

NORTH CAROLINA STATE BUILDING CODE

VOLUME II

PLUMBING



1968 EDITION

Published by
THE NORTH CAROLINA BUILDING CODE COUNCIL
and the
NORTH CAROLINA DEPARTMENT OF INSURANCE
Post Office Box 351
Raleigh, N. C.

FOREWORD

North Carolina has been a pioneer in the field of Statewide Building and Fire Prevention regulations which have been enacted for the protection of the public. The Building Laws passed in 1903 and 1905 created a Building Code for materials and methods of construction in use at that time.

The General Assembly of 1933 created a Building Code Council and authorized it to, in cooperation with the Commissioner of Insurance, prepare and adopt a Building Code. The first North Carolina Building Code received the approval of the official Building Code Council and the Commissioner of Insurance in 1935 and was printed that same year. The General Assembly of 1941 ratified and adopted this edition, which was known as the 1936 Edition.

The 1936 Edition contained a State Plumbing Code. It was rewritten by the State Board of Health and the Building Code Council in 1954. The 1954 Edition was printed as Article XX of the State Code and it was bound in the 1958 Edition. The 1933 Building Code Council authorized cities and towns to make changes in the State Code as long as they were more stringent. However, many cities and towns and counties rewrote the State Code and some adopted a plumbing code of their own thus providing for different plumbing regulations in many areas of the State.

The 1957 Legislature rewrote the 1933 Building Code Council Act and re-organized and expanded the Council. All local Codes different from the State Code were required to be approved by the Council.

The technical provisions herein are taken from the 1962-1963 Edition of the Southern Standard Plumbing Code with 1964-66 Amendments published by the Southern Building Code Congress which is based mainly on the 1955 Edition of the National Plumbing Code, ASA, A40.8—1955.

The Code is presented with the hope that its use will protect the public from dangerous and unsanitary buildings and will provide Architects and Engineers a set of minimum standards to follow in designing buildings. The Building Code Council has authority to make changes in the Code when the wider use of materials and methods comply with standards set forth in the Laws. From time to time, there will be modifications and changes in the Code.

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NORTH CAROLINA STATE BUILDING CODE

VOLUME II

PLUMBING

*Adopted by the North Carolina Building Code
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of the General Assembly of
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NOTES:

- (1) This 1968 edition replaces the 1963 edition and all amendments thereto and legally applies to all buildings, (except dwellings) in State of N. C. on June 1, 1968. This edition should be adopted locally to apply to dwellings.
- (2) All local amendments to this code must be approved by the State Building Code Council before they are legally effective. (See Section 108 of Chapter I, Administration of State Code in back of this Volume for Procedure to follow).

REFERENCE SOURCES

American Standard National Plumbing Code (ASA A40.8-1955), published by The American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y.

Report of the Coordinating Committee for a National Plumbing Code, 1951, Domestic Commerce Series No. 28, issued jointly by U.S. Department of Commerce, National Production Authority, Washington 25, D. C. and Housing and Home Finance Agency, Office of the Administrator, Washington 25, D. C.

National Plumbing Code Illustrated, (Illustrating: Report of the Coordinating Committee for a National Plumbing Code and ASA A40 Plumbing Code), Author Vincent T. Manas, published by Manas Publications, 4513 Potomac Avenue, N. W., Washington 7, D. C.

A Report on the Investigation of Loop and Circuit Venting a Battery of Water Closets and Pedestal Urinals, by F. M. Dawson and D. E. Metzler, College of Engineering—State University of Iowa; Sponsored by the Research Committee of the National Association of Plumbing Contractors.

Plumbing Fixture Arrangement, Construction Aid 1, published by Housing and Home Finance Agency, Office of the Administrator, Washington 25, D. C.

Fixture Unit Ratings as Used in Plumbing System Design. Housing Research Paper 15, published by Housing and Home Finance Agency, Office of the Administrator, Washington 25, D. C.

Wet Venting of Plumbing Fixtures, BMS119; Capacities of Plumbing Stacks in Buildings BMS Report 132; Stack Venting of Plumbing Fixtures, BMS118; Self-Siphonage of Fixture Traps, BMS Report 126; Building Materials and Structures Report BMS66, Plumbing Manual—published by United States Department of Commerce, National Bureau of Standards, U. S. Government Printing Office, Washington 25, D. C.

Southern Standard Building Code, Part III Plumbing, published by Southern Building Code Congress, 1116 Brown-Marx Building, Birmingham, Alabama.

Uniform Plumbing Code, 1964 Edition published by the Western Plumbing Officials, P. O. Box 247, South Pasadena, California 91031.

Gas Appliances, Gas Piping, (NFPA-54-64, ASA Z21.30) published by National Fire Protection Association, 60 Batterymarch Street, Boston, Mass., 02110.

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NORTH CAROLINA STATE BUILDING CODE

VOLUME II — PLUMBING

CHAPTER I — ADMINISTRATION

SECTION 101—TITLE AND SCOPE

101.1—TITLE

These rules and regulations shall be known as the 1968 Edition of the North Carolina State Building Code, Volume II Plumbing, may be cited as such and will be referred to hereinafter as this Code. (See G.S. 143-138(a))

101.2—PURPOSE

The purpose of the Code is to provide certain minimum standards, provisions and requirements for safe and stable design, sanitation methods of construction and uses of materials in buildings and/or structures hereafter erected, constructed, enlarged, altered, repaired, moved, converted to other uses or demolished and to regulate the plumbing equipment, maintenance, use and occupancy of all buildings and/or structures. All regulations contained in the North Carolina State Building Code shall have a reasonable and substantial connection with the public health, safety, morals, or general welfare, and their provisions shall be construed liberally to those ends. (See G.S. 143-138(c))

101.3—SCOPE

(a) **NEW BUILDINGS; EXEMPTIONS.** The Code shall apply to all new buildings, structures and additions thereto wherever they might be situated in the State of North Carolina provided, however, that such regulations shall not apply to the following types of buildings unless the governing body of the municipality or the county wherein such buildings are located shall by vote adopt a resolution making the regulations applicable to one or more such types of buildings:

- (1) Dwellings; and outbuildings used in connection therewith;
- (2) Apartment buildings used exclusively as the residence of not more than two families;
- (3) Temporary buildings or sheds used exclusively for construction purposes, not exceeding twenty feet in any direction and not used for living quarters.

This Code shall not apply to farm buildings located outside any municipality. (See G.S. 143-138(b) and 160-138(e))

(b) EXISTING BUILDINGS

1. *Alterations:* This code shall apply to all alterations which affect the structural strength, exits, fire hazards, lighting or sanitary conditions of any building in the State of North Carolina except those exempted in Section 101.3(a) above. (See G.S. 143-138(b))

2. *Change of Use:* This Code shall apply to all buildings which are to be devoted to a new use and which the requirements of this code are in any way more stringent than the requirement covering the previous use of the building. (See G.S. 143-138(b))

Section 102

SECTION 102—CONTENT OF STATE BUILDING CODE

- Volume I —General Construction
 - " I-A—Fire Resistance Ratings
 - " II —Plumbing
 - " III—Heating and Air Conditioning
 - " IV—Electrical Systems and Elevators
- (See G.S. 143-138(b))

SECTION 103—ADMINISTRATION BY COMMISSIONER OF INSURANCE

103.1—GENERAL

The Commissioner of Insurance shall have general supervision, through the Division of Engineering of the Department of Insurance, of the administration and enforcement of all sections of the North Carolina State Building Code referred to in Section 102 above (except elevators), through the cooperation of local inspectors appointed by the governing body of municipalities and counties. (G.S. 143-139(b))

103.2—STAFF FOR BUILDING CODE COUNCIL

The Engineering Division serves as Staff for the Building Code Council. (See G.S. 143-137(c))

103.3 RIGHT OF ENTRY

The Commissioner of Insurance and his authorized deputies in the Engineering Division have the right at all reasonable hours to enter into or upon all buildings in their jurisdiction for the purpose of examination and inspection. (See G.S. 69-4, 69-13, 160-143, 143-139(b))

103.4—INSPECTIONS

The Commissioner of Insurance through the Division of Engineering may inspect any building wherever it may be situated in the State to assist local officials in the enforcement of the Building Code. (See G.S. 143-139(b))

SECTION 104—ADMINISTRATION BY BUILDING CODE COUNCIL

104.1—BUILDING CODE COUNCIL CREATED

There is created by statute a State Building Code Council composed of nine members appointed by the Governor consisting of one registered architect, one licensed general contractor, one registered engineer practicing structural engineering, one registered engineer practicing mechanical engineering, one registered engineer practicing electrical engineering, one licensed plumbing and heating contractor, one municipal building inspector, a representative of the public who is not a member of the building construction industry, and a representative of the engineering staff of a State agency charged with approval of plans of State owned buildings. (See G.S. 143-136(a))

104.2—OFFICERS

The Council shall elect from its appointed members a Chairman and Vice-Chairman. Officers shall serve for a period of two years from the date of election or until their successors are elected. (See G.S. 143-137(a))

104.3—MEETINGS

The Building Code Council shall meet regularly the *second Tuesday in March and September*. Special meetings may be called by the Chairman. Any five members of the Council shall constitute a quorum. (See G.S. 143-137(b))

104.4—DUTIES

The Building Code Council shall have the duty of adopting and amending the North Carolina State Building Code, the approval of local ordinances and hearing appeals from the decision of an enforcement agency. (See G.S. 143-138 a, d, and e; 143-141)

104.5—STAFF AND PERSONNEL

The Division of Engineering of the Department of Insurance shall serve as the staff for the Council. (See G.S. 143-137(c))

104.6—RECOMMENDED STATUTORY CHANGES AND ENFORCEMENT PROCEDURES

(a) The Building Code Council has the duty of studying the building laws of the State and to recommend to the Legislature desirable changes to simplify and improve such laws. (See G.S. 143-142(a))

(b) The Council has the duty of advising State Agencies as to any changes in Administrative practice to improve enforcement of the building laws. (See G.S. 143-142(b))

SECTION 105—ADMINISTRATION BY LOCAL BUILDING OFFICIALS
(Building Inspector, (Plumbing Inspector))

105.1—OFFICE OF BUILDING OFFICIAL (BUILDING INSPECTOR)
CREATED Note: The Building Inspector who is delegated to enforce the Plumbing Code is usually referred to as the Plumbing Inspector.

(a) *City Building Inspector*: There is created by Statute the office of building inspector in all cities and towns of 1000 or more in population according to the last U. S. census whose duty shall be to enforce the North Carolina State Building Code including Volumes I, II, III & IV. (See G.S. 160-118, 160-120 and 160-154) (See Local Administrative ordinance)

(b) *County Building Inspector*: The Board of County Commissioners may appoint one or more building inspectors to enforce the State Building Code including Volumes I, II, III & IV. (See G.S. 153-9 (52)) See Local Administrative Ordinance)

(c) *Combination City and County Building Inspectors*: By mutual agreement between the County Commissioners and the City Commissioners, a building inspector or inspectors may be appointed to serve a county and cities within the county and/or one or more counties. (See G.S. 153-9 (52)) (See Local Administrative Ordinance)

(d) *County Plumbing Inspector*: The County Commissioners may appoint one or more Plumbing Inspectors to enforce the State Plumbing Code and approved local regulations in some counties in lieu of building inspectors to enforce all volumes of the Code. (See G.S. 153-9 (47)). (See local Administrative Ordinance).

105.2—DUTIES AND AUTHORITY OF PLUMBING INSPECTOR

(a) *Duties of Plumbing Inspector:* The plumbing inspector shall have the power, and it shall be his duty, to enforce the requirements and provisions of this code; to approve or disapprove plans and specifications pertinent to plumbing within a reasonable time after receipt of an application; to issue permits, notices and certificates; to witness tests and to perform such other duties that may be required by the local governing authority, in connection with the administration and enforcement of this code and other applicable plumbing regulations.

(b) *Right of Access for Purposes of Inspection, Power to Condemn, Exception:* The plumbing inspector shall have the right to enter public or private property within the jurisdiction of this code at such reasonable time as may be necessary for the performance of his duties. This plumbing inspector is empowered to condemn any plumbing system, or segment thereof, fixtures, apparatus or appurtenances which are not installed, altered or restored in accordance with the provisions of this code. In the interest of public health, the administrative authority further, shall have the right to condemn any plumbing system or part thereof which is a detriment to health and require that same be remedied immediately.

Buildings constructed by the State of North Carolina in accordance with plans and specifications approved by the North Carolina Department of Administration are not subject to inspection by the plumbing inspector of a county or municipality or the Codes and requirements thereof. (G.S. 143-135.1)

(c) *Discretionary Power, Appeal:* In the event plumbing cannot be reasonably installed, altered or restored in accordance with the provisions of this code, due to structural barrier, the decision of the plumbing inspector shall prevail, based upon general accepted standards that will not jeopardize the public health or safety. Should any controversy arise relating to the interpretation of this code, the master plumber or installer may appeal to the local governing authority, provided, however, an appeal from the local governing authority or Plumbing Inspector may be taken to the Engineering Division of the Department of Insurance or to the N. C. Building Code Council or Superior Court, as provided for in G.S. 143-139 and G.S. 143-140. (See Section 106)

105.3—LICENSING OF PLUMBERS

(a) *Master Plumber:* The words, "Master Plumber", when used in this code, shall be deemed and held to mean, a person who holds a current license issued by the State Board of Examiners of Plumbing and Heating Contractors, in accordance with the provisions of G.S. 87, Article 2, which authorizes the said person to engage in the business of plumbing contracting in cities or towns having a population of more than 3500, in accordance with the last official U. S. Census.

(b) *Installer:* The word, "Installer", when used in this code, shall be deemed and held to mean, a person who installs plumbing, or who is responsible for the installation of plumbing, in accordance with the provisions of this code, in cities, towns or unincorporated areas in which a license is not required by the State Board of Examiners of Plumbing and Heating Contractors.

(c) *Journeyman Plumber*: For the purpose of this code, the words, "Journeyman Plumber", shall be deemed and held to mean a person who is skilled in the art of installing plumbing, and who is employed by, and under the supervision and jurisdiction of, a Master Plumber or Installer, as defined herein.

105.4—PERMITS REQUIRED

(a) *Applications, Permits Required: Exceptions*: Applications shall be obtained from, the plumbing inspector, for the installation of plumbing systems or the extensions, alterations or general repairs thereof, in accordance with the provisions of this code, however, the provisions of this code shall not apply to those who make minor repairs or replacements to an already installed system of plumbing, on the house side of a trap, provided such repairs or replacements in no way disrupts the original water supply, waste or ventilating systems. In event a fixture is replaced, a permit shall be secured and same shall be inspected by the plumbing inspector.

(b) *Applications, Permits Issued To Master Plumbers and Installers*: Applications to install plumbing in cities or towns of more than 3500 population, in accordance with the last official United States Census, shall be received from, and permits issued only to, master plumbers, as defined herein. When applications and permits are required in cities or towns of less than 3500 population or any unincorporated area, same shall be made by, and issued to, the installer of plumbing or the person responsible for the installation of same.

(c) *Master Plumber or Installer Not to Secure Permit for Others*: No master plumber or installer shall secure a permit from the plumbing inspector for others, not qualified in accordance with the provisions of this code, to install plumbing.

(d) *Applications, Permits Required Before Work Begins*: Applications must be approved by, and permits secured from the plumbing inspector before beginning the installation, alteration or restoration of plumbing, as provided in this code.

(e) *Permit May Be Revoked, Damages*: The plumbing inspector, at any time during the progress of the installation of plumbing, may revoke a permit for reason of noncompliance with the provisions of this code, and, further, upon the condition that interested parties shall have no claim for damages that may result from such procedure.

(f) *Permit May Be Refused*: Additional permits shall not be issued to any master plumber or installer during a period in which he refuses to correct previous defects in the installation of plumbing as required by the plumbing inspector.

105.5—INSPECTIONS REQUIRED

(a) *Inspection Required*: All plumbing installed in accordance with the provisions of this code shall be inspected by the plumbing inspector and no part of the plumbing system shall be covered until same has been so inspected and approved as herein prescribed.

(b) *Request For Inspection*: Requests for inspection of plumbing, as required in this code shall be filed by the master plumber or the installer of same in the office of the plumbing inspector at such time as the local governing authority may determine.

Section 105

(c) *Final Inspection*: When the installation, alteration or restoration of plumbing has been completed in accordance with the provisions of this code, a request for final inspection shall be filed at the office of the plumbing inspector by the master plumber or installer.

(d) *Final Certificate of Inspection Issued By Plumbing Inspector*: If, after the final inspection and tests of plumbing, as provided for in this code, the plumbing inspector approves of same, he shall issue a certificate of compliance to the master plumber or installer. A property owner or his agent shall be entitled to a copy of said certificate of compliance upon request to the plumbing inspector.

105.6—TESTING

(a) *Plumbing System To Be Tested*: In order to prevent the use of defective materials and to provide for water tight or air tight joints, the piping of the entire drainage and venting system shall be tested in the presence of the plumbing inspector by application of the water test as follows. If such test is applied to the entire system, all openings in the piping shall be tightly closed, except the highest openings above the roof, and the entire system shall be filled with water to the point of overflow. 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 completely filled with water. No section shall be tested with less than a ten (10) foot head of water. In testing successive sections, at least the upper ten (10) feet of the next succeeding section shall be tested 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. In lieu of the above water test, the plumbing inspector may require an air test, to consist of not less than five (5) pounds per square inch of pressure in the system. In either of the above tests, the plumbing system shall sustain a constant water level or air pressure per square inch for a period of not less than fifteen (15) minutes. If either of the above tests reveals defective materials or workmanship, same shall be replaced or corrected and tests, as provided in this section, shall be repeated. A roughing-in test shall be required before any piping of the plumbing system is concealed or fixtures set.

(b) *Test of Existing Plumbing*: In event the plumbing inspector has reason to believe that insanitary conditions exist, in habitable buildings or on premises, he may require the owner or agent thereof to provide for tests, as described in Section 105.6(a) hereof, and in event defective materials or workmanship are revealed by such tests, the said owner or agent shall immediately repair the plumbing system in accordance with the directions of the plumbing inspector.

(c) *Materials and Labor for Tests*: All equipment, material, power and labor necessary for inspection and tests shall be furnished by the master plumber or installer.

105.7—FEES

(a) *Inspection Fees*: Prior to the issuance of a permit to install, alter or restore plumbing in accordance with the provisions of this code, the master plumber or installer shall pay the required inspection fees, as designated by the local governing authority.

SECTION 106—APPEALS

106.1—APPEALS TO COMMISSIONER OF INSURANCE

Any person desiring to raise any questions under the North Carolina State Building Code shall be entitled to a full hearing before the Commissioner of Insurance upon proper request in writing by any such person. (G.S. 143-140, 69-13)

106.2—APPEALS TO BUILDING CODE COUNCIL FROM DECISIONS OF STATE ENFORCEMENT AGENCIES

(a) Any person desiring to take an appeal to the Building Code Council from the decision of a State enforcement agency must file such an appeal within 30 days after such decision giving written notice to the Council. (See G.S. 143-141)

(b) *Procedural Rules for Appeals from Decisions of Enforcement Agencies:*

Rule 1—Time of Notice—Any person wishing to appeal from the decision of an enforcement agency to the Building Code Council shall give a written Notice of Appeal as follows:

(a) The *original and eleven copies* of said notice shall be filed not later than 30 days from the date of the decision of the enforcement agency with the Building Code Council, c/o Division of Engineering, Department of Insurance, Box 351, Raleigh, North Carolina.

(b) The Staff of the Building Code Council shall immediately forward one copy of said notice to the enforcement agency from which the appeal is taken.

(c) The time within which notice is to be filed, shall be computed by excluding the first and including the last day. If the last day is Saturday, Sunday or a legal holiday, it must be excluded.

Rule 2—Form of Notice—Whenever Notices of Appeal is given as provided by these rules, said notice shall be legibly printed, typewritten or mimeographed and shall contain the following information:

(a) The name of the party or parties taking the appeal;

(b) The name of the enforcement agency and the date of the decision from which the appeal is taken;

(c) The decision from which the appeal is taken must be set forth in full in the Notice of Appeal, or a copy of said decision must be attached to all copies of the Notice of Appeal;

(d) The contentions and allegations of fact of the party or parties taking the appeal must be set forth in full in a clear and concise manner with particular reference to the section or sections of the North Carolina State Building Code in controversy;

(e) The original notice shall be signed by the party or parties filing same. No notarization or verification is required.

Rule 3—Time for Hearing—Upon the proper filing of an appeal in accordance with these rules, the Chairman of the Building Code Council shall cause the appeal to be heard by the Council within a reasonable time, at least *ten days notice* to Council members.

Section 107

Rule 4—Notice to Appellant—The Chairman of the Building Code Council shall cause all appeals to be docketed for hearing and shall fix the time and place for said hearing and shall cause not less than ten days notice in writing, of the time and place of the hearing on the appeal to be given to the appellant, the enforcement agency from which the appeal is taken and all members of the Council.

Rule 5—Dismissal—The Council shall, upon motion of the enforcement agency or on its own motion, dismiss all appeals for the following reasons:

- (a) Not prosecuted by the appellant.
- (b) All appeals wherein the Notice of Appeal has not been filed in accordance with these Rules.
- (c) For lack of jurisdiction.

106.3—APPEALS TO COURT

By Statute a person may appeal directly to the Superior Court in the county in which the building is to be situated with or without an appeal to the Building Code Council. (See G.S. 143-141(b))

106.4—LOCAL BOARD OF APPEALS. (See Local Administrative Ordinance)

SECTION 107—AMENDMENTS TO STATE BUILDING CODE

107.1—PROCEDURAL RULES FOR HEARINGS BEFORE THE BUILDING CODE COUNCIL ON PROPOSED AMENDMENTS TO THE NORTH CAROLINA STATE BUILDING CODE, Volume II, Plumbing.

The following procedural rules shall apply when any citizen, State agency, or political subdivision of the State makes application to the Building Code Council requesting that the North Carolina State Building Code be revised or amended pursuant to G.S. 143-138(d):

Rule 1—Request for Hearing—Any citizen, State agency, or political subdivision of the state requesting a hearing before the Building Code Council for the above purposes shall submit a written request as follows:

(a) An *original and ten copies* of said request for hearing shall be filed with the Building Code Council, c/o Division of Engineering, Department of Insurance, Box 351, Raleigh, North Carolina.

(b) The staff of the Building Code Council shall immediately forward one copy of said request to each member of the Building Code Council.

Rule 2—Form of Request for Hearing—Each request shall be legibly printed, typewritten or mimeographed and shall contain the following information:

(a) Name, address and basis of interest of party or parties requesting hearing.

(b) The proposed amendment to the North Carolina State Building Code must be set forth in full, and the request shall contain explicit reference to the affected section or sections of the Building Code.

(c) The request shall state, in support of the proposed amendment or amendments, the reasons for proposing the amendment or amendments.

(d) The proposed amendment or amendments shall comply with the standards set forth in G.S. 143-138(c) and reference to the particular standards and sections involved shall be set forth in the request for hearing.

(e) The original request for a hearing shall be signed by the party or parties or their duly authorized agent submitting same.

Rule 3—Time of Hearing—Upon the proper filing of a request for hearing in accordance with these rules, the Chairman of the Building Code Council shall cause a hearing to be held within a reasonable time not to exceed six months; said hearing shall be open to the public.

Rule 4—Notice of Hearing—The Chairman of the Building Code Council shall fix the time and place for said public hearing and shall cause notice of the hearing to be given as follows:

(a) Notice in writing to the party or parties or their duly authorized agents requesting the hearing not less than fifteen days prior to the hearing;

(b) Notice of public hearing by publication as required by G.S. 143-138(a);

(c) Not less than *ten days notice* in writing to all members of the Building Code Council.

Rule 5—Improper Filing of Request for Hearing—When a request for hearing is filed under this Section other than in accordance with these Rules, the staff of the Building Code Council shall notify the applicant of proper procedure to follow.

107.2—PRINTING AMENDMENTS

Amendments to the State Building Code will be printed once each year as an accumulative supplement. (See G.S. 143-138(g))

SECTION 108—APPROVAL OF LOCAL ORDINANCES

108.1—LOCAL CODES AND ORDINANCES TO BE APPROVED

The 1957 Legislature revised the North Carolina Building Code Council act which requires that all local city and county building, plumbing, heating and electrical ordinances be approved by the Council before they are legally effective. In the interest of standardization of local codes and ordinances throughout the State and to further facilitate statutory and code references by all inspectors, architects, engineers, builders and the general public and the resultant ease of understanding and enforcement brought about by uniformity, the Building Code Council has taken the position of approving only those local amendments to the State Building Code which are deemed absolutely necessary on a local basis in lieu of approving a separate code for each city or county.

Section 109

108.2—PROCEDURAL RULES

The following procedural rules shall apply when any city or county makes application to the Building Code Council requesting approval of a local ordinance:

Rule 1

(a) An *original and 11 copies* of the request for the hearing and proposed local ordinance shall be filed with the Building Code Council in care of the Division of Engineering, Department of Insurance, Box 351, Raleigh, North Carolina.

(b) Request for the hearing must be signed by a *responsible official* of the city or county.

(c) Request for hearing and copies of ordinance must be sent in at least 15 days before date of hearing to be acted on. (Regular meetings of Council are held the *second Tuesday in March and September*).

Rule 2

All Local ordinances (including those relating to *Building construction, plumbing, heating and electrical*) must be divided into three major sections:

1. Local *administrative regulations, fees, etc.* dealing with administration of the Code. These regulations should not conflict with State Laws.

2. Reference to an *adoption of the State Building Code* (including general construction, plumbing, heating and electrical). Reference also should be made to adoption of the recommended Uniform Residential Code for dwellings if it is desired to have regulations applicable to dwellings.

3. The *proposed amendments to the State Building Code* (including general construction, plumbing, heating and electrical) must be set forth in full, designating page and paragraph reference to that section of the State Building Code proposed to be modified or supplemented.

Rule 3

The *reasons* for requesting the change to the State Code must be shown. Reference to sections of nationally recognized standards set forth in G.S. 143-138(c) should be made to support this request.

Rule 4

After approval of the Council and local administrative body, two copies of all amendments must be sent to the Secretary of the Council in the form they are to be distributed, one for the *Council's file* and the other to be stamped approved by the Building Code Council and returned for *local file*.

SECTION 109—ALTERNATE MATERIALS AND ALTERNATE METHODS OF CONSTRUCTION

The provisions of this code are not intended to prevent the use of any material, or method of construction not specifically prescribed by this code, provided any such alternate has been approved and its use authorized by

the Plumbing Official. The Plumbing Official shall approve any such alternate, provided he finds that the proposed design is satisfactory and complies with the provisions of this Code, and that the material, method, or work offered is, for the purpose intended, at least the equivalent of that prescribed in the code in quality, strength, effectiveness, fire-resistance, durability and safety. The Plumbing Official shall require that sufficient evidence or proof be submitted to substantiate any claim that may be made regarding its use. If, in the opinion of the Plumbing Official, the evidence and proof are not sufficient to justify approval, the applicant may refer the entire matter to the Building Code Council. (See G.S. 143-141)

SECTION 110—VIOLATIONS AND PENALTIES

Any person who shall be adjudged to have violated the North Carolina State Building Code shall be guilty of a misdemeanor and shall upon conviction be liable to a fine not to exceed \$50.00 for each offense. Each thirty days that such violation continues shall constitute a separate and distinct offense. (See G.S. 14-68, 69-36 and 69-37; 87-14; 143-138(h); 160-119; 160-125 and 160-129; 160-150, 160-151 and 160-153)

SECTION 111—VALIDITY

If any section, subsection, sentence, clause or phrase of this Code is for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this Code.

CHAPTER II

BASIC PRINCIPLES

SECTION 201—BASIC PRINCIPLES

The basic principles of this Code are enunciated as basic goals in environmental sanitation worthy of accomplishment through properly designed, acceptability installed, and adequately maintained plumbing systems. Some of the details of a plumbing construction must vary, but the basic sanitary and safety principles are the same. The principles may serve to define the intent.

Principle No. 1—All premises intended for human habitation, occupancy, or use by full or part-time employees shall be provided with a supply of pure and wholesome water, neither connected with unsafe water supplies nor subject to the hazards of backflow or backsiphonage.

Principle No. 2—Every building having plumbing fixtures installed and intended for human habitation, occupancy, or use by full or part-time employees on premises abutting on a street, alley, or easement in which there is a public sewer shall have a connection with the sewer.

Principle No. 3—Each family dwelling unit shall have at least one water closet, one lavatory, one bathtub or shower, one kitchen-type sink, and water and drain connections for a clothes washer unless central washing facilities are provided, and shall be connected to the public sewer or private sewage disposal system. All other structures for human occupancy or use shall have adequate sanitary facilities but in no case less than one water closet and one other fixture for cleansing purposes and shall be connected to the public sewer or a private sewage disposal system.

Principle No. 4—Plumbing fixtures shall be made of smooth non-absorbent material, shall be free from concealed fouling surfaces, and shall be located in ventilated enclosures.

Principle No. 5—Each fixture directly connected to the drainage system shall be equipped with a water-seal trap.

Principle No. 6—No substance which will clog the pipes, produce explosive mixtures, destroy the pipes or their joints, or interfere unduly with the sewage-disposal process shall be allowed to enter the building drainage system.

Principle No. 7—Proper protection shall be provided to prevent contamination of food, water, sterile goods, and similar materials by backflow of sewage. When necessary, the fixture, device, or appliance shall be connected indirectly with the building drainage system.

Principle No. 8—No water closet shall be located in a room or compartment which is not properly lighted and ventilated.

Principle No. 9—If water closets or other plumbing fixtures are installed in buildings where there is no sewer within a reasonable distance as defined in Section 422.1, suitable provision shall be made for disposing of the building sewage by some accepted method of sewage treatment and disposal.

Section 201

Principle No. 10—Where a plumbing drainage system may be subject to backflow of sewage, suitable provision shall be made to prevent its overflow in the building.

Principle No. 11—Plumbing shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls and other surfaces through fixture usage.

Principle No. 12—Sewage or other waste, from a plumbing system which may be deleterious to surface or sub-surface waters shall not be discharged into the ground or into any waterway unless it has first been rendered innocuous through subjection to some acceptable form of treatment.

