.** Abbreviation for American Society for Testing Materials.
6. **Back Vent Pipe.** That part of a vent line which connects directly with an individual trap, underneath, or back of the fixture it serves, and extending to the branch or main vent pipe at any point higher than the fixture or fixture trap it serves.
7. **Back Flow.** Flow of water or sewage opposite to the normal direction of flow.
8. **Back Flow Valve.** A valve or device which permits the flow of liquids in one direction only.
9. **Back Siphonage.** The formation of a partial vacuum in water supply pipes which causes a sucking back of polluted water or other liquids into the water supply piping.
10. **Basement.** That portion of a building the floorline of which is below lot grade and the ceiling of which is not more than five (5) feet above lot grade. Same for cellar.
11. **Bell or Hub.** That portion of a pipe which, for a short distance is sufficiently enlarged to receive the end of another pipe of the same diameter for the purpose of making a joint.
12. **Branch.** The branch of any system of piping is that part of the system which extends horizontally at a slight grade, with or without lateral or vertical extensions from the stack, to receive fixture outlets not directly connected to the stack.
13. **Brazed Joint.** A method of joining two pieces of metal by telescoping the parts to be joined and fusing by means of a hard solder or alloy.
14. **Burr.** Roughness or extra metal protruding from the walls of a pipe, usually as the result of cutting the pipe.
15. **Camp Ground.** Any place, area, or tract of land upon which is located any occupied trailer house, or other temporary habitation.
16. **Catch Basin.** A water tight receptacle built to arrest the sediment of surface subsoil or other waste drainage, and to retain oily or greasy wastes, to prevent their entrance into the house sewer or drain.
17. **Circuit Vent.** A continuation of a horizontal soil or waste pipe beyond the connection at which liquid wastes from a fixture or fixtures enter the soil or waste pipe. The extension is usually vertical immediately beyond its connection to the soil or waste

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pipe and is continued through the roof or looped or reconnected into a vent stack above all fixture trap branches. The base of the vertical portion of the vent shall be connected to the horizontal portion of the soil or waste pipe between fixtures connected thereto.

18. **Cleanout.** A metallic plug or cover joined by means of a screw thread to an opening in a pipe, which can be removed for the purpose of cleaning or examining the interior of the pipe.

19. **Combination Fixture.** Combination fixture is a trade term designating an integral combination of one sink and one or two laundry trays in one fixture.

20. **Conductors or Roof Leaders.** Pipes which carry the storm or rain water from the roofs of buildings or areas to the storm drain, basin, or rain water cistern. The vertical portion of the conductor (downspout) may be located within or outside the building.

21. **Continuous Vent.** A continuation of a vertical waste pipe above the connection at which liquid wastes enter the waste pipe. The extension may or may not continue in a vertical direction.

22. **Continuous Waste.** A waste from two or more fixtures connected to a single trap.

23. **Cross-Connection.** A physical connection through which a supply of potable water could be contaminated, polluted, or infected.

24. **Crown Weir.** The highest portion of the inside bottom surface at the crown of a trap.

25. **Dead End.** A dead end is a branch leading from a soil, waste, vent, house drain, or house sewer which is terminated by means of a cap, plug, or other fitting and which is without a free circulation of air.

26. **Deep Seal Trap.** A trap with a seal of four (4) inches and not exceeding six (6) inches.

27. **Deep Seal Resealing Trap.** A trap of the centrifugal self-scouring type in which the water motion is both centrifugal and upward at each discharge of the fixture and retains an adequate amount of water to form an efficient trap seal.

28. **Developed Length.** The developed length of a line of pipe is its length along the center line of the pipe and fittings.

29. **Diameter.** Unless specifically stated, the term diameter means the nominal diameter as designated commercially.

30. **Dip of Trap.** The lowest portion of the inside top surface of the channel through a trap.



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31. **Domestic or Sanitary Sewage.** Sewage from buildings used for human habitation or occupancy.

32. **Double Offset.** A double offset is two offsets installed in succession or series in the same line.

33. **Drain.** A drain or drain pipe is any pipe which carries waste water or water-borne wastes in a building drainage system.

34. **Drainage System.** A drainage system, or drainage piping, shall mean and include all the piping within public or private premises, which conveys sewage, rain water, or other liquid wastes, to a legal point of disposal, but shall not include the mains of a public sewer system.

35. **Drum Trap.** A trap consisting of a cylinder with its axis vertical. The cylinder is larger in diameter than the inlet or outlet pipe and is usually four (4) inches in diameter with inlet and outlet one and one-half (1½) inches or two (2) inches in diameter.

36. **Dry Well.** An underground receptacle, receiving the discharge from a treatment tank, equipped with a manhole and cover brought to the surface of the ground for observation and cleaning purposes, so constructed as to assure the disposal of treated wastes by soil absorption through its walls and bottom.

37. **Dwelling.** Any building used only for living purposes.

38. **Effective Opening.** The effective opening is the minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of (1) the diameter of a circle or (2) if the opening is not circular, the diameter of a circle of equivalent cross-sectional area.

39. **Ejector.** A device operated either by electrical or water power, or by other mechanical means and so constructed as to elevate liquids from a lower level to a point of discharge into a public or private sewer or other disposal terminal.

40. **Ferrule.** A metallic sleeve used to connect lead or iron waste or vent pipe to a soil pipe hub.

41. **First Floor.** The floor next above the basement, or lowest floor if there is no basement.

42. **Fittings.** Parts of a pipe line other than a straight pipe or valve used to change direction, extend, or terminate such pipe line.

43. **Fixture Drain.** A fixture drain is the drain from the trap of a fixture to the junction of that drain with any other drain pipe.

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44. **Fixture Unit.** A fixture unit is a design factor for drainage piping so chosen that the load-producing values of the plumbing fixtures can be expressed approximately as multiples of that factor.

45. **Flooded.** A fixture is flooded when the liquid therein rises to the flood level.

46. **Flood Level.** Flood level in reference to a plumbing fixture is the level at which water begins to overflow the top or rim of the fixture.

47. **Flood-Level Rim.** The flood-level rim is the top edge of the receptacle from which water overflows.

48. **Flush Valve.** A valve for flushing water closets and similar fixtures.

49. **Frost-Proof Closet.** A closet that has no water in the bowl and has the trap and the control valve for its water supply installed below the frost line.

50. **Free Circulation of Air.** A plumbing and drainage system so designed and installed as to keep the air within the system in free circulation and movement, and to prevent with a margin of safety, unequal air pressures of such force as might blow, siphon, or affect trap seals, or retard the discharge from plumbing fixtures.

51. **Garage.** A building or part thereof in which automobiles are housed for any purpose.

52. **Garage, Private.** An accessory building for the storage of not more than four private passenger automobiles, and in which space may be rented for such storage to the occupants of a principal building to which such garage is accessory. Where a principal building contains less than four families, space in a private garage may be rented to other than the occupants of the principal building to which such garage is accessory, but in no case shall space be used for more than one commercial vehicle.

53. **Grease Interceptor.** A grease interceptor (trap) is a receptacle designed to collect and retain grease and fatty substances normally found in kitchen or similar wastes. It is installed in the drainage system between the kitchen or other point of production of the waste and the building sewer.

54. **House Drain.** That part of the underground or lowest horizontal piping of plumbing system which receives the discharge of all soil, waste, and other drainage pipes inside of the walls of any building and conveys the same to the house sewer, within five (5) feet outside of the foundation wall of such building.

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55. **House Sewer.** That part of the horizontal piping of a plumbing system extending from a point five (5) feet outside of the foundation wall of a building to its connection with the main sewer, septic tank, or other disposal terminal.

56. **House Trailer.** A vehicle affording shelter used for living and sleeping purposes, and which is equipped with or designed for wheels or similar devices used for the purpose of transporting said vehicle from place to place, whether by motive power or other means.

57. **Horizontal Branch.** A horizontal branch is a branch drain extending laterally from a soil or waste stack or building drain, with or without vertical sections or branches, which receives the discharge from one or more fixture drains and conducts it to the soil or waste stack or to the building (house) drain.

58. **House Trap.** A house trap is a running trap, installed in the house drain at the point where house drain leaves the building; usually provided with a fresh air inlet; the installation of house traps is prohibited, except by special authority, in writing, and only in the most exceptional circumstances, where such use is clearly unavoidable.

59. **Indirect Waste Pipe.** An indirect waste pipe is a waste pipe which does not connect directly with the drainage system, but discharges into it through a properly trapped fixture or receptacle.

60. **Individual Vent.** An individual vent (sometimes referred to as a back vent) is a pipe installed to vent a trap, soil or waste pipe underneath or back of the fixture it serves and connected to a point above the fixture to the general vent system.

61. **Industrial Wastes.** The liquid wastes resulting from the processes employed in industrial establishments.

62. **Interceptors.** An interceptor is a receptacle designed and constructed to intercept or separate and prevent the passage of oil, grease, sand or similar materials into the drainage system to which it is directly or indirectly connected.

63. **Journeyman Plumber.** A journeyman plumber is a person who through training and experience has acquired the requisite skill and knowledge necessary for the proper installation of plumbing.

64. **Lavatory or Wash Basin.** A bowl, basin, or other fixture, for washing of the hands or face, connected with city water and sewer system. Same for wash bowl.

65. **Leader.** A leader or downspout is the water conductor from the roof to the storm drain or other means of disposal.

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66. **Local Vent.** A pipe or shaft serving to convey foul air from a plumbing fixture or room to the outer air, but in no manner connected to the plumbing system.

67. **Loop Vent.** A loop vent is the same as a circuit vent except that it loops back and connects with a soil- or waste-stack vent instead of the vent stack.

68. **Main.** That part of any system of horizontal, vertical, or continuous piping which received the wastes, vent, or back vents, from fixture outlets or traps, directly or through branch pipes.

69. **Main Soil or Waste Vent.** That part of the main soil or waste pipe (stack) above the highest installed branch or fixture connection, extending through the roof.

70. **Manhole.** An opening constructed to a sewer or any portion of a plumbing system of sufficient size to permit a man to gain access thereto.

71. **Place of Employment.** Any indoor, outdoor, or underground place, and the premises appurtenant thereto, where any industry, trade, or business is carried on, either temporarily, or permanently. Or where any process or operation, directly or indirectly related to any industry, trade or business, is carried on; and where any person is directly or indirectly employed by another for direct or indirect gain or profit, but shall not include places where persons are employed in private domestic service or agricultural pursuits.

72. **Plumbing.** Plumbing is the installation, within buildings or structures, of the piping, fixtures, and other appurtenances for the water supply and removal of liquid and water-carried wastes, and shall include the installation of all water service piping, house sewers and drains from and to the mains in the street or other terminal, except piping for heating, air conditioning and industrial processes as regulated in this chapter.

72A. **Plumbing Contractors.** A person or persons, who, by examination or other pre-qualification, have satisfactorily demonstrated that they possess the necessary knowledge and ability to properly conduct a plumbing business as defined in this code and/or to supervise the work of journeymen plumbers so engaged.

73. **Plumbing Fixture.** A receptacle or device attached to a plumbing or drainage system used to receive and discharge water, or other liquid, or water-carried waste.

74. **Plumbing System.** The plumbing system of a building or structure includes the water supply system; the fixtures and fixture traps, the soil, waste, and vent pipes; the house drain, house

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sewer, and storm water drainage; with their devices, appurtenances, and connections all within or adjacent to the building.

75. **Pool.** A pool is a water receptacle used for swimming or as a plunge or other bath, designed to accommodate more than one bather at a time.

76. **Potable Water.** Potable water is water from a public or private water-supply system or source which is accepted by the proper governing authority as suitable for human consumption.

77. **Private Sewer.** A privately owned sewer not connected with the public sewerage system.

78. **Private Water Supply.** A privately owned water supply.

79. **Privy.** An outhouse or structure used for the deposition of human excrement.

80. **Privy Vault.** A pit beneath a privy in which human excrement collects.

81. **Public Building.** Any building or structure other than a dwelling or accessory building, as defined in Section 300 of Building Code.

82. **Public Sewer.** A publicly owned sewer.

83. **Relief Vent.** A pipe located close to the stack and connected at points which will effectively prevent minus or plus pressures.

84. **Repairs and Stoppages.** Eliminating leaks; removing obstructions in soil, waste, and supply pipes; restoring defective valves, faucets, and similar appliances to an efficient operating condition; without the removal of any fixture, trap, waste, or vent, or other piping.

85. **Rim.** Unobstructed open edge of a fixture.

86. **Riser.** A riser is a water-supply pipe which extends vertically one full story or more to convey water to branches or fixtures.

87. **Roof Drain.** A roof drain is a drain installed to receive water collecting on the surface of a roof and to discharge it into the leader (downspout).

88. **Roughing-In.** The installation of all soil, waste, vent, and water supply pipes from a point where they enter the building, or are carried through the walls and floors, to the point where the fixtures are to be set or connected.

89. **Safing.** A pan or other collector placed beneath a pipe or fixture, to prevent leakage from escaping onto the floor, ceilings, or walls.

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90. **Sand Trap.** A catch basin for the collection of sand or other gritty materials.

91. **Sanitary Sewer.** A sewer constructed to convey domestic sewage and industrial wastes from buildings to a septic or bacterial treatment tank or other point of disposal and from which all surface, clear, and storm water is excluded.

92. **Second-Hand.** Material or plumbing equipment that has been installed, and has been used, removed and passed to another ownership or possession.

93. **Septic or Biological Tank.** A reservoir or tank which receives raw sewage, and by bacterial action and sedimentation effects a process of liquidation and clarification.

94. **Sewage.** Any liquid waste containing animal or vegetable matter in suspension or solution, and which may include liquids containing minerals from laboratories or industrial institutions.

95. **Sewerage.** The works comprising a sewer system, pumping stations, treatment works, and all other works necessary to the connection, treatment, or disposal of sewage.

96. **Shall, Should, and May.** The word "shall" when used in this code is mandatory. "Should" is not mandatory, but expresses recommendation. "May" implies neither compulsion nor recommendation, but permission.

97. **Shock Absorber.** A device installed on the water supply piping to prevent shocks caused by water hammer.

98. **Sink.** A shallow fixture, ordinarily with a flat bottom, and usually used in a kitchen or in connection with the preparation of food.

99. **Siphonage.** A suction created by the flow of liquids in pipes.

100. **Size and Length.** The given caliber or size of pipe is for a nominal internal diameter. Some tubing is measured by its outside diameter. The developed length of a pipe is its length along the center line of pipe and fittings.

101. **Slip Joint.** A connection in which one pipe slips into another, the joint of which is made tight with approved gasket or packing.

102. **Slop Sink (Service Sink).** A deeper fixture than a kitchen sink and used for the reception of waste water free of solids.

103. **Soil Pipe.** Any pipe which conveys the discharge of water closets and urinals, with or without other fixtures, to the house drain.

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104. **Spigot.** The end of a pipe which fits into a bell or hub.

105. **Stack.** A general term for any vertical line including offsets of soil, waste, or vent piping.

106. **Storm Drain.** That part of horizontal piping and its branches which conveys the surface drainage from areas, courts, yards, or conductors of a building to the storm sewer, or other point of disposal.

107. **Subsoil Drain.** That part of a drainage system which conveys the ground or seepage water from the base of walls or below the basement floor under buildings to the storm drain, or other point of disposal.

108. **Sump.** A pit or receptacle into which liquid wastes are drained.

109. **Surface Water.** That portion of rainfall or other precipitation which runs off over the surface of the ground.

110. **Terminal.** That part of a drainage or vent system which projects above the roof of the building or at the end of the house drain connecting to the septic tank or hose sewer or other disposal unit.

111. **Trailer Coach.** Trailer Coach shall mean a self-contained unit designed for the shelter of one or more persons as a residence or for other use as permitted by the administrative authority for the serving of drinks, food, or as a comfort station and which can readily be moved or transported from one locality to another on its wheels and which is provided with plumbing facilities.

112. **Trailer Park.** Trailer Park shall mean any area wherein one or more trailers can be parked, either permanently or temporarily, while continuing in use as human habitation.

113. **Trap.** A fitting so constructed as to prevent the passage of air or gas through a pipe without materially affecting the flow of sewage or waste water.

114. **Trap Seal.** The vertical distance between the dip and crown weir or overflow of a trap.

115. **Tray or Laundry Tub.** A fixture used in a laundry for washing.

116. **Vacuum.** A pressure less than atmospheric, sometimes referred to as a suction or negative pressure.

117. **Vent Pipe.** A pipe used for insuring the circulation of air in a plumbing system and to prevent trap siphonage and back pressure.

118. **Vent System.** A vent system is a pipe or pipes installed to provide a flow of air to or from a drainage system or to pro-

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vide a circulation of air within such system to protect trap seals from siphonage and back pressure.

119. **Waste Pipe and Special Waste.** Any pipe which receives the discharge of a fixture, except water closets and urinals, and conveys the same to the house drain, soil, or waste stacks. When such pipe does not connect directly with a house drain or soil stack it is termed a special waste.

120. **Water Service Pipe.** The pipe from the water main or source of supply to the building or premises served.

121. **Water Distribution Pipes.** Those pipes which convey water from the water service pipes to the plumbing fixtures, taps, or draw cocks.

122. **Water Main.** The water (street) main is a water-supply pipe for public or community use.

123. **Water Outlet.** Water outlets, as used in connection with the water-distribution system, means the discharge opening for the water to (1) a fixture; (2) atmospheric pressure (except into an open tank which is part of the water-supply system); (3) boiler or heating system; (4) any water-operated device or equipment requiring water to operate, but not a part of the plumbing system.

124. **Water Service Pipe.** The water-service pipe is the pipe from the water main or other source of water supply to the building served.

125. **Wet Vent.** That portion of a vent pipe through which liquid wastes flow.

126. **Wiping a Joint.** The fusion of metal with solder, smoothly finished with a wiping cloth, and having a thickness of not less than one fourth ( $\frac{1}{4}$ ) inch at the point where the pipes are joined.

127. **Workmanship.** Work of such character that will fully secure the results required in this chapter.

128. **Yard Drain.** The horizontal piping and its branches which conveys the surface drainage from areas, courts, or yards, outside the walls of a building, to the storm water drain, or other point of disposal.

**SECTION 2003. GENERAL REGULATIONS.**

**1. Use of Public Sewers.**

Where a public sewer in a public thoroughfare or easement is accessible to premises abutting thereon, the liquid wastes from any such premises shall be discharged into such public sewer, unless otherwise directed by a competent authority.



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Where a public sewer is not available, the construction of drains, soil, waste, and vent pipes in buildings and structures shall conform to the regulations of this section, and shall discharge into private drains, septic tanks, or any approved disposal terminal.

#### **2. Septic or Sewage Tanks and Privies.**

No septic or other sewage tank or privy should be constructed on any premises to which a public sewer is accessible. The use of all septic or other sewage tanks and privies already constructed on property to which a public sewer is or becomes accessible shall be discontinued not later than 90 days after the public sewer becomes available. Thereafter, all such discontinued septic or other sewage tanks, and privy vaults shall have the contents removed to within not less than twenty-four (24) inches of the ground surface and refilled with earth, cinders, ashes, or similar material.