NORTH CAROLINA STATE BUILDING CODE

VOLUME II — PLUMBING

CHAPTER III

DEFINITIONS

301 General

301.1. For the purpose of this code, the following terms shall have the meaning indicated in this chapter.

301.2 No attempt is made to define ordinary words which are used in accordance with their established dictionary meaning except where the word has been loosely used and it is necessary to define its meaning as used in this code to avoid misunderstanding.

301.3 Because the primary purpose is to define terms rather than words, the definitions are arranged alphabetically according to the first word of the term rather than the noun.

302. Definition of Terms.

Administrative Authority. See Plumbing Official.

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, plumbing fixture, or other device and the flood-level rim of the receptacle.

Anchors. See Supports.

Approved. Approved means 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 the Plumbing Official.

Area Drain. An area drain is a receptacle designed to collect surface or rain water from an open area.

Backflow. Backflow is the flow of water or the liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. (See back-siphonage.)

Backflow Connection. Backflow connection or condition is any arrangement whereby backflow can occur.

Backflow Preventer. A backflow preventer is a device or means to prevent backflow into the potable water system.

Back-Siphonage. Back-siphonage is the flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a water-supply pipe due to a negative pressure in such pipe. (See backflow.)

Battery of Fixtures. A "battery of fixtures" is any group of two or more similar adjacent fixtures which discharge into a common horizontal waste or soil branch.

Boiler Blow-Off. A boiler blow-off is an outlet on a boiler to permit emptying or discharge of sediment.

Branch. A branch is any part of the piping system other than a main, riser, or stack.

Branch, Fixture. See Fixture Branch.

Branch, Horizontal. See Horizontal Branch.

Branch Interval. A branch interval is a length of soil or waste stack corresponding in general to a story height, but in no case less than 8 feet within which the horizontal branches from one floor or story of a building are connected to the stack.

Branch Vent. A branch vent is a vent connecting one or more individual vents with a vent stack or stack vent.

Building. Means any structure built for the support, shelter or enclosure of persons, animals, chattels, or property of any kind which has enclosing walls for 50% of its perimeter. The term "building" shall be construed as if followed by the words "or part thereof". (For the purpose of this Code each portion of a building separated from other portions by a fire wall shall be considered as a separate building).

Building Classification. Building classification is the arrangement in the Building Code for the designation of buildings in classes based upon their use of occupancy.

Building Drain. The building (house) drain is that part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building connecting with the main soil stack or vent stack which shall be located at the group or battery of fixtures where the greatest fixture unit load occurs, and conveys it to the building (house) sewer beginning 10 feet outside the building wall. A cleanout shall be installed at that point and extended to finish grade.

Building Sewer. The building (house) sewer is that part of the horizontal piping of a drainage system which extends from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sewer, private sewer, or individual sewage-disposal system.

Building Storm Drain. A building (house) storm drain is a drain used for conveying rain water, surface water, ground water, subsurface water, condensate, cooling water, or other similar discharge to a building storm sewer, extending to a point not less than 10 feet outside the building wall.

Building Storm Sewer. A building (house) storm sewer is the extension from the building storm drain to the public storm sewer, or other point of disposal.

Building Subdrain. A building (house) subdrain is that portion of a drainage system which cannot drain by gravity into the building sewer.

Building Trap. A building (house) trap is a device, fitting, or assembly of fittings installed in the building drain to prevent circulation of air between the drainage system of the building and the building sewer.

Circuit Vent. A circuit vent is a branch vent that serves two or more traps and extends from in front of the last fixture connection of a horizontal branch to the vent stack.

Code. The word "Code" when used alone shall mean these regulations, subsequent amendments thereto, or any emergency rule or regulation which the Plumbing Official having jurisdiction may lawfully adopt.

Combination Fixture. A combination fixture is a fixture combining one sink and tray or a two or three-compartment sink or tray in one unit.

Combined Building Sewer. A combined building sewer receives storm water and sewage.

Combination Waste and Vent System. A combination waste and vent system is a specially designed system of waste piping embodying the horizontal wet venting of one or more sinks or floor drains by means of a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain.

Common Vent. A common vent is a vent connecting at the junction of two fixture drains and serving as a vent for both fixtures.

Conductor. See Leader.

Continuous Vent. A continuous vent is a vertical vent that is a continuation of the drain to which it connects.

Continuous Waste. A continuous waste is a drain from two or three fixtures connected to a single trap.

Cross-Connection. A cross-connection is any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other water of unknown or questionable safety, whereby water may flow from one system to the other, the direction of flow depending on the pressure differential between the two systems. (See Backflow and Back-Siphonage.)

Dead End. A dead end is a branch leading from a soil, waste, or vent pipe, building drain, or building sewer, which is terminated at a developed distance of 2 feet or more by means of a plug or other closed fitting.

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

Diameter. Unless specifically stated, the term "diameter" is the nominal diameter as designated commercially.

Double Offset. A double offset is two changes of direction installed in succession or series in continuous pipe.

Downspout. See Leader.

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

Drainage Piping. See Drainage System.

Drainage System. A drainage system (drainage piping) includes all the piping within public or private premises, which conveys sewage, rain

water, or other liquid wastes to a legal point of disposal, but does not include the mains of a public sewer system or private or public sewage-treatment or disposal plant.

Dual Vent. See Common Vent.

Durham System. Durham System is a term used to describe soil or waste systems where all piping is of threaded pipe, tubing, or other such rigid construction, using recessed drainage fittings to correspond to the types of piping.

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) diameter of a circle, (2) if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

Existing Work. Existing work is a plumbing system or any part thereof which has been installed prior to the effective date of this Code.

Fixture Branch. A fixture branch is a pipe connecting several fixtures.

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.

Fixture Supply. A fixture supply is a water-supply pipe connecting the fixture with the fixture branch.

Fixture Unit. A fixture unit is a quantity in terms of which the load-producing effects on the plumbing system of different kinds of plumbing fixtures are expressed on some arbitrarily chosen scale.

Fixture-Unit Flow Rate. Fixture-unit flow rate is the total discharge flow in gpm of a single fixture divided by 7.5 which provides the flow rate of that particular plumbing fixture as a unit of flow. Fixtures are rated as multiples of this unit of flow.

Flood-Level. See Flooded.

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

Flooded. A fixture is flooded when the liquid therein rises to the flood-level rim.

Flush Valves. A flush valve is a device located at the bottom of the tank for the purpose of flushing water closets and similar fixtures.

Flushometer Valve. A flushometer valve is a device which discharges a predetermined quantity of water to fixtures for flushing purposes and is opened by manual or automatic application and closed by direct water pressure.

Frostproof Closet. A frostproof closet is a hopper that has no water in the bowl and has the trap and the control valve for its water supply installed below the frost line.

Grade. Grade is the slope or fall of a line of pipe in reference to a horizontal plane. In drainage it is usually expressed as the fall in a fraction of an inch per foot length of pipe.

Grease Interceptor. See Interceptor.

Grease Trap. See Interceptor.

Hangers. See Supports.

Horizontal Branch. A horizontal branch is a drain pipe 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.

Horizontal Pipe. Horizontal pipe means any pipe or fitting which makes an angle of more than 45 deg. with the vertical.

House Drain. See Building Drain.

House Sewer. See Building Sewer.

House Trap. See Building Trap.

Indirect Waste Pipe. An indirect waste pipe is a pipe that does not connect directly with the drainage system but conveys liquid wastes by discharging into a plumbing fixture or receptacle which is directly connected to the drainage system.

Individual Vent. An individual vent is a pipe installed to vent a fixture trap and which connects with the vent system above the fixture served or terminates in the open air.

Industrial Wastes. Industrial wastes are liquid wastes resulting from the processes employed in industrial establishments and are free of fecal matter.

Insanitary. Contrary to sanitary principles—injurious to health.

Interceptor. An interceptor is a device designed and installed so as to separate and retain deleterious, hazardous, or undesirable matter from normal wastes and permit normal sewage or liquid wastes to discharge into the disposal terminal by gravity.

Journeyman Plumber. A Journeyman Plumber is a person who performs the manual work of installing plumbing under the direction of a Master Plumber.

Leader. A leader (downspout) is the water conductor from the roof to the building storm drain, combined building sewer, or other means of disposal.

Liquid Waste. Liquid waste is the discharge from any fixture, appliance, or appurtenance, in connection with a plumbing system, which does not receive fecal matter.

Load Factor. Load factor is the percentage of the total connected fixture unit flow rate which is likely to occur at any point in the drainage system. It varies with the type of occupancy, the total flow unit above this point being considered, and with the probability factor of simultaneous use.

Local Governing Body. A city, county, state, state agency or other political government subdivision or entity authorized to administer and enforce the provisions of the Plumbing Code as adopted or amended.

Local Ventilating Pipe. A local ventilating pipe is a pipe on the fixture side of the trap through which vapor or foul air is removed from a room or fixture.

Loop Vent. A loop vent is the same as a circuit vent except that it loops back and connects with a stack vent instead of a vent stack.

Main. The main of any system of continuous piping is the principal artery of the system, to which branches may be connected.

Main Sewer. See Public Sewer.

Main Vent. The main vent is the principal artery of the venting system, to which vent branches may be connected.

Master Plumber. A Master Plumber is a person who assumes responsible charge and direction of other persons in the installation of plumbing. See Section 102.1 for qualifications.

May. The word "may" is a permissive term.

Nuisance. The word "nuisance" embraces public nuisance as known at common law or in equity jurisprudence; and whatever is dangerous to human life or detrimental to health; whatever building, structure, or premises is not sufficiently ventilated, sewer, drained, cleaned, or lighted, in reference to its intended or actual use; and whatever renders the air or human food or drink or water supply unwholesome, are also severally, in contemplation of this Code, nuisances.

Offset. An offset in a line of piping is a combination of elbows or bends which brings one section of the pipe out of line but into a line parallel with the other section.

Person. Person is a natural person, his heirs, executors, administrators, or assigns; and includes a firm, partnership or corporation its or their successors or assigns. Singular includes plural; male includes female.

Pitch. See Grade.

Plumbing. Plumbing is the practice, materials, and fixtures used in the installation, maintenance, extension, and alteration of all piping, fixtures, appliances, and appurtenances in connection with any of the following: Sanitary drainage or storm drainage facilities, the venting system and the public or private water-supply systems, within or adjacent to any building, structure, or conveyance; also the practice and materials used in the installation, maintenance, extension, or alteration of storm-water, liquid-waste, or sewerage, and water-supply systems of any premises to their connection with any point of public disposal or other acceptable terminal.

Plumbing Fixtures. Plumbing fixtures are installed receptacles, devices, or appliances which are supplied with water or which receive or discharge liquids or liquid-borne wastes, with or without discharge into the drainage system with which they may be directly or indirectly connected.

Plumbing Official. The plumbing official is the individual official, board, department, or agency established and authorized by a state, county, city or other political subdivision created by law to administer and enforce the provisions of the plumbing code as adopted or amended.

Plumbing Inspector. See Plumbing Official.

Plumbing System. The plumbing system includes the water-supply and distribution pipes; plumbing fixtures and traps; soil, wastes, and vent pipes; building drains and building sewers including their respective connections, devices, and appurtenances within the property lines of the premises, and water-treating or water-using equipment.

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.

Potable Water. Potable water is water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of the Health Authority having jurisdiction.

Private or Private Use. In the classification of plumbing fixtures, private applies to fixtures in residences or apartments and to fixtures in private bathrooms of hotels and similar installations where the fixtures are intended for the use of a family or an individual.

Private Sewer. A private sewer is a sewer privately owned and not directly controlled by public authority.

Public or Public Use. In the classification of plumbing fixtures, public applies to fixtures in general toilet rooms of schools, gymnasiums, hotels, railroad stations, public buildings, bars, public comfort stations, and other installations (whether pay or free) where a number of fixtures are installed so that their use is similarly unrestricted.

Public Official. See Plumbing Official.

Public Sewer. A public sewer is a common sewer directly controlled by public authority.

Relief Vent. A relief vent is a vent the primary function of which is to provide circulation of air between drainage and vent systems.

Return Offset. A return offset is a double offset installed so as to return the pipe to its original alignment.

Revent Pipe. A revent pipe (sometimes called an individual vent) is that part of a vent pipe line which connects directly with an individual waste or group of wastes, underneath or back of the fixture and extends either to the main or branch vent pipe.

Rim. A rim is an unobstructed open edge of a fixture.

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

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).

Roughing-In. Roughing-in is the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures. This includes drainage, water-supply, and vent piping, and the necessary fixture supports.

Sand Interceptor. See Interceptor.

Sanitary Sewer. A sanitary sewer is a pipe which carries sewage and excludes storm, surface and ground water.

Second Hand. Second hand as applied to material or plumbing equipment is that which has been installed, used, and removed for subsequent relocation and use.

Separator. See Interceptor.

Septic Tank. A septic tank is a watertight receptacle which receives the discharge of a drainage system or part thereof, and is designed and constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open-joint or perforated piping, or disposal pit.

Sewage. Sewage is any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

Shall. The word "shall" is a mandatory term.

Side Vent. A side vent is a vent connecting to the drain pipe through a fitting at an angle not greater than 45 deg. to the vertical.

Size of Pipe and Tubing. See Diameter.

Slope. See Grade.

Soil Pipe. A soil pipe is any pipe which conveys the discharge of water closets or fixtures having similar functions, with or without the discharge from other fixtures, to the building drain or building sewer.

Soil Vent. See Stack Vent.

Special Waste Pipe. See Chapter 9.

Stack. A stack is the vertical main of a system of soil, waste, or vent piping.

Stack Group. Stack group is a term applied to the location of fixtures in relation to the stack so that by means of proper fittings, vents may be reduced to a minimum.

Stack Vent. A stack vent (sometimes called a waste vent or soil vent) is the extension of a soil or waste stack above the highest horizontal drain connected to the stack.

Stack Venting. Stack venting is a method of venting a fixture or fixtures through the soil or waste stack.

Storm Drain. See Building Storm Drain.

Storm Sewer. A storm sewer is a sewer used for conveying rain water, surface water, condensate, cooling water, or similar liquid wastes.

Subsoil Drain. A subsoil drain is a drain which receives only subsurface or seepage water and conveys it to a place of disposal.

Sump. A sump is a tank or pit which receives sewage or liquid waste, surface or storm water, located below the normal grade of the gravity system and which must be emptied by mechanical means.

Supports. Supports, hangers, and anchors are devices for supporting and securing pipe and fixtures to walls, ceilings, floors, or structural members.

Trap. A trap is a fitting or device so designed and constructed as to provide, when properly vented, a liquid seal which will prevent the back passage of air without materially affecting the flow of sewage or waste water through it.

Trap Seal. The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

Vacuum Breaker (See also Backflow Preventer)

Non-Pressure Type (Atmospheric)—A vacuum breaker which is not designed to be subject to static line pressure.

Pressure Type—A vacuum breaker designed to operate under conditions of static line pressure.

Vent Pipe. See Vent System.

Vent Stack. A vent stack is a vertical vent pipe installed primarily for the purpose of providing circulation of air to and from any part of the drainage system.

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

Vertical Pipe. A vertical pipe is any pipe or fitting which is installed in a vertical position or which makes an angle of not more than 45 deg. with the vertical.

Waste. See Liquid Waste and Industrial Wastes.

Waste Pipe. A waste pipe is a pipe which conveys only liquid waste, free of fecal matter.

Water-Distributing Pipe. A water-distributing pipe in a building or premises is a pipe which conveys water from the water-service pipe to the plumbing fixtures and other water outlets.

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

Water Outlet. A water outlet, as used in connection with the water-distributing system, is the discharge opening for the water (1) to a fixture; (2) to atmospheric pressure (except into an open tank which is part of

the water-supply system); (3) to a boiler or heating system; (4) to any water-operated device or equipment requiring water to operate, but not a part of the plumbing system.

Water Riser Pipe. See Riser.

Water-Service Pipe. The water-service pipe is the pipe from the water main or other source of water supply to a point two feet from the building served.

Water-Supply System. The water-supply system of a building or premises consists of the water-service pipe, the water-distributing pipes, and the necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to the building or premises.

Wet Vent. A wet vent is a vent which receives the discharge from wastes other than water closets.

Yoke Vent. A yoke vent is a pipe connecting upward from a soil or waste stack to a vent stack for the purpose of preventing pressure changes in the stacks.

CHAPTER IV

GENERAL REGULATIONS

401 Conformance with Code.

401.1

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

All materials shall be installed according to the manufacturer's recommendations where not in conflict with this Code. All pipe and fittings shall bear the manufacturer's name or trade mark.

402 Grade of Horizontal Drainage Piping.

402.1

Horizontal drainage piping shall be run in practical alignment at a uniform grade. (See Chapter XIII for specific slopes.)

403 Change in Direction.

403.1 Fittings

Changes in direction in drainage piping shall be made by the appropriate use of 45-degree wyes, long-or-short-sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or equivalent fittings. Single and double sanitary tees and quarter bends may be used in drainage lines only where the direction of flow is from the horizontal to the vertical except that a quarter bend may be used as an integral part of a water closet bend.

403.2 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.

404 Fittings and Connections.

404.1 Fittings Prohibited.

No fittings having a hub in the direction opposite to flow, or tee branch shall be used as a drainage fitting. No running threads, or saddles shall be used in the drainage system. No drainage or vent piping shall be drilled or tapped.

404.2 Heel or Side Inlet Bend.

A heel or side-inlet quarter bend shall not be used as a vent when the inlet is placed in a horizontal position.

404.3 Obstruction to Flow.

No fitting or connection which offers abnormal obstruction to flow shall be permitted. See par. 607.

405 Repairs and Alterations.

405.1 Existing Buildings.

In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, necessary deviations from the provision of this Code may be permitted, provided such deviations conform to the intent of the Code and are approved in writing by the Plumbing Official.

405.2 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 necessary to abate such nuisance.

406 Sewer and Water Pipes.

406.1

Water service pipes, or any underground water pipes, shall not be run or laid in the same trench as the building sewer or drainage piping, except as provided for in Chapters XII and XIII.

407 Trenching, Excavation, and Backfill.

407.1 Support of Piping.

Buried piping shall be supported throughout its entire length.

407.2 Tunneling and Driving.

Tunneling may be done in yards, courts, or driveways of any building site. When pipes are driven, the drive pipe shall be at least one size larger than the pipe to be laid.

407.3 Open Trenches.

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.

407.4 Mechanical Excavation.

When mechanical means of excavation are used, ditch shall be properly graded and tamped to support the load of the pipe installation.

407.5 Backfilling.

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

407.6 Backfill Material.

Trenches shall be backfilled in thin layers to 12 in. 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.

408 Structural Safety.

408.1

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 in accordance with the Requirements of the Building Code or as approved by the Plumbing or Building Official.

409 Workmanship.

409.1

Workmanship shall conform to generally accepted good practice.

410 Protection of Pipes.

410.1 Breakage and Corrosion.

Pipes passing under or through walls shall be protected from breakage. Pipes passing through or under cinder or concrete or other corrosive material shall be protected against external corrosion by protective coating, wapping, or other means which will prevent such corrosion.

410.2 Cutting or Notching.

No structural member shall be weakened or impaired by cutting, notching, or otherwise, except to the extent permitted by the Plumbing or Building Official.

410.3 Pipes Through Footings or Foundation Walls.

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 as may be approved in writing by the Plumbing Official.

410.4 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.

411 Damage to Drainage System or Public Sewer.

411.1

It shall be unlawful for any person to deposit by any means into the building drainage system or into a public or private sewer any ashes; cinders; rags; inflammable, poisonous, or explosive liquids; gasses; oils; grease; or any other material which would or could obstruct, damage, or overload such system or sewer.

412 Industrial Wastes.

412.1

Wastes detrimental to the public sewer system or detrimental to the functioning of the sewage-treatment plant shall be treated and disposed of as directed by the Plumbing Official or other authority having jurisdiction.

413 Sleeves.

413.1

Annual space between sleeves and pipes shall be filled or tightly caulked with coal tar or asphaltum compound, lead, or other material found equally effective and approved as such by the Plumbing Official.

414 Ratproofing.

414.1 Exterior Openings.

All exterior openings provided for the passage of piping shall be properly sealed with snug fitting collars of metal or other approved ratproof material securely fastened into place.

414.2 Interior Openings.

Interior openings through walls, floors, and ceilings shall be ratproofed as found necessary by the Plumbing Official.

415 Used or Second-Hand Equipment.

415.1

It shall be unlawful to purchase, sell, or install used equipment or material for plumbing installations unless it complies with the minimum standards set forth in this Code.

416 Condemned Equipment.

416.1

Any plumbing equipment condemned by the Plumbing Official because of wear, damage, defects, or sanitary hazards shall not be re-used for plumbing purposes.

417 Depth of Building Sewer and Water Service (Outside of Building).

417.1

No water, soil or waste pipes shall be installed or permitted outside a building or in an exterior wall unless adequate provisions are made to protect such pipes from freezing and shall not be placed above frost line without consent of the Plumbing Official.

418 Piping in Relation to Footings.

418.1 Parallel.

No piping shall be laid parallel to footings or outside bearing walls closer than 3 feet, except as may be approved by the Plumbing Official.

418.2 Depth.

Piping installed deeper than the bottom of footings or bearing walls shall be 45 deg. therefrom except as may be approved by the Plumbing Official.

419 Drainage Below Sewer Level.

419.1

Drainage piping located below the level of the sewer shall be installed as provided for in Chapters XIII and XV.

420 Connections to Plumbing System Required.

420.1

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.

421 Sewer Required.

421.1

Every building in which plumbing fixtures are installed shall have a connection to a public or private sewer except as provided in paragraph 422.1.

422 Individual or Private Sewage-Disposal System.

422.1

When a public sewer is not available within 300 feet for use, sewage and drainage piping shall be connected to an individual sewage-disposal system found to be adequate and approved by the Board of Health or extend to the public sewer.

423 Location of Fixtures.

423.1 Light and Ventilation.

a. All plumbing fixtures, except drinking fountains, single lavatories and kitchen sinks, shall be located in compartments or rooms provided with windows of not less than three (3) sq. ft. area. To provide a minimum of at least two (2) cubic feet of fresh air per minute per square foot of floor, area, or provided with a system of mechanical or gravity ventilation capable of exhausting forty (40) cubic feet of air per minute per water closet or urinal in public bath or rest rooms and not less than twenty-five (25) cubic feet per minute in private bath rooms, but in no case shall the fresh air supply be less than specified above.

b. Public bath, toilet or rest room shall not open directly into a kitchen or room used for the preparation of food (see definition of public).

423.2 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.

424 Piping Measurements.

424.1

Except where otherwise specified in this Code all measurements between pipes or between pipes and walls, etc., shall be made to the center lines of the pipes.

425 Venting.

425.1.

The drainage system shall be provided with a system of vent piping which will permit the admission or emission of air so that under no circumstances of normal or intended use shall the seal of any fixture trap be subjected to a pressure differential of more than 1 inch of water.

426 Ventilation Ducts.

426.1

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

427 Water Closet Connections.

427.1 Lead.

Three-inch lead bends and studs may be used on water closets or similar connections, provided the inlet is dressed or swedged to receive a 4-inch floor flange.

427.2 Iron.

Three-inch bends may be used on water closets or similar connections, provided a 4-inch by 3-inch flange is used to receive the fixture horn.

427.3 Reducing.

Four-by-three-inch reducing bends are acceptable.

428 Dead Ends.

428.1

In the installation or removal of any part of a drainage system, dead ends shall be avoided except where necessary to extend a cleanout so as to be accessible.

429 Toilet Facilities for Workmen.

429.1

Suitable toilet facilities in accordance with Table 922.2 shall be provided and maintained in a sanitary condition for the use of workmen during construction. (Refer to local Health Department and N. C. Department of Labor Standards)

CHAPTER V

MATERIALS — QUALITY AND WEIGHT

501 Materials.

501.1 Minimum Standards.

The materials listed in this chapter 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 Plumbing Official shall allow the extension, addition or relocation of existing soil, waste, or vent pipes with materials of like grade or quality, as permitted in paragraph 405.1.

501.2 Use of Materials.

Each material listed in Table 505 shall conform to at least one of the standards cited opposite it. Its use shall be further governed by the requirements imposed in other chapters of the Code. Materials not included in the table shall be used only as provided for in paragraph 501.1. Materials 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.

501.3 Specifications for Materials.

Standard specifications for materials for plumbing installations are listed in Table 505 — Products conforming at least to any of the specifications listed for a given material shall be considered acceptable.

NOTE 1. Abbreviations used in Table 505 refer to standards or specifications as identified below.

ASTM Standards and Tentative Standards published by the American Society for Testing Materials, 1916 Race Street, Philadelphia, Pa. 19103

AWWA Standards and Tentative Standards published by the American Water Works Association, 2 Park Avenue, New York, N. Y. 10016

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, D. C. 20234

FS Federal Specifications published by the Federal Specifications Board and obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20234

MSS Standards published by the Manufacturers Standardization Society of the Value and Fittings Industry, 420 Lexington Avenue, New York, N. Y. 10017

NSF National Sanitation Foundation Testing Laboratory, Inc., School of Public Health, University of Michigan, P. O. Box 1468, Ann Arbor, Michigan 48106

SPR Simplified Practice Recommendations representing recorded recommendations of the trade and issued by the U. S. Department of Commerce, Washington, D. C. 20234

USAS United States of America Standards Institute (formerly ASA American Standards Association), 10 East 40th Street, New York, N. Y. 10016

NOTE 2. ASTM Standards are issued under fixed designations; the final number indicates the year or 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 505 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 505 gives the full designations of standards current at the time this Code is printed. The latest printed and issued Standards shall take precedence.

NOTE 4. Plastics may be furnished at the option of the supplier, provided that the plastics are those indicated as suitable for the specific parts designated in Sections 502, 703, 704 and 909.

The term "plastic(s)" hereinafter referred to shall be defined as meaning all or any of the plastics listed in Table 505 and further defined in the table in this section (501.3). Plastics used shall be selected from the table in 501.3 and shall meet the physical property requirements listed in this table. Tests for physical properties and chemical resistance shall be made in accordance with current revisions of standard methods developed by the American Society for Testing and Materials (ASTM). See Table 1.

Each plastic part must bear the name (or type) of plastic used and the manufacturer's name or his trade-mark.

501.4 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 maker's mark or name, the weight, type, and classes of the product, when such marking is required by the approved standard that applies.

502 Special Materials.

502.1 Lead.

See Table 505. Sheet lead shall be not less than the following:

For safe pans — not less than 4 psf.

For flashings of vent terminals — not less than 3 psf.

Lead bends and lead traps shall not be less than $\frac{1}{8}$ in. wall thickness.

502.2 Copper.

Sheet copper shall be not less than the following:

Safe pans — 12 oz. per sq. ft.

Vent terminal flashings — 8 oz. per sq. ft.

502.3 Calking Ferrules.

Shall be manufactured from brass and shall be in accordance with the following table:

Pipe Sizes Inches	Inside Diameter Inches	Length Inches	Minimum Weight Each	
2	2 $\frac{1}{4}$	4 $\frac{1}{2}$	1 lb.	0 oz.
3	3 $\frac{1}{4}$	4 $\frac{1}{2}$	1 lb.	12 oz.
4	4 $\frac{1}{4}$	4 $\frac{1}{2}$	2 lb.	8 oz.

**TABLE 1 — PHYSICAL PROPERTY REQUIREMENTS
FOR PLASTICS**

Properties	TEST VALUES						ASTM Test Method
	Max or Min	Units	Acetal* Plastics	Acrylic Plastics	Fluoro-carbon Plastics	Nylon Plastics	
Impact Strength (Notched Izod @ 73°F)	Min	Ft Lb per in	1.0	0.25	2.5	0.8	D-256
Tensile Strength @ 73°F	Min	psi	8,000	8,000	1,700	10,000	D-638
Tensile Modulus @ 73°F (1)	Min	psi	350,000	350,000	50,000	350,000	D-638
Flexural Modulus @ 73° (1)	Min	psi	350,000	350,000	50,000	350,000	D-790
Deformation under Load (2000 psi, 24 hr, 122°F)	Max	%	0.7	1.5	—	1.5	D-621
Deflection Temperature: @ 264 psi @ 66 psi	Min	° F	225 310	149 154	— 230	150 360	D-648
Water Absorption (24 hr Immersion)	Max	%	0.3	0.5	0.05	1.5	D-570
Melting Point	Min	° F	316	300	600	480	D-789
Specific Gravity	Max	—	1.39-1.44	1.20	2.20	1.15	D-792
Chemical Resistance	—	—	(2)	(2)	(2)	(2)	D-543

Footnotes:—(1) Either tensile modulus or flexural modulus may be used at the option of the material supplier.

(2) Seven-day immersion at 73°F. in any of the chemicals listed below shall not result in more than 3.0% gain nor more than 0.5% loss in weight. The physical appearance of the samples tested shall remain unchanged, as measured by comparison with an untreated control sample.

- | | |
|---|------------------------------|
| 1. 3% Acetic Acid | 3. 2% Sodium Carbonate |
| 2. 1% Soap Solution | 4. 0.25% Sodium Hypochlorite |
| 5. 0.25% Heavy Duty Detergent Solution. | 6. 5% Sodium Hydroxide |
| | 7. Water |

*Acetal Plastics shall conform to the physical properties as listed in ASTM D-2133-64T and Federal Specifications L-P-392 a-64.

502.4 Soldering Bushings.

Where permitted shall be of red brass in accordance with the following table:

Pipe Sizes Inches	Minimum Weight Each
1¼	6 oz.
1½	8 oz.
2	14 oz.
2½	1 lb. 6 oz.
3	2 lb. 0 oz.
4	3 lb. 8 oz.

502.5 Floor Flanges.

Floor flanges for water closets or similar fixtures shall be not less than 1/8-inch thick for brass, 1/4-inch thick and not less than 2-inch caulking depth for cast iron or galvanized malleable iron. If of hard lead, they shall weigh not less than 1 lb. 9 oz. and be composed of lead alloy with not less than 7.75 per cent antimony by weight.

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

Closet screws and bolts shall be brass or bronze.

502.6 Cleanouts.

- (a) Cleanouts shall have plugs of brass and shall conform to Federal Specifications WW-P-401. Cleanouts may also have plugs of nylon plastic meeting the material requirements of Table I in Section 501.3 Note 4.
- (b) Plugs may have raised square or countersunk heads.
- (c) Countersunk heads should be used where raised heads may cause a hazard.
- (d) Cleanout plugs with Borosilicate Glass systems shall be of Borosilicate Glass.

502.7 Sediment Baskets, Strainers, Grates.

These items in metal can also be made in acetal plastic.

502.8 Shower Diverter Parts.

Acetal and nylon plastics are acceptable as alternate materials for these and similar items.

502.9 Faucet Stems and Other Internal Faucet Parts.

Acetal plastic is acceptable as an alternate material for these and similar items.

502.10 Ball Cocks and Flush Mechanisms.

Acetal plastic is acceptable as an alternate material for these and similar items.

502.11 Fixture Trim, Handles, Dials.

Acrylic and acetal plastics are acceptable as materials for these and similar items.

502.12 Gaskets, Flanges and Seals.

Fluorocarbon plastic is acceptable as an alternate material.

502.13 Showerheads.

Acetal or nylon plastics may be used as an alternate material in showerheads or parts thereof.

502.14 Valve Seats, Flow Regulators, Parts and Similar Items.

Acetal or nylon may be used as an alternate material for valve seats, flow regulator devices, and similar items.

502.15 Shock Arrestors.

Acetal may be used as an alternate material for shock arrestors.

503 Alternate Materials and Methods.

503.1 Existing Premises.

In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, the Plumbing Official has discretionary

power to permit deviation from the provisions of this Code, provided that such a proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to plumbing, shall be observed.

503.2 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 has been approved by the Plumbing Official or the North Carolina Building Code Council.

503.3 Evidence of Compliance.

The Plumbing Official shall require sufficient evidence to enable him to judge whether proposed alternates meet the requirements of this Code for safety and health.

503.4 Tests.

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

503.5 Test Procedure.

Tests shall be made in accordance with generally recognized standards; but in the absence of such standards, the Plumbing Official shall specify the test procedure.

503.6 Repeated Tests.

The Plumbing Official 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.

504 Approved Materials.

504.1 Specific Usage.

Each chapter of this Code indicates specifically the type of material permitted for the various parts of the plumbing system. The specifications for each of those materials are given in Table 505.

504.2 Limited Use of Materials.

ABS-DWV and PVC-1-DWV conforming with standards listed in Table 505, and bearing the National Sanitation Foundation Seal may be used for drainage, wastes and vents until September 8, 1970 in family dwellings not exceeding occupancy of three family units provided there is no stack height exceeding 36' and that it not be installed under concrete slab on grade.

The pipe and fittings must be installed in accordance with the standards listed in Table 505 and each pipe and fitting stamped with the NSF Seal as meeting requirements of this standard.

TABLE 505 — MATERIAL: FOR PLUMBING INSTALLATIONS

Note: To be used only within the limitations of the applicable standards listed below.

MATERIALS	SEE SECTIONS 501.3 & 504.2			OTHER STANDARDS & REMARKS
	ASA or USAS	ASTM	FS	
Non-Metallic Piping				
Asbestos Cement Sewer Pipe		C-428-65T	SS-P-331b(65)	See Footnotes 1 & Section 506
Asbestos Cement Water Pipe		C-296-59T	SS-P-351a(53)	
Bituminized Sewer Pipe & Fittings		D-1861-61T	SS-P-356(55)	CS-116-54. See Section 506
Bituminized Perforated Pipe & Fittings			SS-P-358a(60)	
Bituminized Laminated Fiber Pipe		D-1862-61T	SS-P-00345(61)	CS-229-59. See Section 506
Clay Sewer Pipe		C-200-65T	SS-P-361b(1)(56)	
Clay Sewer Pipe (Perforated)		C-211-61T	SS-P-0035a(59)	CS-143-59
Clay Drain Pipe	A-106.1-58	C-4-62T		
Clay Pipe Flexible Joint		C-425-64T	SS-S-169(54)	
Clay Pipe Hot Pour Joints		C-361-59T	SS-P-375(56)	
Concrete Reinforced Sewer Pipe				
Concrete Sewer Pipe		C-14-59	SS-P-371a(56)	

MATERIALS	SEE SECTIONS 501.3 & 504.2			OTHER STANDARDS & REMARKS
	ASA or USAS	ASTM	FS	
Concrete (Steel Cylinder Type)			SS-P-381(55)	
Concrete Reinforced Culverts		C-76-62T		
Concrete Perforated		C-444-60T		
Concrete Drain Tile		C-412-60T		
Plastic Pipe & Fittings				
SRP—Pipe & Fittings			WW-P-00380	CS-228-61 See Section 506
Acrylonitrile-butadiene-styrene pipe DWV (ABS-DWV)			FS-LP322 (FSS-GSA)	CS 270-65 For interior plumbing drainage, waste & vents
ABS-DWV Fittings		D2468-65	FS-LP322a (FSS-GSA)	CS 270-65 For interior plumbing drainage, waste & vents
Polyvinyl Chloride Pipe PVC-1-DWV		1784 1785	FS-LP0032D (FSS-GSA)	CS 272-65 For interior plumbing drainage, waste & vents
PVC-1-DWV Fittings		1784 1785	FS-LP0032D (FSS-GSA)	CS 272-65 For interior plumbing drainage, waste & vents
Plastic Materials Acetals		D-2183-64T	LP-392a(64)	

MATERIALS	SEE SECTIONS 501.3 & 504.2			OTHER STANDARDS & REMARKS
	ASA or USAS	ASTM	FS	
Acrylics		D-788-63	LM-500 (60)	See Section 506
Fluorocarbon		D-1457-62T	LP-403A (64)	
Nylon		D-789-62T		
Ferrous Pipe & Fittings				
Cast Iron Soil Pipe & Fittings— Service Weight	A-40.1-35	A-74-42	WW-P-401 (51)	CS-188-59 and Amd. CS-188-59 and Amd. 1
Cast Iron Soil Pipe & Fittings— Extra Heavy	A-21.2-53	A-377-66	WW-P-421b (61)	AWWA-C 100-55
Cast Iron Water Pipe	A-40.5-43		WW-P-356 (36)	
Cast Iron Pipe (threaded)	B-16.4-63	A-126-66	WW-P-501c (56)	
Cast Iron Fittings (threaded)	B-16.12-65	A-126-66	WW-P-491a (46)	
Cast Iron Drainage Fittings (threaded)	B-36.2-61	A-72-59T	WW-P-441b (52)	
Wrought Iron Pipe	B-36.10-59			
Wrought Steel Iron Pipe				
Steel Pipe Black & Hot-Dipped Zinc-Coated (Galvanized) for ordinary use	B-36.20-66	A-120-55	WW-P-406b (1) (64)	

MATERIALS	SEE SECTIONS 501.3 & 504.2			OTHER STANDARDS & REMARKS
	ASA or USAS	ASTM	FS	
Welded & Seamless Steel Pipe	B-36.1-66	A-53-65	WW-P-404c(2) (65)	
Malleable Iron Fittings (threaded) 150 lb.	B-16.3-63	A-197-65	WW-P-521d(59)	
Pipe Threads	B-2.1-60		GGG-P-351a(44) WW-N-351a(56)	CS-5-46
Nipples—Pipe (threaded)				
Non-Ferrous Pipe & Fittings				
Seamless Copper Pipe	H-26.1-63*	B-42-62	WW-P-377b(1) (55)	
Seamless Red Brass Pipe	H-27.1-63*	B-43-62		
Seamless Copper Water Tube (K, L & M)	H-23.1-63	B-88-62		
Threadless Copper Pipe (TP)	H-26.2-63	B-302-62	WW-T-799a(1) (46)	CS-229-61 See Section 506
Copper Drainage Tube DWV	H-23.6-63	B-306-66		
Seamless Copper Tube	H-23.3-63	B-75-62	WW-T-797a(1) (58)	
Seamless Brass Tube	H-36.1-63	B-135-63	WW-T-791(1) (33)	
General Requirements for Wrought Seamless Copper & Copper-Alloy Pipe & Tube	H-23.4-64	B-251-64		

* ASA H23.4-63 is applicable to and forms a part of this standard.

MATERIALS	SEE SECTIONS 501.3 & 504.2			OTHER STANDARDS & REMARKS
	ASA or USAS	ASTM	FS	
Cast Bronze Threaded Fittings 125 & 250 lb.	B-16.15-64		WW-P-460(45)	For Copper Water Tube
Cast Bronze Solder-Joint Pressure Fittings	B-16.18-63			
Wrought-Copper & Bronze Solder-Joint Pressure Fittings	B-16.22-63			
Cast Bronze Solder-Joint Drainage Fittings	B-16.23-60			For Plumbing Drainage Waste & Vents
Bronze Flanges & Flanged Fittings	B-16.24-62		WW-P-460(45)	
Brass Fittings for Flared Copper Tube	B-16.26-58		WW-T-799a(1)(46)	
Wrought Copper & Bronze Solder-Joint Drainage Fittings	B-16.29-66		MSS-P-64(61)	For Plumbing Drainage Waste & Vents
Miscellaneous				
Caulking Lead			QQ-L-156(46)	CS-94-41
Lead Pipe, Bends & Traps			WW-P-325(44)	CS-96-41
Sheet Lead			QQ-L-201a(53)	Grade A
Sheet Copper		B-152-60	QQ-C-502b(58)	
Soft Solder		B-32-60aT	QQ-S-571c(60)	

MATERIALS	SEE SECTIONS 501.3 & 504.2			OTHER STANDARDS & REMARKS
	ASA or USAS	ASTM	FS	
Sheet Brass		B-248-62	QQ-B-626a (57)	
Galvanized Iron & Steel Sheets	G-8.2-60	A-93-63T	QQ-1-716 (48)	
Cement Lining	A-21.4-64		WW-P-496a (51)	AWWA-C-104-64
Coal-Tar Enamel (Protective Coating)			HH-C-536c (54)	AWWA-C-203-62
Fixture-Setting Compound				
Neoprene Elastomeric Compression Joint Sealer (Gasket)			564-65T	Composition
Borosilicate Glass Pipe and Fittings (Acid Waste Only)				DD-6-541A
Air Gap Standards	A-40.4-42			MIL-P-22561A
Backflow Preventors	A-40.6-43			
Valves Bronze Gate			WW-V-54c (66)	
Valves Cast Iron Gate		A-126-66	WW-V-58a (66)	
Gas Water Heaters	Z-21.10.1-62			AGA-Approved
Pressure & Temperature Relief Valves	Z-21.10.3-62			ASME, AGA & NBBVI approved
	Z-21.22-64			
Vacuum Relief Valves	Z-21.22-64			

Note 1:

Asbestos cement building sewer pipe shall conform to ASTM standard C-428-65T or Federal specification SS-P-331b (1965) with the following amendment:

Diameter: Pipe shall be supplied in nominal diameters of 4, 5 and 6 inch.
Class: Building sewer pipe shall be available in two strength classifications designated as class 1500 and class 2400.

Lengths: Pipe shall be supplied in standard lengths of 10 or 13 foot with ½ lengths 5 foot and 6 foot 6 inch respectively, available on request.

Out of roundness: Shall be measured inside the end of length at a point equal to ½ the coupling length and shall not exceed plus or minus 3/16 of one inch.

Hydrostatic strength: not applicable

Flexural strength:	Class 1500	Class 2400
4"	550 lbs.	725 lbs.
5"	950 lbs.	1230 lbs.
6"	1500 lbs.	1850 lbs.

Each standard length shall be tested in flexure on a 9 foot span using the above total applied load. When supplying 13 foot lengths the manufacturer may test on a 12 foot span using 9/12 of the load specified in the above table.

Crushing strength:	Class 1500	Class 2400
4"	1500 lbs.	2400 lbs.
5"	1500 lbs.	2400 lbs.
6"	1500 lbs.	2400 lbs.

Each pipe when tested shall have sufficient crushing strength to withstand the above load when tested by the ASTM Three Bearing Test Method.

Note 2:

Modified Epoxy Resin Pipe and Fittings.
(Acid Wastes Only)

Tensile Strength (ASTM Method D651-48) 12,700 PSI

Comprehensive Strength (ASTM Method D790-54) 38,000 PSI

Flexural Strength (ASTM Method D790-49T) 19,300 PSI

Crushing Strength 1½" nominal diameter 13,368 lb. lin. ft.

506 Limitation of use of Materials Listed in Table 505.

506.1 Asbestos Cement Sewer Pipe.

For uses see Sections 602.11, 1302.1, 1501.5, 1502.4 and 1502.5.

506.2 Bitumized Sewer Pipe and Fittings.

For uses see Sections 602.11, 1302.1, 1501.5, 1502.4 and 1502.5.

506.3 SRP—Plastic Pipe and Fittings.

For storm sewers, storm drain pipe and fittings out side the building see Sections 1501.5 and 1502.5.

506.4 Plastic Materials.

For uses see Sections 502, 703, 704, 909 and Table under Note 4 of Section 501.3.

506.5 DWV—Copper Drainage Tube.

For above ground drainage waste and vents "Except urinal waste and vents."

CHAPTER VI

JOINTS AND CONNECTIONS

601 Tightness.

601.1

Joints and connections in the plumbing system shall be gastight and watertight for the pressure required by test, with the exceptions of those portions of perforated or open-joint piping which are installed for the purpose of collecting and conveying ground or seepage water to the underground storm drains.

602 Types of Joints.

602.1 Calked Joints.

Calked 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 1/8-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.

602.2 Threaded Joints, Screwed Joints.

Threaded joints 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 on male threads.

602.3 Wiped Joints.

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 3/4-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 joints at wall or floor. Joints between lead pipe and cast iron, steel, or wrought iron shall be made by means of a calking ferrule, soldering nipple, or bushing.

602.4 Soldered Joints.

Joints between copper tube and fittings shall be made with approved fittings. The tube shall be measured correctly and cut square. All tube ends shall be fully reamed. Tube ends and fitting cups shall be cleaned by mechanical means and a non-corrosive, paste-type flux shall be sparingly applied to both tube ends and solder cups as soon as practicable. Excess flux shall be removed prior to heating. Sufficient heat shall be applied to the cup of the fitting to draw the solder into the joint by capillary attraction. The joint shall be allowed to cool naturally.

602.5 Flared Joints.

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

602.6 Hot-Poured Joints.

Hot-poured compound 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 psi. 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 deg. 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 one hour after pouring.

602.7 Precast Joints.

Precast collars shall be formed on the spigot and in the bell of the pipe in advance of use. Materials shall be resistant to both acids and alkalis, and precast joints shall conform in all respects to the requirements of ASTM Specifications, Designation C-425.

602.8 Brazed Joints.

Brazed joints shall be made in accordance with the provisions of Section 517 of the United States of America Standards Institute Code for Pressure Piping USASI B31.5-1962.

602.9 Cement Mortar Joints.

Cement joints shall be used only when specifically permitted in other chapters of this Code or when approved by the Plumbing Official, 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. After one-half hour of setting, the joint shall be rammed around entire periphery with a blunt tool to force the partially stiffened mortar into the joint and to repair any cracks formed during the initial setting period. Pipe interior shall be swabbed to remove any material that might have fallen into the interior. Additional mortar of the same composition shall be trowled so as to form a 45 deg. taper with the barrel of the pipe.

602.10 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 jointed.

602.11 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 other approved pipe materials shall be made by means of an adapter coupling sealed with a rubber ring, an approved PVC joint sealer or calked as required in paragraph 602.1.

When necessary to cut a new taper or pipe end in the field, a tapering tool designed for this purpose shall be used.

602.12 Bituminized Fiber 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 calked as required in paragraph 602.1.

When necessary to cut a new taper or pipe end in the field, a tapering tool designed for this purpose shall be used.

602.13 Elastomeric Compression Gasket Joints for Cast Iron Soil Pipe

(a) A positive-seal one piece elastomeric compression type gasket may be used for joining hub and spigot cast iron soil pipe as an alternate for lead and oakum joints, which is made by inserting an approved gasket in the hub. The inside of the gasket is lubricated and the spigot end of the pipe is pushed into the gasket until seated, thus effecting a positive seal.

(b) Joint for hubless cast iron soil pipe fittings shall be made with an approved neoprene gasket and stainless steel retaining sleeve.

602.14 High Silicon Iron Pipe Joints.

Series 300 stainless steel coupling or drawbend with intermediate sleeve and nonporous inner sealing sleeve of sintered polytetrafluorethylene, to be molded of a single and continually joined ring type sleeve; and stainless steel nuts and bolts to be used for joining high silicon iron waste pipe and fittings.

602.15 Borosilicate Glass Joints.

Joints in borosilicate glass waste systems, vents, etc., shall be made with a stainless steel compression coupling bead to bead. Band, bolt and nut shall be of 300 series stainless steel, the band to surround a sleeve made of acrylonitrile rubber, inside the rubber sleeve of fluorocarbon polymer. Only the liner is to come in contact with contents of pipe.

602.16 Borosilicate Glass Drainline Joints.

Glass to glass connections shall be made with a bolt compression type stainless steel (300 series) coupling with contoured Buna-N resilient compression ring and a fluorocarbon inner seal ring.

Joints between glass drainline and other types of piping material shall be made with adapters having a TFE seal and/or according to manufacturer's recommendations.

Calked joints shall be as provided in Section 602.1 or packed with acid resistant asbestos rope and calked with acid proof cement.

602.17 Joints for Modified Epoxy Resin Pipe

Series 300 stainless steel or drawbend with intermediate neoprene sleeve and nonporous inner sealing sleeve of sintered polytetrafluorethylene, similar to DuPoint Teflon (R), to be molded of a single and continually joined ring type sleeve; and stainless steel nuts and bolts to be used for joining modified epoxy resin pipe and fittings.

603 Use of Joints.

603.1 Clay Sewer Pipe.

Joints in vitrified clay pipe or between such pipe and metal pipe shall be made as provided in paragraphs 602.6 and 602.7.

603.2 Concrete Sewer Pipe.

Joints in concrete sewer pipe or between such pipe and metal pipe shall be made as in paragraphs 602.6 and 602.7.

603.3 Cast Iron Pipe.

Joints in cast iron pipe shall be either caulked, screwed, positive-seal elastomeric compression gasket or a neoprene gasket and stainless steel retaining sleeve, as provided in Section 602.1; 602.2; and 602.13 (a) and (b).

603.4 Screw Pipe to Cast-Iron.

Joints between wrought-iron, steel, brass, or copper pipe, and cast-iron pipe shall be either calked or threaded joints made as provided in paragraphs 602.1 and 602.2 or shall be made with approved adapter fittings.

603.5 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 calking ferrule, soldering nipple, or bushing as provided in paragraph 602.3.

603.6 Copper Tube.

Joints in copper tube shall be made in accordance with the requirements in Section 602.4 for soldered joints, Section 602.5 for flared (compression) joints or Section 602.8 for brazed joints.

604 Special Joints.

604.1 Copper Tube to Screwed Pipe Joints.

Joints from copper tube to threaded pipe shall be made by the use of approved adapter fittings. The joint between the copper tube and the fitting shall be properly soldered or brazed and the connection between the threaded pipe and the fitting shall be made with a standard pipe size screw joint.

604.2 Welding or Brazing.

Brazing or welding shall be performed in accordance with requirements of recognized published standards of practice and by licensed or otherwise qualified mechanics, except when it is determined by the Plumbing Official to be equivalent procedure for the purpose of this Code.

604.3 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, and on the exposed fixture supply.

604.4 Expansion Joints.

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

604.5 Ground Joint Connections.

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

605 Unions (Screwed).

605.1 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.

605.2 Water-Supply System.

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

606 Water Closet, Pedestal Urinal, and Trap Standard Service.

606.1

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, approved plastic, wrought copper, wrought copper alloy, hard-lead, or iron flanges, calked, 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.

607 Prohibited Joints and Connections.

607.1 Drainage System.

Any fitting or connection which has an enlargement, chamber, or recess with a ledge, shoulder, or reduction of pipe area, that offers an obstruction to flow through the drain, is prohibited.

607.2

No fitting or connection that offers abnormal obstruction to flow, shall be used. The enlargement of a 3-inch closet bend or stub to 4-inches shall not be considered an obstruction.

608 Waterproofing of Openings.

608.1

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

609 Increases and Reducers.

609.1

Where different sizes of pipes, or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be used between the two sizes.

CHAPTER VII

TRAPS AND CLEANOUTS

701 Traps.

701.1 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 laboratories immediately adjacent to each other in the same room, if the waste outlets are not more than 30-inches apart and the trap is centrally located when three compartments are installed.

701.2 Distance of Trap to Fixture.

The vertical distance from the fixture outlet to the trap weir shall not exceed 24-inches except where a fixture (clothes washer) requires an extended trap inlet (standpipe).

702 Type and Size of Traps and Fixture Drains.

702.1 Trap Size.

The size (normal diameter) of trap for a given fixture shall be sufficient to drain the fixture rapidly but in no case less than given in Chapter XIII, Table 1304.2.

702.2 Relation to Fixture Drains.

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

702.3 Type of Traps.

- (a) Fixture traps shall be self-cleaning other than integral traps without partitions or movable parts, except as specifically approved in other sections of this Code.
- (b) Slip joints or couplings may be used within the trap seal of the trap. Where glass traps are required, slip joints or couplings must have a TFE seal.
- (c) A trap integral with the fixture shall have uniform interior and smooth waterway.

702.4 Drum Traps.

- (a) Drum traps shall be limited to special fixtures designed for drum traps and approved by the Plumbing Official. They shall not be less than 4 inches in diameter and shall be provided with a water seal of not less than 2 inches.
- (b) The trap screw shall be one size less than the trap diameter.
- (c) Trap screw (cleanout) shall be lead, brass, or copper.

703 General Requirements.

703.1 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 required by the Plumbing Official for special conditions.

703.2 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. Nylon plastics may be used as an alternate material.
- (b) Cleanouts on the seal of a trap shall be made tight with threaded cleanout plug and approved washer.

703.3 Trap Level and Protection.

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

703.4 Traps Underground.

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

703.5 Prohibited Traps.

- (a) No trap which depends for its seal upon the action of movable parts shall be used.
- (b) Full "S" traps are prohibited except as approved by the Plumbing Official.
- (c) Bell Traps are prohibited.
- (d) Crown-vented traps are prohibited.
- (e) Baffled or partitioned traps are prohibited except as approved in other sections of the code.
- (f) Tubular Traps less than 20 gauge.

703.6 Double Trapping.

No fixture shall be double-trapped.

704 Pipe Cleanouts.

704.1 Material and Design.

The bodies of cleanout ferrules shall conform in thickness to that required for pipe and fittings of the same metal, and extend not less than $\frac{1}{4}$ -inch above the hub. For new work, the cleanout plug shall be of heavy brass not less than $\frac{1}{8}$ -inch thick and shall be provided with raised nut or recessed socket for removal. Both ferrule and plug shall have American national tapered pipe threads. Heavy lead plugs may be used for repairing a cleanout where necessary. Nylon plastics may be used as an alternate material.

704.2 Location.

Cleanouts shall not be more than 50-feet apart in horizontal drainage lines of 4-inch nominal diameter or less and not more than 100-feet apart for larger pipes. Line cleanouts which may be rodded both ways shall be used whenever possible.

704.3 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 outside of the building and brought to grade as indicated above.

704.4 Change of Direction.

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

704.5 Concealed Piping.

Cleanouts on concealed piping shall be extended through and terminate flush with the finished wall or floor, or brought to grade. 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 proper cleaning of the system.

704.6 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 or with less than 18-inch crawl space under the floor the following will be acceptable in lieu of a cleanout at the base of the stack. The building drain may be extended to the outside of the building and terminated in an accessible cleanout or an accessible cleanout installed in the building drain not more than 5-feet outside the building wall.

704.7 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.

704.8 Direction of Flow.

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.

704.9

Cleanout plugs shall not be used for the installation of new fixtures or floor drains except where approved in writing by the Plumbing Official.

705 Size of Cleanouts.

705.1 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.

705.2 Large Pipes.

For underground piping over 10-inches, manholes shall be provided and located at each 90 deg. change in direction and at intervals of not more than 300-feet.

705.3 Manhole Covers.

Metal covers shall be provided for manholes.

706 Cleanout Clearances.

706.1 Large Pipes.

Cleanouts on 3-inch or larger pipes shall be so installed that there is a clearance of not less than 18-inches for the purpose of rodding or as approved by Plumbing Official.

706.2 Small Pipes.

Cleanouts smaller than 3-inches shall be so installed that there is a 12-inch clearance for rodding or as approved by Plumbing Official.

706.3

Cement, plaster, or any other permanent finishing material shall not be placed over a cleanout plug or as approved by Plumbing Official.

706.4 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.

707 Cleanout Equivalent.

707.1

A single fixture and trap readily removable without disturbing concealed roughing work, may be accepted as a cleanout equivalent, if there is no more than two 90 deg. bends on the line to be rodded and the line size does not exceed 2" (inches).

CHAPTER VIII

INTERCEPTORS – SEPARATORS AND BACKWATER VALVES

801 Interceptors and Separators.

801.1 When Required.

Interceptors (including grease, oil, and sand interceptors, etc.) shall be provided when, in the opinion of the Plumbing Official, they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand and other ingredients harmful to the building drainage system, the public sewer or sewage-treatment plant or processes.

801.2 Approval.

The size, type, and location of each interceptor or separator shall be approved by the Plumbing Official and no wastes other than those requiring treatment or separation shall be discharged into any interceptor unless approved by the Plumbing Official.

801.3

No grease interceptor shall be hereinafter installed which does not comply, in all respects with the type or model of each size thereof approved by the department having jurisdiction.

801.4 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 Plumbing Official, in accordance with paragraph 801.2.

802 Grease Interceptors.

802.1 Commercial Buildings.

A grease interceptor shall be installed in the waste line leading from sinks, drains, or other fixtures in the following establishments when, in the opinion of the Plumbing Official, a hazard exists; restaurants, hotel kitchens or bars, factory cafeterias or restaurants, clubs, or other establishments where grease can be introduced into the drainage system in quantities that can affect line stoppage or hinder sewage disposal.

802.2 Residential Units.

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

803 Oil Separators.

803.1

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

804 Sand Interceptors.

804.1 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.

805 Venting Interceptors.

805.1 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.

806 Accessibility of Interceptor.

806.1

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.

807 Interceptor's Efficiency.

807.1 Flow Rate.

Interceptors shall be rated and approved for their efficiency as directed by the Plumbing Official and in accordance with generally accepted practice.

807.2 Approval.

No grease interceptors shall be approved until it has successfully passed the testing and rating procedure set up by the Plumbing Official.

807.3 Water Connection.

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

808 Laundries.

808.1 Interceptors.

Commercial laundries (includes coin operated laundrettes) 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.

808.2 Intercepting Device.

Basket or device shall prevent passage into the drainage system of solids $\frac{1}{2}$ -inch or larger in size. The basket or device shall be removable for cleaning purposes.

809 Bottling Establishments.

809.1 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.

810 Slaughter Houses.

810.1 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.

810.2 Interceptors.

Slaughtering and dressing room drains shall be provided with interceptors approved by the Plumbing Official, in accordance with paragraph 801.2.

810.3 Food-Grinder.

Wastes may discharge directly to the building drainage system.

811 Commercial Grinders.

811.1 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.

811.2 Approval.

The Plumbing Official shall determine where and what type of interceptor is required. Except as required by local authority, interceptors shall not be required for private living quarters or residential units.

812 Maintenance.

812.1 Cleaning.

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

813 Oil Interceptors.

813.1 Where Required.

Oil separators shall be installed when required by the Plumbing Official and shall conform to requirements of paragraph 813.2.

813.2 Minimum Dimension.

Oil separators shall have a depth of not less than 2-feet below the invert of the discharge drain.

813.3 Motor Vehicle Storage and Servicing.

Interceptors shall have a capacity of 6 cubic feet where not more than three vehicles are serviced and one cubic foot in net capacity shall be added for each additional vehicle up to ten vehicles. Where more than ten vehicles are serviced and stored, the Plumbing Official shall determine the size of separator required.

813.4

Where storage facilities are not maintained, as in repair shops, the capacity of the separator 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.

813.5 Special Type Separators.

Before installing any special type separator a drawing including all pertinent information shall be submitted for approval of the Plumbing Official, as being in accordance with this Code.

814 Backwater Valves.

814.1 Fixtures Subject to Backflow.

The installation of backwater devices shall be in accordance with lawful requirements of the Plumbing Official having jurisdiction over the public sewer system. Where fixtures are located below the level of the top of the first upstream manhole, said fixtures shall be protected by a backwater valve.

814.2 Fixture Branches.

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

814.3 Material.

Backwater valves shall have all bearing parts of bronze or other corrosion-resistant material.

814.4 Backwater Valves.

Shall be so constructed as to insure a mechanical seal against backflow.

814.5 Diameter.

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

814.6 Location.

Backwater valves shall be so installed as to provide ready accessibility to their working parts.

CHAPTER IX

PLUMBING FIXTURES

901 General Requirements — Materials.

901.1 Quality of Fixtures.

Plumbing fixtures shall be constructed from approved materials, 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:

Vitreous China Plumbing Fixtures, NBS Commercial Standard CS 20-63

Enameled Cast-Iron Plumbing Fixtures, NBS Commercial Standard CS 77-63

Porcelain Enameled Formed Steel Plumbing Fixtures, NBS Products Standards PS 5-66

Stainless Steel Plumbing Fixtures (Designed for Residential Use), NBS Commercial Standard CS 243-62

Plumbing Fixtures (for) Land Use, Including Fixtures for Medical and Dental Facilities FS WW-P 541 b and Interim amendment 6-1963

GEL-Coated Glass-Fiber Reinforced Polyester Resin Bathtub Units—USAS Z124.1-67

GEL-Coated Glass-Fiber Reinforced Polyester Resin Shower Receptor and Shower Stall Units, USAS Z 124.2-67

Trim for Water-Closet Bowls, Tanks and Urinals, NBS Product Standard PS 6-66

Plumbing Fixtures, Fittings, Trim R 227-47

Lavatory and Sink Traps R 21-46

902 Alternate Materials.

902.1 Materials.

Sinks and special fixtures may be made of soapstone, borosilicate glass for cupsinks, 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.