#### **3. Sewage Treatment.**

a. Where liquid wastes from any plumbing system are not discharged into a public sewer, such wastes shall be treated or disposed of in compliance with this code, so as not to endanger any water supply that is or may be used for drinking, bathing, or domestic purposes, or which will create any nuisance or unsanitary conditions.

b. Where sewage, discharged into the public sewer, is of such character as to endanger the sewer system or sewage treatment plant, such sewage shall be treated in an approved manner before being discharged into such sewer.

c. Permission to construct septic or other sewage treatment and disposal tanks and approval of the system to be installed must be obtained from the State Board of Health, or other competent authority.

#### **4. Septic Tank Location.**

Septic Tanks shall be located as directed by an administrative authority, but in no case shall a septic tank be located within or under any building.

#### **5. Disturbing, Damaging or Entering Sewers.**

No person shall disturb, damage, or enter any public sewer pipe, manhole, catch basin, or other part of a sewer system without a special permit from the plumbing inspector or other administrative authority.

#### **6. Foreign Matter in Sewers.**

No slaughter house or tannery offal, or garbage, dead animals, or liquid containing silt, hair, fibers, grease, or other obstructing materials shall be discharged into any public sewer unless such

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sewage shall be screened and intercepted in a manner as approved by the plumbing inspector or other administrative authority.

**7. Harmful Wastes in Sewers.**

a. *Acid Waste.* Waste from any source containing acid or other wastes having especially destructive action on plumbing or drainage systems of ordinary materials shall not be permitted to discharge into such systems of any building or structure unless such wastes are conveyed in special acid-resisting systems constructed of lead, vitrified tile, ferro-silicon alloy, or other approved materials.

b. Lead pipe may be used in cases where the wastes or acids are of a nature which do not attack lead. Its use is prohibited for wastes containing mixed acids. When lead pipe is used, all joints shall be made by lead burning or by other approved methods. Lead pipe shall not be used in contact with cinders, concrete, or mortar unless protected in an approved manner.

c. When tile pipe is used, joints shall be made by ramming an approved acid resistant packing in the bottom of the bell and filling the remainder of the bell with an approved acid-proof cement. The entire line shall be encased in concrete of the proportions of one (1) part cement to six (6) parts of clean sharp sand and crushed stone or washed gravel. The least thickness of concrete around the pipe shall be one-half ( $\frac{1}{2}$ ) the nominal diameter of the pipe but not less than two (2) inches. The concrete should be reinforced by at least four (4) steel rods one-half ( $\frac{1}{2}$ ) inch diameter longitudinally placed with the pipe and equally spaced, said rods to be covered in the concrete to a depth of one-half ( $\frac{1}{2}$ ) inch.

d. When ferro-silicon pipe (Duriron) is used, the minimum analysis shall be as follows:

Silicon	above	14.25%
Carbon	below	0.80
Manganese	below	0.50
Sulphur	below	0.08
Phosphorous	below	0.20
Iron	remainder	

e. The joints of ferro-silicon pipe shall be of bell and spigot type, caulked in the same manner as is usual for cast iron soil pipe, except that an approved acid resisting packing shall be used instead of hemp or oakum, such as rope asbestos.

**8. Receiver.**

Where the administrative authority determines that a receiver or neutralizing basin must be employed to properly protect the

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pipng of the drainage system or to dispose of the waste in an approved manner, all waste pipes from acid tanks or other receptacles shall discharge into a neutralizing basin which shall be supplied with fresh water by receiving the waste of one or more bubblers or other clear water of sufficient quantity to neutralize the acids before entering the drain. The capacity of said basin or receiver shall be determined by the amount of waste tributary thereto, but in no case shall the size be less than twenty-four (24) inches in diameter and forty-eight (48) inches deep.

#### **9. Inside Receivers.**

A receiver of acid wastes placed inside of a building or structure shall be set so that the top is not less than two (2) inches higher than the surrounding floor and shall be provided with an approved air tight cover, a 2-inch or larger fresh air inlet terminating with a return bend outside of the building or structure one (1) foot or more above grade, and a vent pipe of approved material not less than two (2) inches in diameter extended through the roof.

#### **10. Outside Receivers.**

a. A receiver of acid wastes placed outside of a building or structure and connected to a house sewer shall have an approved perforated cover. A fresh air inlet or vent pipe will not be required.

b. Where outside receivers are used in connection with a sanitary house sewer, they shall not serve as yard drain catch basins.

#### **11. Explosive or Volatile Matter in Sewer.**

a. No explosive or volatile matter shall be discharged into any sewer, in cleaning establishments, buildings used for housing or repairing automobiles, gasoline and oil service stations, and other buildings or establishments where gasoline, oils, calcium carbide, or other explosive or volatile matter is stored, sold, or handled, the drains which are connected to the public sewers shall be provided with an approved intercepting pit or tank so constructed, located, and maintained as to prevent the entrance into the sewer of such explosive or volatile matter.

b. The installation of floor drains in rooms used solely for electrical transformers is prohibited. Such rooms shall be provided with approved catch basins so constructed to serve the purposes for which they are intended and shall not connect directly to the sewerage system.

#### **12. Dead Ends.**

In the installation of any drainage system, or part thereof, dead ends are to be avoided as far as practicable, and in no case shall exceed five (5) feet in length.

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**13. Protection of Piping.**

All pipes passing under or through walls shall be protected against breakage by the use of iron sleeves not less than two sizes larger than such pipes. All pipes passing through or under cinder, or other corrosive material shall be protected against external corrosion. No cinders or other corrosive material shall be permitted within one (1) foot six (6) inches of the outside surface of the pipe.

**14. Remodeling, Reconstruction, and Repairs.**

a. Where a fixture is removed, all vent, soil, and waste pipes serving such fixture shall be removed, if practicable, so as to avoid any dead ends and the openings left thereby shall be securely closed.

b. Where an old or defective fixture is removed and is to be replaced, and no other fixture or piping is to be added or remodeled, it will not be necessary to reconstruct the soil, waste, or vent piping to conform to this chapter, unless such piping is in a defective condition, or has been illegally installed, or fixtures or piping have been illegally installed above existing fixtures on the same soil or waste stack.

c. Where old or defective plumbing is to be remodeled or additional fixtures installed, the new or remodeled portions of the plumbing system shall conform to the regulations of this article. When changing the location of or moving a building or structure, all connections to the existing plumbing and drainage systems shall comply with the regulations of this article.

**15. Workmanship.**

The workmanship of all plumbing and drainage systems shall be of such grade, to fully obtain the results sought in all sections of this article.

**SECTION 2004. QUALITY AND WEIGHT OF MATERIALS.**

**1. Minimum Standards.**

The materials listed in this section shall conform at least to the standards cited when used in the construction, installation, alteration or repair of any part of a plumbing and drainage system, except that the administrative authority shall allow the extension, addition, or relocation of existing soil, waste, or vent pipes with materials of like grade or quality, as permitted in this code.

**2. Use of Materials.**

Each material listed in Table I, Standards for Plumbing Materials, shall conform to at least one of the standards cited opposite it. Its use shall be further governed by the requirement imposed in other chapters of the code. Materials not included in the table shall be used only as provided for elsewhere in this code. Mate-

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rials shall be free of manufacturing defects or damage, however occasioned, which would, or would tend to, render such materials defective, unsanitary, or otherwise improper to accomplish the purpose of this code.

### **3. Specifications for Materials.**

Standard specifications for materials for plumbing installations are listed in Table I. Products conforming at least to any of the specifications listed for a given material shall be considered acceptable.

**Note 1.** Abbreviations used in Table I refer to standards or specifications as identified below.

**ASA**—American Standards approved by the American Standards Association, 70 East Forty-fifth Street, New York 17, N. Y.

**ASTM**—Standards and Tentative Standards published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

**FS**—Federal Specifications published by the Federal Specifications Board and obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

**AWWA**—Standards and Tentative Standards published by the American Water Works Association, 500 Fifth Avenue, New York 18, N. Y.

**CS**—Commercial Standards representing recorded voluntary recommendations of the trade, issued by the United States Department of Commerce and obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

**MSS**—Standards published by the Manufacturers Standardization Society of the Valve and Fittings Industry, 420 Lexington Avenue, New York 17, N. Y.

**SPR**—Simplified Practice Recommendations representing recorded recommendations of the trade and issued by the United States Department of Commerce, Washington 25, D. C.

**Note 2.**—ASTM standards are issued under fixed designations; the final number indicates the year of original adoption, or in the case of revision, the year of last revision.

T indicates Tentative. In the CS series of standards, also, the final number indicates the year of issue. For Federal Specifications, the year indicated in Table I is that of the date of issue or that of the latest revision or amendment.

**Note 3.** All standards and specifications for materials are subject to change. Designations carrying indication of the year of issue may thus become obsolete. Table I gives the full designa-

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tions of standards current at the time this code is printed. As provided, the administrative authority is required to review this table and have it brought up-to-date at intervals not exceeding 5 years, by written notification to the State Building Code Council.

**4. Identification of Materials.**

Each length of pipe, and each pipe fitting, trap, fixture, and device used in a plumbing system shall have cast, stamped, or indelibly marked on it the marker's mark or name, the weight, type, and classes of the product, when such marking is required by the approved standard that applies.

a. **Lead.**—See Table I. Sheet lead shall be not less than the following:

**For Safe Pans**—not less than 5 pounds per square foot.

**For flashings of vent terminals**—not less than 4 pounds per square foot.

**Lead bends and lead traps** shall be not less than one-eighth inch wall thickness.

b. **Copper.**—Sheet copper shall be not less than the following:

**Safe pans**—12 ounces per square foot.

**Vent terminal flashings**—8 ounces per square foot.

c. **Caulking Ferrules** shall be manufactured from red brass and shall be in accordance with the following:

Pipes Sizes (inches)	Inside Diameter (inches)	Length (inches)	Minimum Weight each	
			Lb.	Oz.
2 -----	2¼	4½	1	0
3 -----	3¼	4½	1	12
4 -----	4¼	4½	2	8

d. **Soldering bushings** shall be of red brass in accordance with the following:

Pipe sizes (inches)	minimum weight each Lb. Oz.	Pipe sizes (inches)	Minimum weight each Lb. Oz.
1¼ -----	0 6	2½ -----	1 6
1½ -----	0 8	3 -----	2 0
2 -----	0 14	4 -----	3 8

**5. Floor Flanges.**

a. Floor flanges for water closets or similar fixtures shall be not less than one-eighth inch thick for brass, one-fourth inch thick and not less than 2-inch caulking depth of cast iron or galvanized malleable iron. If of hard lead, they shall weigh not

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less than 1 pound 9 ounces and be composed of lead alloy with not less than 7.75 per cent antimony by weight.

b. Flanges shall be soldered to lead bends, or shall be caulked or screwed to other metal.

c. Closet screws and bolts shall be brass.

**6. Cleanouts.**

a. Cleanout plugs shall be of brass and shall conform to Federal Specifications WW-P-401.

b. Plugs may have raised square heads or counter sunk.

c. Counter-sunk heads shall be used where raised heads may cause a hazard.

**7. Approval.**

Provisions of this code are not intended to prevent the use of any material, device method of assemblage or installation, fixture, or appurtenance not specifically authorized, provided such alternate is at least equal to the code requirements, and such change has been approved by the administrative authority, in accordance with this section.

**8. Evidence of Compliance.**

The administrative authority shall require sufficient evidence to enable him to judge whether proposed alternates meet the requirements of this code for safety and health.

**9. Tests.**

When there is insufficient evidence to substantiate claims for alternates, the administrative authority may require tests of compliance as proof to be made by an approved agency at the expense of the applicant.

**10. Test Procedure.**

a. Tests shall be made in accordance with generally recognized standards, but in the absence of such standards, the administrative authority shall specify the test procedure.

b. The administrative authority may require tests to be repeated if, at any time, there is reason to believe that an alternate no longer conforms to the requirements on which its approval was based.

**11. Periodic Review.**

The administrative authority shall periodically, at least every 5 years, review the approved list of specifications and standards for materials in Table I and in section entitled Plumbing Fixtures,

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to check the designations, as provided in Section 2004, numbers, etc., which are used for identification, and if there are later issues shall submit them for their legal adoption, as provided for in Section 2004, Note 3.

a. Note: All standards and specifications for materials are subject to change. Designations carrying indication of the year of issue may thus become obsolete. Table I gives the full designation of standards current at the time this code is printed.

**SECTION 2005. STANDARDS FOR PLUMBING MATERIALS.**

**1. Specific Usage.**

Each section of this code indicates specifically the type of materials permitted for the various parts of the plumbing system. The standards for each of these materials are given in Table I.

TABLE I

MATERIALS	ASA	ASTM	FS	OTHER STANDARDS REMARKS
Nonmetallic piping: Clay sewer pipe.....		(C13-44T (C200-44T)	SS-P-361a(1942)	Standard Strength Extra Strength.
Concrete sewer pipe, sizes 4 to 24 inches.....		(C75-41 (C14-41)	SS-P-371(1937)	Reinforced Nonreinforced. Type I.
Bituminized fibre sewer pipe and fittings.....				CS 116-41*
Asbestos Cement sewer pipe.....			SS-P-351(1940)	(1) (2)
Ferrous pipe and fittings:				
Cast-iron soil pipe and fittings.....	A40.1-1935	A74-1942	WW-P-401(1935)*	Extra Heavy, Standard weight*
Cast iron water pipe.....	A21.2-1939	A44-1941	WW-P-421(1931)*	AWWA 1908
Cast iron (threaded) pipe.....	A40.5-1943		WW-P-356(1936)	
Cast iron (screwed) fittings.....	B16d-1041		WW-P-501b(1945)	
Cast iron drainage fittings.....	B16.12-1942		WW-P-491a(1945)*	
Wrought iron pipe.....	B36.2-1939	A72-45	WW-P-441a(1939)*	
Steel pipe.....		A120-47	WW-P-406(1944)*	Type I & II
Open hearth iron pipe.....		A253-47	WW-P-406(1944)*	Type III only
Malleable-iron fittings.....	(B16C-1939 150 lbs.)	A277-44T	WW-P-521b(1945)	
Nonferrous pipe and fittings:				
Brass Tubing.....		B135-47T*	WW-T-701	
Brass pipe.....		B43-47	WW-P-351(1930)*	
Copper Pipe.....		B42-47	WW-P-377(1932)	
Bronze screwed fittings.....		B10.15-47	WW-P-460(1945)	MSS-SP-10



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MATERIALS	ASA	ASTM	FS	REMARKS
Seamless copper tubing:		B75-48T	WW-P-297(1932) <sup>10</sup>	
Copper water tube (KLM).....	H23.1-1948	B89-48	WW-T-799a(1943) <sup>11</sup>	SPR 217-49
Soldered joint fittings (for copper water tube).....	A40.3-1941			for copper water Tube
Cast-brass soldered joint fittings.....	B16-1949			
Flared fittings for copper (water) tubes.....	A40.2-1936		WW-P-325(1944)	CS85-41 CS86-41
Lead pipe and traps.....				
Miscellaneous:				
Caulking Lead.....			QQ-L-156(1936) <sup>12</sup>	CSQ4-41 Type I
Sheet Lead.....			QQ-L-201(1933) <sup>13</sup>	Grade A
Sheet Brass.....		(B 36-48T) (B121-47T)	QQ-B-611a(1938)	
Sheet Copper.....		B152-48T	QQ-C-501a(1941) <sup>14</sup>	
Galvanized iron and steel sheets ..	JC.8-1937	(A163-39) (A93-46)	QQ-I-716(1942) <sup>15</sup>	
Galvanized pipe and fittings.....		A120-47	WW-P-406(1944)	Sec. D6
Cement lining.....	A21.14-1939		WW-P-406(1944)	Sec. D7
Coal-tar enamel (protective coating).....				AWWA 7A.6 1940
Soft solder.....		B32-46T	QQ-S-571b(1947)	
Fixture-setting compound.....			HH-C-536(1936)	
Air-gap standards.....	A40.4-1942			
Backflow preventers.....	A40.6-1943			
Grease interceptors.....				P.D.I.-G 101 <sup>16</sup>
Valves:				
Bronze Gate.....			WW-V-54(1946) <sup>17</sup>	
Cast-iron Gate.....			WW-V-58(1945) <sup>17</sup>	

<sup>1</sup>Asbestos-cement sewer pipe shall meet Federal Specification SS-P-351 (1940) including amendment 2, dated Jan. 14, 1942, except for the following substitution:

Sizes only 4-, 5-, and 6-inch  
 Class: nonpressure tests  
 Lengths 10 feet—out of roundness, inside diameter  $\pm \frac{1}{4}$  inch  
 Hydrostatic strength; not applicable.  
 Flexural strength, 9-foot span: 4-inch pipe, 560 pounds; 5-inch pipe, 900 pounds; 6-inch pipe, 1,290 pounds.  
 Crushing strength, 4-inch pipe, 1,740 pounds; 5-inch pipe, 1,680 pounds; 6-inch pipe 1,420 pounds.  
 Tests: 1 specimen from each 300 lengths of pipe.

<sup>2</sup> See code chapters for limits of recommended usage.  
<sup>3</sup> Amendment 2, dated Dec. 20, 1945, included.  
<sup>4</sup> Amendment 3, dated Apr. 26, 1940, included.  
<sup>5</sup> Amendment 1, dated Feb. 7, 1946, included.  
<sup>6</sup> Amendment 2, dated Feb. 8, 1943, included.  
<sup>7</sup> Amendment 1, dated June 9, 1945, included.  
<sup>8</sup> Mercurous nitrate test required.  
<sup>9</sup> Errata No. 1, dated Oct. 1930, included.  
<sup>10</sup> Errata No. 1, dated Aug. 1933, included.  
<sup>11</sup> Limited to sizes included in SPR 217-49, includes amendment 1, June 27, 1946.  
<sup>12</sup> Amendment No. 1, dated Nov. 18, 1940, included.  
<sup>13</sup> Amendment No. 1, dated June 2, 1942, included.  
<sup>14</sup> Amendment No. 3, dated May 27, 1942, included.  
<sup>15</sup> Amendment No. 3, dated Nov. 1945, included.  
<sup>16</sup> Amendment No. 1, dated Apr. 19, 1940, included.  
<sup>17</sup> Amendment No. 1, dated Sept. 30, 1946, included.  
<sup>18</sup> Plumbing and Drainage Institute Standards.

**SECTION 2006. JOINTS AND CONNECTIONS.**

**1. General Requirements.**

All joints and connections between pipe and fittings shall be made gas tight and water tight and shall conform with the regulations of this section.

**2. Increases and Reducers.**

When different sizes of pipes or pipe and fittings are to be connected, increasers or reducers shall be used.

**3. Joints and Connections, Not Permitted.**

a. Any fitting or connection with a ledge or shoulder or reduction of the drain area in the direction of the flow on the outlet or drain side of any trap shall not be permitted.

b. Double hubs or double hub fittings may be used only on vent pipe, conductors and cleanouts.

c. The drilling and tapping of house drains, soil, waste, or vent pipes, and the use of saddle hubs, bands, and sleeves shall not be permitted.

d. No double hub, sleeve, or inverted caulk joint shall be permitted in soil or waste lines.

e. Welding for the purpose of making a connection to a soil, waste, vent, or water pipe shall only be permitted if written approval is obtained from the administrative authority and only if other approved means is impracticable.

**4. Expansion Bolts.**

Connections of wall hangers, pipe supports, or fixture settings with any material other than wood shall be made with expansion bolts or by other approved methods without the use of wooden plugs.