903 Overflows.

903.1 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.

903.2 Connection.

The overflow pipe from a fixture shall be connected on the house or inlet side of the fixture trap, except that overflows of 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.

904 Installation.

904.1 Cleaning.

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

904.2 Joints.

Where fixture comes in contact with wall and floors, the joint shall be watertight.

904.3 Securing Fixtures.

Floor-outlet fixtures shall be rigidly secured to floor and/or closet flange (flange to floor) by screws or bolts.

904.4 Wall-hung Bowls.

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.

904.5 Setting.

Fixtures shall be set level and in proper alignment with reference to adjacent walls. (See paragraph 606.1.)

905 Water-Supply Protection.

905.1 Supply Fittings.

The supply lines or fittings for every plumbing fixture shall be so installed as to prevent backflow. (See paragraph 1204.3.)

906 Prohibited Fixtures and Connections.

906.1 Fixtures.

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

906.2 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.

907 Water Closets.

907.1 Public Use.

Water-closet bowls for public use shall be of the elongated type.

907.2 Flushing Device.

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

907.3 Float Valves.

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

907.4 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.

907.5 Automatic Flush Valve.

Flushometer 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 fixture 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 paragraph 905.

907.6 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.

908 Urinals.

908.1 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.

908.2 Urinals Equipped with Automatic Flush Valves.

Flushometers shall be as prescribed in paragraph 907.5 and no valve shall be used to flush more than one urinal.

908.3 Trough Urinals.

Trough urinals shall be permitted only in places of occasional 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 washdown pipe shall be perforated so as to flush with an even curtain of water against the back of the urinal. This pipe shall be securely 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.

908.4 Equivalent Length.

Trough urinals shall be figured on the basis of one (1) urinal for each 18-inches of length, i.e.

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

908.5 Floor-Type Urinals.

Floor-type trough urinals are prohibited.

908.6 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 non-absorbent material.

909 Strainers and Fixture Outlets.

909.1

All plumbing fixtures, other than water closets and siphon-action wash-down or blowout urinals, shall be provided with metal strainers having waterway area complying with paragraph 901.1. Acetal plastic may be used as an alternate material.

910 Lavatories.

910.1 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.

911 Shower Receptors and Compartments.

911.1 Shower.

All shower compartments, except those having metal enameled or approved precast receptors, shall have a lead or copper shower pan or the equivalent thereof or as determined by the Plumbing Official. The pan shall turn up on all sides at least 4-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 and having removable strainer.

Laminated asphalt paper and plastic material may be used for shower pan and shall consist of 8 plies of kraft paper bonded by 7 layers of asphalt with 3 layers of the asphalt reinforced with glass fibers, faced with polyethylene, and having a total weight of not less than 0.40 pounds per square foot. Materials shall comply with the tests established by the Federal Housing Administration publication of 30 January 1963 entitled "Test Procedure to Determine Suitability of Materials for Use as Shower Pans."

911.2 Construction.

Floors under shower compartments shall be laid on a smooth and structurally sound base and shall be lined and made watertight with sheet lead, copper or other acceptable materials. Shower compartments located in basements, cellars, or in other rooms in which the floor has been laid directly on the ground surface need not be lined.

911.3 Public or Institutional Showers.

Floor of public shower rooms shall be drained in such a manner that no waste water from any head will pass over floor areas occupied by other bathers.

911.4 Walls.

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

911.5 Joints.

Built-in tubs with overhead showers shall have waterproofed joints between the tub and non-absorbent waterproof wall materials.

912 Sinks.

912.1 Waste Outlets.

Sinks shall be provided with waste outlets not less than 1½-inches in diameter. Waste outlets may have open strainers or may be provided with stoppers.

912.2 Food Grinders.

Sinks on which a food grinder is installed shall have a waste opening not less than 3½-inches in diameter.

913 Food Waste Grinder Units.

913.1 Separate Connections.

Domestic food waste disposal units may be connected and trapped separately from any other fixture or compartment. Units may have either automatic or hand-operated water-supply control. (See paragraph 1204.)

913.2 Grease Interceptors.

No food waste grinder shall be connected through a grease interceptor.

913.3 Commercial-Type Grinders.

Commercial-type food grinders shall have an automatic water-supply and shall be provided with not less than a 2-inch waste line. Back waste shall be trapped and vented as provided in other sections of this Code.

914 Drinking Fountains.

914.1 Design and Construction.

Drinking fountains shall conform to American Standard Specifications for Drinking Fountains. (ASA Z4.2-1942.)

914.2 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 A40.14-1942) and American Standard Backflow Preventers in Plumbing Systems (ASA A40.16-1943.)

915 Floor Drains.

915.1 Floor Drains.

Floor drains shall be installed in all public toilet rooms, public bathrooms and public restrooms. (See definition of Public.)

915.2 Traps 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 strainer shall be at least two-thirds of the cross-section area of the drain line to which it connects.

915.3

Floor drains shall be of a size to serve efficiently the purpose for which it is intended, but in no case less than 2-inches, except that for commercial buildings, schools, dormitories and institutions, floor drains shall be not less than 3-inches.

915.4

Acid resisting floor drains shall have Borosilicate Glass Traps where installed as part of a glass drainline system.

916 Dishwashing Machines.

916.1 Protection.

Domestic dishwashing machines shall meet requirements in paragraph 1204.3.

916.2 Separate Trap.

Each unit shall waste indirectly to an individual trap (grease trap) or discharge indirectly into a properly trapped and vented fixture.

916.3 Air Gap.

Commercial dishwashing machines shall be connected through an air gap or as provided in Chapter 9 "Indirect Waste Piping and Special Wastes."

916.4 Hot Water.

Dishwashing machines or similar dishwashing equipment not in private living quarters or dwelling units shall be provided with water at 180 deg. F for sterilization.

917 Multiple Wash Sinks.

917.1 Circular Type.

Each 18-inches of wash sink circumference (circular type) shall be equivalent to one lavatory.

917.2 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.

918 Garbage-Can Washers.

918.1 Discharge.

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

918.2 Interceptor.

The discharge from a garbage-can washer shall be connected through an interceptor.

918.3 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.

918.4 Connections.

Water Supply Connections shall conform to paragraph 1204.3.

919 Laundry-Trays.

919.1 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.

919.2 Overflow.

Laundry-tray overflows shall conform to the requirements of paragraph 903.1.

920 Washing Machines for Residences.

920.1 Protection.

Domestic washing machines shall meet requirements in Section 1204.3.

920.2 Separate Trap.

Each unit shall be separately trapped or discharge indirectly into a properly trapped and vented fixture.

921 Special Fixtures and Specialties.

921.1 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 in paragraph 1204.3.

921.2 Approval.

Specialties requiring water and waste connections shall be submitted for approval of the Plumbing Official.

922 Minimum Facilities.

922.1

Wherever plumbing fixtures are installed, the minimum number of each type of fixture installed shall be in accordance with Table 922.2, unless otherwise specifically provided.

TABLE 922.2 — MINIMUM FACILITIES¹

Type of Building or Occupancy ²	Water Closets	Urinals	Lavatories	Bathtub or Showers	Drinking Fountains ³
Dwelling or Apt. House ⁴	1 for each Dwelling or Apartment Unit	.....	1 for Each Apartment or Dwelling Unit.	1 for Each Apartment or Dwelling Unit.	
Schools ⁵	Male Female				
Elementary	1 per 60 1 per 35	1 per 30 Male	1 per 60 Persons.		1 per 75 Persons.
Secondary	1 per 100 1 per 45	1 per 30 Male	1 per 100 Persons.		1 per 75 Persons.
College—Academic	Male Female 1 per 100 1 per 60	1 per 110 Male	Male 1 per 150 Female 1 per 100		1 per 75 Persons.
Office or Public Buildings ¹¹ or Institutions (other than for patient use)	No. of Persons 1-15 16-35 36-55 56-80 81-100 101-150 Fixtures M. F. 1 1 2 2 4 5 6 8 1 Fixture for each 40 Additional Persons	Wherever urinals are provided for men or women, one water closet less than the number specified may be provided for each urinal installed except that the number of water closets in such cases shall not be reduced to less than 2/3 of the minimum specified for men and 3/4 of the minimum specified for women.	No. of Persons 1-15 16-35 36-60 61-90 91-125 Fixtures 1 2 3 4 5 1 Fixture for Each 45 Additional Persons.		1 for Each 75 Persons.
Manufacturing, Warehouses, Loft Buildings, Foundries and similar Establishments ^{4 11}	No. of Persons 1-9 10-24 25-49 50-74 75-100 Fixtures M. F. 1 1 2 2 3 4 4 5 5 6 6 1 Fixture for Each Additional 30 Employees	Same substitution as above.	1-100 Persons for Each 10 Persons. Over 100, 1 for Each 15 Persons. ^{7, 8}	1 shower for each 15 persons exposed to excessive heat or to skin contamination with poisonous, infectious, or irritating material.	1 for Each 75 Persons.

Type of Building or Occupancy ²	Water Closets	Urinals	Lavatories	Bathtub or Showers	Drinking Fountain ³
Dormitories ¹	Male: 1 for Each 10 Persons Female: 1 for Each 8 Persons Over 10 Persons, Add 1 Fixture for Each 25 Additional Males and 1 for Each 20 Additional Females.	More than 100 persons—1 fixture for each 10 males or each eight females plus one additional fixture for each 25 additional males or each 20 additional females.	1 for Each 12 Persons. (Separate dental lavatories should be provided in community toilet rooms. Ratio of dental lavatories for each 50 persons is recommended.) Add 1 Lavatory for Each 20 Males, 1 for Each 15 Females.	1 for each 8 persons. In the case of women's dormitories, additional bathtubs should be installed at the ratio of 1 for each 30 females. Over 150 persons, add 1 fixture for each 20 persons.	1 for Each 75 Persons.
Theatres, Auditoriums, and Churches ¹	No. of Persons No. of Fixtures M. F. 1-100 2 2 101-200 3 3 201-400 4 4 Over 400, Add 1 Fixture for Each, Additional 500 Males, and 1 for Each 300 Females.	No. of Persons No. of Fixtures M. F. 1-200 2 201-400 3 401-750 4 Over 600, Add 1 for Additional 300 Males.	No. of Persons No. of Fixtures M. F. 1-200 1 201-400 2 401-600 3 Over 750, 1 for Each Additional 500 Persons.		
Restaurant, Clubs and Lounges ¹	No. of Persons No. of Fixtures M. F. 1-50 1 1 51-150 2 2 151-300 3 4 Over 300 Add 1 Fixture for Each 200 Additional Persons.	No. of Persons No. of Fixtures M. F. 1-150 1 Over 150 Persons, Add One Fixture for Each 150 Men.	No. of Persons No. of Fixtures M. F. 1-150 1 151-200 2 201-400 3 Over 400, 1 Fixture for Each Additional 400 People.		

M—Male, F—Female.

¹The figures shown are based upon one fixture being the minimum required for the number of persons indicated or any fraction thereof.

²Building category not shown on this table. Will be considered separately by the Plumbing Official.

³Drinking fountains shall not be installed in toilet rooms.

⁴Kitchen Sinks—1 for each dwelling or apartment unit.

⁵This schedule has been adopted (1958) by the National Council on Schoolhouse Construction.

*As required by the American Standard Safety Code for Industrial Sanitation in Manufacturing Establishments (ASA Z4.1-1955).

†Where there is exposure to skin contamination with poisonous, infectious, or irritating materials, provide 1 lavatory for each 5 persons.

*4-lineal-inches of wash sink or 18-inches of a circular basin, when provided with water outlets for such space, shall be considered equivalent to 1 lavatory.

†Laundry trays, 1 for each 50 persons. Slop sinks, 1 for each 100 persons.

†Washing Machine—Water and drain connections in each dwelling or apartment unit unless central washing facilities are provided.

†The installation of female urinals shall be optional.

General. In applying this schedule of facilities, consideration must be given to the accessibility of the fixtures. Conformity purely on a numerical basis may not result in an installation suited to the need of the individual establishment. For example, schools should be provided with toilet facilities on each floor having classrooms.

Temporary workingmen facilities:

1 water closet and 1 urinal for each 30 workmen.

24-in. urinal trough—1 urinal

36-in. urinal trough—2 urinals

48-in. urinal trough—2 urinals

60-in. urinal trough—3 urinals

72-in. urinal trough—4 urinals

923 Water Heaters and Hot Water Storage Tanks. (Refer also to Section 1215.)

923.1 General

(a) Water heater is an appliance for supplying potable hot water for domestic or commercial purpose other than for space heating. Using solid, liquid, gas fuel or electricity for heating the water.

(b) All storage tanks and water heaters shall be clearly and indelibly marked showing the allowable safe working pressure.

923.2 Location.

(a) Water heaters should be so located to provide as short a run of hot water piping to fixtures as possible and accessible to all tenants or maintenance personnel, as the case may be.

(b) Water heaters and storage tanks shall be so located and connected that it will be readily accessible for observation, maintenance, servicing and replacement.

923.3 Prohibited Installations.

Water heaters (using solid, liquid or gas fuel) with the exception of those having sealed combustion systems, shall not be installed in bathrooms and bedrooms. However, water heaters of the automatic storage type may be installed as replacement in a bathroom, when specifically authorized by the administrative authority, provided they are properly vented and supplied with adequate combustion air.

923.4 Clearances.

Water heaters shall be positioned in relation to combustible construction as recommended by manufacturer.

923.5 Connections.

(a) A shut-off valve shall be provided in the cold water supply to each hot water heater or storage tank and shall be accessible on the same floor and within three (3) feet of the heater or tank.

(b) The method of connecting a circulating water heater to the tank shall assure proper circulation of water through the heater, and permit a safe and useful temperature of water to be drawn from the tank.

923.6 Safety Devices.

Refer to Section 1215.

923.7 Sediment Drains.

A suitable water valve or cock, through which sediment may be drawn off or the heater or tank emptied, shall be installed at the bottom of the heater or tank.

923.8 Anti-Syphon Devices.

Means acceptable to the administrative authority shall be provided to prevent syphoning in any water heater or tank to which any water heater or tank is connected.

A cold water "dip" tube with a hole at the top or a vacuum relief valve installed in the cold water supply line above the top of the heater or tank may be acceptable for this purpose.

Bottom fed heaters or bottom fed tanks connected to water heaters shall have a vacuum relief valve installed.

The vacuum relief valve shall be in compliance with the appropriate Standard A.S.A. Z21.22.

924 Toilet Rooms and Water Fountains for the Physically Handicapped.

(See Volume I N. C. State Building Code Chapter 11X when those facilities are required and other reference sections applicable.)

924.1 Toilet Rooms.

It is essential that an appropriate number of toilet rooms, in accordance with the nature and use of a specific building or facility, be made accessible to, and usable by, the physically handicapped.

(a) Toilet rooms shall have space to allow traffic of individuals in wheelchairs.

(b) Toilet rooms shall have at least one toilet stall that—

(1) Is 3 feet wide.

(2) Is at least 4 feet 8 inches, preferably 5 feet, deep

(3) Has a door (where doors are used) that is 32 inches wide and swings out

(4) Has handrails on each side, 33 inches high and parallel to the floor, 1¼ inches in outside diameter, with 1½ inches clearance between rail and wall, and fastened securely at ends and center.

(5) Has a water closet with the seat 20 inches from the floor

NOTE: The design and mounting of the water closet is of considerable importance. A wall-mounted water closet with a narrow understructure that recedes sharply is most desirable. If a floor-mounted water closet must be used, it should not have a front that is wide and perpendicular to the floor at the front of the seat. The bowl should be shallow at the front of the seat and turn backward more than downward to allow the individual in wheelchair to get close to the water closet with the seat of the wheelchair.

(c) Toilet rooms shall have lavatories with narrow aprons, which when mounted at standard height are usable by individuals in wheelchairs; or shall have lavatories mounted higher, when particular designs demand, so that they are usable by individuals in wheelchairs.

NOTE: It is important that drain pipes and hot-water pipes under a lavatory be covered or insulated so that a wheelchair individual without sensation will not burn himself.

(d) Some mirrors and shelves shall be provided above lavatories at a height as low as possible and no higher than 40 inches above the floor, measured from the top of the shelf and the bottom of the mirror.

(e) Toilet rooms for men shall have wall-mounted urinals with the opening of the basin 19 inches from the floor, or shall have floor-mounted urinals that are on level with the main floor of the toilet room.

(f) Toilet rooms shall have an appropriate number of towel racks, towel dispensers, and other dispensers and disposal units mounted no higher than 40 inches from the floor.

924.2 Water Fountains.

An appropriate number of water fountains or other water-dispensing means shall be accessible to, and usable by, the physically disabled.

(a) Water fountains or coolers shall have upfront spouts and controls.

(b) Water fountains or coolers shall be hand-operated or hand- and foot-operated. (See also American Standard Specifications for Drinking Fountains, Z4.2-1942.)

NOTE 1. Conventional floor-mounted water coolers can be serviceable to individuals in wheelchairs if a small fountain is mounted on the side of the cooler 30 inches above the floor.

NOTE 2: Wall-mounted, hand-operated coolers of the latest design, manufactured by many companies, can serve the able-bodied and the physically disabled equally well when the cooler is mounted with the basin 36 inches from the floor.

NOTE 3: Fully recessed water fountains are not recommended.

NOTE 4: Water fountains should not be set into an alcove unless the alcove is wider than a wheelchair.

CHAPTER X

HANGERS AND SUPPORTS

1001 General.

1001.1 General.

Piping in a plumbing system shall be installed without undue strains in stresses and provision shall be made for expansion, contraction, and structural settlement.

1002 Vertical Piping.

1002.1 Attachment.

Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents.

1002.2 Cast-Iron Soil Pipe.

Cast-iron soil pipe shall be supported at the base and at each story level not to exceed 15-feet.

1002.3 Screwed Pipe.

Screwed pipe (S.P.S.) shall be supported at the base and at not less than every other story level not to exceed 30-feet.

1002.4 Copper Tube.

Copper tube shall be supported at each story for piping 1½-inches and over and at not more than 4-foot intervals for piping 1¼-inches and smaller.

1002.5 Lead Pipe.

Lead pipe shall be supported at intervals not exceeding 4-feet.

1002.6 Borosilicate Glass.

Borosilicate glass shall be supported at intervals of eight to ten feet with a hanger or by a padded riser clamp under bottommost coupling in riser, restricting sideward as well as downward movement, at each floor for 3 inch and larger diameter pipe, and at every other floor for smaller diameter pipe. All hangers shall have a padding with ¼" thick solid neoprene or Buna-N rubber.

1002.7 Glass.

Glass drainline shall be supported at every floor for 3", 4", and 6" diameter vertical runs and supported at every other floor for 1½" and 2" sizes. Use padded riser clamps.

1002.8 Plastic Pipe.

Semi-rigid plastic pipe, when allowed by Code, shall be supported at each story for piping 1½ inches and over and not more than 4 foot intervals for piping 1¼ inches and smaller based on the manufacturer's recommendations.

1003 Horizontal Piping.

1003.1 Supports.

Horizontal piping shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.

1003.2 Cast-Iron Soil Pipe.

Cast-iron soil pipe shall be supported at not more than 5 foot intervals on 5 foot lengths and 10 foot intervals on 10 foot lengths. Hangers shall be located as near hubs as possible.

1003.3 Screwed Pipe.

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

1003.4 Copper Tubing.

Copper tubing shall be supported at approximately 8-foot intervals for piping 1½-inches and smaller and 10-foot intervals for piping 2-inches and larger.

1003.5 Lead Pipe.

Lead pipe shall be supported by strips or otherwise for its entire length.

1003.6 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 Plumbing Official.

1003.7 Plastic Pipe.

Semi-rigid plastic pipe, when allowed by Code, shall be supported at intervals of not more than 5 feet.

1003.8 Borosilicate Glass.

Borosilicate glass, horizontal piping shall be supported at intervals of 8 to 10 feet with a hanger having a padding of ¼" thick solid neoprene or Buna-N rubber. Glass drainline shall be supported in horizontal runs every eight to ten feet, never closer unless there are more than two joints in the 8-10 foot section. Use padded hangers, either clevis or trapeze type.

1004 Hangers and Anchors.

1004.1 Material.

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

1004.2 Attachment.

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

1005 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 repairs or replacement.

1006 Base of Stacks.

1006.1 Supports.

Bases of all soil stacks, waste and vent stacks, shall be supported to the satisfaction of the Plumbing Official.

1006.2 Piping Material.

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

CHAPTER XI

INDIRECT WASTE PIPING AND SPECIAL WASTES

1101 Indirect Waste Piping.

1101.1 General.

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

1101.2 Food Handling.

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

1101.3 Commercial Dishwashing Machines.

Dishwashing machines shall be indirectly connected.

1101.4 Grease Interceptor.

An interceptor shall be placed on the outlet side of the dishwashing machine, or on the discharge side of the indirect waste receptor when required by the Plumbing Official.

1101.5 Connections.

Indirect waste connections shall be provided for drains, overflows, or relief vents from the water-supply system or air conditioning units.

1101.6 Sterile Materials.

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

1101.7 Drips.

Appliances, devices, or apparatus not regularly classed as plumbing fixtures but which have drips or drainage outlets, shall be drained by indirect waste pipes discharging into an open receptacle as provided in paragraph 1101.2.

1102 Material and Size.

1102.1

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

1103 Length.

1103.1 Maximum Length.

The maximum length of the indirect waste to vent shall not exceed 15-feet.

1103.2 Cleaning.

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

1104 Air Gap or Backflow Preventer.

1104.1 Provision of Air Gap.

The air gap between the indirect waste and the building drainage system shall be at least twice the effective diameter of the drain served and shall be as provided in paragraph (a) and (b) below:

(a) By extending the indirect waste pipe to an open, accessible slop sink, floor drain, or other suitable fixture which is properly trapped and vented. The indirect waste shall terminate a sufficient distance above the flood level rim of the receiving fixture to provide the required air gap, and shall be installed in accordance with other applicable sections of this Code;

(b) By providing a break (air gap) in the drain connection on the inlet side of the trap serving the fixture, device, appliance or apparatus.

1105 Receptors.

1105.1 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.

1105.2 Cleanout Location.

If the indirect waste receptor is set below floor level, cleanout shall be brought level with the floor.

1105.3 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.

1105.4 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.

1106 Clear Water Wastes.

1106.1

Water 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.

1107 Condensors and Sumps.

1107.1

No steam pipe shall connect to any part of a drainage or plumbing system, nor shall any water above 140 deg. F 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.

1108 Drinking Fountains.

1108.1

Drinking fountains may be installed with indirect wastes.

1109 Special Wastes.

1109.1 Acid Waste.

Acid and chemical indirect waste pipes shall be of materials unaffected by the discharge of such wastes.

1109.2 Neutralizing Device.

In no case shall corrosive liquids, spent acids, or other harmful chemicals which might destroy or insure a drain, sewer, soil or waste pipe, or which might create noxious or toxic fumes, discharge into the plumbing system without being thoroughly diluted or neutralized by passing through a properly constructed and acceptable dilution or neutralizing device. Such device shall be automatically provided with a sufficient intake of diluting water or neutralizing medium, so as to make its contents noninjurious before being discharged into the soil or sewage system.

1110 Swimming Pools.

1110.1

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

CHAPTER XII

WATER SUPPLY AND DISTRIBUTION

1201 Quality of Water Supply.

1201.1 Potable Water.

Potable water is water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of the Governing Authority having jurisdiction.

1201.2 Acceptable Sources.

Where a public supply of potable water is not available, requirements satisfactory to the Governing Authority having jurisdiction shall be observed.

1201.3 Non-potable Water.

Non-potable water may be used for flushing water closets and urinals and other fixtures not requiring potable water, provided such water shall not be accessible for drinking or culinary purposes.

1202 Color Code.

1202.1 Identification of Piping.

All piping conveying non-potable water shall be adequately and durably identified by a distinctive yellow-colored paint so that it is readily distinguished from piping carrying potable water. (See ASA Z53-1-1945 Safety Color Code for Marketing Physical Hazards.)

1203 Water Supply Mandatory.

1203.1

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

1204 Protection of Potable Water Supply.

1204.1 Cross Connections.

Potable water supply piping, water discharge outlets, backflow prevention devices or similar equipment shall not be so located as to make possible their submergence in any contaminated or polluted liquid or substance.

1204.2 Approval of Devices.

Before any device for the prevention of backflow or back-siphonage is installed, it shall have first been certified as meeting the requirements of ASA A40.6-1943 by a recognized testing laboratory acceptable to the Authority having jurisdiction. Devices installed in a potable water supply for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices. The Authority having jurisdiction may inspect such devices and, if found to be defective or inoperative, shall require the replacement thereof.

1204.3 Backflow.

The water-distribution system shall be protected against backflow. Every water outlet shall be protected from backflow, preferably by having the outlet end from which the water flows spaced a distance above the flood level rim of the receptacle into which the water flows sufficient to provide a "minimum required air gap" as defined in ASA A40.4-1942. Where it is not possible to provide a minimum air gap, the water outlet shall be equipped with an accessibly located backflow preventer complying with ASA A40.6-1943, installed on the discharge side of the manual control valve.

1204.4 Special Devices.

Where it is not possible to provide either a minimum air gap or a backflow preventer as may be the case in connection with cooling jackets, condensers or other industrial or special appliances, the Plumbing Official shall require other approved means of protection.

1205 Vacuum Breakers and Air Gaps.

1205.1 Flushometer.

Flushometer shall be equipped with an approved vacuum breaker. 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.

1205.2 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.

1205.3 Trough Urinals.

Trough urinals shall be equipped with an approved vacuum breaker installed on the discharge side of the last valve and not less than 30-inches above the spray pipe.

1205.4 Lawn Sprinklers.

Lawn sprinkler systems shall be equipped with an approved 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.

1205.5 Valve Outlet.

Fixtures with hose attachments shall be protected by an approved backflow preventer installed six-inches above the highest point of usage and on the discharge side of the valve.

1206 Water-Distribution Pipe, Tubing and Fittings.

1206.1

Materials for water-distributing pipes and tubing shall be brass, copper water tube, minimum type M when used above ground, lead, cast-iron,

wrought-iron, open-hearth-iron, or steel, with appropriate 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 coated with coal tar enamel or other coatings approved for such purpose by a recognized Standards Organization, and the threaded joints shall be coated and wrapped after installation. (See Chapter V for Standards on Coal Tar Enamel Coatings.)

1206.2

Inaccessible water piping under floor slabs shall be minimum Type L copper tube, brass, lead, cast iron, galvanized steel or galvanized wrought iron, except that galvanized steel shall be protected when used under floor slabs in corrosive soils. All ferrous piping and fittings shall be coated with coal tar enamel or other coatings approved for such purpose by a recognized standard organization and the threaded joints shall be coated and wrapped after installation.

1206.3

Except as permitted in paragraph 1206.4, the underground water-service pipe and the building drain or building sewer shall be not less than 5-feet apart horizontally and shall be separated by undisturbed or compacted earth. When copper tubing is used for water service pipe, it must be minimum type "L".

1206.4

The water-service pipe may be placed in the same trench with the building drain and building sewer provided the following conditions are met:

The bottom of the water-service pipe, at all points, shall be at least 12-inches above the top of the sewer line at its highest point.

The water-service pipe shall be placed on a solid shelf excavated at one side of the common trench.

The water-service tube shall have a weight of not less than that of copper water tube Type L with soldered joints.

1206.5 Stop-and-Waste Valve Combination.

Combination stop-and-waste valves and cocks shall not be installed in an underground service pipe.

1206.6 Private Water Supply.

No private water supply shall be inter-connected with any public water supply.

1207 Water Pumping and Storage Equipment.

1207.1 Pumps and Other Appliances.

Water pumps, tanks, filters, softeners and all other appliances and devices shall be protected against contamination.

1207.2 Water-Supply Tanks.

Potable water-supply tanks shall be properly covered to prevent the entrance of foreign material or insects into the water supply. Soil or waste lines shall not pass directly over such tanks.

1207.3 Pressure Tanks, Boilers, 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.

1207.4 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.

1208 Water-Supply Tanks (House-Suction Booster.)

1208.1 When Required.

When the water pressure from the city mains during flow is insufficient to supply all fixtures freely and continuously, the rate of supply shall be supplemented by a gravity house tank or booster system.

1208.2 Support.

All water-supply tanks shall be supported in accordance with the building code or other regulations which apply.

1208.3 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 properly screened against the entrance of insects and vermin shall be provided.

1208.4 Tank Supply.

The water-supply inlet within the tank shall be at an elevation not less than is required for an air gap in an open tank with overflow, but in no case shall the elevation be less than 4-inches above the overflow.

1208.5 Drains.

Water-supply tanks shall be provided with valved drain lines located at their lowest point and discharged as an indirect waste or as required for overflow pipes in paragraph 1204.3.

1208.6 Size of Overflow.

Overflow drains for water-supply tanks shall not be less than the following:

Drain Pipe (inches)	Tank Capacity (gallons)	Drain Pipe (inches)	Tank Capacity (gallons)
1	Up to 750	2½	3,001 to 5,000
1½	751 to 1,500	3	5,001 to 7,500
2	1,501 to 3,000	4	Over 7,500

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

1208.7 Gravity and Suction Tanks.

Tanks used for domestic water supply, combined supply to fire standpipes and domestic water system, or to supply standpipes for fire-fighting equipment only, shall be equipped with tight covers which are vermin and rodent proof. Such tanks shall be vented with a return bend vent pipe having an area not less than one-half the area of the down feed riser and the vent opening shall be covered with a metallic screen of not less than one hundred (100) mesh.

1208 Pressure Tanks.

Pressure tanks used for supplying water to the domestic water distribution system, combined supply to fire standpipes and domestic water system, or to supply standpipes for fire equipment only, shall be equipped with an acceptable vacuum breaking device located on the top of the tank. The air inlet of this device shall be covered with a metallic screen of not less than one hundred (100) mesh.

1209 Disinfection of Potable Water System Piping.

1209.1

The local Plumbing Official having jurisdiction may require that a 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:

1209.2

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.