**5. Caulked Joints.**

Caulked joints for cast-iron bell-and-spigot soil pipe shall be firmly packed with oakum or hemp and filled with molten lead not less than 1 inch deep and not to extend more than one-eighth inch below rim of hub. No paint, varnish, or other coatings shall be permitted on the jointing material until after the joint has been tested and approved.

**6. Threaded Joints—Screwed Joints.**

Threads shall conform to American National Taper Pipe thread, ASA B2, 1-1945 or FS GGG-P-351a. All burrs shall be removed. Pipe ends shall be reamed or filed out to size of bore, and all chips shall be removed. Pipe-joint cement and paint shall be used only

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on male threads: fittings for galvanized vent piping may be galvanized malleable or cast-iron threaded fittings.

### **7. Wiped Joints.**

a. Joints in lead pipe or fittings, or between lead pipe or fittings and brass or copper pipe, ferrules, solder nipples, or traps, shall be full-wiped joints. Wiped joints shall have an exposed surface on each side of a joint not less than three-fourths inch and at least as thick as the material being jointed. Wall or floor flange lead-wiped joints shall be made by using a lead ring or flange placed behind the joint at wall or floor.

b. Joints between lead pipe and cast iron, steel, or wrought iron shall be made by means of a caulking ferrule, soldering nipple, or bushing.

### **8. Soldered or Sweat Joints.**

a. Soldered or sweat joints for tubing shall be made with approved fittings. Surfaces to be soldered or sweated shall be cleaned bright. The joints shall be properly fluxed and made with approved solder.

b. Joints in copper water piping shall be made by the appropriate use of approved brass water fittings, properly sweated or soldered together, or wrought copper fittings.

### **9. Flared Joints.**

Flared joints for soft-copper water tubing shall be made with fittings meeting approved standards. The tubing shall be expanded with a proper flaring tool.

### **10. Hot-Poured Joints.**

Hot-poured compounds for clay or concrete sewer pipe shall not be water absorbent and when poured against a dry surface shall have a bond of not less than 100 pounds per square inch. All surfaces of the joint shall be cleaned and dried before pouring. If wet surfaces are unavoidable, a suitable primer shall be applied. Compound shall not soften sufficiently to destroy the effectiveness of the joint when subjected to a temperature of 160° F. nor be soluble in any of the waste carried by the drainage system. Approximately 25 per cent of the joint space at the base of the socket shall be filled with jute or hemp. A pouring collar, rope, or other device shall be used to hold the hot compound during pouring. Each joint shall be poured in one operation until the joint is filled. Joints shall not be tested until 1 hour after pouring.

### **11. Precast Joints.**

Precast collars shall be formed in both the spigot and bell of the pipe in advance of use. Collar surfaces shall be conical with side slopes of 3° with the axis of the pipe and the length shall be

equal to the depth of the socket. When the spigot end is inserted in the collar, it shall bind before contacting the base of the socket. Material shall be inert and resistant to both acids and alkalies.

**12. Cement Mortar Joints.**

Cement joints shall be used only when specifically permitted in other sections of this Code or when approved by the administrative authority, as sufficient to accomplish the purpose of this Code. A layer of jute or hemp shall be inserted into the base of the joint space and rammed to prevent mortar from entering the interior of the pipe. Jute or hemp shall be dipped into a slurry suspension of portland cement in water prior to insertion into bell. Not more than 25 per cent of the joint space shall be used for jute or hemp. The remaining space shall be filled in one continuous operation with a thoroughly mixed mortar composed of one part cement and two parts sand, with only sufficient water to make the mixture workable by hand. Additional mortar of the same composition shall then be troweled so as to form a 45° taper with the barrel of the pipe. Pipe interior shall be swabbed to remove any material that might have fallen into the interior.

**13. Burned Lead Joints.**

Burned (welded) lead joints shall be lapped and the lead shall be fused together to form a uniform weld at least as thick as the lead being joined.

**14. Asbestos Cement Sewer Pipe Joints.**

Joints in asbestos cement pipe shall be made with sleeve couplings of the same composition as the pipe, sealed with rubber rings. Joints between asbestos cement pipe and metal pipe shall be made by means of an adapter coupling caulked as required in paragraph "Caulked Joints".

**15. Bituminized Fiber Pipe Joints.**

Joints in bituminized fiber pipe shall be made with tapered type couplings of the same material as the pipe. Joints between bituminized fiber pipe and metal pipe shall be made by means of an adapter coupling caulked as required in paragraph "Caulked Joints".

**USE OF JOINTS**

**16. Clay Sewer Pipe.**

Joints in vitrified clay pipe or between such pipe and metal pipe shall be made as provided in paragraphs 10 and 12 this section.

**17. Concrete Sewer Pipe.**

Joints in concrete sewer pipe or between such pipe and metal pipe shall be made as provided in paragraphs 10 and 12 this section.

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**18. Cast-Iron Pipe.**

Joints in cast-iron pipe shall be either caulked or screwed, as provided in 5 and 6 this section.

**19. Screw Pipe to Cast-Iron.**

Joints between wrought-iron, steel, brass, or copper pipe, and cast-iron pipe shall be either caulked or threaded joints made as provided, or shall be made with approved adapter fittings.

**20. Lead to Cast-Iron, Wrought-Iron, or Steel.**

Joints between lead and cast-iron, wrought-iron, or steel pipe shall be made by means of wiped joints to a caulking ferrule, soldering nipple, or bushing as provided in 7 this section.

**21. Copper Water Tube.**

Joints in copper tubing shall be made either by the appropriate use of approved brass water fittings, properly sweated or soldered together or by means of approved compression fittings, or wrought copper fittings.

**SPECIAL JOINTS**

**22. Copper Tubing to Screwed Pipe Joints.**

Joints from copper tubing to threaded pipe shall be made by the use of brass converter fittings. The joint between the copper pipe and the fitting shall be properly sweated or soldered and the connection between the threaded pipe and the fitting shall be made with a standard pipe size screw joint.

**23. Brazing or Welding.**

Brazing or welding shall be performed in accordance with requirements of recognized published standards of practice and by licensed or other qualified mechanics except when it is determined by the administrative authority to be equivalent procedure for the purpose of this code.

**24. Slip Joints.**

In drainage and water piping, slip joints may be used only on the inlet side of the trap or in the trap seal.

**25. Expansion Joints.**

Expansion joints must be accessible and may be used where necessary to provide for expansion and contraction of the pipes.

**26. Ground Joint Brass Connection.**

Ground joint brass connections which allow adjustment of tubing but provide a rigid joint when made up shall not be considered as slip joints.

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**27. Drainage System.**

Unions may be used in the trap seal and on the inlet side of the trap. Unions shall have metal-to-metal seats.

**28. Water-Supply System.**

Unions in the water-supply system shall be metal-to-metal with ground seats.

**29. Water Closet, Pedestal Urinal, and Trap Standard Service.**

Fixture connections between drainage pipes and water closets, floor-outlet service sinks, pedestal urinals, and earthenware trap standards, shall be made by means of brass, hard-lead, or iron flanges, caulked, soldered, or screwed to the drainage pipe. The connection shall be bolted, with an approved gasket or washer or setting compound between the earthenware and the connection. The floor flange shall be set on an approved firm base. The use of commercial putty or plaster is prohibited.

**30. Waterproofing of Openings.**

Joints at the roof, around vent pipes, shall be made water-tight by the use of lead, copper, or other approved flashings or flashing material. Exterior-wall openings shall be made watertight.

**SECTION 2007. TRAPS AND CLEANOUTS.**

**1. Fixture Traps.**

Plumbing fixtures, excepting those having integral traps, shall be separately trapped by a water-seal trap, placed as close to the fixture outlet as possible.

a. Provided, that a combination plumbing fixture may be installed on one trap, if one compartment is not more than 6 inches deeper than the other and the waste outlets are not more than 30 inches apart.

b. Provided, that one trap may be installed for a set of not more than three single-compartment sinks or laundry trays or three lavatories immediately adjacent to each other in the same room, if the waste outlets are not more than 30 inches apart.

**2. Distance of Trap to Fixture.**

The vertical distance from the fixture outlet to the trap weir shall not exceed 24 inches, except as provided in the foregoing.

**TYPE AND SIZE OF TRAPS AND FIXTURE DRAINS**

**3. Trap Size.**

The size (nominal diameter) of trap for a given fixture shall be sufficient to drain the fixture rapidly but in no case less than given in Section 2015, Table 4.

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### **4. Relation to Fixture Drains.**

No trap shall be larger than the fixture drain to which it is connected.

### **5. Design of Traps.**

Traps shall be self-cleaning and water sealed. No form of trap shall be used which depends upon the action of movable parts for its seals. No trap shall be used which in case of defect would allow the passage of sewer air. No trap shall be used which depends upon concealed interior partitions for its seal. All traps shall have a full bore, smooth interior waterway with threads tapped out of full-weight material.

a. Slip joints or couplings may be used on the trap inlet or within the trap seal of the trap if metal-to-metal ground joint is used.

b. A trap integral with the fixture shall have a uniform interior and smooth waterway.

c. Traps provided with accessible coupling nuts on inlet and outlet sides (in the water seal) of the dip of the trap, to make removal of the entire "U" or dip of trap possible, need not be provided with additional cleanouts.

### **6. Trap Seal.**

Each fixture trap shall have a water seal of not less than 2 inches and not more than 4 inches, except where a deeper seal is found necessary by the administrative authority for special conditions.

### **7. Trap Cleanouts.**

a. Each fixture trap, except those cast integral or in combination with fixtures, in which the trap seal is readily accessible or except when a portion of the trap is readily removable for cleaning purposes, shall have an accessible brass trap screw of ample size protected by this water seal.

b. Cleanouts on the seal of a trap shall be made tight with threaded cleanout plug and approved washer.

### **8. Trap Level and Protection.**

Traps shall be set true with respect to their water seals and, where necessary, they shall be protected from freezing.

### **9. Traps Underground.**

Underground traps, except P traps into which floor drains with removable strainers discharge, shall be provided with accessible and removable cleanouts.

**10. Building (House) Traps.**

- a. Each building trap, when installed, shall be provided with a cleanout and a relieving vent or fresh air intake.
- b. Relieving vents or fresh air intakes need not be larger than half the diameter of the drain to which they connect.
- c. Building (house) traps shall not be installed except by special permission, where unusual conditions make their use imperative.

**11. Prohibited Traps.**

- a. No trap which depends for its seal upon the action of movable parts shall be used.
- b. Bell traps are prohibited.
- c. Crown-vented traps are prohibited.

**12. Double Trapping.**

No fixture shall be double trapped.

**13. Traps—Material.**

- a. The material for traps shall be either vitreous china, vitrified clay, lead, brass, copper, cast-iron, silicon iron, or malleable iron. All cast-iron traps with bell and spigot shall be coated inside and outside with tar or asphaltum. All cast-iron or malleable iron traps with threaded joints shall be galvanized or coated inside and out as required herein.

**PIPE CLEANOUTS**

**14. Location.**

Cleanouts shall be not 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 pipes; except that on fibre pipe lines laid underground, cleanouts shall not be more than 50 feet apart.

**15. Underground Drainage.**

Cleanouts, when installed on an underground drain, shall be extended to or above the finished grade level directly above the place where the cleanout is installed; or may be extended to the outside of the building when found necessary by the administrative authority.

**16. Change of Direction.**

Cleanouts shall be installed at each change of direction of the building drain greater than 45°.



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**17. Concealed Piping.**

Cleanouts on concealed piping shall be extended through and terminate flush with the finished wall or floor; or pits or chases may be left in the wall or floor, provided they are of sufficient size to permit removal of the cleanout plug and effective cleaning of the system.

**18. Base of Stacks.**

A cleanout shall be provided at or near the foot of each vertical waste or soil stack. For buildings with a floor slab on fill or ground with less than 18-inch crawl space under the floor, the cleanout shall be extended up to the floor, or may be installed to the vertical stack immediately above the floor or baseboard level.

**19. Building Drain Junction.**

There shall be a cleanout near the junction of the building drain and building sewer or a cleanout with Y branch inside the building wall: provide cleanout at curb where house sewer connects to city sewer.

**20. Direction of Flow.**

a. Every cleanout shall be installed so that the cleanout opens in a direction opposite to the flow of the drainage line or at right angle thereto.

b. Cleanout plugs shall not be used for the installation of new fixtures or floor drains, but the bell into which they are caulked may be so used, and the cleanout re-installed as close as practicable to the original location.

**21. Size of Cleanouts.**

a. **Small Pipes**—Cleanouts shall be of the same nominal size as the pipes up to 4 inches and not less than 4 inches for larger piping.

b. **Large Pipes**—For underground piping over 10 inches, manholes shall be provided and located at each 90° change in direction and at intervals of not more than 200 feet.

c. **Covers**—Metal covers shall be provided for manholes.

**22. Cleanout Clearances.**

a. **Large Pipes**—Cleanouts on 3-inch or larger pipe shall be so installed that there is a clearance of not less than 18 inches for the purpose of rodding.

b. **Small Pipes**—Cleanouts smaller than 3 inches shall be so installed that there is a 13-inch clearance for rodding.

c. **Caulking**—Cement, plaster, or any other permanent finishing material shall not be placed over a cleanout plug.

d. **Concealment**—Where it is necessary to conceal a cleanout plug, a covering plate or access door shall be provided which will permit ready access to the plug.

**23. Acidproof Traps.**

Where a vitrified-clay or other brittle ware, acidproof trap is installed underground, it shall be embedded in concrete to a thickness of 6 inches from the bottom and sides of the trap.

**24. Pipe Cleanouts.**

a. When brass screw plugs for cleanouts are used, they shall be at least three-sixteenths ( $3/16$ ) inch in thickness and provided with standard pipe thread and a one (1) inch square or hexagonal solid brass head at least three-quarters ( $3/4$ ) inch high or adequate inverted countersunk socket. The ferrule, when constructed of brass, shall be at least three-sixteenths ( $3/16$ ) inch in thickness, and when constructed of iron, shall be the same weight per foot as cast-iron soil pipe. The screw cap shall have at least five (5) threads of iron pipe size. The ferrules, when installed shall project at least one-quarter ( $1/4$ ) inch above the hub.

b. The foregoing shall not prohibit the use of patented manufactured cleanouts made of rust-resistant metals. However, no pipe cleanout may be used which requires gasket or washer to insure air tight joints; or using tapered plug to seat against lead caulking.

**SECTION 2008. INTERCEPTORS AND SEPARATORS**

**1. General Requirements.**

a. **When Required**—Interceptors (including oil, and sand interceptors, etc.) shall be provided when, in the judgment of the administrative authority, they are necessary for the proper handling of liquid wastes containing flammable wastes, sand, and other ingredients harmful to the building drainage system, the public sewer or sewage-treatment plant or processes.

b. **Approval**—The size, type, and location of each interceptor or separator shall be approved by the administrative authority in accordance with generally accepted standards and no wastes other than those requiring treatment or separation shall be discharged into any interceptor, as herein provided.

c. **Separation**—A mixture of light and heavy solids or liquids and solids having various specific gravities may be treated and then separated in an interceptor as approved by the administrative authority.

## GREASE INTERCEPTORS

### 2. Commercial Buildings.

A grease interceptor shall be installed in the waste line leading from sinks, drains, or other fixtures in the following establishments: restaurants, hotel kitchens or bars, cafeterias, clubs, or other establishments where grease can be introduced into the drainage system in quantities that can effect line stoppage or hinder sewage disposal.

### 3. Residential Units.

A grease interceptor is not required for individual dwelling units or any private living quarters.

### 4. Oil Separators.

An oil separator shall be installed in the drainage system or section of the system where, in the judgment of the administrative authority, a hazard exists or where oils or other flammables can be introduced or admitted into the drainage system by accident or otherwise.

### 5. Sand Interceptors.

**Commercial Installations**—Sand and similar interceptors for heavy solids shall be so designed and located as to be readily accessible for cleaning, and shall have a water seal of not less than 6 inches.

### 6. Venting Interceptors.

**Relief Vent**—Interceptors shall be so designed that they will not become air bound if closed covers are used. Each interceptor shall be properly vented.

### 7. Accessibility of Interceptor.

Each interceptor shall be so installed as to provide ready accessibility to the cover and means for servicing and maintaining the interceptor in working and operating condition. The use of ladders or the removal of bulky equipment in order to service interceptors shall constitute a violation of accessibility.

## INTERCEPTORS EFFICIENCY

### 8. Flow Rate.

a. Interceptors shall be rated and approved for their efficiency as determined by the administrative authority and in accordance with generally accepted practice.

b. **Approval**—No grease interceptor shall be approved until it has successfully passed the testing and rating procedure set up by the administrative authority.

c. **Water Connection**—Water connection for cooling or operating an interceptor shall be such that backflow cannot occur.

## LAUNDRIES

### 9. Interceptors.

Commercial buildings, such as laundries, self-service laundrettes, cleaning and dyeing plants, and similar establishments shall be equipped with an interceptor having a removable wire basket or similar device that will prevent strings, rags, buttons, or other materials detrimental to the public sewerage system from passing into the drainage system.

### 10. Intercepting Device.

Basket or device shall prevent passage into the drainage system of solids one-half inch or larger in size. The basket or device shall be removable for cleaning purposes.

## BOTTLING ESTABLISHMENTS

### 11. Bottling Plants.

Bottling plants shall discharge their process wastes into an interceptor which will provide for the separation of broken glass or other solids, before discharging liquid wastes into the drainage system.

### 12. Slaughterhouses.

a. Separators—Slaughtering-room drains shall be equipped with separators which shall prevent the discharge into the drainage system of feathers, entrails, and other materials likely to clog the drainage system.

b. Interceptors—Slaughtering and dressing-room drains shall be provided with interceptors approved by the administrative authority.

c. Food-grinder—wastes may discharge directly to the building drainage system.

### 13. Commercial Grinders.

a. Discharge—Where commercial food-waste grinders are installed, the waste from those units may discharge direct into the building drainage system and not through a grease interceptor.

b. Approval—The administrative authority shall determine where and what type of interceptor is necessary, except that interceptors shall not be required for private living quarters or residential units.

### 14. Maintenance.

Cleaning—Interceptors shall be maintained in efficient operating condition by periodic removal of accumulated grease.

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**15. Oil Interceptors.**

a. **Where Required**—Oil separators shall be installed when required by the administrative authority.

b. **Minimum Dimension**—Oil separators shall have a depth of not less than 2 feet below the invert of the discharge drain.

**16. Motor-Vehicle Storage.**

Interceptors shall have a capacity of 6 cubic feet where not more than 3 vehicles are serviced and 1 cubic foot in net capacity shall be added for each additional vehicle up to 10 vehicles. Where more than 10 vehicles are serviced, the administrative authority shall determine the size of separator required.

**17. Motor-Vehicle Servicing.**

Where storage facilities are not maintained, as in repair shops, the capacity of the separators shall be based on a net capacity of 1 cubic foot for each 100 square feet of surface to be drained into the interceptor with a minimum capacity of 6 cubic feet.

**18. Special Type Separators.**

Before installing any special type separator a drawing including all pertinent information shall be submitted for approval of the administrative authority as being in accordance with this code.

**BACKWATER VALVES**

**19. Fixtures Subject to Backflow.**

The installation of backwater devices shall be in accordance with lawful requirements of the administrative authority having jurisdiction over the public sewer system.