1209.3

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.

1209.4

In the case of a potable-water storage tank where it is not possible to disinfect as provided in paragraphs 1209.2 and 1209.3 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.

1209.5

In the case of potable-water filters or similar devices, the dosage shall be determined by the Plumbing Official.

1210 Allowance for Character of Water.

1210.1 Selection of Materials.

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 pipe. No material that would produce toxic conditions in a potable-water supply system shall be used for piping, tubing or fittings.

1210.2 Used Piping.

No piping material that has been used for other than a potable-water supply system shall be re-used in the potable-water supply system.

1211 Water Supply Control.

1211.1 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 valve shall be provided inside near the entrance of the water-service pipe into the building.

1211.2 Tank Controls.

Supply lines taken from pressure or gravity tanks shall be valued at or near their source.

1211.3 Separate Controls for Each Family Unit.

In two-family or multiple dwellings, each family unit shall be controlled by an arrangement of shut-off valves which permit each group of fixtures or the individual fixtures to be shut off without interference with the water-supply to any other family unit or portion of the building.

1211.4 Group Fixtures.

A group of fixtures means two or more fixtures adjacent or near each other. In a one-family house one or two bathrooms adjacent or one over the other may be considered a group.

1211.5 Buildings Other Than Dwellings.

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

1211.6 Water Heating Equipment.

A shut-off valve shall be provided in the cold-water branch line to each water-storage tank or each water heater.

1212 Water-Supply Distribution.

1212.1 Water-Service Pipe.

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 $\frac{3}{4}$ -inch nominal diameter.

1212.2 Demand Load.

The demand load in the building water-supply system shall be based on the number and kind of fixtures installed and the probable simultaneous use of these fixtures.

1213 Procedure in Sizing the Water-Distribution System of a Building.

1213.1 Size of Potable Water Piping.

(a) The size of each water meter and each potable water supply pipe from the meter or other source of supply to the fixture supply branches, risers, fixtures, connections, outlets or other uses shall be based on the total demand and shall be determined according to the methods and procedures outlined in this section.

(b) Whenever a water filter, water softener or similar water treating device, backflow prevention device or similar device is installed in any water supply line, the pressure loss through such devices must be included in the pressure loss calculations of the system, and the water supply pipe and meter shall be adequately sized to provide for any such pressure loss.

No water filter, water softener, backflow prevention device or similar device regulated by this code shall be installed in any potable water supply piping when the diameter of the inlet or outlet of any such device or its connecting piping is less than the diameter of such water supply piping, or when the installation of such device produces an excessive pressure drop in any such water supply piping.

All such devices shall be of a type approved by the Administrative Authority and shall be tested for flow rating and pressure loss by an approved laboratory or recognized testing agency to standards consistent with the intent of this chapter. The maximum rated flow and the pressure loss shall be stamped legibly on the device or on a metal label, permanently attached to the device, and shall be in the following form:

MAXIMUM PRESSURE DROP

Flow Gallons per minute	Pressure Drop Pounds per square inch
5	—
10	—
15	—

NOTE: The final figure in the flow rate column shall be the maximum rated flow or capacity of the device.

(c) The quantity of water required to be supplied to every plumbing fixture shall be represented by fixture units, as shown in Table 12-A. Equivalent fixture valves shown in Table 12-A include both hot and cold water demand.

(d) Where the maximum length of supply piping is two hundred (200) feet or less, each water piping system of fifty (50) fixture units or less shall be sized in accordance with the values set forth in Table 12-B of this section. Other systems within the range of Table 12-B may be sized from that table or by the method set forth in sub-section (e) of this section.

(e) Except as provided in subsection (d) of this section, the size of each water piping system shall be determined in accordance with the procedure set forth in Appendix A of this code (Recommended Rules for Sizing the Water Supply System).

(f) Except where the type of pipe used and the water characteristics are such that no decrease in capacity due to length of service (age of system) may be expected, all friction loss data shall be obtained from the "Fairly Rough" or "Rough" charts in Appendix A of this code. Friction or pressure losses in water meters, valve and fittings shall be obtained from the same sources. Pressure losses through water treating equipment, backflow prevention devices or other flow restricting devices shall be computed as required by subsection (b) of this section.

(g) On any proposed water piping installation sized pursuant to Table 12-B the following conditions shall be determined:

- (1) Total number of fixture units as determined from the table of Equivalent Fixture Units (Table 12-A) for the fixtures to be installed.
- (2) Developed length of supply pipe from meter to most remote outlet.
- (3) Difference in elevation between the meter or other source of supply and the highest fixture or outlet.
- (4) Pressure in the street main or other source of supply at the locality where the installation is to be made. Calculations shall be based on not to exceed one hundred (100) p.s.i. pressure in the system.
- (5) In localities where there is a wide fluctuation of pressure in the main throughout the day, the water piping systems shall be designed on the basis of the minimum pressure available.

(h) Size of meter and building supply pipe using Table 12-B. Knowing the available pressure at the water meter or other source of supply, and after subtracting one half ($\frac{1}{2}$) pound per square inch pressure for each foot of difference in elevation between such source of supply and the highest water supply outlet in the building or on the premises, use the "Pressure Range" group within which this pressure will fall. Select the "length" column which is equal to or longer than the required length. Follow down the column to a fixture unit value equal to or greater than the total number of fixture units required by the installation. Having located the proper fixture unit value for the required length, sizes of meter and building supply pipe will be found in the two left-hand columns.

No building supply pipe shall be less than three-quarter ($\frac{3}{4}$) inch in diameter.

(i) Size of branches. The size of each branch shall be determined by the number of fixture units to be served by that branch, following the methods outlined in subsection (h) of this section.

(j) Sizing for flushometer valves. Branches and mains serving water closet or similar flushometer valves may be sized from Table 12-B when the following values are assigned to each flushometer valve beginning with the most remote valve on each branch.

For the first flushometer valve	40 fixture units
For the second flushometer valve	30 fixture units
For the third flushometer valve	20 fixture units
For the fourth flushometer valve	15 fixture units
For the fifth flushometer valve	10 fixture units

Five unit flushometer valves may be computed at half the values assigned, but in no case less than five units. After the fifth valve on any branch or main, subsequent loadings may be computed using the values given in Table 12-A of this chapter. Piping supplying a flushometer valve shall not be less in size than the valve inlet.

NOTE: Any system using flushometer valves may be sized by the procedures set forth in paragraph (e) of this section.

(k) Hot Water Piping. In sizing the hot water piping of water supply systems having a total demand of fifty (50) fixture units or less from Table 12-B, the greatest developed length of the cold water supply piping may be used and the length of the hot water piping ignored when the hot water piping friction loss is compensated for by the following method:

- (1) Compute the total hot water fixture unit demand, using those values given in Table 12-A for the combined hot and cold water use.
- (2) Assign the total demand computed as required in (1) above, as the fixture unit demand at the hot water heater inlet.
- (3) Starting at the most remote outlet on the cold water piping and working back toward the water meter, compute the pipe sizing for the system from the column originally selected in Table 12-B, using the fixture unit values given in Table 12-A, and adding in the fixture unit demand of the hot water heater supply inlet as computed in (1) above, at the point where it occurs. The final size of the cold water branch or main need not exceed the originally established size of the building supply.

(l) Except as provided in subsection (k), water piping systems which include hot water piping, shall be designed by taking the total length of the supply piping from the source of cold water supply through the water heater, to the most remote hot water outlet and assessing flow values of seventy-five (75) per cent of the combined hot and cold water demand as given in Table 12-A, to the piping supplying either hot or cold water to those fixtures served by both. Piping serving water heaters shall be sized to deliver the above required hot water demand, plus all required cold water demands, but in no case need the piping be larger in size than that required by Table 12-B for the total building supply.

(m) Exceptions. The provisions of this section relative to size of water piping need not apply to the following:

- (1) Water supply piping systems designed in accordance with recognized engineering procedures acceptable to the Administrative Authority.
- (2) Alteration of or minor additions to existing installations, provided the Administrative Authority finds that there will be a reasonably adequate supply of water for all fixtures.
- (3) Replacement of existing fixtures or appliances.
- (4) Piping which is part of fixture or equivalent.
- (5) Unusual conditions where, in the judgment of the Administrative Authority, a reasonably adequate supply of water is provided.

(6) Non-potable water lines.

(7) The size and material of irrigation water piping installed outside of any building or structure and separated from the potable water supply by means of an approved air gap or backflow prevention device is not regulated by this code. The potable water piping system supplying each such irrigation system shall be adequately sized as required elsewhere in this chapter to deliver the full connected demand of both systems.

1213.2

When required by the Plumbing Official, the sizing of the water-distribution system shall be calculated by a registered mechanical engineer or other acceptable authority.

1213.3 Size of Fixture-Supply.

The minimum size of a fixture-supply pipe shall be as follows:

Type of Fixture or Device	Pipe Size (Inches)	Type of Fixture or Device	Pipe Size (Inches)
Bath Tubs	½	Sinks Flushing Rim	¾
Combination Sink and Tray	½	Urinal (Flush Tank)	½
Drinking Fountain	¾	Urinal (Direct Flush Valve)	¾
Dishwasher (Domestic)	½	Water Closet (Tank Type)	¾
Kitchen Sink, Residential ...	½	Water Closet (Flush Valve Type)	1
Kitchen Sink, Commercial ...	¾	Hose Bibbs	¾
Lavatory	¾	Hose Bibbs— Toilet Rooms	½
Laundry Tray, 1, 2 or 3 Compartments	½	Wall Hydrant	¾
Shower (Single Head)	½	Washing Machines	½
Sinks (Serv., Slop)	½		

For fixtures not listed, the minimum supply branch may be made the same as for a comparable fixture.

1213.4 Minimum Pressure.

Minimum, fairly constant, service pressure, at the point of outlet discharge shall be not less than 8 psi. for all fixtures except for direct flush-valves, for which it shall be not less than 15 psi., and except where special equipment is used requiring higher pressure. In determining the minimum pressure, allowance shall be made for the pressure drop due to friction loss in the piping system during maximum demand periods as well as head, meter, and other losses in the system.

1213.5 Auxiliary Pressure, Supplementary Tank.

If the residual pressure in the system is below the minimum allowable at the highest water outlet when the flow in the system is at peak demand, an automatically controlled pressure tank or gravity tank shall be installed, of sufficient capacity to supply sections of the building installation which are too high to be supplied directly from the public water main.

TABLE 12-A
Equivalent Fixture Units

(Includes Combined Hot and Cold Water Demand)

Fixture	Number of Fixture Units	
	Private Use	Public Use
Bar sink	1	2
Bathtub (with or without shower over)	2	4
Dental unit or cuspidor	—	1
Drinking fountain (each head)	—	1
Hose bibb or sill cock (standard type)	3	5
House trailer (each)	6	6
Laundry tub or clotheswasher (each pair of faucets)	2	4
Lavatory	1	2
Lavatory (dental)	1	1
Lawn sprinklers (standard type, each head)	1	1
Shower (each head)	2	4
Sink (bar)	1	2
Sink or dishwasher	2	4
Sink (flushing rim, clinic)	—	10
Sink (washup, each set of faucets)	—	2
Sink (washup, circular spray)	—	4
Urinal (pedestal or similar type)	—	10
Urinal (stall)	—	5
Urinal (wall)	—	5
Urinal (flush tank)	—	3
Water closet (flush tank)	3	5
*Water closet (flushometer valve)	6	10

Water supply outlets for items not listed above shall be computed at their maximum demand, but in no case less than

$\frac{3}{8}$ inch	1	2
$\frac{1}{2}$ inch	2	4
$\frac{3}{4}$ inch	3	6
1 inch	6	10

*See subsection (j) of Section 1213.1 for method of sizing flushometer valve installations using Table 12-B

TABLE 12-B

**FIXT Fixture Unit Table for Determining Water
PIPE Pipe and Meter Sizes for Flush Tank Systems**

Pressure Range—30 to 45 psi

Meter and Street Service	Building Supply & Branches		Maximum Allowable Length in Feet				
			40	60	80	100	150	200
3/4"	1/2" **	6	5	4	4	3	2
3/4"	3/4"	18	16	14	12	9	6
3/4"	1"	29	25	23	21	17	15
1"	1"	36	31	27	25	20	17
1"	1 1/4"	54	47	42	38	32	28
1 1/2"	1 1/4"	90	68	57	48	38	32
1 1/2"	1 1/2"	151	124	105	91	70	57
2"	1 1/2"	210	162	132	110	80	64
1 1/2"	2"	220	205	190	176	155	138
2"	2"	372	329	292	265	217	185
2"	2 1/2"	445	418	390	370	330	300

Pressure Range—46 to 60 psi

3/4"	1/2" **	9	8	7	6	5	4
3/4"	3/4"	27	23	19	17	14	11
3/4"	1"	44	40	36	33	28	23
1"	1"	60	47	41	36	30	25
1"	1 1/4"	102	87	76	67	52	44
1 1/2"	1 1/4"	168	130	106	89	66	52
1 1/2"	1 1/2"	270	225	193	167	128	105
2"	1 1/2"	360	290	242	204	150	117
1 1/2"	2"	380	360	340	318	272	240
2"	2"	570	510	470	430	368	318
2"	2 1/2"	680	640	610	580	535	500

Pressure Range—Over 60 psi

3/4"	1/2" **	11	9	8	7	6	5
3/4"	3/4"	34	28	24	22	17	13
3/4"	1"	63	53	47	42	35	30
1"	1"	87	66	55	48	38	32
1"	1 1/4"	140	126	108	96	74	62
1 1/2"	1 1/4"	237	183	150	127	93	74
1 1/2"	1 1/2"	366	311	273	240	186	154
2"	1 1/2"	490	395	333	275	220	170
1 1/2"	2"	*380	*380	*380	*380	370	335
2"	2"	*690	670	610	560	478	420
2"	2 1/2"	*690	*690	*690	*690	*690	650

*Maximum Allowable Load on Meter

**Building Supply—3/4" minimum

1213.6 Low Pressure Cut-Off.

When a booster pump is used on an auxiliary pressure system and the possibility exists that a pressure of 5 psi. or less may occur on the suction side of the pump, there shall be installed a low-pressure cut-off on the booster pump to prevent the creation of negative pressures on the suction side of the water system. Other arrangements may be used if found adequate and if approved as such by the Plumbing Official.

1213.7 Variable Street Pressures.

When the street main has a wide fluctuation in pressure during the day, the water-distribution system shall be designed for minimum pressure available.

1213.8 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.

1213.9 Water Pressure Valve or Regulators.

(a) Where the service water pressure to a building is excessive, an approved water pressure regulator with strainer shall be installed to reduce the pressure to the fixture. Sill cocks and outside hydrants may be left in full main pressure at the option of the owner. The pressure reducing valve shall be set to deliver at a pressure below 80 pounds per square inch, depending upon the building requirements.

(b) All brass castings in continuous contact with water shall conform to ASTM Specifications B62-63, composition bronze or ounce metal castings. All other parts in contact with the water shall be of approved materials suitable for service conditions to which exposed. The reducing valve seat shall be removable and shall be of nickel chrome stainless steel or other approved nickel alloy.

(c) Strainer bodies, which are separate from the valve body, may be gray iron castings and reducing valve bodies in sizes over 2" may be gray iron castings. All gray iron castings must be protected from corrosion by an approved protective coating.

(d) The delivery pressure variation shall not be more than 1 psig for every 10 psig pressure change in the inlet pressure. The reduced pressure fall-off from its no flow setting shall not exceed 17 psig and with a difference at this point of 50 pounds between the initial and this reduced flow pressure of 50 pounds, the capacity shall not be less than that shown in the table.

(e) Nominal Pipe Size	½"	¾"	1"	1¼"	1½"	2"
Avg. Vel./thru pipe in ft./sec.	10.5	10.0	9.5	9.0	8.5	7.5
Flow in GPM	9.95	16.65	25.0	42.0	54.8	77.5

(f) Provision shall be made to permit water on the building side of the reducing valve to flow back into the main when the building pressure exceeds the main supply pressure due to thermal expansion. Reducing valves with build-in by-pass check valves will be acceptable.

An integral by-pass check valve shall be capable of opening to permit a reverse flow of water through the reducing valve to prevent a build-up of system pressure by thermal expansion of the water with an increase of reduced pressure not exceeding 2 psi above the prevailing initial pressure.

(g) The valve shall be designed to fall open to permit uninterrupted water flow.

(h) All regulators and strainers must be so constructed and installed as to permit repair or removal of parts without breaking a pipe line or removing the valve and strainer from the pipe line.

1214 Hot-Water Distribution.

1214.1 Hot-Water Distribution Piping.

The sizing of the hot-water distribution piping shall conform to good engineering practice (See paragraph 1213.1).

1214.2 Hot Water Supply.

The hot water supply on any fixture requiring hot water shall be installed on the left side of the fixture unless otherwise specified by the manufacturer.

1215 Hot Water Tanks or Heaters and Safety Devices.

1215.1 General.

(a) All automatically fired water tanks shall be equipped with the following minimum controls and devices as applicable:

- (1) Operating temperature controls.
- (2) High Limit temperature control with maximum thermostetting of 210° F. (energy cut-off).
- (3) A positive flame failure cut-off.
- (4) Approved and listed burner and controls;
Gas-fired—American Gas Association.
Oil-fired—Underwriter's Laboratories.
- (5) An approved type pressure relief and temperature relief valves or and approved type combination thereof. New installations shall comply with General Statutes 66-27.1 (see appendix). Temperature relief ratings shall be in accordance with ASA standard Z21.22 (1958).

(b) No individual, firm, corporation, or business shall install, sell or offer for sale any automatic hot water tank or heater of 120 gallon capacity or less which does not have installed thereon by the manufacturer of such tank or heater an American Society of Mechanical Engineers and National Board of Boiler and Pressure Vessel Inspectors approved type pressure-temperature relief valve, and so labeled by the manufacturer's identification stamped or cast upon the tank or heater or upon a plate secured to it.

(c) Relief valves shall be connected to the top of the tank with the spindle vertical, if possible, either directly to a tapped or flanged opening in the tank, or to a fitting connected to the tank by a close nipple. The temperature sensing probe shall be actuated by the water within the top six inches of the tank and the relieving capacity of any one valve shall equal or exceed the heat (BTU's) input of the heater or to the storage tank. Relief Valve pressure setting shall not exceed the tank or heater manufacturer's rated working pressure and thermostetting shall not exceed 210° F. The outlet of a pressure, temperature, or other relief valve shall not be connected to the drainage system as a direct waste, but shall be piped to a floor drain or other safe location; discharge piping to be the same size as relief valve outlet or larger.

(d) For installation with a separate storage tank, relief valves shall be installed on the tank and there shall not be any type of valve installed between the water heater and the storage tank. When shut-off valves are provided between the heater and storage tank, additional approved type safety relief valve(s) shall be installed on the heater.

(e) Dip tubes, supply and hot water nipples, supply water baffles or heat traps when used in hot water supply storage tanks or heaters shall be constructed and tested to withstand a temperature of 400°F. without deteriorating in any manner, and the tank so labeled by the manufacturer.

(f) Copper or steel coil tube type hot water supply heaters which are not covered by the ASME Boiler Code that have been designed and constructed as safe as otherwise provided in the ASME Code and are AGA or U. L. approved shall be equipped with approved safety devices as required by this section.

(g) A hot water supply or storage tank, fired or unfired, shall not be used as a heating boiler.

(h) All storage tanks shall have clearly and indelibly stamped in metal, or so marked upon a plate welded thereto, or otherwise permanently attached, the maximum allowable working pressure. Such markings shall be in an accessible position 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.

(i) All electric, gas and oil water heaters must be approved and listed by nationally recognized testing laboratories such as A.G.A., U.L., etc.; and all hot water tanks (fired or unfired) shall bear the ASME label of approval when required. The maximum allowable working pressure of a tank or heater shall in no case exceed the pressure indicated by the manufacturer's identification stamped upon the tank or upon a plate secured to it.

(j) Flue Connection—Each fired tank or fired coil heater shall be equipped with a minimum three inch diameter vent pipe or flue connected to an approved gas vent or chimney meeting the requirements of the State Building Code.

1215.2

Tanks or heaters that exceed any of the following limitations shall meet the requirements of the ASME Boiler Code, Section VIII and con-

formity shall be certified by the inspection and stamping of the National Board of Boiler and Pressure Vessel Inspectors.

- (1) A heat input of 200,000 BTU's per hour.
- (2) A water temperature of 200°F.
- (3) A nominal water containing capacity of 120 gallons.

(a) Each hot water supply tank or heater of more than 120 gallon capacity shall have at least one officially-rated ASME and NB approved type pressure relief valve or at least one officially-rated ASME and NB approved type pressure-temperature relief valve of the automatic reseating type set to relieve at or below the maximum allowable working pressure of the tank. When more than one relief valve is used on either hot water heating or hot water storage tanks, the additional valve or valves shall be officially-rated ASME and NB approved type and shall be set within the range not to exceed 20% of the lowest pressure at which any valve is set. Relief valve shall be spring loaded without disc guides on the pressure side of the valve. Relief valves shall be so arranged that they cannot be reset to relieve at a higher pressure than the maximum permitted by this paragraph.

(b) Pressure reducing valves shall be used in the water supply to the heater or tank where the static water pressure exceeds 75% of the water working pressure of the heater or tank.

(c) There shall be a stop and check valve in the water supply to the tank or heater.

1216 Miscellaneous.

1216.1 Drain Cock.

All storage tanks shall be equipped with adequate drain cocks.

1216.2 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.

1216.3 Water Used for Processing.

Water used for cooling of 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.

CHAPTER XIII

DRAINAGE SYSTEM

1301 Materials.

1301.1 General.

Pipe, tubing, and fittings for drainage systems shall comply with the provisions in Chapter V.

1301.2 Specific Type.

Standards given in Table 505 apply to the specific materials approved for use and as indicated in the various paragraphs in this chapter as they apply to the drainage system.

1301.3 Above-Ground Piping Within Buildings and Piping in Race Ways or Tunnels.

Soil and waste piping for drainage system shall be cast iron, galvanized steel, galvanized wrought iron, lead, brass, borosilicate glass, ABS or PVC plastic pipe, when allowed by code and meeting the requirements of Table 505, copper pipe, or copper tube.

Cast iron soil pipe and fittings for soil, waste, vent conductors or building drains when above ground (unless otherwise specified) may be service weight.

(a) Vertical soil, waste and vent stacks shall be designed to control expansion and contraction, in accordance with accepted engineering practice, to the satisfaction of the administrative authority.

1301.4 Underground Piping Within Buildings.

All underground drains within buildings shall be cast iron soil pipe or lead or borosilicate glass, extra strength, enclosed in a polystyrene casing, or ABS or PVC plastic pipe (except under concrete slab), when allowed by Code, meeting the requirements of Table 505. For buildings six (6) stories or under in height, the underground pipe may be of service weight cast iron soil pipe, lead, extra strength borosilicate glass enclosed in polystyrene casing, or Type "L" copper.

For buildings over six (6) stories in height, the underground pipe may be extra heavy cast iron soil pipe, lead, extra strength borosilicate glass enclosed in polystyrene casing or Type "K" copper at the discretion of the design engineer.

(a) Acid soil and waste piping within buildings, when underground, shall be heavy schedule factory-protected Borosilicate Glass Drainline, five foot lengths, and either wrapped or coated fittings and couplings.

Black drainage and galvanized malleable fittings may be used on drainage, waste and vents with galvanized pipe.

1301.5 Fittings.

Fittings on the drainage system shall conform to the type of piping used. Fittings on screwed pipe shall be of the recessed drainage type. Black drainage and galvanized malleable fittings may be used on drainage, waste and vents with galvanized pipe. (See Section 404.)

1301.6 Acid Soil and Waste Piping.

Acid soil and waste piping for drainage systems shall be of a high silicon cast iron or other materials approved by the Administrative Authority. Fitting shall conform to the type of piping used. Acid soil and waste piping shall not be connected to the conventional plumbing system.

1302 Building Sewer.

1302.1 Separate Trenches.

The building sewer, when installed in a separate trench from the water-service pipe, shall be cast-iron sewer pipe, vitrified-clay sewer pipe, concrete sewer pipe, bituminized fiber sewer pipe, ABS or PVC or asbestos-cement sewer pipe. Joints shall be water-tight and rootproof and all materials shall be installed according to the manufacturer's recommendations. (See Appendix C). All pipe and fittings shall bear the manufacturer's name or trade mark. When water service and the building sewer or drain are in the same trench, the building sewer and/or drain shall be cast iron sewer pipe.

1302.2 Sewer in Filled Ground.

A building sewer or building drain installed in filled or unstable ground shall be of cast-iron pipe, except that nonmetallic drains may be laid upon the approved concrete pad if installed in accordance with paragraph 1302.1.

1302.3 Sanitary and Storm Sewers.

Where separate systems of sanitary drainage and storm drainage are installed in the same property, the sanitary and storm building sewers or drains may be laid side by side in one trench.

1302.4 Old House Sewers and Drains.

Old house sewers and house drains may be used in connection with new building or new plumbing and drainage work only when they are found, on examination and test, to conform in all respects to the requirements governing new house sewers, and the Plumbing Official shall notify the owner to make the changes necessary to conform to this Code.

1302.5

Cleanouts on building sewers shall be located as set forth under paragraph 704.

1303 Drainage Piping Installation.

1303.1 Horizontal Drainage Piping.

Horizontal drainage piping shall be installed at a uniform slope following the land surface contour but at slopes not less than permitted in paragraphs 1303.2, 1303.3, and 1303.4.

1303.2 Small Piping.

Horizontal drainage piping of 3-inch diameter and less shall be installed with a fall of not less than $\frac{1}{4}$ -inch per foot.

1303.3 Large Piping.

Horizontal drainage piping larger than 3-inch diameter shall be installed with a fall of not less than $\frac{1}{8}$ -inch per foot.

1303.4 Minimum Velocity.

Where conditions do not permit building drains and sewers to be laid with a fall as great as that specified, then a lesser slope may be permitted provided the computed velocity will not be less than 2 fps.

1304 Fixture Units.

1304.1 Values for Fixtures.

Fixture unit values as given in Table 1304.2 designate the relative load weight of different kinds of fixtures which shall be employed in estimating the total load carried by a soil waste pipe and shall be used in connection with the tables of sizes for soil, waste, and drain pipes for which the permissible load is given in terms of fixture units.

TABLE 1304.2 — FIXTURE UNITS PER FIXTURE OR GROUP

Fixture Type	Fixture-Unit Value as Load Factors	Minimum Size of Trap ² Inches
1 Bathroom group consisting of water closet, lavatory and bathtub or shower stall.	Tank water closet 6 Flush-valve water closet 8	
Bathtub ¹ (with or without over head shower).	2	1½
Bathtub ¹ .	3	2
Bidet.	3	Nominal 1½
Clothes washer (domestic)	3	2
Clothes washer (commercial)	See 1304.4	See 1304.3
Combination sink and tray.	3	1½
Combination sink and tray with food disposal unit.		Separate traps
Dental unit or cuspidor.	4	1½
Dental lavatory.	1	1¼
Dental lavatory.	1	1¼
Drinking fountain.	½	1
Dishwater ² domestic.	2	1½
Floor drains ³ .	1	2
Kitchen sink, domestic.	2	1½
Kitchen sink, domestic with food waste grinder.	3	1½
Lavatory ⁴ .	1	Small P.O. 1¼
Lavatory ⁴ .	2	Large P.O. 1½
Lavatory, barber, beauty parlor.	2	1½
Lavatory, surgeon's	2	1½
Laundry tray (1 or 2 compartments)	2	1½
Shower stall, domestic.	2	2
Showers (group) per head ² .	3	
Sinks.		
Surgeon's.	3	1½
Flushing rim (with valve).	8	3
Service (trap standard).	3	3
Service (P trap).	2	2
Pot, scullery, etc. ²	4	1½
Urinal, pedestal, syphon jet, blowout.	8	Nominal 3
Urinal, wall lip.	4	1½
Urinal stall, washout.	4	2
Urinal trough ² (each 2-ft. section)	2	1½
Wash sink ² (circular or multiple). each set of faucets.	2	Nominal 1½
Water closet, tank-operated.	4	Nominal 3
Water closet, valve-operated.	8	3

¹A shower head over a bathtub does not increase the fixture value.

²See Pars. 1304.3 and 1304.4 for methods of computing unit value of fixtures not listed in Table 1304.2 or for rating of devices with intermittent flows.

³Size of floor drain shall be determined by the area of surface water to be drained.

⁴Lavatories with 1¼ or 1½-inch trap have the same load value; larger P.O. plugs have greater flow rate.

1304.3

Fixtures not listed in Table 1304.2 shall be estimated in accordance with Table 1304.3.

TABLE 1304.3

Fixture Drain or Trap Size	Fixture-Unit Value
1¼-inches and smaller	1
1½-inches	2
2-inches	3
2½-inches	4
3-inches	5
4-inches	6

1304.4 Values for Continuous Flow.

For a continuous or semicontinuous flow into a drainage system, such as from a pump, pump ejector, air-conditioning equipment, or similar device, two fixture units shall be allowed for each gallon-per-minute of flow.

1305 Determination of Sizes for the Drainage System.

1305.1 Maximum Fixture-Unit Load.

The maximum number of fixture units that may be connected to a given size of building sewer, building drain, horizontal branch, or vertical soil or waste stack is given in Tables 1305.2 and 1305.3.

TABLE 1305.2 — BUILDING DRAINS AND SEWERS

Diameter of Pipe	Maximum Number of Fixture-Units that may be Connected to Any Portion ¹ of the Building Drain or the Building Sewer ³			
	Fall Per Foot			
	1/16-Inch	1/8-Inch	1/4-Inch	1/2-Inch
Inches				
2			21	26
2½			24	31
3		20 ²	27 ²	36 ²
4		180	216	250
5		390	480	575
6		700	840	1,000
8	1,400	1,600	1,920	2,300
10	2,500	2,900	3,500	4,200
12	3,900	4,600	5,600	6,700
15	7,000	8,300	10,000	12,000

¹Includes branches of the building drain.

²Not over two water closets.

³No building drain or sewer shall be less than 4-inches in size.