**20. Basic Requirements.**

a. Backwater valves when required shall be installed in the branch of the building drain which receives only the discharge from fixtures located within such branch and below grade.

b. **Material**—All bearing parts of backwater valves shall be of corrosion-resistant material.

c. Backwater valves shall be so constructed as to insure a mechanical seal against backflow.

d. **Diameter**—Backwater valves, when fully opened, shall have a capacity not less than that of the pipes in which they are installed.

e. **Location**—Backwater valves shall be so installed as to provide ready accessibility to their working parts, by use of manhole

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installed over backwater valves or such other means as shall make them fully accessible for repair or cleaning.

**21. General Catch Basin.**

a. When catch basins and grease interceptors are to be constructed at the site they shall comply with the following requirements:

b. Catch basins shall be constructed in a water-tight and substantial manner of solid masonry units, concrete, iron, or vitrified clay pipe. The outlet in the wall of the basin shall be at least four (4) inches in diameter and the spigot end of the outlet of the basin shall be submerged at least six (6) inches below the water line and placed not less than two (2) feet above the bottom of the basin. A 4-inch cleanout shall be provided on the invert. The basin shall have a substantial concrete or cast-iron cover well fitting, removable, and when bolted to the basin, the bolts shall be of brass.

**22. Grease Catch Basins or Separators.**

a. Outdoor grease catch basins shall be constructed in the same manner as regulated for general catch basins. The basins shall be at least twenty-four (24) inches in diameter and the bottom shall be at least six (6) feet below grade. The outlet shall be inverted by means of a sanitary tee with the top extended not less than twelve (12) inches from bottom of cover. The inlet shall enter the basin at least four (4) inches above the water line. The outlet in the wall of the basin shall be two (2) feet six (6) inches or more from the bottom of the basin and the spigot end of the outlet shall be submerged six (6) inches below the water line and the top extended one (1) foot above the water line. The inlet and outlet shall be placed as far apart as possible and in larger installations baffle plates are recommended for greater efficiency in operation.

b. Wherever possible, grease catch basins shall be installed just outside the wall of the building or as near to the fixture to be served as is practicable. When installations must be made inside of a building the minimum size of basin shall be twenty-four (24) inches in diameter, shall have a metal ring embedded in concrete to which an air-tight cast-iron cover is bolted by means of brass bolts, and shall be raised two (2) inches or higher above the floor. The waste line from the fixture shall be constructed in an approved manner and extend as direct as possible to the basin, free from unnecessary offsets and changes in direction, and shall be provided with cleanout plugs so located that the entire line may be easily rodded. The local or inlet pipe shall not be embedded or trenched in the ground or concrete flooring, unless properly insulated, to prevent congealing of grease before it enters the basin. Approved ratings for commercial separators will be acceptable.

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c. The above requirements, for general purposes of this code, cover construction of these units in the field: however, nothing in the foregoing shall prohibit the use of manufactured grease interceptors, either metal or precast concrete, and where such equipment is used, they may be installed in accordance with manufacturers recommendations, subject to the limitations in Table I.

**23. Yard Catch Basins.**

All drain or sewer pipes that are used to drain yards, gardens, or other areas shall be connected with yard catch basins. Such basins shall be constructed in the same manner as regulated for general catch basins, shall be at least twenty-four (24) inches in diameter, and where possible the outlet in the wall of the catch basin shall be at least four (4) feet below the surface of the ground and the spigot end of the outlet shall be submerged six (6) inches on the invert. The basin shall have a concrete or heavy cast-iron cover with strainer flush with the surrounding ground. Yard basins shall be connected to the storm sewers only, and shall be placed inside of the street lines and lot lines of the lot to be drained.

**24. Stable Catch Basins.**

Liquid wastes from barns, manure pits, and stable yards shall be connected to stable catch basins. Such basins shall be constructed in the same manner as regulated for general catch basins, shall be at least twenty-four (24) inches in diameter, and not less than four (4) feet deep. The outlet in the wall of the basin shall be not more than ten (10) inches below the top of the basin and the spigot end of outlet shall be submerged six (6) inches below the water line. A 4-inch cleanout shall be provided on the invert. The basin shall be provided with a tight cover and a 4-inch local vent extending to the outside air two (2) feet above the ground and terminating with a return bend. Stable basins shall be connected to the sanitary sewers only. It is required that stable drains connect to catch basins terminating in a sanitary sewer.

**25. Garage Catch Basins.**

a. All liquid wastes, sand, and grit from public garages, service pits, paved areas adjoining service pits, cleaning establishments, and similar places where such wastes come in contact with kerosene, gasoline, benzine, naptha, or other volatile liquids, oils or compounds shall be intercepted before entering the house drain or sewer by a garage catch basin. Such basins shall be constructed in the same manner as regulated for general catch basins and shall be at least twenty-four (24) inches in diameter and four (4) feet deep.

b. The outlet invert shall enter the wall of the basin in such a manner that the space between the water line in the basin and

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the top of the basin shall not exceed ten (10) inches, and the spigot end of the outlet shall be submerged six (6) inches below the water line. A 4-inch cleanout shall be provided on the invert. The basin shall have an open bar strainer flush with the surrounding paved area, not less than sixteen (16) inches in diameter. Garage catch basins shall be connected to the sanitary sewers only. If the catch basin is the only fixture on the house drain and if the house drain is not properly vented, then a 2-inch vent shall be provided, which vent shall be extended in accordance with the regular venting regulations.

c. Garage buildings consisting of three or more compartment shall either have an open non-absorbent gutter of a 4-inch or larger drain, not to exceed fifty (50) feet in length, leading from each compartment to the catch basin. The installation shall be made of cast-iron pipe and fittings securely supported in concrete to insure stability.

d. When approved by a competent authority, the outlet may be connected to the basin more than ten (10) inches below top of basin. In all such installations the basin shall be provided with a 4-inch local vent pipe extended to the outer air and terminated with a return bend twenty-four (24) inches or more above grade.

**SECTION 2009. HANGERS AND SUPPORTS.**

**1. Vertical Piping.**

Vertical piping shall be supported at not less than every twenty (20) feet of height, using wrought iron clamps fitting closely to the pipe to be supported; clamps to have extension of a length not less than the diameter of the pipe, on each side, resting solidly on the building construction; clamps for 4-inch pipe shall be of 1½" x ¼" flat iron bar, with ½" bolts. Clamps for other piping sizes to be graded using the above as a base. Clamps for copper pipe to have inside shields of sheet lead or similar non-conductive material, "extending ½"" on each side of clamp: piping to be installed so that coupling, bell, or other projection shall rest on clamp.

**HORIZONTAL PIPING**

**2. Supports.**

Horizontal piping shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging, and within eighteen (18) inches of each change of direction.

**3. Cast-Iron Soil Pipe.**

Cast-iron soil pipe shall be supported at not more than 5-foot intervals.



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**4. Screwed Pipe.**

Screwed pipe (SPS) shall be supported at approximately 12-foot intervals.

**5. Copper Tubing.**

Copper tubing shall be supported at approximately 6-foot intervals for piping one and one-half (1½) inches and smaller and 10-foot intervals for piping two (2) inches and larger.

**6. Lead Pipe.**

Lead pipe shall be supported by straps or clips for its entire length, on sufficiently close centers to prevent sagging.

**7. In Ground.**

Piping in the ground shall be laid on a firm bed for its entire length, except where support is otherwise provided which is adequate in the judgment of the administrative authority.

**8. Materials.**

Hangers and anchors shall be of metal of sufficient strength to maintain their proportional share of the pipe alignments and prevent rattling.

**9. Attachment.**

Hangers and anchors shall be securely attached to the building construction.

**STRAINS AND STRESSES**

**10. Installation of Pipe.**

Piping in a plumbing system shall be so installed as to prevent undue strains and stresses.

**11. Expansion and Contraction.**

Provision shall be made for expansion and contraction of piping and for structural settlement that may affect the piping.

**12. Piping in Concrete.**

Piping in concrete or masonry walls or footings shall be placed or installed in chases or recesses which will permit access to the piping for repair or replacement.

**SUPPORTS**

**13. Base of Stacks.**

a. Bases of cast-iron soil stacks shall be supported on concrete, brick laid in cement mortar, metal brackets attached to the building construction, or by other methods approved by the administrative authority.

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b. Other piping connected to a stack shall be so anchored as to take the load off the stack at the base.

c. Hangers for horizontal pipings shall be wrought iron, with tapped boss for suspension, and shall be supported from overhead structure with solid rod,  $\frac{1}{2}$ -inch thick for 4-inch pipe; rods for other size piping to be graduated using the above size as base. Concrete, or similar overhead finish shall have rod inserts. Wood or similar overhead finish shall have coach screw rods having not less than full 2-inch penetration. The use of perforated hanger iron is prohibited.

**14. Support of Fixtures.**

Backboards of approximately the length of the fixture, and not less than one (1) inch thick, and five (5) inches deep of sound dry lumber, shall be installed for the support of toilet tanks, lavatories, and other wall hung fixtures other than toilets. Backboards shall be firmly attached to the structure, and shall not project beyond the rough wall line. Wall hung toilets, and other fixtures when desired, shall use patented metal wall supports having horizontal foot supports below finished floors; in cases where wall hung fixtures are to be installed on partitions of inadequate structural strength to fully support their weight and use, or where their use is likely to be hazardous beyond the ordinary, as in schools, institutions, etc., the fixtures shall be supported by the use of flat metal backing five (5) inches by one-eighth ( $\frac{1}{8}$ ) inch thick by the length of the fixture, set on the reverse side of the partition from the fixture, with through bolts not less than one-fourth ( $\frac{1}{4}$ ) inch thick.

**15. Support of Hot Water Tanks, Generators, Etc.**

Hot water tanks and generators, and cold water storage tanks shall be supported with rods of substantial thickness from overhead structure, or on pipe stands or stands made from structural iron, brick or concrete. Such supports or stands shall be of sufficient strength to adequately carry the weight of tank and water stored, with reasonable margins of safety, and shall be set on equally sound base, or, if supported from overhead, from sound structural steel or wood, and shall be shaped to the contour of the tank at all points of contact.

**SECTION 2010. INDIRECT AND SPECIAL WASTES.**

**1. General Requirements.**

Wastes from the following individual fixtures, devices, appliances or apparatus, shall discharge to the building drainage system through an air gap.

**2. Food Handling.**

Establishments engaged in the storage, preparation, selling, serving, processing, or otherwise handling of food shall have the

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waste piping from all refrigerators, ice boxes, rinse sinks, cooling or refrigerating coils, laundry washers, extractors, steam tables, egg boilers, coffee urns, or similar equipment discharged indirectly into a water-supplied sink or receptor and the waste outlet shall terminate at least 2 inches above the flood rim of such sink or receptor.

#### **3. Commercial Dishwashing Machines.**

Dishwashing machines, except those in private living quarters or dwelling units, shall be indirectly connected.

a. **Interceptor**—An interceptor may be placed on the outlet side of the dishwashing machine or on the discharge side of the indirect waste receptor.

b. **Connection**—Indirect waste connections shall be provided for drains, overflows, or relief vents from the water-supply system.

c. **Sterile Materials**—Appliances, devices, or apparatus such as stills, sterilizers, and similar equipment requiring water and waste and used for sterile material shall be indirectly connected or provided with an air gap between the trap and the appliance.

d. **Drips**—Appliances, devices or apparatus not regularly classed as plumbing fixtures but which have drips or drainage outlets, may be drained by indirect waste pipes discharging into an open receptacle as provided, with suitable air gaps.

#### **4. Material and Size.**

The material and size of indirect waste pipes shall be in accordance with the provision of the other sections of this code applicable to sanitary-drainage piping.

##### **Length of waste pipe.**

a. Any indirect waste pipe exceeding 2 feet in length shall be trapped.

b. **Maximum Length**—The maximum length of the indirect waste to vent shall not exceed 15 feet.

c. **Cleaning**—Indirect waste piping shall be so installed as to permit ready access for flushing and cleansing.

#### **5. Air Gap or Backflow Preventer.**

The air gap between the indirect waste and the building drainage system shall be at least twice the effective diameter of the drain served. The drain shall be extended using as few changes in direction as possible, to an open slopsink, or other suitable fixture which is properly trapped and vented. The indirect waste shall terminate a sufficient distance above the flood level rim of

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the receiving fixture to provide the required air gap, and shall be installed in accordance with other applicable sections of this code.

**6. Receptors.**

a. **Installation**—Waste receptors serving indirect pipes shall not be installed in any toilet room nor in any inaccessible or unventilated space such as a closet or storeroom.

b. **Cleanout Location**—If the indirect waste receptor is set below floor level, it shall be equipped with a running trap set adjacent to the sink with cleanout brought level with the floor.

c. **Strainers and Baskets**—Every indirect waste receptor shall be equipped either with a readily removable metal basket over which all indirect waste pipe shall discharge, or the indirect waste receptor outlet shall be equipped with a beehive strainer not less than 4 inches in height.

d. **Splashing**—All plumbing receptors receiving the discharge of indirect waste pipes, shall be of such shape and capacity as to prevent splashing or flooding. No plumbing fixture which is used for domestic or culinary purposes shall be used to receive the discharge of an indirect waste pipe.

**7. Clear Water Wastes.**

Waste lifts, expansion tanks, cooling jackets, sprinkler systems, drip or overflow pans, or similar devices which waste clear water only shall discharge onto a roof or into the building drainage system through an indirect waste.

**8. Condensers and Sumps.**

No steam pipe shall connect to any part of a drainage or plumbing system, nor shall any water above 140° be discharged into any part of a drainage system. Such pipes may be indirectly connected by discharging into an interceptor or into the drainage system.

**9. Drinking Fountains.**

Drinking fountains may be installed with indirect wastes.

**10. Swimming Pools.**

Piping carrying waste water from swimming or wading pools including pool drainage, back wash from filters, or water from scum gutter drains or floor drains which serve walks around pools, shall be installed as an indirect waste pipe utilizing a pump, if necessary, when indirect waste pipe is below the sewer grade.

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**SECTION 2011. STORM WATER DRAINS.**

**1. General Requirements.**

a. **Drainage Required**—Roofs, paved areas, yards, courts, and courtyards, shall be drained into a storm-sewer system where such systems are available.

b. **Prohibited Drainage**—Storm water shall not be drained into sewers intended for sewage only.

c. **Expansion Joints**—Expansion joints or sleeves shall be provided where warranted by temperature variations or physical conditions.

d. **Subsoil Drain**—Where subsoil drains are placed under the cellar or basement floor or are used to surround the outer walls of a building, they shall be made of open-jointed or horizontally split or perforated clay tile, or perforated bituminized fiber pipe not less than 4 inches in diameter. When the building is subject to backwater, the subsoil drain shall be protected by an accessibly located backwater valve. Subsoil drains may discharge into a properly trapped area drain or sump. Such sumps do not require vents.

e. **Building Subdrains**—Building subdrains located below the public sewer level shall discharge into a sump or receiving tank the contents of which shall be automatically lifted and discharged into the drainage system as required for building sumps.

**2. Materials.**

a. **Inside Conductors**—Conductors placed within a building or run in a vent pipe shaft shall be of cast-iron, galvanized steel, galvanized wrought iron, galvanized ferrous alloys, brass, copper or lead.

b. **Outside Leaders**—When outside leaders are of sheet metal and connected with a building storm drain or storm sewer, they shall be connected to a cast-iron drain extending above the finished grade, or into cast-iron boots extending not less than 24 inches above grade.

c. **Underground Storm Drains**—Building storm drains underground, inside the building, shall be of cast-iron soil pipe.

d. **Building Storm Sewers**—The building storm sewer shall be of cast-iron soil pipe, vitrified-clay pipe, concrete pipe, bituminized-fiber pipe, or asbestos cement pipe, except that all such piping shall be cast-iron pipe, when located within five (5) feet of any building, or under any drive or walkway, or under any building, or where ground conditions or lack of adequate coverage over pipe would make the use of other than cast-iron pipe hazardous.

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**3. Traps.**

No traps shall be required for storm-water drains which are connected to a sewer carrying storm water exclusively.

**4. Conductors and Connections.**

a. Conductor pipes shall not be used as soil, waste, or vent pipes, nor shall soil, waste, or vent pipes be used as conductors.

b. Rain-water conductors installed along alleyways, driveways, or other locations where they may be exposed to damage shall be protected by metal guards, recessed into the wall, or constructed from ferrous alloy pipe.

c. Floor drains connected to a storm drain shall be trapped, and shall have back flow preventers.

**5. Roof Drains.**

a. **Material**—Roof drains shall be of cast-iron, copper, lead, or other acceptable corrosion-resisting material.

b. **Strainers**—All roof areas, except those draining to hanging gutters, shall be equipped with roof drains having strainers extending not less than 4 inches above the surface of the roof immediately adjacent to the roof drains. Strainers shall have an available inlet area, above roof level, of not less than 1½ times the area of the conductor or leader to which the drain is connected.

c. **Flat Decks**—Roof drain strainers for use on sun decks, parking decks, and similar areas, normally serviced and maintained, may be of the flat surface type, level with the deck and shall have an available inlet area not less than two times the area of the conductor or leader to which the drain is connected.

d. **Roof Drain Flashings**—The connection between roofs and roof drains which pass through the roof and into the interior of the building shall be made water-tight by the use of proper flashing material.

**6. Size of Leaders and Storm Drains.**

Vertical leaders shall be sized on the maximum projected roof area, according to the following table:

TABLE 2. SIZE OF VERTICAL LEADERS

Diameter of leader or conductor <sup>1</sup> (inches)	Maximum projected roof area (sq. ft.)	Diameter of leader or conductor <sup>1</sup> (inches)	Maximum projected roof area (sq. ft.)
2"-----	720	5"-----	5,600
2½"-----	1,300	6"-----	8,000
3"-----	2,200	8"-----	11,300
4"-----	2,800	10"-----	21,200
		12"-----	29,100

<sup>1</sup> 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.

**SECTION 2012. WATER SUPPLY AND DISTRIBUTION.**

**1. Quality of Water Supply.**

a. **Potable Water**—Potable water is water from a public or private water system or source which is accepted by the proper governing authority as suitable for human consumption.

b. **Nonpotable Water**—Nonpotable water may be used only when specifically approved by the State Board of Health for flushing water closets and urinals and other purposes not requiring potable water, only provided that such water shall not be readily accessible for drinking purposes. All piping conveying nonpotable water shall be adequately and durably identified by a distinctively colored paint so that it is readily distinguished from piping carrying potable water.

**2. Protection of Potable Water Supply.**

a. **Cross-Connections**—Potable and nonpotable water supplies shall be distributed through systems entirely independent of each other, and any cross-connection between such supplies is prohibited.

b. **Water Pipes In Trenches**—Wherever possible water-service and house-sewer pipes should be laid in separate trenches. Where they must be laid in the same trench, the water pipe shall be laid on a bench or on solidly tamped back-fill at least 12 inches above the top of the sewer pipe.

c. **Backflow**—Every potable water outlet shall be protected from backflow, preferably by having the outlet end from which the water flows, spaced a distance from the flood-level rim of the receptacle into which the water flows, sufficient to provide a "minimum required air gap" as defined in American Standard for Air Gaps in Plumbing Systems (ASA A40, 4-1942); or as previously described in this code. Where it is not possible to provide a minimum air gap, then the fixture shall be equipped with an accessibly located backflow preventer, complying with the American Standard Backflow Preventers in Plumbing Systems (ASA A40.6), installed between the control valve and the fixture or outlet.

d. Where it is not possible to provide a minimum air gap or backflow preventer, as may be the case in connections to cooling jackets, condensers, or other industrial or special appliances, then the governing authority shall require a separate tank supply or such other means of protection as may be practicable and desirable.

**3. Pumps, Wells, and Other Appliances.**

a. All water pumps, tanks, wells, filters, softeners, and similar appliances and devices shall be protected from superficial ground

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or surface water and other contamination, by approved covers, walls, copings, or casings. The regulations of the state, county, or city department or board of health having jurisdiction shall govern.

b. **Water-Supply Tanks**—All nonpressure potable water supply tanks shall be properly covered to prevent entrance of foreign material into the water supply. Soil or waste lines shall not be permitted to pass directly over such tanks or over manholes in pressure tanks.

c. **Protection Against Freezing**—All water pipes, tanks, appliances, and devices, subject to freezing temperatures, shall be effectively protected against freezing.

**4. Material.**

a. **Water-Distributing Pipe, Tube, and Fittings**—Material for water-distributing pipes and tubing shall be of brass, copper, lead, cast-iron, wrought iron, open-hearth iron, or steel, with appropriate approved fittings, complying with the specifications as given in Table I. All threaded ferrous pipe and fittings shall be galvanized (zinc-coated) or cement lined. When used underground in corrosive soil all ferrous pipe and fittings shall be coal-tar-enamel coated.

b. **Allowance for Character of Water**—When selecting the material and size of pipe for water supply, due consideration shall be given to the action of the water on the interior of the pipe and of the soil, fill, or other material on the exterior of the pipe.

**5. Water Piping and Shut-Off Valves.**

a. **Water Service**—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, and in no case shall be less than three-quarters ( $\frac{3}{4}$ ) inch.

**CAUTION:** If flush valves or other devices requiring relatively high rates of flow of water are used the water-service pipe must be designed to supply this flow.

b. **Water-Supply Control**—A main shut-off valve on the water-service pipe shall be provided near the curb, and also an accessible shut-off valve with a drip shall be provided on the inner side of the foundation wall. Supply lines taken from pressure or gravity tanks shall be valved at or near their source.

c. **Shut-Off Valves**—Separate stopcocks or valves, always accessible, shall be placed at the foot of each riser line, and, in multiple dwellings or commercial buildings, for each individual fixture or group of fixtures controlled by each tenant.



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d. **Draining of Water Pipes**—All water pipes shall be so graded or pitched that the entire system or parts thereof can be drained. The formation of traps or sags shall be avoided where possible. When unavoidable, such sags or traps, or inverts shall have provisions for complete draining.

**6. Water-Supply Tanks (House Tanks).**

a. **When Required**—When the water pressure from the city mains during flow is insufficient to supply fixtures which could be in simultaneous operation, the rate of supply shall be supplemented by a gravity house tank or booster system.

b. **Design**—All water-supply tanks shall be supported in accordance with the building code or regulations which apply, and tanks other than pressure tanks shall be covered to prevent contamination.

c. **Overflow for Water-Supply Tanks**—Overflow pipes for gravity tanks shall discharge above and within 6 inches of a roof or catch basin, or they shall discharge over an open, water-supplied sink. Adequate overflow pipes shall be provided and in no case shall such overflows be connected directly to any drainage system.

d. **Drains**—All water-supply tanks shall be provided with valved drain lines located at their lowest point and discharged above the flood-level rim of the receptacle into which the drain water flows and as required for overflow pipes in the preceding paragraph. Each tank shall be provided with drain pipes of diameters at least those given below:

Tank Capacity (Gallons)	Drain Pipe (Inches)
750	1
1500	1½
3000	2
5000	2½
7500	3
over 7500	4

e. Each drain line shall be equipped with a valve of the same diameter as the pipe.

**7. Water Supply Mandatory.**

Every building in which plumbing fixtures are installed and are for human occupancy or habitation shall be provided with an ample supply of pure and wholesome water.

**8. Vacuum Breakers and Air Gaps.**

a. **Flushometer**—Flushometers shall be equipped with approved vacuum breakers. The vacuum breaker shall be installed on the discharge side of the flushing valve with the critical level at least 4 inches above the overflow rim of the bowl.

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b. **Flushing Tanks**—Flushing tanks shall be equipped with an approved ball-cock. The ball-cock shall be installed with the critical level of the vacuum breaker at least 1 inch above the full opening of the overflow pipe. In cases where the ball-cock has no hush tube the bottom of the water supply inlet shall be installed 1 inch above the full opening of the overflow pipe.

c. **Trough Urinals**—Trough urinals shall be equipped with a vacuum breaker installed on the discharge side of the last valve and not less than 30 inches above the spray pipe.

d. **Lawn Sprinklers**—Lawn-sprinkler systems shall be equipped with a backflow preventer on the discharge side of each of the last valves. The backflow preventer shall be at least 6 inches above the highest head, and at no time less than 6 inches above the surrounding ground. Where combination control valves and backflow preventers are installed, the bottom of the valve shall constitute the bottom of the backflow preventer.

e. **Valve Outlet**—Fixtures with hose attachments shall be protected by a backflow preventer installed 6 inches above the highest point of usage and on the discharge side of the valve.

**9. Stop-and-Waste Valve Combination.**

Combination stop-and-waste valves and cocks shall not be installed in an underground service pipe, or in any other location which would allow re-entry of liquids when stop cock is closed.

**10. Private Water Supply.**

No private water supply shall be interconnected with any public water supply without the specific approval of the State Board of Health.

**11. Water Pumping and Storage Equipment.**

a. **Pumps and Other Appliances**—Water pumps, tanks, filters, softeners, and all other appliances and devices shall be protected against contamination.

b. **Pressure Tanks, Boiler, and Relief Valves**—The drains from pressure tanks, boilers, relief valves, and similar equipment shall be connected to the drainage system through an indirect waste.

c. **Cleaning, Painting, Repairing Water Tanks** — A potable water supply tank used for domestic purposes shall not be lined, painted, or repaired with any material which will affect either the taste or the potability of the water supply when the tank is returned to service. Tanks shall be disconnected from the system during such operations, to prevent any foreign fluid or substance from entering the distribution piping.

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**12. Disinfection of Potable Water System Piping.**

a. The administrative authority having jurisdiction shall require when necessary that the potable water system or any part thereof installed or repaired be disinfected in accordance with one of the following methods before it is placed in operation.

b. The system or part thereof, shall be filled with a solution containing 50 parts per million of available chlorine and allowed to stand 6 hours before flushing and returning to service.

c. The system or part, thereof, shall be filled with a solution containing 100 parts per million of available chlorine and allowed to stand 2 hours before flushing and returning to service.

d. In the case of potable water storage tank where it is not possible to disinfect as provided in the two preceding paragraphs the entire interior of the tank shall be swabbed with a solution containing 200 parts per million of available chlorine and the solution allowed to stand 2 hours before flushing and returning to service.

e. In the case of potable water filters or similar devices, the dosage shall be determined by the administrative authority.

**13. Hazard and Noise.**

Where water pressures are excessive, air chambers or other approved mechanical devices shall be provided to reduce water hammer or line noises to such an extent that no pressure hazard to the piping system will exist.

**SECTION 2013. HOT WATER SYSTEM.**

**1. Hot Water Distribution Piping.**

The sizing of the hot water distribution piping shall conform to good engineering practice, and shall be such as to, at all times, furnish to each fixture served an ample supply of hot water.

**2. Pressure-Relief Valve.**

The installation of hot water boilers, hot water supply tanks, and all other pressure heating vessels including the installation of pressure and temperature relief valves shall be in accordance with the North Carolina Boiler and Hot Water Supply Tank Rules and Regulations adopted under Article 7, General Statutes 95-54 through 95-69.2., and as they may be amended from time to time.

**3. Pressure Marking of Storage Tank.**

Any storage tank hereafter installed for domestic hot water shall have clearly and indelibly stamped in the metal, or so marked upon a plate welded thereto or otherwise permanently attached, the maximum allowable working pressure. Such markings shall

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be placed in an accessible position on the outside of the tank so as to make inspection or reinspection readily possible. All storage tanks for domestic hot water shall meet the applicable ASME standards; if such tanks are to be insulated a window shall be left in the insulation which will allow the markings to be clearly visible.

### 4. Miscellaneous.

a. **Drain Cock**—All storage tanks shall be equipped with adequate drain cocks.

b. **Line Valves**—Valves in the water-supply distribution system, except those immediately controlling one fixture supply, when fully opened shall have a cross-sectional area of the smallest orifice or opening through which the water flows at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

### 5. Water Used for Processing.

Water used for cooling of open equipment or similar purposes shall not be returned to the potable water distributing system. When discharged to the building drainage system, the waste water shall be discharged through an indirect waste pipe or air gap.

## SECTION 2014. PLUMBING FIXTURES.

### 1. Quality of Fixtures.

Plumbing fixtures shall have smooth impervious surfaces, be free from defects and concealed fouling surfaces, and, except as permitted elsewhere in this code, shall conform in quality and design to one of the following standards:

TABLE #3

Staple Porcelain Plumbing Fixtures, NBS Commercial Standard CS 4-29
Staple Vitreous China Plumbing Fixtures, NBS Commercial Standard CS-20-49
Enameled Cast-Iron Plumbing Fixtures, NBS Commercial Standard CS 77-48
Earthenware (vitreous glazed) Plumbing Fixtures, NBS Commercial Standard CS 111-43
Plumbing Fixtures (for) Land Use, F. S. WW-P-451a-1947.
Formed Steel Enameled Sanitary Ware, F. S. WW-P-542
Formed Metal Porcelain Enameled Sanitary Ware, NBS Commercial Standard CS 144-47
Hospital Plumbing Fixtures, NBS Simplified Practice Recommendation R 106-41
Plumbing Fixtures, Fittings, Trim, R 227-47
Lavatory and Sink Traps, R 21-46

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### **2. Alternate Materials.**

**Materials**—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-resisting steel or other materials especially suited to the use for which the fixture is intended.

### **3. Overflows.**

**a. Design**—When any fixture is provided with an overflow, the waste shall be so arranged that the standing water in the fixture cannot rise in the overflow when the stopper is closed or remain in the overflow when the fixture is empty.

**b. Connection**—The overflow pipe from a fixture shall be connected on the house or inlet side of the fixture trap, except that overflows or flush tanks may discharge into the water closets or urinals served by them, but it shall be unlawful to connect such overflows with any other part of the drainage system.

### **4. Installation.**

**a. Cleaning**—Plumbing fixtures shall be installed in a manner to afford easy access for cleaning. Where practicable, all pipes from fixtures shall be run to the nearest wall.

**b. Joints**—Where fixture comes in contact with wall and floors, the joint shall be water-tight.

**c. Securing Fixtures**—Floor-outlet fixtures shall be rigidly secured to floor by screws or bolts, and wall-hung water-closet bowls shall be rigidly supported by a concealed metal supporting member so that no strain is transmitted to the closet connection, all as previously described in Section 2009, Paragraph 14.

**d. Setting**—Fixtures shall be set level and in proper alignment with reference to adjacent wall.

### **5. Water-Supply Protection.**

**Supply Fittings**—The supply lines or fittings for every plumbing fixture shall be so installed as to prevent backflow.

### **6. Prohibited Fixtures and Connections.**

**a. Fixtures**—Pan, valve, plunger, offset, washout, latrine, frost-proof, and other water closets having an invisible seal or an unventilated space or having walls which are not thoroughly washed at each discharge, are prohibited. Any water closet which might permit siphonage of the contents of the bowl back into the tank are prohibited.

**b. Connections**—Fixtures having concealed slip-joint connections shall be provided with an access panel or utility space so arranged as to make the slip connections accessible for inspection and repair.

**7. Water Closets.**

a. **Public Use**—Water-closet bowls for public use shall be of the elongated type.

b. **Flushing Device**—Water-closet tanks shall have a flushing capacity sufficient to properly flush the water-closet bowls with which they are connected.

c. **Float Valves**—Float valves in lowdown tanks shall close tight and provide water to properly refill the trap seal in the bowl.

d. **Close-Coupled Tanks**—The flush-valve seat in close-coupled water-closet combinations shall be 1 inch or more above the rim of the bowl, so that the flush-valve will close even if the closet trapway is clogged, or any closets with flush valve seats below the rim of the bowl shall be so constructed that in case of trap stoppage, water will not flow continuously over the rim of the bowl.

e. **Automatic Flush Valve**—Flush valves shall be so installed that they will be readily accessible for repairing. When the valve is operated, it shall complete the 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 fixtures and refill the fixture trap. Means shall be provided for regulating flush-valve flow. Not more than one fixture shall be served by a single flush valve. Protection against backflow shall be provided as specified in the paragraph headed "Backflow".

f. **Seats**—Water closets shall be equipped with seats of smooth non-absorbent material. All seats of water closets provided for public use shall be of the open-front type. Integral water-closet seats shall be of the same material as the fixture.

**8. Urinals.**

a. **Automatic Flushing Tank**—Tanks flushing more than one urinal shall be automatic in operation and of sufficient capacity to provide the necessary volume to flush and properly cleanse all urinals simultaneously.

b. **Urinals Equipped With Automatic Flush Valves**—Flush valves shall be as prescribed in paragraph headed "Automatic Flush Valve" and no valve shall be used to flush more than one urinal.

c. **Trough Urinals**—Trough urinals shall be permitted only in places of temporary occupancy. They shall be not less than 6 inches deep and shall be furnished with one-piece backs and have strainers with outlets at least 1½ inches in diameter. The wash-down pipe shall be perforated so as to flush with an even curtain of water against the back of the urinal. This pipe shall be se-

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curely clamped as high as practicable to the back of the urinal. Trough urinals shall have tanks with a flushing capacity of not less than 1½ gallons of water for each 2 feet of urinal length.

d. **Equivalent Length**—Trough urinals shall be figured on the basis of one urinal for each 18 inches of length, provided that—

24-inch trough equals 1 urinal  
36-inch trough equals 2 urinals  
48-inch trough equals 2 urinals  
60-inch trough equals 3 urinals  
72-inch trough equals 4 urinals

e. **Floor-Type Urinals**—Floor-type trough urinals are prohibited.

f. **Surrounding Materials**—Wall and floor space to a point 1 foot in front of urinal lip and 4 feet above the floor, and at least 1 foot to each side of the urinal shall be lined with nonabsorbent material.

**9. Strainers and Fixture Outlets.**

All plumbing fixtures, other than water closets and siphon-action washdown or blowout urinals, shall be provided with metal strainers having waterway area complying with paragraph headed "Quality of Fixtures."

**10. Lavatories.**

**Waste Outlets**—Lavatories shall have waste outlets not less than 1¼ inches in diameter. Wastes may have open strainers or may be provided with stoppers.

**11. Shower Receptors and Compartments.**

a. **Shower**—All shower compartments, except those built directly on the ground or those having metal enameled or similar material receptors, shall have a lead or copper shower pan or the equivalent thereof as determined by the administrative authority. The pan shall turn up on all sides at least 6 inches above finished floor level. Traps shall be so constructed that the pan may be securely fastened to the trap at the seepage entrance making a watertight joint between the pan and trap. Shower receptacle waste outlets shall be not less than 2 inches in diameter and have removable strainers.

b. **On the Ground**—Shower receptors built on the ground shall be constructed from dense nonabsorbent and noncorrosive materials and shall have smooth impervious surfaces, or as provided in the preceding paragraph.

c. **Dimensions**—Shower compartments shall have not less than 1,024 square inches in floor area and, if rectangular, square, or triangular in plan, shall be not less than 30 inches in shortest dimensions.

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d. **Public or Institution Showers**—Floors of public shower rooms shall be drained in such a manner that no waste water from any head will pass over areas occupied by other bathers.

e. **Walls**—Shower compartments shall have walls constructed of smooth, non-corrosive, and nonabsorbent waterproof materials to a height of not less than 6 feet above the floor.

f. **Joints**—Built-in tubs with overhead showers shall have waterproof joints between the tub and walls and the walls shall be waterproof, to a point 12 inches above the shower head.

**12. Sinks.**

a. **Waste Outlets**—Sinks shall be provided with waste outlets not less than  $1\frac{1}{2}$  inches in diameter. Waste outlets may have open strainers or may be provided with stoppers.

b. **Food Grinders**—Sinks on which a food waste grinder is installed shall have a sink waste opening not less than  $3\frac{1}{2}$  inches in diameter.

**13. Food-Waste-Grinder Units.**

a. **Separate Connections**—Domestic food-waste-disposal units shall be connected and trapped separately from any other fixture or compartment. Units may have either automatic or hand-operated water supply control.

b. **Grease Interceptors**—No food-waste grinder shall be connected through a grease interceptor.

c. **Commercial-Type Grinders**—Commercial-type food-grinders shall be provided with not less than a 2-inch waste line. Each waste line shall be trapped and vented as provided in other sections of this code.

**14. Drinking Fountains.**

a. **Design and Construction**—Drinking fountains shall conform to American Standard Specifications for Drinking Fountains (ASA 24.2-1942).

b. **Protection of Water Supply**—Stream projectors shall be so assembled as to provide an orifice elevation as specified by American Standard Air Gaps in Plumbing Systems (ASA A40.4-1942) and American Standard Backflow Preventers in Plumbing Systems (ASA A40.6-1943).

**15. Floor Drains.**

a. **Trap and Strainers**—Floor drains shall have metal traps and a minimum water seal of 3 inches and shall be provided with removable strainers. The open area of strainers shall be at least two-thirds of the cross-section area of the drain line to which it connects.



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b. **Size**—Floor drains shall be of a size to serve efficiently the purpose for which it is intended, and to maintain the areas to be drained reasonably free of water without backing up.

**16. Dishwashing Machines.**

a. **Protection**—Domestic dishwashing machines shall meet requirements in previous sections of this code.

b. **Separate Trap**—Each unit shall be separately trapped or discharged indirectly into a properly trapped and vented fixture.

c. **Air Gap**—Commercial dishwashing machines shall be connected through an air gap or as provided in "Indirect Waste Piping".

d. **Hot Water**—Dishwashing machines or similar dishwashing equipment not in private living quarters or dwelling units shall be provided with water at 180° F. for sterilization.

**17. Multiple Wash Sinks.**

a. **Circular Type**—Each 18 inches of wash sink circumference (circular type) shall be equivalent to one lavatory.

b. **Straight-Line Type**—Multiple wash sinks of the straight-line type shall have hot and cold combination spouts not closer than 18 inches from adjacent similar spouts and each spout shall be considered the equivalent of one lavatory.

**18. Garbage-Can Washers.**

a. **Discharge**—Garbage-can washers shall not discharge through a trap serving any other device or fixture.

b. **Grease Interceptor**—The discharge from a garbage-can washer shall be connected through a grease interceptor.

c. **Baskets**—The receptacle receiving the wash from garbage cans shall be provided with a basket or similar device to prevent the discharge of large particles into the building drainage system.

d. **Connections**—Water-supply connections shall conform to previous ruling on "Backflow".

**19. Laundry Trays.**

a. **Waste Outlets**—Each compartment of a laundry tray shall be provided with a waste outlet not less than 1½ inches in diameter and with a stopper.

b. **Overflow**—Laundry-tray overflows shall conform to the requirements of paragraph headed "Overflows".