**TABLE 1305.3 — HORIZONTAL FIXTURE BRANCHES
AND STACKS**

Diameter of Pipe	Maximum No. of Fixture Units That May Be Connected To:			
	Any Horizontal ¹ Fixture Branch	One Stack of 3 Stories in Height or 3 Intervals	More Than 3 Stories In Height	
			Total for Stack	Total at One Story or Branch Interval
Inches				
1¼	1	2	2	1
1½	3	4	8	2
2	6	10	24	6
2½	12	20	42	9
3	20 ²	30 ³	60 ³	16 ²
4	160	240	500	90
5	360	540	1,100	200
6	620	960	1,900	350
8	1,400	2,200	3,600	600
10	2,500	3,800	5,600	1,000
12	3,900	6,000	8,400	1,500
15	7,000	.....	.....	.....

¹Does not include branches of the building drain.

²Not over two water closets.

³Not over six water closets.

1305.4 Minimum Size of Soil and Waste Stacks.

No soil or waste stack shall be smaller than the largest horizontal branch connected thereto except that a 4 x 3 W.C. connection shall not be considered as a reduction in pipe size.

1305.5 Minimum Size of Stack-Vent or Vent Stack.

Any structure to which a building drain is installed shall have at least one stack-vent or vent stack carried through the roof, size to be determined by Table 1305.3 and 1421.5, but not less than 3 inches diameter permitted.

1305.6 Future Fixtures.

When provision is made for the future installation of fixtures, those provided for shall be considered in determining the required sizes of drain pipes. Construction to provide for such future installation shall be terminated with a plugged fitting or fittings at the stack so as to form no dead end.

1305.7 Underground Drainage Piping.

No portion of the drainage system installed underground or below a basement or cellar shall be less than 2-inches in diameter.

1306 Offsets on Drainage Piping.

1306.1 Offsets of 45 Deg. or Less.

An offset in a vertical stack, with a change of direction of 45 deg. or less from the vertical, may be sized as a straight vertical stack. In case a horizontal branch connects to the stack within 2-feet above or below the offset, a relief vent shall be installed in accordance with paragraph 1418.3.

1306.2 Waste Stacks Serving Kitchen Sinks.

In a one or two family dwelling only in which the waste stack or vent receives the discharge of a kitchen type sink and also serves as a vent for fixtures connected to the horizontal portion of the branch served by the waste stack, the minimum size of the waste stack up to the highest sink branch connection shall be 2-inches in diameter. Above that point the size of the stack shall be governed by the total number of fixture units vented by the stack.

1306.3 Above Highest Branch.

An offset above the highest horizontal branch is an offset in the stack-vent and shall be considered only as it affects the developed length of the vent.

1306.4 Below Lowest Branch.

In the case of an offset in a soil or waste stack below the lowest horizontal branch, no change in diameter of the stack because of the offset shall be required if it is made at an angle of not greater than 45 deg. If such an offset is made at an angle greater than 45 deg., the required diameter of the offset and the stack below it shall be determined as for a building drain. (Table 1305.2.)

1306.5 Offsets of More Than 45 Deg.

A stack with an offset of more than 45 deg. from the vertical shall be sized as follows:

The portion of the stack above the offset shall be sized as for a regular stack based on the total number of fixture units above the offset.

The offset shall be sized as for a building drain. (Table 1305.2, Column 5.)

The portion of the stack below the offset shall be sized as for the offset or based on the total number of fixture units on the entire stack, whichever is the larger. (See Table 1305.3, Column 4.)

A relief vent for the offset shall be installed as provided in Chapter 12 and in no case shall the horizontal branch connect to the stack with 2-feet above or below the offset.

1307 Sumps and Ejectors.

1307.1 Building Drains Below Sewer.

Building drains which cannot be discharged to the sewer by gravity flow shall be discharged into a tightly covered and vented sump from which

the liquid shall be lifted and discharged into the building gravity drainage system by automatic pumping equipment or by any equally efficient method approved by the Plumbing Official.

1307.2 Storage Period.

The storage of drainage in a sump or ejector shall not exceed a period of 12 hours.

1307.3 Design.

Sump and pumping equipment shall be so designed as to discharge all contents accumulated in the sump during the cycle of emptying operation.

1307.4 Venting.

The system of drainage piping below the sewer level shall be installed and vented, in a manner similar to that of the gravity system.

1307.5 Duplex Equipment.

Sumps receiving the discharge of more than six water closets shall be provided with duplex pumping equipment.

1307.6 Vent Sizes.

Building sump vents shall be sized in accordance with Table 1421.5 but shall in no case be sized less than 1½-inches.

1307.7 Separate Vents.

Vents from pneumatic ejectors or similar equipment shall be carried separately to the open air as a vent terminal.

1307.8 Connections.

No direct connection of a steam exhaust, blowoff, or drip pipe shall be made with the building drainage system. Waste water when discharged into the building drainage system shall be at a temperature not higher than 140 F. When higher temperature exists, proper cooling methods shall be provided.

1308 Floor Drains.

1308.1 Accessibility.

Floor drains shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The drain inlet shall be so located that it is, at all times, in full view.

1308.2 Connection.

Floor drains subject to backflow shall not be directly connected to the drainage system, or shall be provided with a backwater valve.

1308.3 Provision for Evaporation.

Floor-drain trap seals subject to evaporation shall be of the deep-seal type of not less than 4-inch water seal, or shall be fed from an approved plumbing fixture or by means of an approved automatic priming device designed and approved for that purpose.

1308.4 Venting.

Floor drains need not be individually vented when sized according to Par. 1422.2.

1308.5 Size.

Floor-drain traps and drains, installed below a basement floor or underground, shall be not less than 2-inches in diameter.

1308.6 Bell Traps.

Bell traps shall not be permitted.

1309 Frost Protection.

1309.1

No soil or waste pipes shall be installed or permitted outside of a building, or concealed in outside walls or in any place where they may be subjected to freezing temperatures, unless adequate provision is made to protect them from frost.

CHAPTER XIV

VENTS AND VENTING

1401 Materials.

1401.1 Vents.

Pipe, tubing, and fittings for the vent piping system shall comply with the provisions in Chapter V.

1401.2 Specific Type.

Standards given in Table 505 apply to the specific materials approved for use and as indicated in the various paragraphs in this chapter as they apply to the venting system.

1401.3 Piping Above Ground.

Vent piping shall be cast iron, galvanized steel, galvanized wrought iron, lead, brass or copper pipe, or copper tube.

1401.4 Piping Underground.

Vent piping placed underground shall be cast iron or copper tube of a weight not less than that of copper water tube Type L; provided that other materials may be used for underground vents when found adequate and installed as directed by the Plumbing Official. Where threaded joints are approved for use underground, they shall be coated and wrapped after installation and test.

1401.5 Fittings.

Fittings shall conform to the type of pipe used in the vent system as required by paragraph 1401.2 and 1401.3. Black drainage and galvanized malleable fittings may be used on drainage, waste and vent with galvanized pipe.

1401.6 Acid System.

Vent piping on acid-waste systems shall conform to that required for acid-waste pipe, Section 1301.3.

1402 Protection of Trap Seals.

1402.1 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.

1403 Vent Stacks.

1403.1 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.

1403.2 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.

1403.3 Main Stack.

Every building in which plumbing is installed shall have at least one main vent stack or stack vent, which shall run undiminished in size and as directly as possible, from the building drain through to the open air above the roof. Vents shall be sized according to Table 1421.2 and be not less than 3-inches in diameter.

1404 Vent Terminals.

1404.1 Roof Extension.

Extensions of vent pipes through a roof shall be terminated at least 6-inches above it except that 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.

1404.2 Flashings.

Each vent terminal shall be made watertight with the roof by proper flashing.

1404.3 Flag Poling.

Vent terminals shall not be used for the purpose of flag poling, TV aerials, or similar purposes, except when the piping has been anchored to the construction and approved as safe by the Plumbing Official.

1404.4 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.

1404.5 Extensions Through Wall.

Vent terminals extending through a wall, when approved by the Plumbing Official, 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 paragraph 1404.5. Vent terminals shall not terminate under the overhang of the building.

1405 Frost Closure.

1405.1 Vent Terminal.

Where there is a possibility of frost closure, the vent extension through a roof shall be at least 3-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.

1405.2 Increaseers.

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

1406 Vent Grades and Connections.

1406.1 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.

1406.2 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 deg. 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. Vents from floor drains and island fixtures, except kitchen sinks, are not required to extend above the flood level rim of the fixture.

1406.3 Height Above Fixtures.

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 fixture 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.

1406.4 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.

1407 Bars and Soda Fountain Sinks.

1407.1 Bars 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.

1407.2 Sumps.

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

1408 Fixtures Back-to-Back.

1408.1 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. (See paragraph 1410.2.)

1409 Fixture Vents.

1409.1 Distance of Trap from Vent.

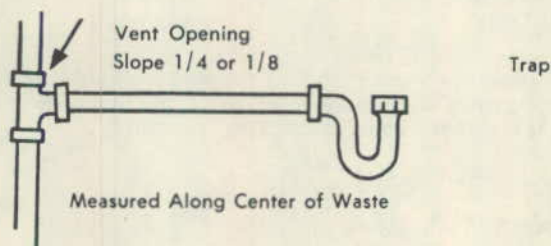
Each fixture trap shall have a protecting vent so located that the slope and the developed length in the fixture drain from the trap weir to the vent fitting are within the requirements set forth in Table 1409.3.

1409.2 Trap-Seal Protection.

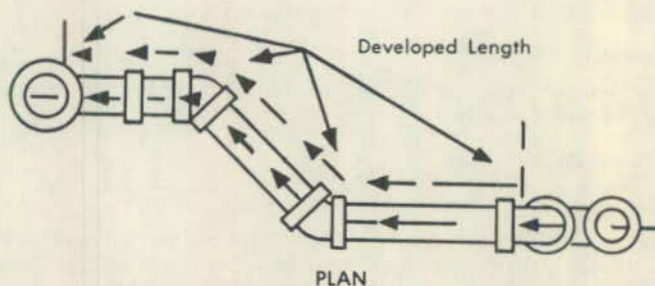
The plumbing system shall be provided with a system of vent piping which will permit the admission or emission of air so that under normal and intended use the seal of any fixture trap shall not be subjected to a pressure differential of more than 1-inch of water.

TABLE 1409.3 — DISTANCE OF FIXTURE TRAP FROM VENT

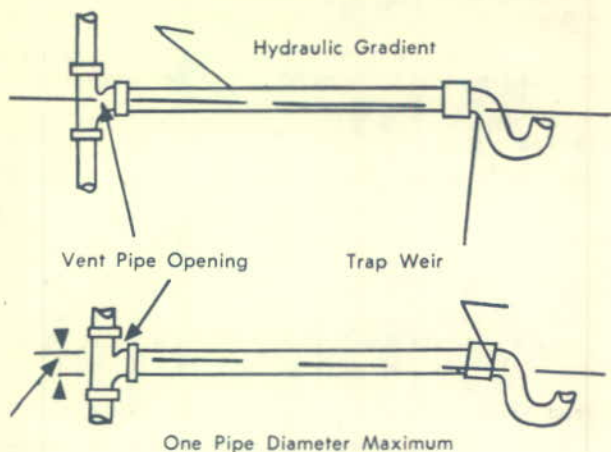
Size of Fixture Drain Inches	Distance Trap to Vent
1¼	2 ft. 6 in.
1½	3 ft. 6 in.
2	5 ft. 0 in.
3	6 ft. 0 in.
4	10 ft. 0 in.



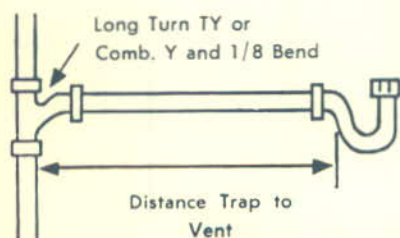
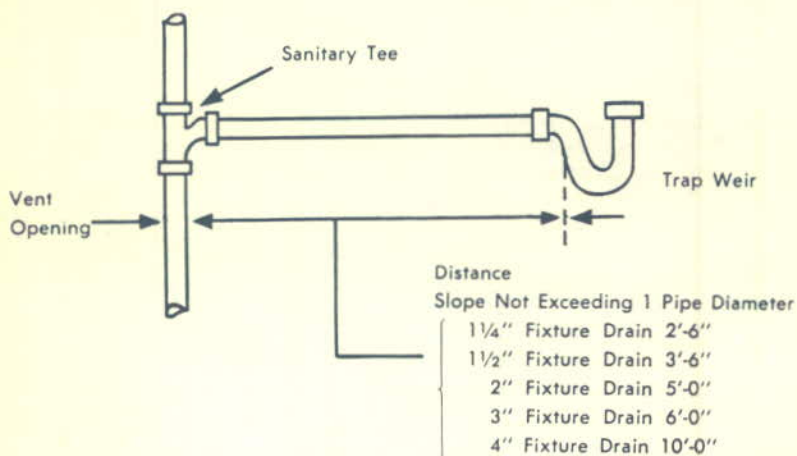
SECTION



DEVELOPED LENGTH MEASUREMENT



SLOPE MEASUREMENT



Size of Fixture Drain (Inches)	Length In Feet	
	1/4" Slope	1/2" Slope
1 1/4	1'-6"	1'-0"
1 1/2	2'-6"	2'-0"
2	4'-6"	4'-0"
3	6'-0"	6'-0"
4	8'-0"	8'-0"

1409.4 Trap Dip.

The vent pipe opening from a soil or waste pipe, except for water closets, urinals and similar fixtures, shall not be below the top weir of the trap.

1409.5 Crown Vent.

No back vent shall be installed within two pipe diameters of the trap weir.

1410 Common Vent.

1410.1 Individual Vent.

An individual vent may be used as a common vent for two fixture traps when both fixture drains connect with a vertical drain or a horizontal drain at the same level providing proper fittings are used.

1410.2 Common Vent.

A common vent may be used for two fixtures set on the same floor level but connecting at different levels in the stack, provided the vertical drain is one pipe size larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger and that both drains conform to Table 1409.3.

1411 Vents for Fixture Trap Below Trap Dip.

1411.1 Hydraulic Gradient.

Fixture drains shall be vented within the hydraulic gradient between the trap outlet and vent connection, but in no case shall the unvented drain exceed the distance provided for in Table 1409.3.

1411.2 Different Levels.

If any stack has fixtures entering at different levels, the fixtures other than the fixture entering at the highest level shall be vented, except as may be permitted in other sections of this chapter.

1412 Wet Venting.

1412.1 Single Bathroom Groups.

A single bathroom group of fixtures may be installed with the drain from a back-vented lavatory, kitchen sink, or combination fixture serving as a wet vent for a bathtub or shower stall and for the water closet, provided that:

- (a) Not more than one fixture unit is drained into a 1½-inch diameter wet vent or not more than four fixture units drain into a 2-inch diameter wet vent.
- (b) The horizontal branch connects to the stack at the same level as the water-closet drain or below the water-closet drain when installed on the top floor. It may also connect to the water-closet bend.

1412.2 Double Bath.

Bathroom groups back-to-back on top floor consisting of two lavatories and two bathtubs or shower stalls may be installed on the same horizontal

branch with a common vent for the lavatories and with no back vent for the bathtubs or shower stalls and for the water closets, provided the wet vent is 2-inches in diameter, and the length of the fixture drain conforms to Table 1409.3.

1412.3 Multistory Bathroom Groups.

On the lower floors of a multistory building, the waste pipe from one or two lavatories may be used as a wet vent for one or two bathtubs or showers provided that:

- (a) The wet vent and its extension to the vent stack is not less than 2-inches in diameter, and that,
- (b) Each water closet below the top floor is individually back vented, and that,
- (c) The vent stack is sized as given in Table 1412.3c.

TABLE 1412.3c — SIZE OF VENT STACKS

Number of Wet-Vented Fixtures	Diameter of Vent Stacks Inches
1 or 2 bathtubs or showers	2
3 to 5 bathtubs or showers	2½
6 to 9 bathtubs or showers	3
10 to 16 bathtubs or showers	4

1412.4 Exception.

In multistory bathroom groups, wet vented in accordance with paragraph 1412.3, the water closets below the top floor need not be individually vented if the 2-inch waste connects directly into the water closet bend at a 45 deg. angle to the horizontal portion of the bend in the direction of flow.

1413 Stack Venting.

1413.1 One-Bathroom Group.

Except as indicated in paragraph 1413.2, a group of fixtures, consisting of one bathroom group and a kitchen sink or combination fixture, may be installed without individual fixture vents, in a one-story building or on the top floor of a building, provided each fixture drain connects independently to the stack and the water closet and bathtub or shower-stall drain enters the stack at the same level and in accordance with the requirements in Table 1409.3.

1413.2 Overtaxed Sewers.

When a sink or combination fixture connects to the stack-vented bathroom group, and when the street sewer is sufficiently overloaded to cause frequent submersion of the building sewer, a relief vent or back-vented fixture shall be connected to the stack below the stack-vented water closet or bathtub.

1414 Individual Fixture Reventing.

1414.1 Horizontal Branches.

One sink and one lavatory, or three lavatories within 5-feet developed length of a main-vented line may be installed on a 2-inch horizontal waste branch without reventing, provided the branch is not less than 2-inches in diameter throughout its length, and provided the wastes are connected into the side of the branch and the branch leads to its stack connection with a pitch of not more than $\frac{1}{4}$ -inch per foot.

1414.2 Where Required.

When fixtures other than water closets discharge downstream from a water closet, each fixture connecting downstream shall be individually vented, except as permitted in 1410.1.

1414.3 Limits of Fixture Units Above Bathtubs and Water Closets.

A fixture or combination of fixtures whose total discharge rating is not more than 3 fixture units may discharge into a stack not less than 3-inches in diameter without reventing, provided such fixture connections are made above the connection to the highest water closet, or bathtub tee-wye, the fixture-unit rating of the stack is not otherwise exceeded, and their waste piping is installed as otherwise required in paragraph 1414.1.

1415 Circuit and Loop Venting.

1415.1. Battery Venting.

A branch soil or waste pipe to which two but not more than eight water closets (except blowout type), pedestal urinals, trap standard to floor, shower stalls, or floor drains are connected in battery, may 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.

1415.2 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 (except water closets) discharge above the horizontal branch, each such fixture shall be vented.

1415.3 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.

1415.4 Fixtures Back-to-Back in Battery.

When fixtures are connected to one horizontal branch through a double wye or a sanitary tee 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.

1416 Pneumatic Ejectors.

1416.1

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.

1417 Relief Vents.

1417.1 Stacks of More Than 10 Branch Intervals.

Soil and waste stacks in buildings having more than 10 branch intervals shall be provided with a relief vent at each tenth interval installed, beginning with the top floor. The size of the relief vent shall be equal to the size of the vent stack to which it connects. The lower end of each relief vent shall connect to the soil or waste stack through a wye below the horizontal branch serving the floor and the upper end shall connect to the vent stack through a wye not less than 3-feet above the floor level.

1418 Offsets at an Angle Less Than 45 Deg. from the Horizontal in Buildings of Five or More Stories.

1418.1 Offset Vents.

Offsets less than 45 deg. from the horizontal, in a soil or waste stack, except as permitted in Chapter XIII, Section 1306, shall comply with paragraphs 1418.2 and 1418.3.

1418.2 Separate Venting.

Such offsets may be vented as two separate soil or waste stacks, namely, the stack section below the offset and the stack section above the offset.

1418.3 Offset Reliefs.

Such offsets may be vented by installing a relief vent as a vertical continuation of the lower section of the stack or as a side vent connected to the lower section between the offset and next lower fixture or horizontal branch. The upper section of the offset shall be provided with a yoke vent. The diameter of the vents shall not be less than the diameter of the main vent, or of the soil and waste stack, whichever is the smaller.

1419 Main Vents to Connect at Base.

1419.1

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.

1420 Vent Headers.

1420.1 Connections 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 1421.5, the number of units being the sum of all units on all stacks connected 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.

1421 Size and Length of Vents.

1421.1 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.

1421.2 Size of Individual, Relief, and Circuit or Loop Vents.

The diameter of an individual, relief, circuit or loop vent shall not be less than one-half the pipe size of the line it is venting, but in no case less than 1¼-inches and shall be determined from its length and the total of fixture units connected thereto, as provided in Table 1421.2. Twenty percent of the total length may be installed in a horizontal position.

1421.3 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.

1421.4 Size of Circuit or Loop Vent.

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

1421.5 Size of Vent Piping.

The nominal size of vent piping shall be determined from its length and the total of fixtures units connected thereto, as provided in Table 1421.5, except that for water closets and similar fixtures, the diameter of the vent serving such fixture shall not be less than 2" (inches). Twenty percent of the total length may be installed in a horizontal position.

TABLE 1421.5 — SIZE AND LENGTH OF VENTS

Size of Soil or Waste Stack	Fixture Units Connected	DIAMETER OF VENT REQUIRED (INCHES)																		
		1 ¼	1 ½	2	2 ½	3	4	5	6	8										
Inches		MAXIMUM LENGTH OF VENT (FEET)																		
1 ¼	2	30																		
1 ½	8	50																		
1 ½	10	30	150																	
2	12	30	75	200																
2	20	26	50	150																
2 ½	42		30	100	300															
3	10		30	100	200	600														
3	30			60	200	500														
3	60			50	80	400														
4	100			35	100	260	1000													
4	200			30	90	250	900													
4	500			20	70	180	700													
5	200				35	80	350													
5	500																			
5	1100				30	70	300	1000												
6	350				20	50	200	900												
6	620				25	50	200	700												
6	960				15	30	125	400												
6	1900																			
6	600																			
8	1400																			
8	2200																			
8	3600																			
10	1000																			
10	2500																			
10	3800																			
10	5600																			

1422 Combination Waste-and-Vent System.

1422.1 Where Permitted.

A combination waste-and-vent system shall be permitted only where structural conditions preclude the installation of conventional system as otherwise provided in this Code.

1422.2 Limits.

A combination waste-and-vent system is limited to floor drains and sinks. It consists of an installation of waste piping in which the trap of the fixture is not individually vented. Every waste pipe and trap in the system shall be at least two pipe sizes larger than the size required in Chapter XIII.

CHAPTER XV

STORM DRAINS

1501 General.

1501.1 Drainage Required.

Roofs, paved areas, yards, courts, and courtyards, shall be drained into a storm-sewer system or a combined-sewer system where such systems are available.

1501.2 Prohibited Drainage.

Storm water shall not be drained into sewers intended for sewage only.

1501.3 Traps.

Leaders and storm drains, when connected to a combined sewer, shall be trapped.

1501.4 Expansion Joints.

Expansion joints or sleeves shall be provided where warranted by temperature variations or physical conditions.

1501.5 Subsoil Drains.

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 or asbestos cement pipe, or ABS or PVC plastic pipe, when allowed by Code, meeting the requirements of Table 505 may be accepted, not less than 4-inches in diameter. When the building is subject to back-water, the subsoil drain shall be protected by an accessibly located back-water valve. Subsoil drains may discharge into a properly trapped area drain or sump. Such sumps do not require vents.

1501.6 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.

1502 Materials.

1502.1 Inside Conductors.

Conductors placed within a building or run in a vent or pipe shaft shall be of cast-iron, galvanized steel, galvanized wrought-iron, galvanized ferrous alloys, brass, copper, or lead or ABS or PVC plastic pipe, when allowed by Code, meeting the requirements of Table 505 may be accepted.

1502.2 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 finish grade, or the sheet-metal leader shall be protected against injury.

1502.3 Underground Storm Drains.

Building storm drains underground, inside the building, shall be of cast-iron soil pipe or Type "L" copper water tube.

1502.4 Building Storm Drains.

Building storm drains underground, inside the building, when not connected with a sanitary or combined sewer shall be of cast-iron soil pipe, Type "L" copper water tube or ferrous-alloy piping except that when approved by the Plumbing Authorities, vitrified-clay pipe, concrete pipe, ABS or PVC plastic pipe, when allowed by Code, meeting the requirements of Table 505, bituminized-fiber pipe and asbestos-cement pipe, may be used.

1502.5 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 ABS or PVC plastic pipe, when allowed by Code, meeting the requirements of Table 505.

1503 Traps.

1503.1 Main Trap.

Individual storm-water traps shall be installed on the storm-water drain branch serving each conductor, or a single trap shall be installed in the main storm drain just before its connection with the combined building sewer, main drain, or public sewer.

1503.2 Material.

Storm-water traps, when required, shall be of cast-iron.

1503.3

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

1503.4

Traps for individual conductors shall be the same size as the horizontal drain to which they are connected.

1503.5

Conductor traps shall be so located that an accessible cleanout may be installed on the building side of the trap.

1504 Conductors and Connections.

1504.1

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

1504.2

Rain-water conductors, installed along alley ways, 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.

1504.3 Combining Storm with Sanitary Drainage.

The sanitary and storm-drainage system of a building shall be entirely separate, except that where a combined sewer is available the building storm-drain may be connected in the same horizontal plane through a single Y fitting to the combined drain or sewer at least 10-feet downstream from any soil stack.

1504.4 Double Connections of Storm-Drains.

Where the sanitary and storm-drains are connected on both sides of the combined sewer, single Y's shall be used and the requirements of paragraph 1504.3 relative to the location of connections shall also apply.

1504.5

Floor drains connected to a storm-drain shall be trapped.

1505 Roof Drains.

1505.1 Material.

Roof drains shall be of cast-iron, copper, lead, ABS or PVC plastic meeting the requirements of Table 505 or other acceptable corrosion-resisting material with adequate strainer area.

1505.2 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 drain. 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.

1505.3 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 2 times the area of the conductor or leader to which the drain is connected.

1505.4 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.

1506 Size of Leaders and Storm-Drains.

1506.1

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

TABLE 1506.1 — SIZE OF VERTICAL LEADERS

Size of Leader or Conductor ¹ Inches	Maximum Projected Roof Area Square Feet
2	720
2½	1300
3	2200
4	4600
5	8650
6	13500
8	29000

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

NOTE: See footnote to Table 1506.2.

1506.2 Building Storm-Drain.

The size of the building storm-drain or any of its horizontal branches having a slope of ½-inch or less per foot, shall be based upon the maximum projected roof area to be handled according to the following Table:

TABLE 1506.2 — SIZE OF HORIZONTAL STORM DRAINS

Diameter of Drain Inches	Maximum Projected Roof Area for Drains of Various Slopes		
	1/8-In. Slope Square Feet	1/4-In. Slope Square Feet	1/2-In. Slope Square Feet
3	822	1160	1644
4	1880	2650	3760
5	3340	4720	6680
6	5350	7550	10700
8	11500	16300	23000
10	20700	29200	41400
12	33300	47000	66600
15	59500	84000	119000

Tables 1506.1 and 1506.2 are based upon a maximum rate of rainfall of 4-inches per hour. If in any state, city, or other political subdivision, the maximum rate of rainfall is more or less than 4-inches per hour, then the figures for roof area must be adjusted proportionately by multiplying the figure by 4 and dividing by the maximum rate of rainfall in inches per hour.

1506.3 Roof Gutters.

The size of semicircular gutter shall be placed on the maximum projected roof area, according to the following Table:

TABLE 1506.3 — SIZE OF GUTTERS

Diameter of Gutter ¹	Maximum Projected Roof Area for Gutters of Various Slopes			
	1/16-In. Slope	1/8-In. Slope	1/4-In. Slope	1/2-In. Slope
Inches	Square Feet	Square Feet	Square Feet	Square Feet
3	170	240	340	480
4	360	510	720	1020
5	625	880	1250	1770
6	960	1360	1920	2770
7	1380	1950	2760	3900
8	1990	2800	3980	5600
10	3600	5100	7200	10000

¹Gutters other than semicircular may be used provided they have an equivalent cross-sectional area.

1507 Size of Combined Drains and Sewers.

1507.1

Conversion of roof area to fixture units of storm drains may be connected to a combined sewer. The drainage area may be converted to equivalent fixture unit loads.

1507.2

When the total fixture unit load on the combined drain is less than 256 fixture units, the equivalent drainage area in horizontal projection shall be taken as 1000 square feet.

1507.3

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

1507.4

If the rainfall to be provided for is more or less than 4-inches per hour, the 1000 square foot equivalent in paragraph 1507.2 and the 3.9 in paragraph 1507.3 shall be adjusted by multiplying by 4 and dividing by the rainfall per hour to be provided for.

1508 Values for Continuous Flow.

1508.1

Where there is a continuous or semicontinuous discharge into the building storm-drain or building storm sewer, as from a pump, ejector, air-conditioning plant, or similar device, each gallon per minute of such discharge shall be computed as being equivalent to 24 square feet of roof area, based upon a 4-inch rainfall.

CHAPTER XVI

GAS PIPING

1601 Gas Piping.

Gas piping shall conform to standards set forth in National Fire Protection Association Pamphlet Number 54 entitled "Gas Appliances and Gas Piping, Installation of." (See Gas Piping Standards printed in back of this Volume.)

APPENDIX A

(Taken from Uniform Plumbing Code, published by
Western Plumbing Officials Association.)

RECOMMENDED RULES FOR SIZING THE WATER SUPPLY SYSTEM

Because of the variable conditions encountered it is impractical to lay down definite detailed rules of procedure for determining the sizes of water supply pipes in an appendix which must necessarily be limited in length. For a more adequate understanding of the problems involved, the reader is referred to Water-Distributing Systems for Buildings, Report BMS 79 of the National Bureau of Standards; and Plumbing Manual, Report BMS 66, also published by the National Bureau of Standards.

The following is a suggested order of procedure for sizing the water supply system.

A1 Preliminary information.

A1.1 Obtain the necessary information regarding the minimum daily service pressure in the area where the building is to be located.

A1.2 If the building supply is to be metered, obtain information regarding friction loss relative to the rate of flow for meters in the range of sizes likely to be used. Friction-loss data can be obtained from most manufacturers of water meters. Friction losses for disk type meters may be obtained from Chart A-1.

A1.3 Obtain all available local information regarding the use of different kinds of pipe with respect both to durability and to decrease in capacity with length of service in the particular water supply.

A2 Demand load.