**20. Special Regulations for Public Toilet Rooms.**

Facilities for washing hands, such as lavatories, wash sinks, etc., shall be furnished in all public toilet rooms as follows:

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There shall be provided, in the same public toilet, or immediately adjacent thereto, lavatory or wash sinks to a number not less than  $\frac{1}{2}$  of the number of toilets, or toilets and urinals combined in the toilet room; such lavatories and wash sinks shall have traps not less than  $1\frac{1}{2}$ " diameter each. There shall also be provided, in such public toilet rooms, one hose bibb, with detachable key stop, approximately 2 feet above finished floor, and under or close to end lavatory, or similar location.

There shall be provided, in all public toilet rooms; floor drain or drains, fitted with heavy pattern strainers; drains shall be of such size that each 50 sq. ft. of floor area to be served shall have 1" of waste diameter at the drain outlet.

Toilets installed for public use shall conform at least in all respects with "Rules and Regulations Governing Working Places and Working Conditions," as issued by N. C. Department of Labor, Rule 9, pages 7 and 8, which shall be considered minimum requirements.

**SECTION 2015. FIXTURE UNITS AND TRAP SIZES.**

**1. Special Fixtures and Specialties.**

a. **Water and Drain Connections**—Baptistries, ornamental and lily pools, aquaria, ornamental fountain basins, and similar constructions when provided with water supplies shall be protected from back-siphonage as required.

b. **Approval**—Specialties requiring water and waste connections shall be submitted for approval of the plumbing inspector, or other administrative authority.

**2. Minimum Facilities.**

Wherever plumbing fixtures are installed, the minimum unit number of each type of fixture installed shall be in accordance with table following, unless otherwise specifically provided.

The unit equivalent of Plumbing Fixture shown in Table No. 4, shall be based on the size of the trap required, and the unit equivalent of fixtures and devices not shown in Table No. 4, shall be based on the rated discharge capacity in gallons per minute in accordance with Table No. 5.

TABLE #4

Kind of Fixture	Trap Size	Units
Drinking Fountains -----	$1\frac{1}{4}$ "	1
Dental Lavatories -----	$1\frac{1}{4}$ "	1
Bar Sinks -----	$1\frac{1}{2}$ "	2
Wash Basins (Lavatories)--For Residential Use	$1\frac{1}{4}$ "	1
Wash Basins (Lavatories)--For Other Use ----	$1\frac{1}{2}$ "	2
Kitchen Sinks-----	$1\frac{1}{2}$ "	2

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Bath Tubs -----	1 1/2"	2
Laundry Tubs -----	1 1/2"	2
Wall Urinals -----	1 1/2"	2
Dental Cuspidors -----	1 1/2"	2
Combination Fixtures -----	1 1/2"	2
Floor Sinks and Hoppers -----	1 1/2"	2
Shower Stalls -----	2"	2
Floor Drains -----	2"	2
Trough Urinals -----	2"	4
Stall Urinals -----	2"	2
Floor Drain -----	3"	3
Floor Drain -----	4"	4
Floor Drain -----	4"	6
Pedestal Urinals -----	2"	2
Slop Sinks -----	4"	6
Water Closets or Clinic Sinks -----	3" or 4"	6
Sand Interceptor -----		

**TABLE #5**  
**Discharge Capacity (In gals. per min.)**

up to 7 1/2 -----	Equals -----	1 unit
8 to 15 -----	Equals -----	2 units
15 to 50 -----	Equals -----	6 units

Over 50 Gals. shall be determined by the Department having jurisdiction.

**SECTION 2016. SIZE OF DRAINAGE AND VENT PIPING.**

**1. General Requirements.**

a. The minimum size of vertical and/or horizontal drainage and/or vent piping shall be determined from the distribution and total of all fixture units connected thereto, and additional, in the case of vertical soil, waste, and/or vent pipes, in accordance with their length.

b. Table No. 6 shows the maximum number of fixture units allowed on any vertical or horizontal soil or waste pipe, house drain, and/or house sewer of a given size; the maximum number of fixture units allowed on any branch interval of a given size; the maximum length (in feet) of any vertical soil, waste and/or vent pipe of a given size; the maximum number of fixture units allowed on any one vent or vent stack of a given size.

c. Every building in which soil or waste piping is installed and every connection to a sewage disposal system shall have at least one stack of a size equal to the main house drain extending continuous from such house drain through the roof as a main vent.

d. Exception: When the house drain exceeds 3 inches in size, such main vent shall be equal to the largest stack in the building, but in no case less than 3 inches.

TABLE #6

Size of Pipe (Inches)	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"
Max. Units Soil or Waste Vertical.....	0	3	**16	**32	***48	200	484	1100	3000	-----	-----
Max. Units Soil or Waste Horizontal.....	0	3	**8	**14	***27	120	200	484	1770	3120	6000
Max. Length (Feet) Soil or Waste Stack.....	0	65	85	148	212	300	390	510	750	-----	-----
Max. Length (Feet) Vent or Vent Stack.....	*45	60	120	180	212	300	390	510	750	-----	-----
Max. Units Vent or Vent Stack....	*1	8	24	48	84	256	600	1360	3600	-----	-----

\*Vertical only  
 \*\*Except Six-Unit Traps  
 \*\*\*Only 2 Six-Unit Traps Allowed

**SECTION 2017. SOIL, WASTE AND VENT PIPING INSTALLATION.**

**1. General Requirements.**

a. All main or branch soil, waste, and vent pipes and fittings within a building and to a point not less than 5 feet outside of the building shall be of cast-iron coated with tar or asphaltum, silicon iron, galvanized wrought iron or steel, galvanized alloyed open-hearth iron, lead, brass, or copper, except that no galvanized wrought iron or steel pipe shall be laid underground.

b. All galvanized wrought iron or steel, galvanized alloyed open-hearth iron, and lead pipe used for water, soil, waste, or vent pipes, or branches thereof, including traps and connections, when installed so as to be embedded or passed through concrete, shall be protected against corrosion by applying one or more coats of asphaltum paint or heavy tar paper wrapping, or both, or by other approved means of protection.

c. No brick, sheet metal, or earthenware flue, nor any chimney flue shall be used as a sewer vent, or to ventilate any trap, drain, soil, or waste pipe.

d. The use of other than cast iron soil pipe for house sewers (from 5 feet outside of the building to property line, street or public alley) is prohibited where surface or ground conditions, insufficient coverage or similar hazards exist: nor shall other than cast iron soil pipe be used under concrete drives or roads.

**2. Conformance With Code.**

All plumbing systems hereafter installed shall conform at least with the provisions of this code.

**3. Grade of Horizontal Drainage Piping.**

Horizontal drainage piping shall be run in practical alignment at a uniform grade.

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**4. Change in Direction.**

a. **Fittings**—Changes in direction in drainage piping shall be made by the appropriate use of 45° Y's, long-or-short-sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or equivalent fittings. Single and double sanitary T's and quarter bends may be used in drainage lines only where the direction of flow is from the horizontal to the vertical.

b. **Short Sweeps**—Short sweeps not less than 3 inches in diameter may be used in soil and waste lines where the change in direction of flow is from either the horizontal to the vertical or from the vertical to the horizontal and may be used for making necessary offsets between the ceiling and the next floor above, where space limitations are such as to prevent the use of 45° fittings.

**5. Fittings and Connections.**

a. **Fittings Prohibited**—No fittings having a hub in the direction opposite to flow, or T branch shall be used as a drainage fitting. No running threads, bands, or saddles shall be used in the drainage system. No drainage or vent piping shall be drilled or taped.

b. **Heel-Inlet Bends**—A heel inlet quarter bend shall not be used as a vent when the inlet is placed in a horizontal position.

c. **Obstruction to Flow**—No fitting, connection, device, or method of installation which obstructs or retards the flow of water, wastes, sewage, or air in the drainage of venting systems in an amount greater than the normal frictional resistance to flow, shall be used in a plumbing system.

**6. Repairs and Alterations.**

a. **Existing Buildings**—In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, deviations from the provisions of this code are permitted, provided such deviations are found to be necessary, conform to the intent of this code, and are approved in writing by the administrative authority.

b. **Health or Safety**—Wherever compliance with all the provisions of this code fails to eliminate or alleviate a nuisance which may involve health or safety hazards, the owner or his agent shall install such additional plumbing or drainage equipment as may be found necessary by the administrative authority.

c. **Open Trench**—All excavations required to be made for the installation of a building-drainage system or any part thereof within the walls of a building, shall be open trench work and shall be kept open until the piping has been inspected, tested, and accepted.

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d. **Backfilling**—Adequate precaution shall be taken to insure proper compactness of backfill around piping without damage to such piping.

e. **Backfill Materials**—Trenches shall be backfills in thin layers to 12 inches above the top of the piping with clean earth which shall not contain stones, boulders, cinder-fill, or other materials which would damage or break the piping or cause corrosive action. Mechanical devices such as bulldozers, graders, etc., may then be used to complete backfill to grade. Fill shall be properly compacted.

**7. Structural Safety.**

In the process of installing or repairing any part of a plumbing and drainage installation, the finished floors, walls, ceilings, tile work, or any other part of the building or premises which must be changed or replaced shall be left in a safe structural condition as determined by the proper administrative authority.

**8. Workmanship.**

Workmanship shall conform to generally accepted good practice.

**9. Protection of Pipes.**

**Cutting or Notching**—No structural member shall be weakened or impaired by cutting, notching, or otherwise, except to the extent permitted by the proper administrative authority.

**10. Pipes Through Footings or Foundation Walls.**

a. A soil or waste pipe, or building drain passing under a footing or through a foundation wall shall be provided with a relieving arch; or there shall be built into the masonry wall an iron pipe sleeve two pipe sizes greater than the pipe passing through or equivalent protection shall be provided as may be approved in writing by the administrative authority.

b. **Freezing**—No water, soil, or waste pipe shall be installed or permitted outside of a building or in an exterior wall unless adequate provision is made to protect such pipe from freezing, where necessary.

**11. Industrial Wastes.**

Wastes detrimental to the public sewer system or detrimental to the functioning of the sewage-treatment plant shall be treated and disposed of as found necessary and directed by the administrative authority, as previously provided in this code.

**12. Sleeves.**

Annular space between sleeves and pipes shall be filled or tightly caulked with coal tar or asphaltum compound, lead, or

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other material found equally effective and approved as such by the administrative authority.

#### **13. Ratproofing.**

**Exterior Openings**—All exterior openings provided for the passage of piping shall be properly sealed with snugly fitting collars of metal or other approved ratproof material securely fastened into place, and all lead waste pipes shall be rat-proofed by wrapping with expanded metal mesh, or other equally satisfactory rat-proofing.

#### **14. Used or Second-Hand Equipment.**

It shall be unlawful to purchase, sell, or install used equipment or material for plumbing installation unless it complies with the minimum standards set forth in this Code, and in accordance with the State Board of Health Regulations.

#### **15. Condemned Equipment.**

Any plumbing equipment condemned by the administrative authority because of wear, damage, defects, or sanitary hazards, shall not be reused for plumbing purposes.

#### **16. Piping in Relation to Footings.**

**Parallel**—No piping shall be laid parallel to footings or outside bearing walls closer than 3 feet, except as may be approved by the administrative authority, upon a finding that less distance is safe. Such piping installed deeper than footings or bearing walls shall be 45° therefrom, except as may be approved by the administrative authority, upon a finding that a greater angle is safe.

#### **17. Connections to Plumbing System Required.**

a. All plumbing fixtures, drains, appurtenances, and appliances used to receive or discharge liquid wastes or sewage shall be connected properly to the drainage system of the building or premises, in accordance with the requirements of this code.

b. **Light and Ventilation**—Plumbing fixtures, except drinking fountains and single lavatories shall be located in compartments or rooms provided with ventilation and illumination conforming to recognized published standards. (See ASA A53.1-1946).

c. **Improper Location**—Piping, fixtures, or equipment shall not be located in such a manner as to interfere with the normal operation of windows, doors, or other exit openings.

#### **18. Ventilation Ducts.**

Ventilation ducts from washrooms and toilet rooms shall exhaust to the outer air or form an independent system.

**19. Toilet Facilities for Workmen.**

Suitable toilet facilities in accordance with Table #4 shall be provided and maintained in a sanitary condition for the use of workmen during construction.

**20. Piping.**

Vent piping shall be of cast-iron, galvanized wrought iron, galvanized steel, and ferrous alloys, lead, brass, or copper pipe, or copper tubing.

a. **Underground**—Vent piping placed underground shall be cast-iron soil pipe.

b. **Fittings**—Fittings shall conform to the type of pipe used in the vent system as required by Section 2006, paragraph 6.

c. **Other Materials**—Nothing in this section shall be deemed to preclude the use of other materials of equal or better quality when approved as such by the administrative authority.

**21. Protection of Trap Seals.**

**Traps Protected**—The protection of trap seals from siphonage or back pressure shall be accomplished by the appropriate use of soil or waste stacks, vents, revents, back vents, loop vents, circuit or continuous vents, or combinations thereof; installed in accordance with the requirements of this chapter.

**22. Vent Stacks.**

a. **Installation**—A vent stack or a main vent shall be installed with a soil or waste stack whenever back vents, relief vents, or other branch vents are required in two or more branch intervals.

b. **Terminal**—The vent stack shall terminate independently above the roof of the building or shall be connected with the extension of the soil or waste stack (stack-vent) at least 6 inches above the flood-level rim of the highest fixture.

c. **Main Stack**—Every building in which plumbing is installed shall have at least one main stack, which shall run undiminished in size and as directly as possible, from the building drain through to the open air above the roof.

**23. Vent Terminals.**

a. **Roof Extension**—Extensions of vent pipes through a roof shall be terminated at least 6 inches above it.

b. **Roof Garden**—Where a roof is to be used for any purpose other than weather protection, the vent extensions shall be run at least 5 feet above the roof, and shall be adequately stayed.

c. **Flashings**—Each vent terminal shall be made watertight with the roof by proper flashing.



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d. **Flag Poling**—Vent terminals shall not be used for the purpose of flag poling, TV aerials, or similar purposes.

**24. Location of Vent Terminal.**

No vent terminal from a drainage system shall be directly beneath any door, window, or other ventilating opening of the building or of an adjacent building nor shall any such vent terminal be within 10 feet horizontally of such an opening unless it is at least 2 feet above the top of such opening.

**25. Extensions Through Wall.**

Vent terminals extending through a wall, when permitted by the administrative authority, shall be at least 10 feet horizontally from any lot line. They shall be turned to provide an opening downward. They shall be effectively screened and shall meet the requirements of this code. Vent terminals shall not terminate under the overhang of the building.

**26. Extensions Outside Building.**

No soil, waste, or vent pipe extension shall be run or placed on the outside of a wall of any new building, but shall be carried up inside the building.

**27. Frost Closure.**

a. **Vent Terminal**—Where there is a possibility of frost closure, the vent extension through a roof shall be at least 4 inches in diameter. When it is found necessary to increase the size of the vent terminal, the change in diameter shall be made inside the building.

b. **Increasers**—Change in diameter of vent terminals shall be made by use of a long increaser at least 1 foot below the roof.

**28. Vent Grades and Connections.**

a. **Grade**—All vent and branch-vent pipes shall be so graded and connected as to drip back to the soil or waste pipe by gravity.

b. **Vertical Rise**—Where vent pipes connect to a horizontal soil or waste pipe, the vent shall be taken off above the center line of the soil pipe, and the vent pipe shall rise vertically, or at an angle not more than 45° from the vertical, to a point at least 6 inches above the flood-level rim of the fixture it is venting before offsetting horizontally or before connecting to the branch vent.

c. **Height Above Fixture**—A connection between a vent pipe and a vent stack or stack-vent shall be made at least 6 inches above the flood-level rim of the highest fixtures served by the vent. Horizontal vent pipes forming branch vents, relief vents, or loop vents shall be at least 6 inches above the flood-level rim of the highest fixture served.

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d. **Side Inlet**—Side-inlet closet bends are permitted only in cases where the fixture connecting thereto is vented and in no case shall the inlet be used to vent a bathroom group without being washed by a fixture.

**29. Bars and Soda-Fountain Sinks.**

a. **Bar and Fountain-Sink Traps**—Traps serving sinks which are part of the equipment of bars, soda fountains, and counters need not be vented when the location and construction of such bars, soda fountains, and counters are such as to make it impossible to do so. When such conditions exist, such sinks shall discharge into a floor sink or hopper which is properly trapped and vented.

b. **Sumps**—Sinks or sumps, receiving indirect waste, shall be located in a properly lighted and ventilated space.

**30. Fixtures Back-to-Back.**

a. **Distance**—Two fixtures set back-to-back, within the distance allowed between a trap and its vent, may be served with one continuous soil or waste-vent pipe, provided that each fixture wastes separately into an approved double fitting having inlet openings at the same level.

**31. Fixture Vents.**

a. **Distance of Trap from Vent**—Each fixture trap shall have a protecting vent so located that the slope and the developed length in the fixture drain from the trap weir to the vent fitting are within the requirements set forth: in general, this distance shall not exceed 3' 6" developed length; except that in single residence or apartment plumbing, the developed length may be 5' 6".

b. **Trap-Seal Protection**—The plumbing system shall be provided with a system of vent piping which will permit the admission or emission of air so that under normal and intended use the seal of any fixture trap shall not be subjected to a pressure differential of more than 1 inch of water.

**32. Circuit and Loop Venting.**

a. **Battery Venting**—A branch soil or waste pipe to which two but not more than eight water closets (except blow-out types), pedestal urinals, shower stalls or floor drains are connected in battery, shall be vented by a circuit or loop vent which shall take off in front of the last fixture connection. In addition, lower-floor branches serving more than three water closets shall be provided with a relief vent taken off in front of the first fixture connection. When lavatories or similar fixtures discharge above such branches, each vertical branch shall be provided with a continuous vent.

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b. **Dual Branches**—When parallel horizontal branches serve a total of eight water closets (four on each branch), each branch shall be provided with a relief vent at a point between the two most distant water closets. When other fixtures (than water closets) discharge above the horizontal branch, each such fixture shall be vented.

c. **Vent Connections**—When the circuit, loop, or relief vent connections are taken off the horizontal branch, the vent branch connection shall be taken off at a vertical angle or from the top of the horizontal branch.

d. **Fixtures Back-to-Back In Battery**—When fixtures are connected to one horizontal branch through a double Y in a vertical position, a common vent for each two fixtures back-to-back or double connection shall be provided. The common vent shall be installed in a vertical position as a continuation of the double connection.

**33. Pneumatic Ejectors.**

Relief vents from a pneumatic ejector shall not be connected to a fixture-branch vent but shall be carried separately to a main vent or stack-vent or to the open air.

**34. Relief Vents.**

Branch intervals serving more than two water closets, or more than two pedestal type urinals may be vented with individual vents to each fixture, or may be vented with loop or circuit vents. If the loop or circuit vent is used, a relief vent, of the same size as the branch interval up to 4 inches shall be taken off the branch interval ahead of the first fixture, in any instance where four or more toilets, or four or more pedestal urinals, waste into the same stacks from a higher floor. If space limitations prevent the relief vent from being taken off at the point designated, it shall be taken off the branch interval as near as practicable to that point.

**35. Main Vents to Connect at Base.**

All main vents or vent stacks shall connect full size at their base to the building drain or to the main soil or waste pipe, at or below the lowest fixture branch. All vent pipes shall extend undiminished in size above the roof, or shall be reconnected with the main soil or waste vent.

**36. Vent Headers.**

**Connection of Vents**—Stack-vents and vent stacks may be connected into a common vent header at the top of the stacks and then extended to the open air at one point. This header shall be sized in accordance with the requirements of Table #6, the number of units being the sum of all units on all stacks connected

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thereto and the developed length being the longest vent length from the intersection at the base of the most distant stack to the vent terminal in the open air as a direct extension of one stack.

### **37. Size and Length of Vents.**

a. **Length of Vent Stacks**—The length of the 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 building drain to the vent stack terminal, if it terminates separately in the open air, or to the connection of the vent stack with the stack-vent, plus the developed length of the stack-vent from the connection to the terminal in the open air, if the two vents are connected together with a single extension to the open air.

b. **Size of Individual Vents**—The diameter of an individual vent shall be not less than  $1\frac{1}{4}$  inches nor less than one-half the diameter of the drain to which it is connected, except as provided in Table 6.

c. **Size of Relief Vent**—The diameter of a relief vent shall be not less than one-half the diameter of the soil or waste branch to which it is connected.

### **37. Size of Circuit or Loop Vent.**

The diameter of a circuit or loop vent shall be not less than the size of the diameter of the horizontal soil or waste branch or the diameter of the vent stack, whichever is smaller.

### **38. Size of Vent Piping.**

The size of vent piping shall be determined from its length and the total of fixture units connected thereto, as provided in Table #6. Twenty per cent of the total length may be installed in a horizontal position.

### **39. Combination Waste-and-Vent System.**

Clear water fixtures, such as lavatories, dental lavatories in residences, drinking fountains, etc., may be used in wet venting systems, provided they are connected as continuous wastes and vents.

40. Branch intervals having more than eight toilets, or pedestal type urinals, and having no other vented branch waste connected thereto, should be individually vented: if loop or circuit vent is used, an additional relief vent shall be installed approximately in the center of such branch interval.

## **SECTION 2018. INSPECTION AND TESTS.**

1. All piping, traps, and fixtures of a plumbing or drainage system shall be tested as regulated herein.

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**2. Notification.**

a. It shall be the duty of the contractor to notify the plumbing inspector orally or in writing before such systems are to be tested and inspected. The notification shall specify the plan number or permit number.

b. It shall be the duty of the contractor to make sure that such system will stand the test prescribed before requesting test inspections. If for any reason a plumber shall fail to have the work ready at the time designated in his call for inspection, a second notice shall be left at the office of the inspector, designating the time for the inspection; if such system is not ready for inspection at the time specified in the second notice, a penalty of \$5.00 shall be paid for each additional inspection call.

**3. Material and Labor for Tests.**

The equipment, material, power, and labor necessary for the test inspection shall be furnished by the plumber.

**4. Methods of Testing.**

a. **Water Test**—The water test shall be applied to the drainage system in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening above the roof, and the system filled with water to the point of overflow above the roof. 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. No section shall be tested with less than a ten (10) foot head of water or a five (5) pound pressure of air. In testing successive sections, at least the upper ten (10) feet of the next preceding section shall be retested so that no joint or pipe in the building shall have been submitted to a test of less than a ten (10) foot head of water or a five (5) pound pressure of air.

b. Under any test the water or air pressure shall remain constant for not less than fifteen (15) minutes without further addition of water or air.

c. **Air Test**—The air test applied to the drainage system shall be made by attaching the air compressor test apparatus to any suitable opening and closing all other inlets and outlets to the system, then forcing air into the system until there is a uniform pressure sufficient to balance a column of mercury ten (10) inches in height or five (5) pounds pressure per square inch on the entire system. Such pressure shall be maintained for a period of not less than fifteen (15) minutes without further addition of air.

**5. House Sewer Inspection.**

The house sewer and all its branches from the main sewer or curb to the house drain shall be inspected but need not be tested.

**6. House Drain Tests.**

The entire house drain with all its branches, receptacles, and connections shall be brought as far as practicable to the surface or grade of the basement floor and tested with water or air. The water test shall have not less than a two (2) foot head of water and the air test not less than a five (5) pound pressure per square inch. Upon being found free from leaky joints and other defects, the test shall be considered satisfactory.

**7. Rain Water Leader (Conductor) Tests.**

Rain water leader (conductor) pipes and their roof extensions, when within the walls of any building, shall be tested with water or air. Branches on the outside system may be tested in connection with the house drain.

**8. Stable and Garage Tests.**

For a stable or a garage or any part thereof the inspection and tests shall be made in the same manner as for any other building.

**9. Soil, Waste, and Vent Pipe Tests and Inspection.**

Soil, waste, and vent pipes, and all work known as "roughing in" and "under-floor work" between the house drain connections to points above the finished floors and beyond the finished face of walls and partitions shall be tested with water or air. All soil or waste stacks shall be connected to the house drain, wherever possible, before being tested.

**10. Final Inspection.**

When a plumbing and drainage system is completed and the fixtures are installed, the final inspection shall be made. No such plumbing or drainage system shall be used until it has been inspected and approved unless special permission is given by the administrative authority for its temporary use.

**11. Smoke Test.**

a. The smoke test shall be used in testing the sanitary condition of the drainage or plumbing system of all buildings where there is reason to believe it has become dangerous or defective as a result of settlement of the building, abuse, accident, or other cause. A smoke test may be required by the administrative authority as part of the final inspection of all new work and alterations of existing work, where the inspection discloses questionable methods of connecting fixtures or traps, defects in fixtures, traps, materials, or faulty workmanship.

b. When a smoke test is made, all windows, doors, and other openings admitting outside air to the building, shall be closed. The smoke machine shall be located outside of the building, and

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be connected to any suitable opening or outlet in the system. When the system is filled completely with dense, pungent smoke, and the openings emit smoke, they shall be closed air tight and air pressure equivalent to a one (1) inch water column shall be applied and left standing at least fifteen (15) minutes. (Due allowance will be made by the inspector for shrinkage due to cooling of heated smoke.) If there is no leakage or forcing of trap seals or other defects, the system shall be considered air and gas tight.

c. Nothing herein shall be construed to prohibit the inspector from ordering the removal of any cleanout or the unsealing of any trap or test plug to determine if the smoke has reached all parts of the system. No fixture of any part of the system shall be used while the test is being made.

### **12. Miscellaneous Inspections and Tests.**

a. When old fixtures are repaired, when additional fixtures are installed, when the style or location of any fixture is changed, or when changes are made in the piping system of old underfloor work, or when a piping system is reconstructed with new piping, or when a repair, alteration, or extension is made to the house sewer, the work shall be inspected but need not be tested.

b. Any addition to a house drain, soil, waste, vent, or interior conductor pipe extending fifteen (15) feet or more in length shall be tested and inspected. All such additions less than fifteen (15) feet in length need not be tested unless required by the inspector.

c. When a plumbing system is condemned because of unsanitary conditions and repairs and alterations are made to make the plumbing sanitary, the same tests and inspections shall be made as regulated for new installations.

### **13. Inspections, Permits, and Tests Not Required.**

Inspections, permits, or tests shall not be required:

a. When a plumbing or drainage system or part thereof is set up for exhibition purposes and is not directly connected to a sewerage system.

b. When forcing out stoppages, relieving frozen pipes and fittings, or repairing leaks.

c. Such repairs or alterations shall not be construed to include the installation or changing the location of vertical or horizontal lines of soil, waste, vent, or interior leader (conductor) pipes.

### **14. Test of Water Distribution Systems.**

It is mandatory that upon the completion of the entire distribution system in any building, it shall be tested and proven tight

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under a water pressure of not less than the maximum working pressure under which it is to be used.

**15. Discretionary Powers.**

When for specific reasons it may be impracticable to make an installation in any existing building or structure comply strictly with the regulations of this article, or where new installations, additions, or alterations are made reasonably in conformance with this chapter as it pertains to plumbing and drainage design, materials, construction and appliances, the inspector shall have discretionary power to permit such modifications as are not inconsistent with the intent and substance thereof.

**16. Defective Work.**

If inspections or tests show defects in the plumbing or drainage system, such defective work or material shall be replaced within three (3) days, or as the inspector may direct. Such inspections and tests shall be repeated until the defects have been eliminated.

**17. Non-Conforming and Condemned Materials.**

The presence of any material other than that approved by this article, in any joint, in any part of a drainage or plumbing system, or on or near the site of the work, shall be sufficient cause for condemning such joint, part of the system, or the entire work. If test or inspection discloses defective material, leakage, or unworkmanlike construction not conforming to the regulations of this article, such defective material or unworkmanlike construction shall be condemned. Condemned materials, not yet installed, shall be removed from the site of the work within three (3) days following the condemnation thereof or as the inspector may direct.

**18. Use of Plumbing Prohibited.**

No part of any new or a reconstructed plumbing system shall be used unless a certificate of approval has been issued by the administrative authority.

**19. Certificate of Approval.**

Upon satisfactory completion and final test of the drainage and plumbing system, a certificate of approval shall be issued by the inspector to the plumber or owner when requested. Before a certificate of approval is issued all fees due for permits, penalties, or additional inspections which may be due such work shall be paid.

**20. Use of New Materials, Prefabricated Assemblies, Etc.**

a. Following an investigation and examination of technical data, test reports, drawings, samples, or other pertinent information, the administrative authority may approve or disapprove the



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use of any new materials, equipment, devices, fixtures, appliances, fittings, or prefabricated plumbing units or fitting assemblies not specifically regulated by this article.

b. In all cases where such approvals are given, the administrative authority may promulgate rules in the manner as regulated, setting forth conditions under which such new materials, equipment, devices, fixtures, appliances, fittings, or prefabricated plumbing units or fitting assemblies have been approved and may be used; provided, however, that the use of such materials, equipment, devices, fixtures, appliances, fittings, or prefabricated plumbing units or fitting assemblies shall not be inconsistent with the intent and substance of the standards established in this article and applicable thereto.

c. Whenever the use of any new materials, equipment, devices, fixtures, appliances, fittings, or prefabricated plumbing units or fitting assemblies is disapproved by the administrative authority any person affected by such decision may file a notice of appeal with the State Building Code Council. Such Council shall hear all appeals from the decision of the inspector relative to the use of such new materials, equipment, devices, fixtures, appliances, fittings, or prefabricated plumbing units or fitting assemblies, and shall make such order or determination as in its opinion ought to be made.

**21. Sketches.**

The charts and sketches illustrating methods of plumbing and drainage installations and construction are an integral part of this article.

**SECTION 2019. INDIVIDUAL SEWAGE DISPOSAL SYSTEMS.**

The most satisfactory method of disposing of sewage is by connection to a public sewerage system. Every effort should be made to secure public sewer extensions. When connection to a public sewer is not feasible and when a considerable number of residences are to be served, consideration should be given to the construction of a community sewer system and treatment plant. Specific information on this matter may be obtained from the state authorities having jurisdiction. In any event, such authority should be consulted prior to the installation of an individual sewage-disposal system. Sewage-disposal installations serving commercial establishments for multiple-dwelling units shall be designed in accordance with the requirements of the administrative authority.

In those instances where the installation of a private residential sewage-disposal system cannot be avoided, the following re-

quirements should be followed. For these requirements see the State Board of Health Special Bulletin No. 519, "Residential Sewage Disposal Plants."

**SECTION 2020. INDIVIDUAL WATER SUPPLY.**

1.

a. Where connection to a municipal water supply or public water system is not possible, it is essential that certain precautions be taken in the development of individual supplies. Consideration must be given to the hydrological, geological, and bacteriological factors affecting the quantity and quality of available water. In many cases specific information on these matters may be obtained from the State local health authorities. In any event such authorities should be consulted prior to the development of any individual water supply.

b. Many residential areas not served by public water supply or sewerage system have been developed in which the lot sizes are inadequate to permit the proper location of individual water and sewerage systems. In such instances it would be well to give serious consideration to the development of a community water system to serve the entire area. The following requirements conform to those set forth in detail in Public Health Service, Supplement No. 185, "Individual Water Supply System" recommendation of the Joint Committee on Rural Sanitation.

2. General.

a. **Ground-Water Supply**—A ground-water supply should be properly located, constructed, and operated so as to be safeguarded against contamination.

b. **Well Location**—The well site shall be chosen to permit the well to be situated an adequate distance from existing and potential sources of contamination as specified in this section, paragraph 3d. In order to determine the separation necessary, it is essential to consider the character and location of the source of contamination, type of well construction, natural hydraulic gradient of water table, permeability of the water-bearing formation, extent of cone depression formed in the water table due to pumping the well, and the type of rock structure. In residential areas, the possible effect of new construction on the safety of the water supply should also be considered.

c. **Classification**—Wells are hereby classified into four groups on the basis of methods of construction, as follows: Dug, bored, driven, and drilled. The type of well to be constructed will depend on the geology of the area and the depth of the water-bearing strata. Drilled wells, because of their greater depths, usually have greater yields and are less affected by drought. They are

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usually more desirable from a public viewpoint since they may be better protected against contamination than dug or bored wells.

**3. Quantity and Quality of Water.**

a. **Minimum Quantity**—The minimum quantity of water to provide for ordinary domestic use should be not less than 50 gallons per person per day. The well and pumping equipment shall be adequate to provide the required quantity of water at the rate of 5 gallons per minute.

b. **Safe Water**—The water shall contain no chemical or mineral substances capable of causing unfavorable physiological effects on those consuming the water.

c. **Chlorination**—The water shall be free from pathogenic bacteria and other disease-producing organisms. The well should be chlorinated after construction or repair to remove any contamination which may have gained access to the supply. (The State or local health department should be contacted relative to possible bacteriological testing.)

**Location**

d. **Minimum Distance**—The minimum distance between any ground-water point or origin and suction lines and any source of contamination shall be not less than that given in following table.

**Distances From Source Of Contamination**

<i>Source</i>	<i>Distance<sup>1</sup></i> Feet	<i>Source</i>	<i>Distance<sup>1</sup></i> Feet
Sewer -----	50	Subsurface Disposal Fields	100
Septic Tanks -----	50	Seepage Pits -----	100
Subsurface Pits -----	50	Cesspools -----	150

<sup>1</sup>These distances constitute minimum separation and should be increased in areas of creviced rock or limestone, or where the direction of movement of the ground water is from sources of contamination toward the well.

e. **Elevation**—The well site should have good surface drainage and should be at a higher elevation than possible sources of contamination. The top of the well should be at least 2 feet above the highest known water mark and at least 50 feet measured horizontally from surface bodies of water.

**4. Construction.**

a. **Depth**—In no case shall an individual water supply be developed from a water-bearing stratum located less than 10 feet below grade.

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b. Preferably, the water-bearing stratum should be located at least 20 feet from the natural ground surface.

c. **Outside Casing**—The well shall be provided with an outside watertight casing extending at least 10 feet below and 6 inches above the ground surface. In the case of drilled or driven wells, the casing should be of steel or wrought iron. For dug or bored wells the casing should be of concrete 6 inches thick, except that in the case of the buried-slab type of dug or bored well, the upper 10-foot section of casing should be of steel or wrought iron as provided for drilled wells. The annular space between the casing and the earth formation shall be grouted to a depth of at least 10 feet. The casing shall be large enough to permit the installation of an independent drop pipe. The casing should preferably be sealed in an impermeable stratum or extended several feet into the water-bearing stratum.

d. **Cover**—Every well shall be provided with a watertight cover overlapping the top of the casing or pipe sleeve. The annular opening between the casing or pipe sleeve and drop pipe shall be sealed either by extending the casing or pipe sleeve into the base of the pump or by some suitable type of "well seal."

e. **Drainage**—The well platform or pump room floor shall be sloped to drain away from the well. The platform or floor shall be constructed of concrete at least 4 inches thick, or other material found equivalent thereto and approved by the administrative authority.

f. **Dug or Bored Well**—In the case of a dug or bored well, the cover shall overlap and extend downward at least 2 inches outside the wall or curbing of the well.

g. **Piping Sleeve**—A pipe sleeve of sufficient diameter to permit removal of the drop pipe and cylinder or jet body shall be provided in the cover. The pipe sleeves should extend at least 1 inch above the cover.

**5. Pumping Equipment.**

a. **Pumps**—Pumps shall be so constructed and installed as to prevent the entrance of any contaminating substances into the water supply.

b. **Pump Head**—The pump head shall be so designed as to prevent any contaminating substances from reaching the water chamber of the pumps.

c. **Well Cover**—The pump shall be so designed as to effect a water proof seal with the well cover or casing.

d. **Priming**—The pump shall be so designed and installed that priming will not be necessary.

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e. **Maintenance**—The installation shall be so designed as to facilitate necessary maintenance and repair.

f. **Protection**—The well shall be protected against freezing by means of heating or by means of properly designed and installed underground discharge.

g. **Pump Room**—Where the pump room is situated in an offset from the basement, the pump room floor shall be located not less than 18 inches above the basement floor.

h. **Well Pits**—The installation of well pits is not recommended.

i. **Pressure Tank**—A pressure tank with a minimum storage capacity of 42 gallons per dwelling unit should be installed.

**SECTION 2021. TRAILER PARK PLUMBING.**

**1. General.**

a. In the establishment of trailer parks, the installation of water and waste piping is of especial importance, owing to the transitory nature of its use: wherever possible, such plumbing shall be connected to a public sewer and water system, but where this cannot be done, the State Board of Health Regulations shall govern, with the following additions:

b. In addition to the required plumbing facilities in public toilet rooms, there shall be provided for each 10 trailers one floor set type slop sink, supplied with hot and cold water, for emptying of slop pails, etc. Extend sewer laterals to each proposed trailer location. Each sewer lateral shall terminate with a P trap and then shall be extended to grade and terminate not less than 4 inches above grade, and shall be 4 inches in size. Extension through ground shall be protected by metal casing or concrete mount. Each outlet for trailer unit shall be provided with a flexible connector furnished by the trailer park operator. Flexible connectors shall be so arranged as to readily clamp into the trailer coach outlet and the connection so designed that in case of emergency, such as fire, trailer coach may be pulled out and the connection automatically disconnected without damage to piping or trailer coach. Sewer outlet for connecting each trailer shall be located centrally so that a flexible connector of sufficient length (provided by the trailer park operator) may connect with the trailer sewer outlet located on the right side of the trailer and just behind the wheel housing. Each sewer lateral shall be furnished with a chain attached cap or valve, so that the lateral may be closed completely, air and water-tight, when trailer parking unit is vacant.

**2. Water-Supply Distribution.**

a. **Contamination**—A ground-water supply should be properly located, constructed, and operated in order to be safeguarded against contamination as previously specified herein.

b. **Consultation**—It is desirable that the State Board of Health be contacted regarding the possibility of obtaining water, before there is any commitment to purchase property for a trailer park, as lack of a proper water supply will nullify the use of the land for trailer park purposes.

**3.**

a. **Materials**—Material for water-distributing pipes and tubing shall be brass, copper, cast-iron, wrought iron, open-hearth iron, or steel with approved fittings. All threaded ferrous pipe and fittings shall be galvanized (zinc-coated) or cement lined. When used underground in corrosive soil, all ferrous pipe and fittings shall be coal-tar enamel coated and the threaded joints shall be coated and wrapped after installation.

b. **Water Characteristics**—When selecting the material and size for water-supply pipe, tubing, or fittings, due consideration shall be given to the action of the water on the interior and of the soil, fill, or other material on the exterior of the piping. No material that would produce toxic conditions in a potable water system shall be used for water distribution. In all cases, areas selected for installation of sewage and water lines, shall be completely separate and independent of each other, with the water piping so located that natural drainage shall be from the area enclosing water piping to the area for sewage, except in actual toilet rooms and bathhouses.