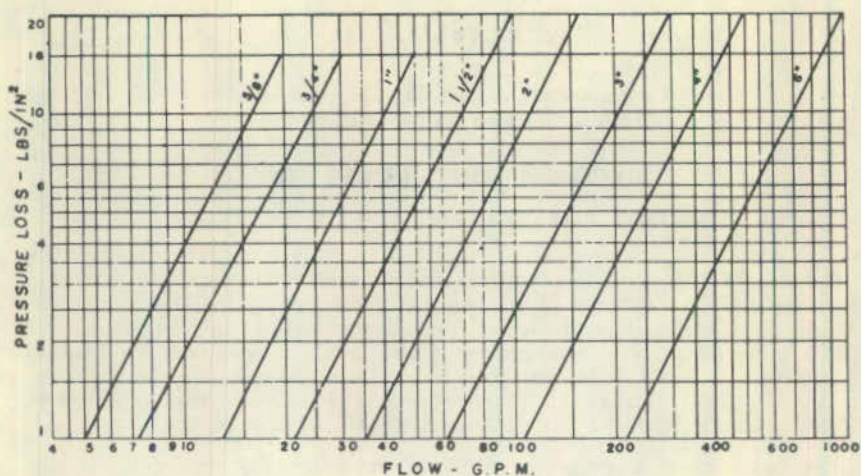
A2.1 Estimate the supply demand for the building main and the principal branches and risers of the system by totaling the fixture units on each, Table A-2, and then by reading the corresponding ordinate from Chart A-2 or A-3, whichever is applicable.

A2.2 Estimate continuous-supply demands in gallons per minute for lawn sprinklers, air conditioners, etc., and add the sum to the total demand for fixtures. The result is the estimated supply demand for the building supply.

A3 Permissible friction loss.

A3.1 Decide what is the desirable minimum pressure that should be maintained at the highest fixture in the supply system. If the highest group of fixtures contains flush valves, the pressure for the group should not be less than fifteen (15) psi. For flushtank supplies, the available pressure may be not less than eight (8) psi.

CHART A-1



A3.2 Determine the evaluation of the highest fixture or group of fixtures above the water (street) main. Multiply this difference in elevation by forty-three hundredths (0.43). The result is the loss in static pressure in psi (pounds per square inch).

A3.3 Subtract the sum of loss in static pressure and the pressure to be maintained at the highest fixture from the average minimum daily service pressure. The result will be the pressure available for friction loss in the supply pipes, if no water meter is used. If a meter is to be installed, the friction loss in the meter for the estimated maximum demand should also be subtracted from the service pressure to determine the pressure loss available for friction loss in the supply pipes.

A3.4 Determine the developed length of pipe from the water (street) main to the highest fixture. If close estimates are desired, compute with the aid of Table A-3 the equivalent length of pipe for all fittings in the line from the water (street) main to the highest fixture and add the sum to the developed length. The pressure available for friction loss in pounds per square inch, divided by the developed lengths of pipe from the water (street) main to the highest fixture, times one hundred (100), will be the average permissible friction loss per one hundred (100) foot length of pipe.

A4 Size of building supply.

A4.1 Knowing the permissible friction loss per one hundred (100) feet of pipe and the total demand, the diameter of the building supply pipe may be obtained from Charts A-4, A-5, A-6 or A-7, whichever is applicable.

TABLE A-2

Demand weight of fixtures in fixture units¹

Fixture type ²	Weight in fixture units ³		Minimum cold water	Connections—hot water
	Private	Public		
Bathtub ⁴	2	4	1/2	1/2
Bedpan washer		10	1	
Bidet	2	4	1/2	1/2
Combination sink and tray	3		1/2	1/2
Dental unit or cuspidor		1	3/8	
Dental lavatory	1	2	1/2	1/2
Drinking fountain	1	2	3/8	
Kitchen sink	2	4	1/2	1/2
Lavatory	1	2	3/8	3/8
Laundry tray (1 or 2 compartments)	2	4	1/2	1/2
Shower, each head ⁴	2	4	1/2	1/2
Sink: Service	2	4	1/2	1/2
Urinal, pedestal		10	1	
Urinal (wall lip)		5	1/2	
Urinal stall		5	3/4	
Urinal with flush tank		3		
Urinal trough (for every 2 foot section)		2	1/2	
Wash sink, circular or multiple (each set of faucets)		2	1/2	1/2
Water closet:				
F.V.	6	10	1	
Tank	3	5	3/8	

¹ For supply outlets likely to impose continuous demands, estimate continuous supply separately and add to total demand for fixtures.

² For fixtures not listed, weights may be assumed by comparing the fixture to a listed one using water in similar quantities and at similar rates.

³ The given weights are for total demand for fixtures with both hot and cold water supplies. The weights for maximum separate demands may be taken as seventy-five (75) per cent of the listed demand for the supply.

⁴ Shower over bath tub does not add fixture unit to group.

TABLE A-3

**Allowance in equivalent length of pipe for friction loss
in valves and threaded fittings.***

Diameter of fitting (inches)	Equivalent length of pipe for various fittings						
	90° stand- ard elbow	45° stand- ard elbow	stand- ard T 90°	Coup- ling or straight run of T	Gate valve	Globe valve	Angle valve
	Feet	Feet	Feet	Feet	Feet	Feet	Feet
3/8	1	0.6	1.5	0.3	0.2	8	4
1/2	2	1.2	3	.6	.4	15	8
3/4	2.5	1.5	4	.8	.5	20	12
1	3	1.8	5	.9	.6	25	15
1 1/4	4	2.4	6	1.2	.8	35	18
1 1/2	5	3	7	1.5	1	45	22
2	7	4	10	2	1.3	55	28
2 1/2	8	5	12	2.5	1.6	65	34
3	10	6	15	3	2	80	40
4	14	8	21	4	2.7	125	55
5	17	10	25	5	3.3	140	70
6	20	12	30	6	4	165	80

*Allowances based on non-recessed threaded fittings. Use one-half (1/2) the allowances for recessed threaded fittings or streamline solder fittings.

The diameter of pipe on or next above the coordinate point corresponding to the estimated total demand and the permissible friction loss will be the size needed up to the first branch from the building supply pipe.

A4.2 If copper tubing or brass pipe is to be used for the supply piping, and if the character of the water is such that only slight changes in the hydraulic characteristics may be expected, Chart A-4 may be used.

A4.3 Chart A-5 should be used for ferrous pipe with only the most favorable water supply as regards corrosion and caking. If the water is hard or corrosive, Charts A-6 or A-7 will be applicable. For extremely hard water, it will be advisable to make additional allowances for the reduction of capacity of hot water lines in service.

A5 Size of principal branches and risers.

A5.1 The required size of branches and risers may be obtained in the same manner as the building supply by obtaining the demand load on each branch or riser and using the permissible friction loss computed in Section A3.

A5.2 Fixture branches to the building supply, if they are sized for the same permissible friction loss per one hundred (100) feet of pipe as the branches and risers to the highest level in the building, may lead to inadequate water supply to the upper floor of a building. This may be controlled by: (1) Selecting the sizes of pipe for the different branches so that the total friction loss in each lower branch is approximately equal to the total loss in the riser, including both friction loss and loss in static pressure; (2) by throttling each such branch by means of a valve until the preceding balance is obtained; (3) by increasing the size of the building supply and risers above the minimum required to meet the maximum permissible friction loss.

A6 General.

A6.1 In general, a velocity greater than fifteen (15) feet per second in the main risers, or principal branches should not be employed, as objectionable line noise is likely to result.

A6.2 If a pressure reducing valve is used in the building supply, the developed length of supply piping and the permissible friction loss should be computed from the building side of the valve.

A6.3 The allowances in Table A-3 for fittings are based on non-recessed threaded fittings. For recessed threaded fittings and streamlined soldered fittings, one-half ($\frac{1}{2}$) the allowances given in the table will be ample.

A7 Example.

A7.1 Assume an office building of four (4) stories and basement; pressure on the building side of the pressure-reducing valve of fifty-five (55) psi; an elevation of highest fixture above the pressure-reducing valve of forty-five (45) feet; a developed length of pipe from the pressure-reducing valve to the most distant fixture of two hundred (200) feet; and fixtures to be installed with flush valves for water closets and stall urinals as follows:

Example

Fixture Units and Estimated Demands

Kind of Fixtures	Building supply			Branch to hot-water system		
	No. of fixtures	Fixture units	Demand (gallons per minute)	No. of fixtures	Fixture units	Demand (gallons per minute)
Water Closets...	130	1,300				
Urinals.....	30	150				
Shower Heads...	12	48		12	(12 x 4) × ¾ = 36	
Lavatories.....	130	260		130	(130 x 2) × ¾ = 195	
Service sinks....	27	81		27	(27 x 3) × ¾ = 61	
Total.....		1,839	310		292	86

Allowing for fifteen (15) psi. at the highest fixture under maximum demand of three hundred and ten (310) gallons per minute, the pressure available for friction loss is found by the following:

$$55 - [15 + (45 \times 0.43)] = 20.65 \text{ psi}$$

The allowable friction loss per one hundred (100) feet of pipe is therefore

$$100 \times 20.65 \div 200 = 10.32 \text{ psi}$$

If the pipe material and water supply are such that Chart A-5 applies, the required diameter of the building supply is three (3) inches, and the required diameter of the branch to the hot-water heater is two (2) inches.

The sizes of the various branches and risers may be determined in the same manner as the size of the building supply or the branch to the hot water system—by estimating the demand for the riser or branch from Charts A-2 or A-3, and applying the total demand estimate for the branch, riser or section thereof to the appropriate flow chart.

CHART A-2

Estimate Curves for Demand Load

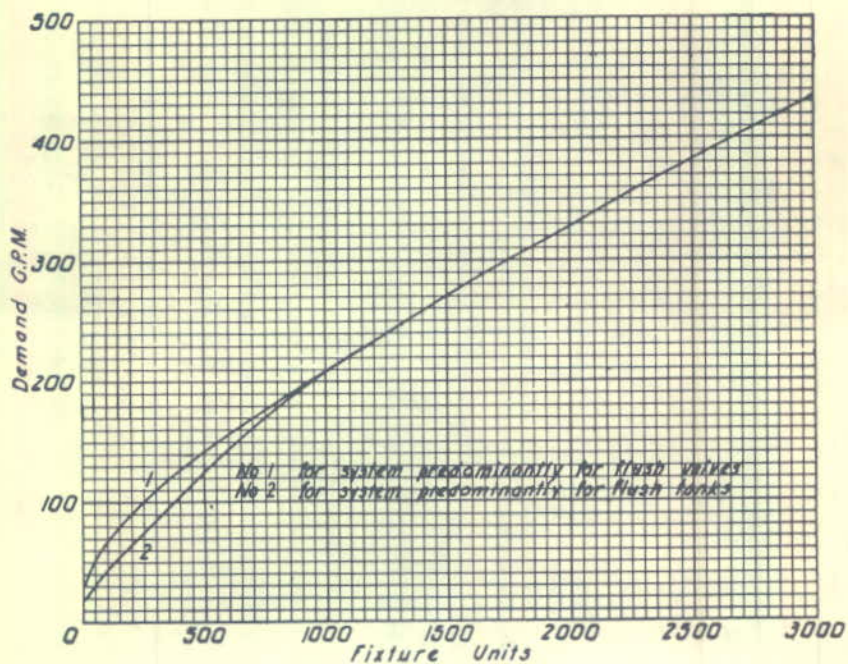


CHART A-3

Enlarged Scale Demand Load

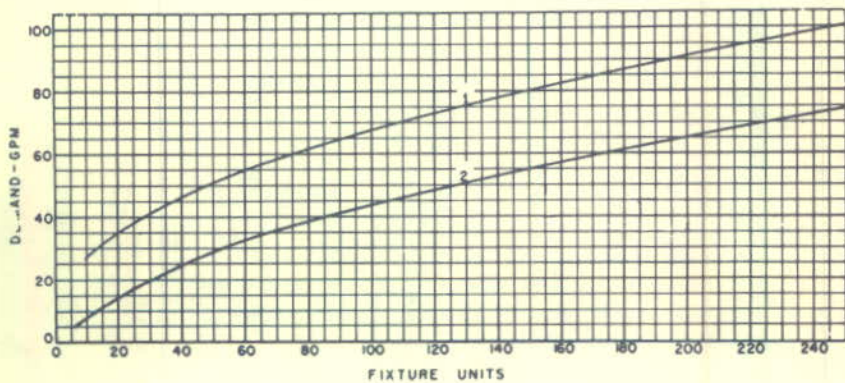


CHART A-4

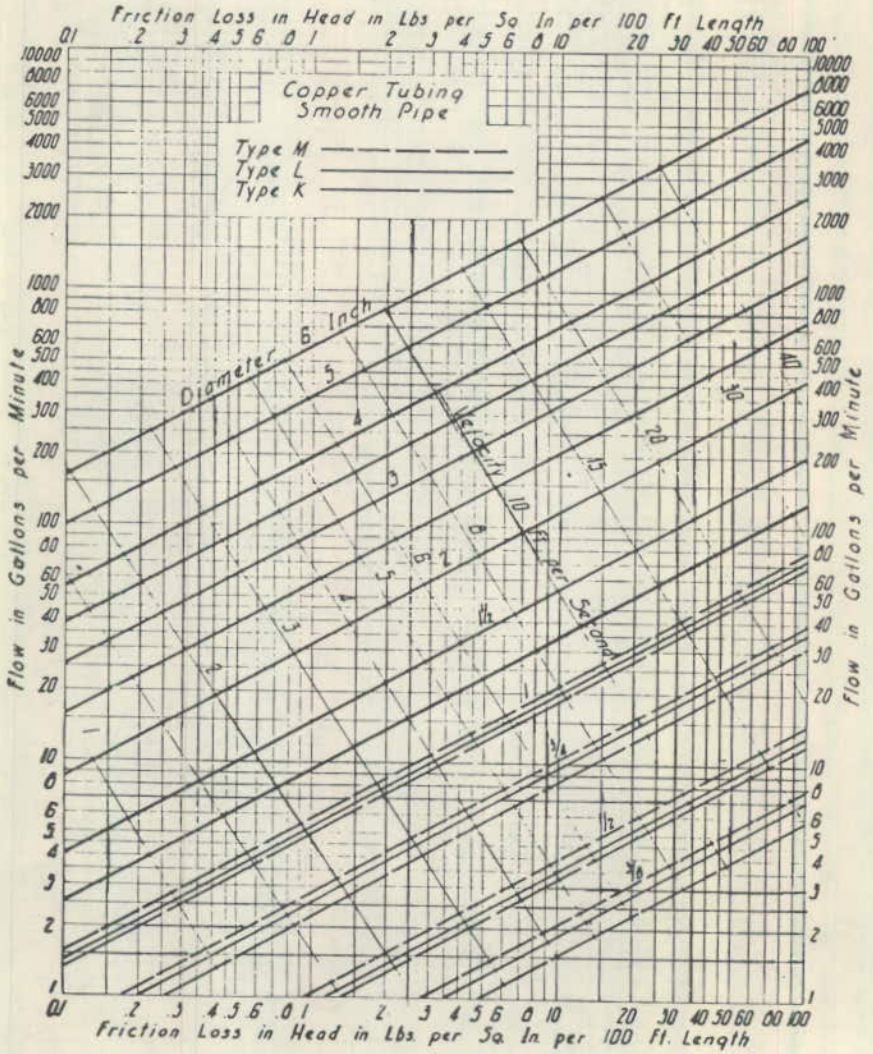


CHART A-5

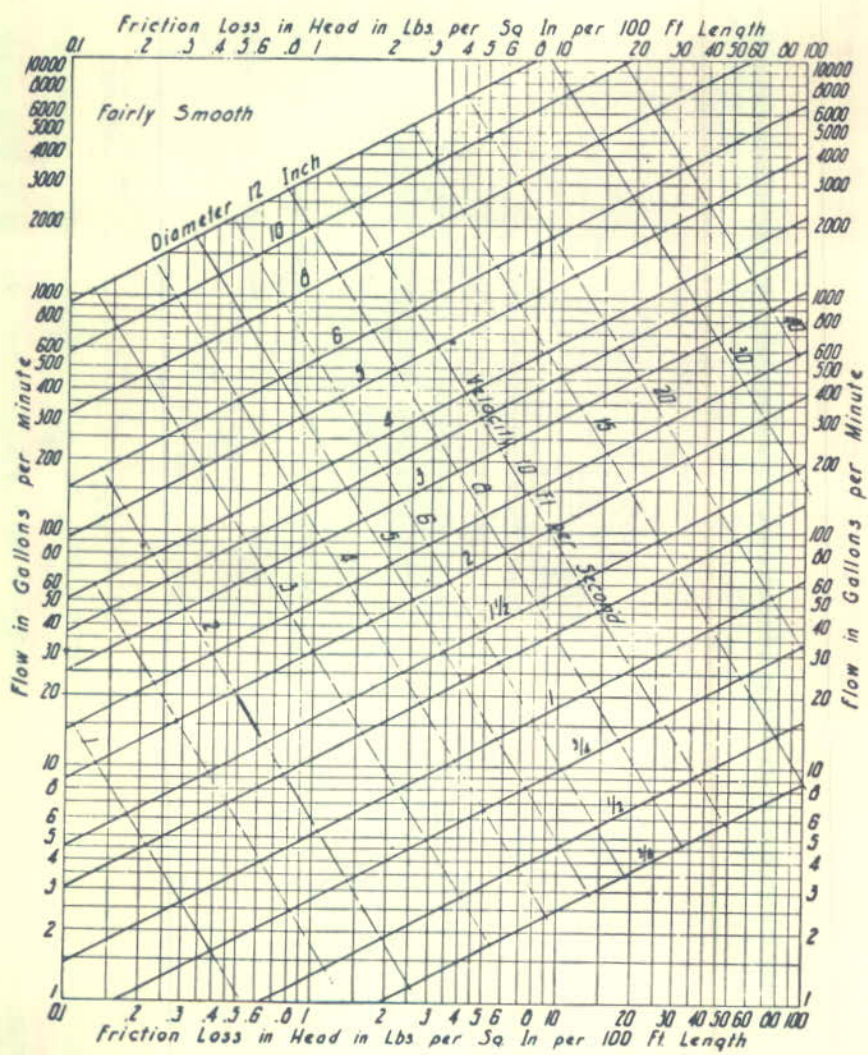


CHART A-6

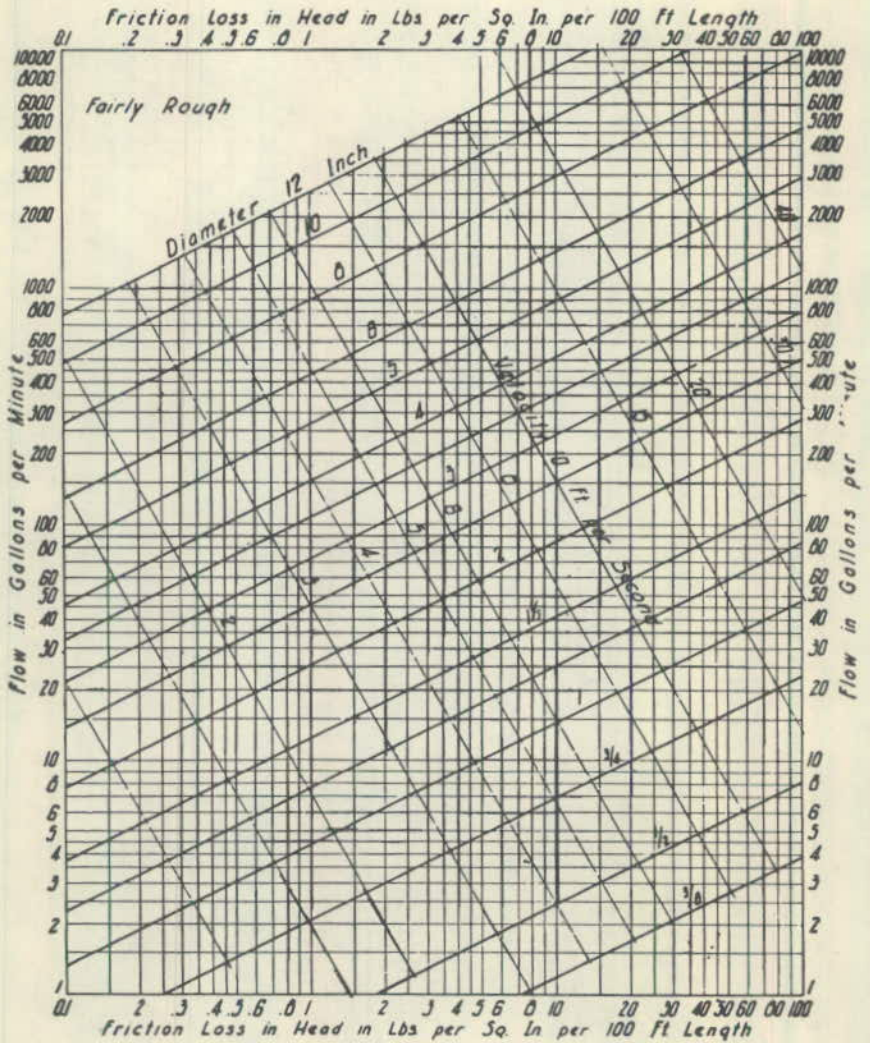
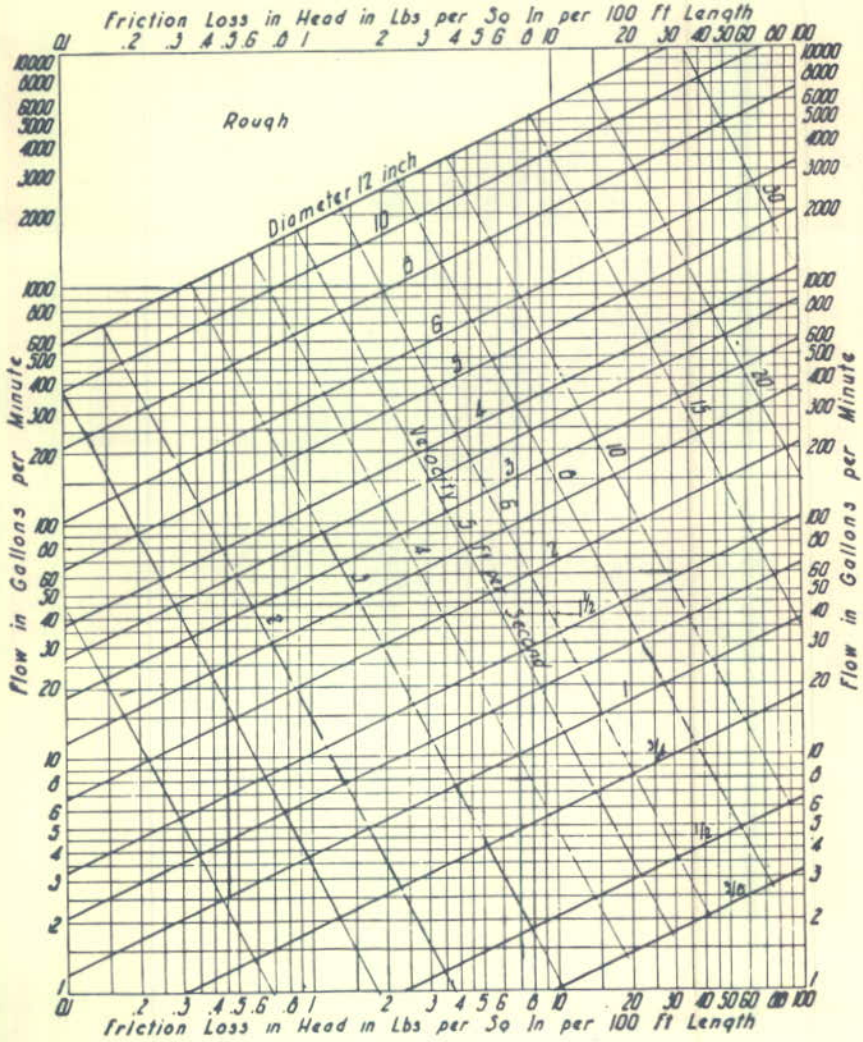


CHART A-7



APPENDIX B

EXPLANATORY NOTES ON COMBINATION WASTE AND VENT SYSTEMS

(See Section 1406.2 for specific limitations)

B1 Combination waste and vent systems, as outlined in Section 1406.2 of the Installation Requirements of this code covers the horizontal wet venting of a series of traps by means of a common waste and vent pipe. Line sizes at least two (2) pipe sizes larger than those required for a conventional system are designed to maintain a wetted perimeter of flow line low enough in the waste pipe to allow adequate air movement in the upper portion, thus balancing the system. Sinks, lavatories and other fixtures that rough in above the floor, should not be permitted on a combination waste and vent system, which, at best, is merely an expedient designed to be used in locations where it would be structurally impractical to provide venting in the conventional manner.

Combination waste and vent systems are intended primarily for extensive floor or shower drain installations where separate venting is not practical, for floor sinks in markets, demonstration or work tables in school buildings, or for similar applications where the fixtures are not adjacent to walls or partitions. Due to its oversize characteristics, such a waste system is not self scouring and consequently care should be exercised as to the type of fixture connected thereto, and to the location of cleanouts. In view of its grease producing potential, restaurant kitchen equipment should not be connected to a combination waste and vent system.

B2 Caution must be exercised to exclude appurtenances delivering large quantities or surges of water (such as pumps, sand interceptors, etc.) from combination waste and vent systems in order that adequate venting will be maintained. Small fixtures with a waste producing potential of less than seven and one half (7½) gallons per minute may be safely assigned a loading value of one (1) unit. Long runs should be laid at the minimum permissible slope in order to keep tail pipes as short as possible. Tail pipes should not exceed two (2) feet in length which may necessitate slopes up to forty-five (45) degrees* on some branches.

B3 It is essential that the pneumatics of such a system be properly engineered as the air pressure within the line must at all times balance that of the outside atmosphere in order to prevent either trap seal loss or air locking between traps. Long mains should be provided with additional relief vents located at intervals of about one hundred (100) feet. Each such relief vent should equal approximately one-half (½) of the area of the wet vented drain served.

B4 Trap sizes are required to be equivalent to the branches they serve [two (2) pipe sizes larger than normal] and tail pipes between fixtures or floor drains and such traps should be reduced to normal size.

*See definition of "Horizontal Pipe."

B5 Duplicate layout drawings of each such proposed piping system must be presented to the Department having jurisdiction, and approval obtained before any installation is made. Complicated layouts should be checked by qualified personnel.

B5.1 Example of sizing: A floor drain normally requires a two (2) inch trap and waste. On a combination waste and vent system both the trap and waste must be increased two (2) pipe sizes (through 2½" and 3") which would make the trap three (3) inch, (pipe sizes recognized for this purpose are 2", 2½", 3", 3½", 4", 4½", 5", 6", etc.). The tail piece between the floor drain and its trap should be two (2) inches (or normal size) to insure that the amount of waste water entering the trap only partially fills the waste branch. A three (3) inch floor drain would thus require a four (4) inch trap, a four (4) inch floor drain, a five (5) inch trap, etc., for the reasons previously stated.

Wet vented trailer park drainage systems are similar in principle to the foregoing. It is provided, however, that a three (3) inch trap serving a house trailer may have a three (3) inch tail-piece when the horizontal trap branch does not exceed six (6) feet in length, if three (3) inches in diameter; or fifteen (15) feet in length if four (4) inches in diameter.

WHEN IN DOUBT CHECK WITH YOUR LOCAL ADMINISTRATIVE AUTHORITY.

APPENDIX C

MANUFACTURERS SPECIFICATIONS, RECOMMENDATIONS AND INSTRUCTIONS FOR THE INSTALLATION OF HOUSE OR BUILDING SEWERS

CAST IRON SOIL PIPE.

The procedure endorsed by the Cast Iron Soil Pipe Institute is that which has been common practice in the Plumbing Industry for many years.

- (1) Grade trench reasonably free of stones and pockets.
- (2) Where trenching conditions are difficult, pipe may be supported by masonry blocks, bricks, concrete blocks, or any other similar support.
- (3) Where any such masonry support is necessary it must be placed within (6") inches of the joint.
- (4) Install pipe, make joint with oakum filler properly yarned, and firmly packed with 1" hot poured lead properly calked, or other approved joints.
- (5) After inspection, backfill by any convenient means, eliminating large stones in first 6 inches of backfill.

These instructions in no way preclude the prefabrication of Cast Iron Soil Pipe before it is laid in the trench, which will vary greatly with the equipment and experience of the individual Contractor.

FIBER PIPE.

- (1) Trenching—Excavate to desired grade. Use template to detect high spots and holes. Fill holes and depressions, tamping thoroughly.
- (2) Where trenching conditions are difficult, pipe shall be uniformly supported throughout using treated timber, concrete pad, sand, or select backfill properly tamped.
- (3) Lay the pipe line as described. Be sure the pipe is bedded in the selected backfill $1/4$ to $1/3$ of the pipe diameter. Under no circumstances should bricks or other supports be used to bring pipe to grade.
- (4) After pipe is bedded and checked for grade, additional selected backfill is placed by shovel at sides and over top of pipe, and tamped. By careful tamping at this point, the pipe can support a much greater load, and is less likely to be subsequently disturbed or shifted.
- (5) Reasonably clean backfill shall be placed 12" over the pipe.
- (6) The trench may now be backfilled by any conventional means—bulldozer—loader—etc., and the pipe is protected.

CEMENT ASBESTOS PIPE.

Trench

Depth—Enough to avoid dangerous surface loads.

Width—At least 8 inches more than pipe diameter but not wider than necessary for installation.

Condition—Trench should be free of water and unfrozen.

Bedding

Soil—Sand or clay—Trim the bottom so that entire length of pipe is in continuous contact with undisturbed trench bottom, otherwise selected backfill should be tamped firmly to proper grade before laying pipe. Dig bell holes for couplings.

In rock—Provide uniform bed of selected earth at least 4 inches thick. Dig bell holes for couplings.

Note—Pipe may be supported during assembly on earth mounds, if desired. Locate the earth mounds one-fifth the pipe length from each pipe end. Mounds should raise pipe at least 2 inches off the bottom so as to provide space for tamping uniform backfill bed.

Tamping and Backfillings

Backfill, unfrozen and free of stones, should be firmly tamped up to the horizontal diameter. Backfill the remainder of the trench avoiding use of stones, rocks, etc., in the 12" layer immediately above pipe.