**4. Potable Water.**

a. **Potable water** is water from a public or private water-supply system or source which is accepted by the proper governing authority as suitable for human consumption.

b. **Chlorination**—The well should be chlorinated after construction or repair to remove any contamination which may have gained access to the supply (State or local health department should be contacted relative to bacteriological testing.)

**5. Control Valves.**

a. **Valves**—In addition to the necessary valves on the distribution system each trailer-unit outlet shall be provided with a  $\frac{3}{4}$ -inch gate valve, and  $\frac{3}{4}$ -inch check valve, installed not less than 6 inches above grade: outlet shall be furnished with chain attached cap or plug, for use when trailer parking unit is vacant.

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b. **Stop and Waste Valves**—The use of ordinary stop and waste valves is prohibited.

6. **Trailer Outlet Connector.**

a. The trailer water outlet shall have a distance of separation from the sewer outlet of not less than 5 feet. The flexible connector between trailer park outlet and trailer coach outlet shall be of a type to readily permit quick attachment, and in the event of emergency where a trailer coach may be pulled out it shall be so arranged to automatically disconnect without damaging the piping or trailer coach.

b. **Location**—Trailer outlet shall be located at rear of lot.

**SECTION 2022. INSTALLATION AND MAINTENANCE OF AIR CONDITIONING APPARATUS.**

The purpose of this section is to prevent the overloading of the public sewers by the discharge therein of water used for cooling purposes and for the purpose and within the meaning of this section, the following definitions shall obtain:

Air conditioning shall mean the cooling or dehumidification, or both, of space for human occupancy.

No installation of air conditioning equipment requiring the use of water shall be installed on any premises supplied from a municipal water system until a permit authorizing such installation has been issued by the administrative authority. Applications for permits shall specify the make, type, and tonnage of installation, the minimum and maximum water requirements and such additional information regarding the proposed installation as may be required.

The use of the pressure or flow of water from a public water system as a source of energy is prohibited except when specifically approved by the administrative authority. The use of water is permitted subject to such conditions or reservations as such authority may consider reasonable. The right is reserved to restrict or prohibit extraordinary use of water if water supply conditions so require.

All air conditioning units having standard rated capacities of 5 tons or over shall be equipped with evaporative condensers, evaporative coolers and condensers, water cooling towers, spray ponds, or other water-cooling equipment, so that all water from the mains is used for make-up purposes only. Units up to and including 10 tons may be operated with other water conserving device at the discretion of the City.

Make-up water connections to a water conservation device, drip pans, etc., shall be so installed that an air break of not less than

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twice the diameter of the supply pipe shall exist at all times, or some other means used to make it impossible for water to siphon back into the public water mains.

In cases where the waste water is discharged into a public sewer system, the discharge shall be made into a water supplied, trapped, vented clear water fixture, with an air break between the end of the discharge and the overflow point of such fixture of not less than twice the diameter of the discharge pipe.

Direct water connections to water cooling jackets for air conditioning shall be equipped with an approved check valve to prevent possible back flow of refrigerant and shall also be equipped with relief valves to insure that excessive pressures shall not be built up through low water supply.

**Revocation of Permits**—Any permit issued hereunder may be revoked summarily upon conviction for violation of this section, or upon failure of the holder of said permit to discontinue using water for air conditioning immediately upon orders of the administrative authority.

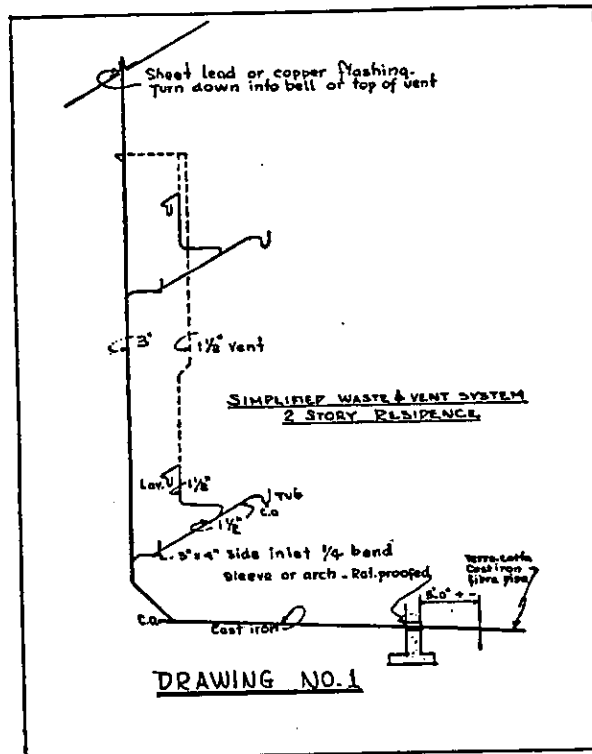
**SECTION 2023. GAS PIPING, GAS APPLIANCES.**

Installation and designing of gas piping and equipment using gas of any description other than undiluted liquified petroleum gas, shall be installed in accordance with the American Standard Recommendation of the American Gas Association, Inc., 420 Lexington Avenue, New York 17, New York, and listed as "Installation of Gas Pipe and Gas Appliances in Buildings," dated 1950 and approved by American Standard Association, Inc., December 5, 1950. Regulations and instructions listed therein shall constitute a minimum Gas Piping Code for the State of North Carolina, except insofar as they may conflict with the foregoing sections of this chapter, and these recommendations are adopted as of date of issuance of this Code with any addenda or additions thereto, after the date shown above.

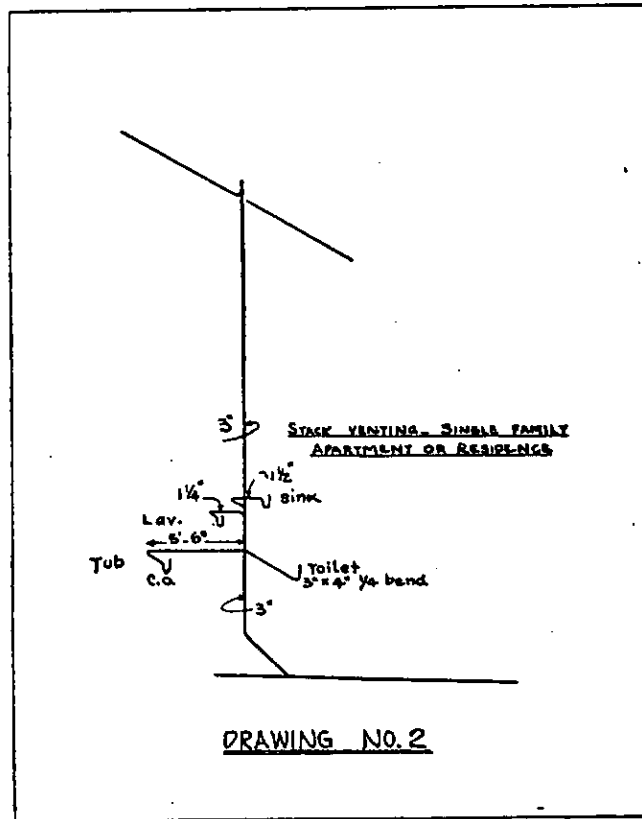
Installation, design and maintenance of gas piping and equipment using liquified petroleum gas shall be made in accordance with the recommendations of the Liquified Petroleum Gas Association, 11 South La Salle Street, Chicago 3, Illinois, dated October 1951, including Appendix A and Appendix B, and shall constitute a Minimum Liquified Petroleum Gas Code for the State of North Carolina, except insofar as they may conflict with the foregoing sections of this chapter, and are adopted as of date of issuance of this code with any addenda or additions thereto, after the date shown above.



Sketches

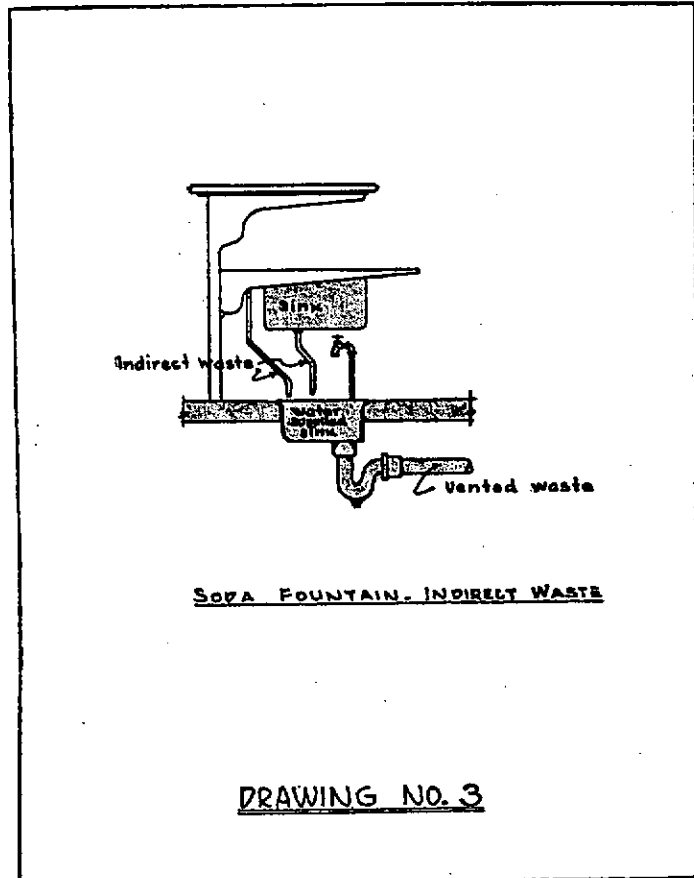


**SIMPLIFIED WASTE AND VENT  
SYSTEM—2-STORY RESIDENCE**



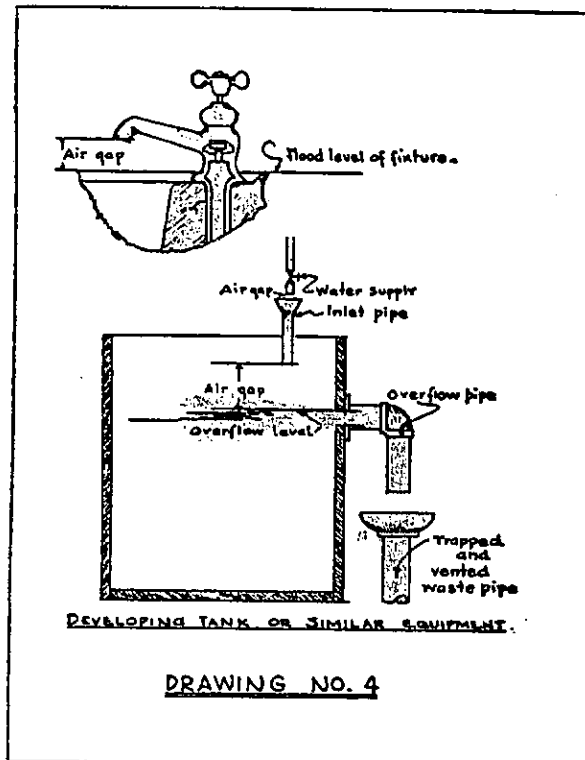
**STACK VENTING—SINGLE FAMILY  
APARTMENT OR RESIDENCE**

Sketches



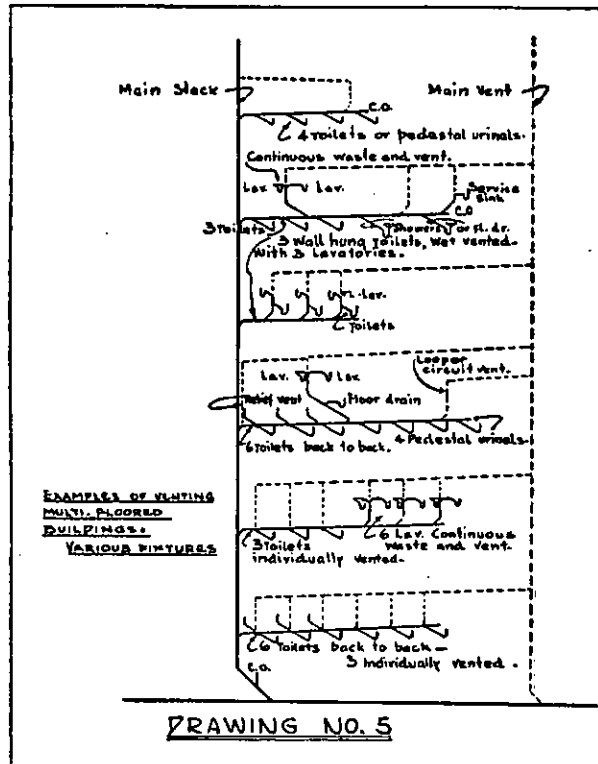
SODA FOUNTAIN INDIRECT WASTE

Sketches



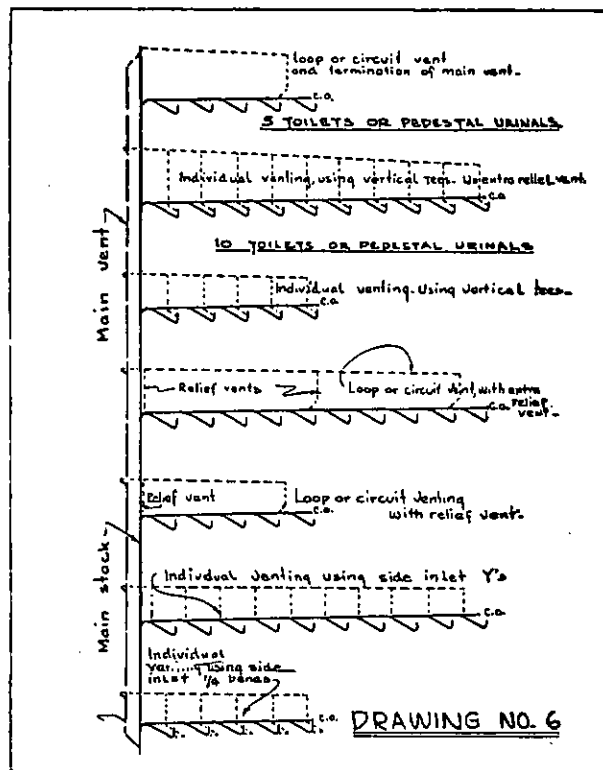
**DEVELOPING TANK  
OR SIMILAR EQUIPMENT.**

Sketches



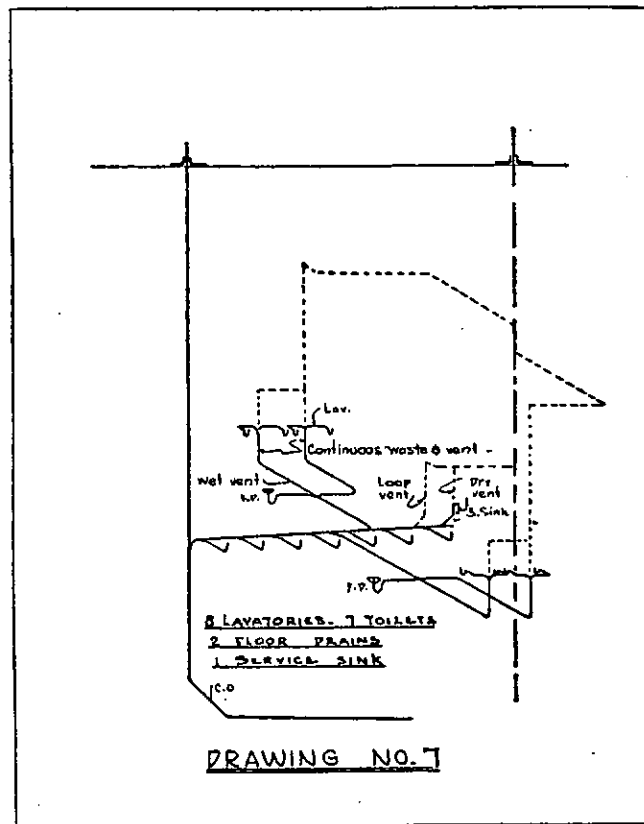
EXAMPLES OF VENTING  
MULTI-FLOORED BUILDINGS

Sketches



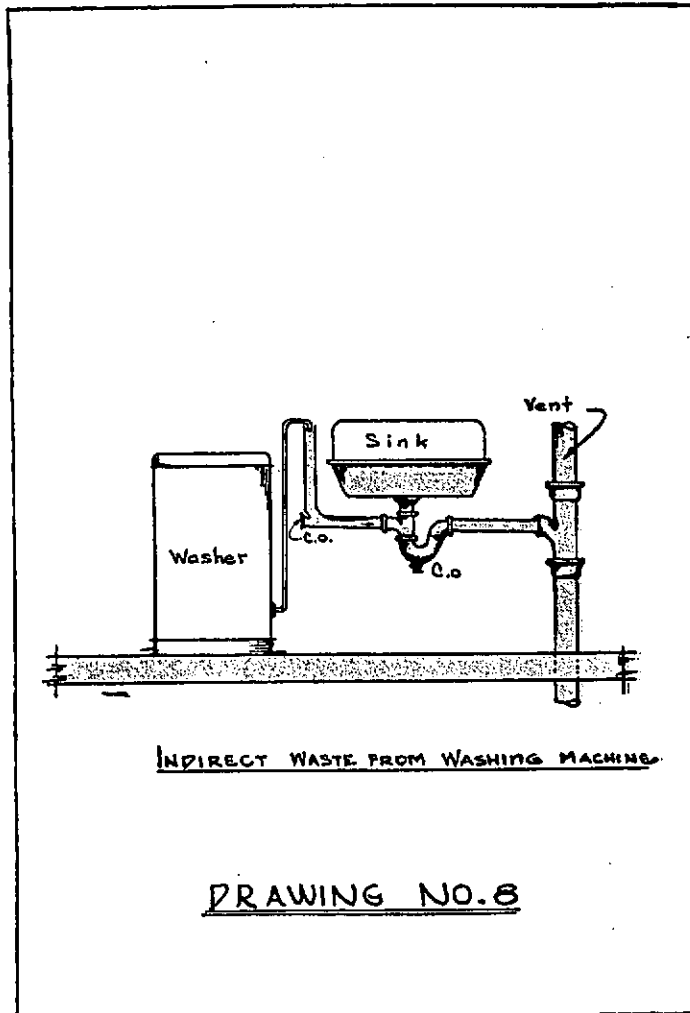
**EXAMPLES OF VENTING  
MULTI-FLOORED BUILDING.**

Sketches



**EXAMPLE OF GROUP OF FIXTURES  
CONNECTED TO COMMON DRAIN**

Sketches



INDIRECT WASTE FROM WASHING MACHINE

DRAWING NO. 8

**INDIRECT WASTE FROM  
WASHING MACHINE**



### **FLOOR AND ROOF CONSTRUCTION**

The following construction shall be accepted as having a fire resistance rating of not less than two hours.

Composite floors consisting of reinforced concrete beams with fillers of hollow tile, cinder concrete block, slag block, or gypsum block, the thickness of filler to be 4 inches or more with a 2-inch or more concrete slab, unplastered; at least  $\frac{3}{4}$  inches concrete protection for steel reinforcement.