CLAY PIPE.

A. Trench and Material Preparation.

(a) Width of trenches in which clay pipe is to be installed shall be such as to provide adequate space for workmen to place and joint the pipe properly.

(b) Bell holes shall be excavated so that, after placement, only the barrel of the pipe receives bearing pressure from the trench bottom.

(c) Preparation of the trench bottom and placement of the pipe shall be carefully made so that, when in final position, the pipe is true to line and grade.

(d) Pipe shall be protected during handling against impact shock and free fall. No pipe shall be used in the work which does not conform to the appropriate ASTM standard.

B. Pipe Laying and Jointing.

(a) The laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of flow.

(b) All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered, so that when laid they will form a sewer with a uniform invert.

(c) Pipe shall be set firmly according to line and grade, and, preparatory to making pipe joints, all surfaces of the portion of the pipe to be jointed shall be cleaned and dried. The joints shall then be carefully adjusted and filled with the jointing material.

(d) Trenches shall be kept water-free during jointing for a sufficient period thereafter to allow the jointing material to become fully set and completely resistant to water penetration. Trenches shall be backfilled immediately after pipe is laid therein to prevent dislocation of the sewer line or jointing material. (Note: Not applicable when factory applied flexible compression joints are used.)

C. Testing.

(a) The sewer line will be tested as required elsewhere herein, or as prescribed by local authority.

APPENDIX D

Plumbing Installation Standards for Mobile Homes and Travel Trailers and Parks.

D-1. PURPOSE, APPLICATION AND SCOPE

- (a) The requirements set forth in this Appendix shall apply specifically to all new Mobile Home and Travel Trailer Parks, and to additions to existing parks as herein defined, and are to provide minimum standards for sanitation and plumbing installation within these parks, for the accommodations, use and parking of Mobile Homes and Travel Trailers.
- (b) Plumbing and heating installations in Mobile Homes and Travel Trailers shall be installed in accordance with the approved Standards of the Mobile Home Manufacturers Association.

D-2. DEFINITIONS

Definitions contained in Plumbing Code shall also apply to this Appendix "D" except where the following special definitions shall apply:

- (a) **Air Lock**—Air lock is a condition where air is trapped in a drain or drain hose and retards or stops the flow of liquid waste or sewage.

Center—Center of a Mobile Home or a Travel Trailer is the longitudinal center line located midway between the right and left side.

Combination Compartment—A shower stall with or without a door which provides for or includes a water closet. It is sized for occupancy of only one person.

Department having jurisdiction—means the administrative authority or other law enforcement agency having jurisdiction over this regulation.

Dependent Travel Trailer—Means a trailer coach not equipped with a water closet.

Drain Hose—The drain hose is the approved type hose, flexible and easily detachable, used for connecting the drain outlet to a sewer inlet connection.

Drain Outlet—The drain outlet is the lowest end of the main drain to which the terminal end of the drain hose is connected.

Independent Mobile Home or Travel Trailer—Means one equipped with a water closet and a bath or shower.

Inlet Coupling—Inlet coupling is the terminal end of the water system to which the water service connection is made. It may be a swivel fitting or threaded pipe end.

Intermediate Waste Holding Tank—(Travel Trailers only) An enclosed tank for the temporary retention of water-borne waste.

Length—Length of a mobile home or travel trailer is the distance measured from the tip of the hitch to the part furthest to the rear.

Mobile Home—Is a vehicular, portable structure built on a chassis and designed to be used without a permanent foundation as a permanent dwelling when connected to indicated utilities.

Mobile Home or Travel Trailer Park—Shall mean and include site, lot, tract or parcel of land upon which one or more mobile home or travel trailer is parked, for the temporary or permanent use as living quarters of one or more families.

Park Drainage System—Means the entire system of drainage piping used to convey sewage or other wastes from the mobile home or travel trailer drain outlet connection, at its connection to the mobile home or travel trailer site, to a public sewer or private sewage disposal system.

Park Water Supply System—All of the water supply piping within the park shall extend from the main public supply or other source of supply to, but not including the mobile home or travel trailer service system, and shall include branch service lines, fixture devices, service buildings and appurtenances thereto.

Service Building—A building housing toilet and bathing facilities for men and women, with laundry facilities.

Sewer Lateral—That portion of the park drainage system extending to a mobile home or travel trailer site.

Travel Trailer—A Travel Trailer is a vehicular, portable structure built on a chassis, designed to be used as a temporary dwelling for travel, recreational and vacation uses, permanently identified "Travel Trailer", by the manufacturer, on the Trailer and when factory equipped for the road, having a body width not exceeding eight feet (8') and being of any length provided its gross weight does not exceed 4500 pounds, or being of any weight provided its overall length does not exceed twenty-nine feet (29').

Travel Trailer Sanitary Service Station—One used for emptying waste holding tanks.

D-3. GENERAL REGULATIONS

- (a) The general provisions of the Plumbing Code shall govern the installation of plumbing systems in mobile homes or travel trailer parks, except where special conditions or construction are specifically defined in this Appendix.
- (b) **Mobile home and travel trailer Sites:** Mobile homes or travel trailers shall not hereafter be parked in any Mobile Home or Travel Trailer Park unless there are provided plumbing and sanitation facilities installed and maintained in conformity with these regulations. Every mobile home or travel trailer shall provide a gas and watertight connection for sewage disposal which shall be connected to an underground sewage collection system discharging into a public or private disposal system.

- (c) No dependent travel trailer shall be parked at any time in a space designed and designated for an independent mobile home or travel trailer unless public toilet and bath facilities within two hundred (200') feet of the dependent travel trailer are available.

D-4. PLANS AND SPECIFICATIONS

Every Mobile Home or Travel Trailer Park owner or operator before providing areas of space for the use and accommodation of independent mobile homes or travel trailers shall make application for permit and file two sets of plans and specifications with the Building Inspection Department or authority having jurisdiction. The plans and specifications shall be in detail as follows:

- (a) A scaled plot plan of the park, indicating the spaces, area, or portion of the park for the parking of independent mobile homes, travel and dependent trailers.
- (b) Size, location and specification of the park drainage system.
- (c) Size, location and specification of water supply lines and their location.
- (d) Size, location and layouts of service building.
- (e) Size, location and specification of gas distribution lines.
- (f) Size, location, specification and layout of the fire protection system.
- (g) A scaled layout of typical trailer sites.
- (h) Applications shall bear the approval of the local enforcement agencies as to compliance with city or county plumbing and health ordinances.
- (i) Plumbing required by this article shall comply with all city or county plumbing and health ordinances and regulations.
- (j) The issuance of a permit shall not constitute approval of any violation of this article or of any city or county ordinance or regulation.
- (k) An approved set of plans and a copy of the permit shall be kept on the park premises until the final inspection has been made.

D-5. SERVICE BUILDINGS

- (a) Each mobile home or travel trailer park shall have at least one service building to provide necessary sanitation and laundry facilities. Those parks serving independent mobile homes and travel trailers need provide only minimum facilities. However, a service building with adequate laundry facilities and storage locker rooms is most desirable.
- (b) The service building should be of permanent construction with an interior finish of moisture resistant material which will stand frequent washing and cleaning and shall be well lighted and ventilated at all times.

- (c) The service buildings of only independent mobile home and independent travel trailer parks shall have a minimum of one (1) laundry tray, one (1) water closet, one (1) lavatory, one (1) shower or bath tub for women and one (1) water closet, one (1) lavatory and one (1) shower or bath tub for men.
- (d) The service buildings in parks that also accommodate dependent travel trailers shall have a minimum of one (1) laundry tray, two (2) water closets, one (1) lavatory, one (1) shower or bath tub for women and one (1) water closet, one (1) urinal, one (1) shower or bath tub for men and one (1) slop-water closet for emptying containers of human waste. The above facilities are for a maximum of ten (10) dependent travel trailers. For every ten (10) additional dependent travel trailers the following additional fixtures shall be provided: One (1) laundry and one (1) shower or bath tub for each sex, one (1) water closet for every ten (10) additional dependent travel trailers for women and one (1) water closet for every fifteen (15) additional dependent travel trailers for men.
- (e) Hot and cold water shall be provided for all fixtures except water closets. The slop-water closet shall be provided with hot and cold water faucets over the bowl in addition to the flushing mechanism (preferably a flushometer valve).
- (f) Each water closet, slop-water closet, tub and shower, shall be in separate compartments, with self-closing doors on all water closet compartments. The shower stall shall be a minimum of 3' x 3' in area, with a dressing compartment with a stool or bench for women.

The laundry trays, washing machines shall be contained in a room separate from the toilet rooms.
- (g) A floor drain (minimum of 3") shall be installed in each toilet room and laundry room.

D-6. MATERIALS

Unless otherwise provided for in this Appendix, all piping fixtures, or devices used or entering into the installation of parks drainage, water distribution and gas distribution systems or parts thereof shall conform to the quality and weights of materials presented in the Plumbing Code or gas code.

D-7. GENERAL REGULATIONS

- (a) Unless otherwise provided for in this Appendix, all plumbing fixtures, piping, drains, appurtenances and appliances designed and used in the parks drainage, water distribution, gas distribution systems and service connections shall be installed in conformance with the Plumbing Code or Gas Code.

D-8. PARK DRAINAGE SYSTEM

- (a) The main sewer and sewer laterals shall be installed in a separate trench not less than twelve inches (12") from the park water service

or distribution system. No sewer pipe material shall be installed less than thirty (30") inches below grade in any area where a mobile home or travel trailer is parked or a motor vehicle may be driven.

- (b) The minimum pipe size in any mobile home or travel trailer park drainage system shall be four inches (4"). Park drainage systems pipe sizes shall be calculated and designed according to good engineering practice.
- (c) Each mobile home or travel trailer shall be considered as six (6) fixture units in determining discharge requirements in the design of park drainage and sewage disposal systems.
- (d) Minimum grade for sewers shall be so designed that a slope sufficient to provide so that the flow will have a mean velocity of two feet (2') per second when the pipe is flowing full or half full.
- (e) The discharge of the park drainage system shall be connected to a public sewer. Where a public sewer is not available within 300 feet for use, an individual sewage disposal system shall be installed, of a type that is acceptable and approved by the Administrative Authority or other law enforcement agency having jurisdiction over this regulation.
- (f) Manholes shall be located at any point in the line where a deviation occurs in excess of forty-five degrees (45°) from a straight line and not more than two hundred feet (200') apart in straight runs. Manholes shall be accessible and brought to grade.
- (g) Wet vented drainage systems shall be so designed and installed to adequately accommodate passage of air and waste in the same pipe.
- (h-1) Branch lines or sewer laterals to individual mobile home or travel trailer shall be not less than four inches (4") in diameter.
- (h-2) Each mobile home and travel trailer site shall be provided with a sewer lateral with a cast iron "P" trap which shall terminate four inches (4") above grade. The inlet shall be so designed and installed to receive the discharge from the mobile home or travel trailer drain connection at the proper grade and angle. The extension above grade shall be protected by at least four inches (4") of concrete approximately eighteen by eighteen (18" x 18") square. Each outlet shall be provided with a gas tight cap and chain to close the inlet when not in use.
- (h-3) Sewer laterals over thirty feet (30') from the main park drainage sewer shall be properly vented and provided with a cleanout brought to grade.
- (h-4) To provide the shortest possible drain connection between the mobile home and travel trailer outlet and drain inlet, all drain inlets shall terminate with reference to the site location of the mobile home or travel trailer.
- (h-5) Drain connections shall slope continuously downward and form no traps. All pipe joints and connections shall be installed and maintained gas and water tight.

- (h-6) No sewage, waste water, or any other effluent shall be allowed to be deposited on the surface of the ground.
- (h-7) Upon completion and before covering, the park drainage system shall be subjected to a static water test. The water test shall be applied to the drainage system either 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, and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a ten-foot (10') head of water. In testing successive sections at least the upper ten feet (10') of the next preceding section shall be tested, so that no joint or pipe in the system shall have been submitted to a test of less than a ten-foot (10') head of water. The water shall be kept in the system, or in the portion under test, for at least fifteen (15) minutes before inspection starts; the system shall then be tight at all points.

D-9. WATER DISTRIBUTION SYSTEM

- (a) Every mobile home or travel trailer site shall be provided with an individual branch service line delivering safe, pure, and potable water. The outlet of the branch service line shall terminate on the left side of the site of the mobile home or travel trailer.
- (b) Each mobile home or travel trailer park water distributing system shall be so designed and maintained as to provide a pressure of not less than 30 p.s.i. at each mobile home or travel trailer site under normal operation conditions. The minimum size of branch service line to each site shall be $\frac{3}{4}$ ".
- (c) A backflow preventive device shall be installed on the branch service line to each independent trailer at, or near, the trailer service connection. Backflow preventive devices shall be of an approved type by a nationally recognized testing agency certifying as to compliance and performance outlined herein: Values shall be designed and maintained to close drip tight at a reduced pressure of not less than one (1) nor more than five (5) pounds per square inch. Valves must be identified with the manufacturer's name and model number.
- (d) A separate service shutoff valve shall be installed in each branch service line on the supply side of the backflow protective device.
- (e) The service connection shall be not less than three-quarter inch ($\frac{3}{4}$ ") diameter; no rigid pipe may be used. Flexible metal tubing is permitted. Fittings at either end shall be of a quick disconnect type not requiring any special tools or knowledge to install or remove.
- (f) The owner or operator of every trailer park accommodating independent trailer coaches shall have all backflow protective devices and pressure relief valves inspected and tested at least once in each twelve (12) month period by a representative of a utility company, of a local enforcement agency, or by a duly licensed plumber to

ensure that such devices are in good working order. A permanent record of such inspections, signed by the inspector, shall be maintained by the park owner or operator.

D-10. MOBILE HOME AND TRAVEL TRAILER CONNECTIONS — RESPONSIBILITY

- (a) When it is evident that there exists, or may exist, a violation of these rules, the owner, operator, lessee, person in charge of the park, or any other person causing a violation shall cause to be corrected immediately or disconnect the service connection and mobile home or travel trailer drain connection from the respective park branch service line and sewer lateral.
- (b) Mobile home and travel trailer drain connections shall be of approved semirigid or flexible reinforced hose having smooth interior surfaces and not less than three inches (3") inside diameter. Drain connections shall be equipped with a standard quick disconnect screw or clamp type fitting, not less in size than the outlet. Drain connections shall be gas-tight and no longer than necessary to make the connection between the mobile home and travel trailer outlet and the trap inlet on the site.

D-11. GAS DISTRIBUTION SYSTEM

- (a) In mobile home and travel trailer parks in which gas distribution systems are installed, the installation shall conform with the requirements set forth in the Gas Code.
- (b) The minimum size of the gas service line to each mobile home or travel trailer site shall be $\frac{3}{4}$ " and a cutoff valve shall be installed on each branch.

D-12. MAINTENANCE

- (a) All devices or safeguards required by this article shall be maintained in good working order. The owner, operator, or lessee of the mobile home or travel trailer park or his designated agent shall be responsible for their maintenance.

APPENDIX E

OTHER REGULATIONS RELATING TO PLUMBING INSTALLATIONS

Location of Windows In Relation To Vent Stacks

In the event that a structure is built higher than an existing structure, the owner of the structure shall not locate any windows within ten (10) feet of any existing vent stack on the lower structure, unless the owner of such higher structure shall defray the expenses of or shall himself make such alterations as are necessary to conform with the provisions of this code.

Individual Sewage Disposal Systems

In those instances where the installation of a private residential sewage-disposal system cannot be avoided, the following requirements should be followed. For these requirements see the State Board of Health Bulletin No. 519, "Residential Sewage Disposal Plants."

Individual Water Supply

Where connection to a municipal water supply or public water system is not possible, private water supplies shall be constructed in accordance with State Board of Health Bulletin No. 476, "Protection of Private Water Supplies."

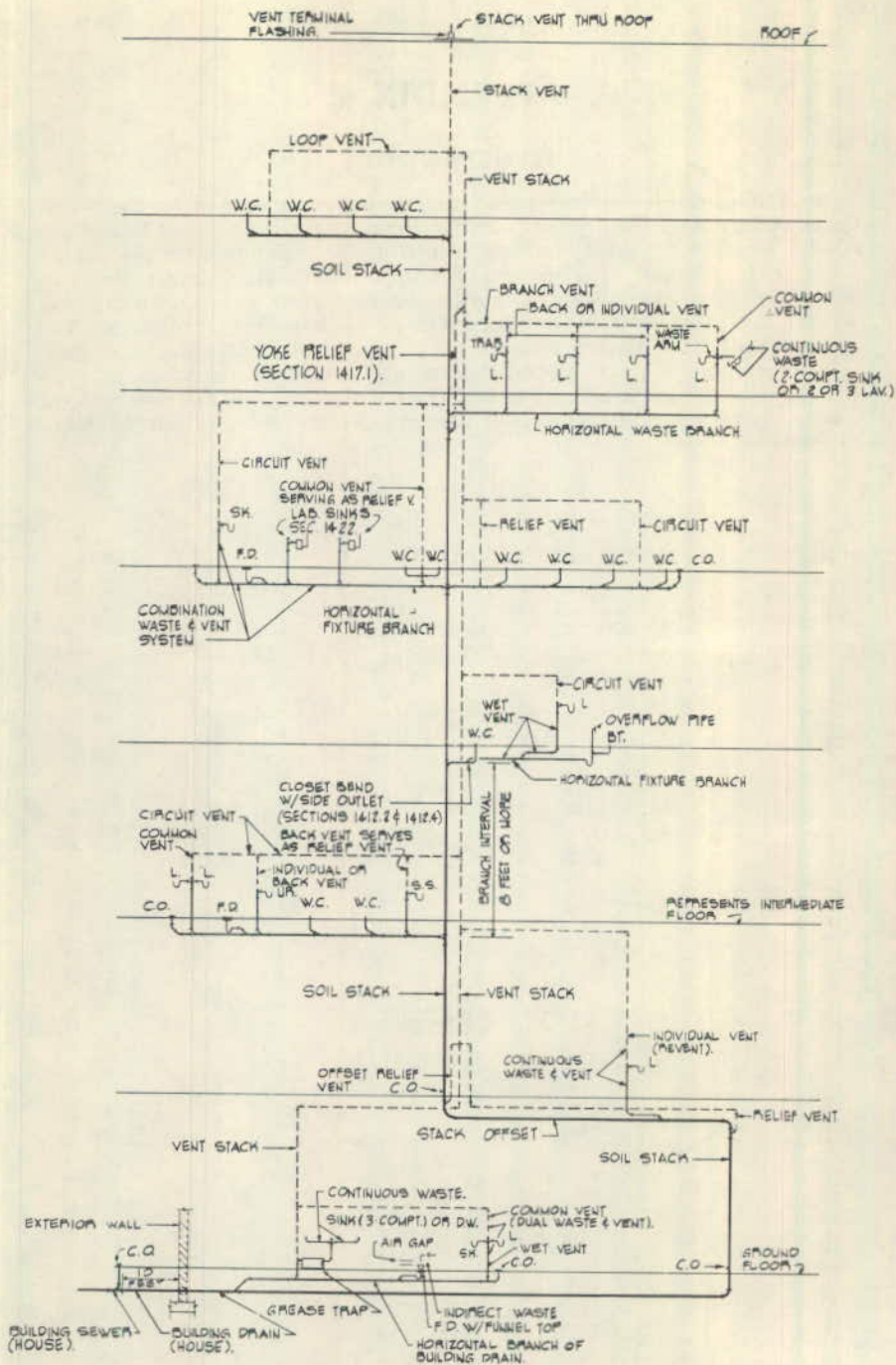
Air Conditioning Equipment: Application Required

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

APPENDIX F

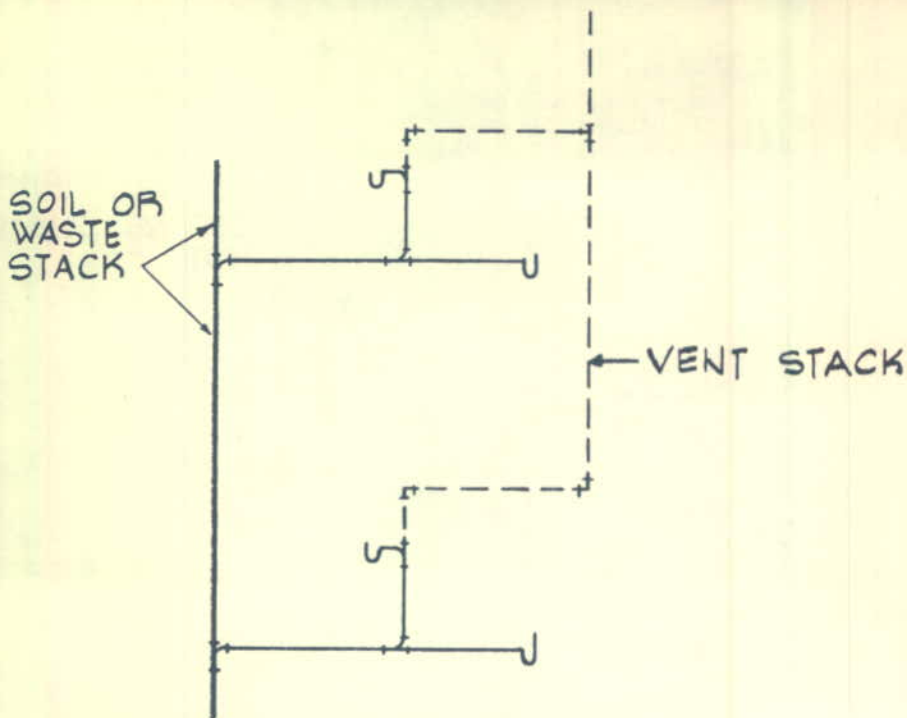
ILLUSTRATIONS

The following illustrations (diagrams) have been prepared by the North Carolina Insurance Department working together with the Code Committees of the North Carolina Plumbing Inspectors Association and the North Carolina Association of Plumbing, Heating and Cooling Contractors. In using the diagrams, they are not to be construed as superceding the written text, but merely to illustrate the written code provision. The various methods indicated diagrammatically do not limit other configuration or design of plumbing soil, waste and vent systems when in compliance with the written text. It is further suggested that the user thereof refer to the appropriate section regarding any one diagram to avoid misunderstanding.

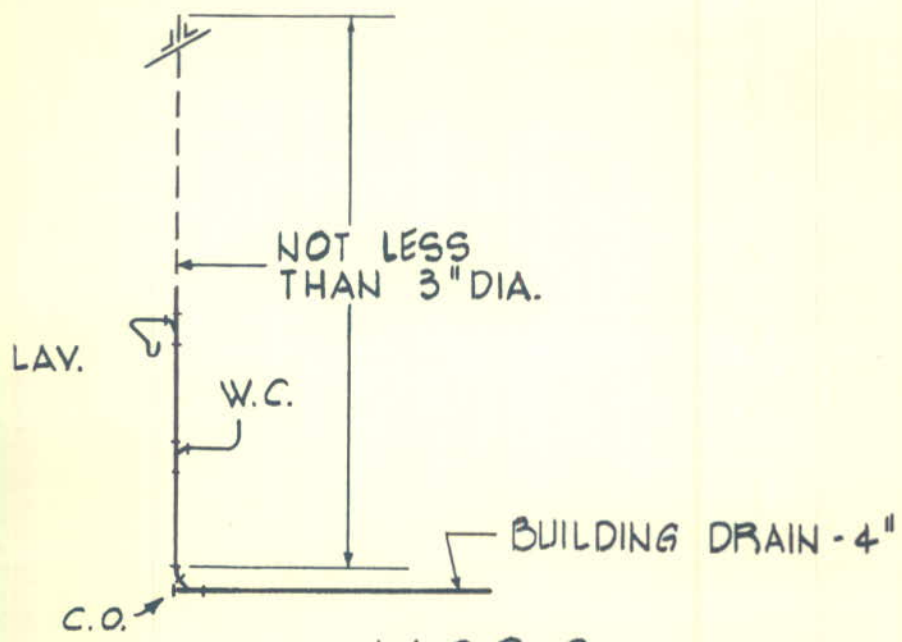


DRAINAGE, WASTE, & VENT COMPONENTS

NOTE: THIS DIAGRAM SERVES TO DEFINE THE VARIOUS PARTS OF A DRAINAGE, WASTE, AND VENT SYSTEM.

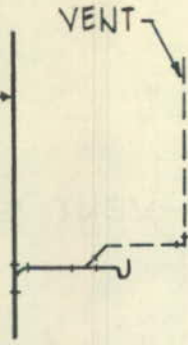


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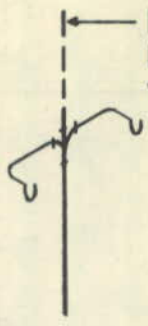
1403.3

TO
OTHER
FIXTURES

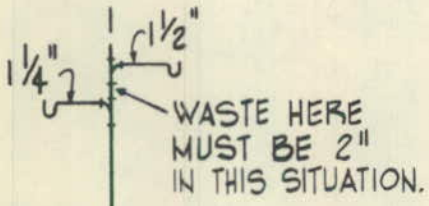


1406.2

INDIVIDUAL VENT
USED AS COMMON
VENT

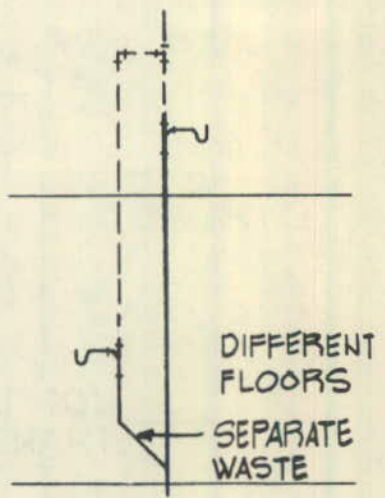


1410.1

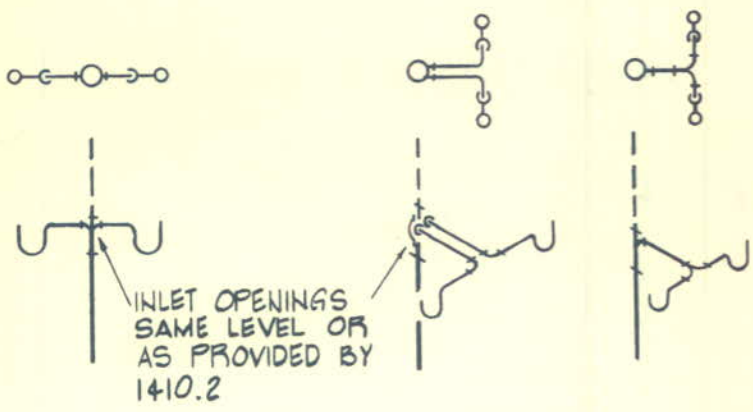
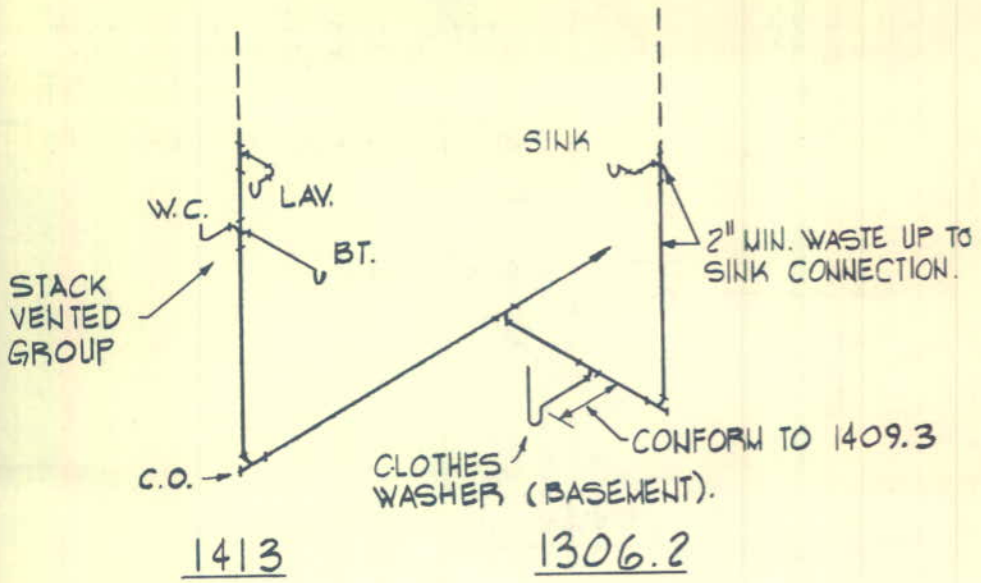


SAME FLOOR BUT
DIFFERENT LEVELS

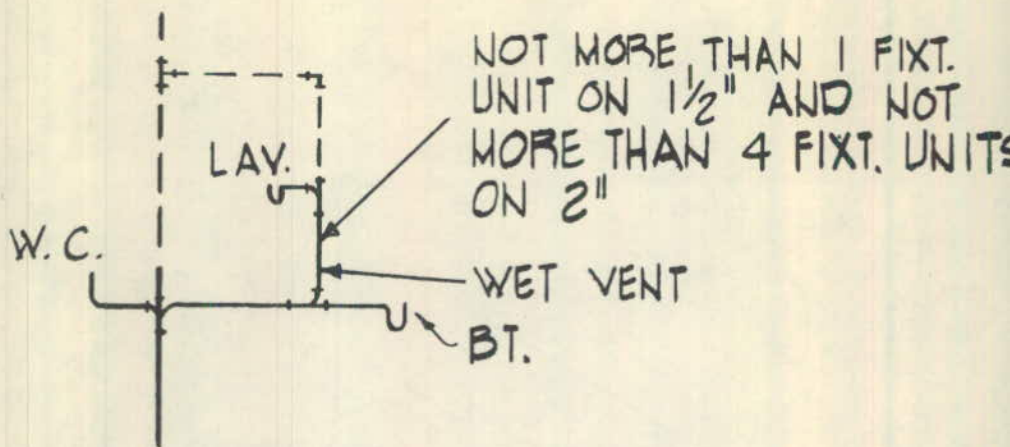
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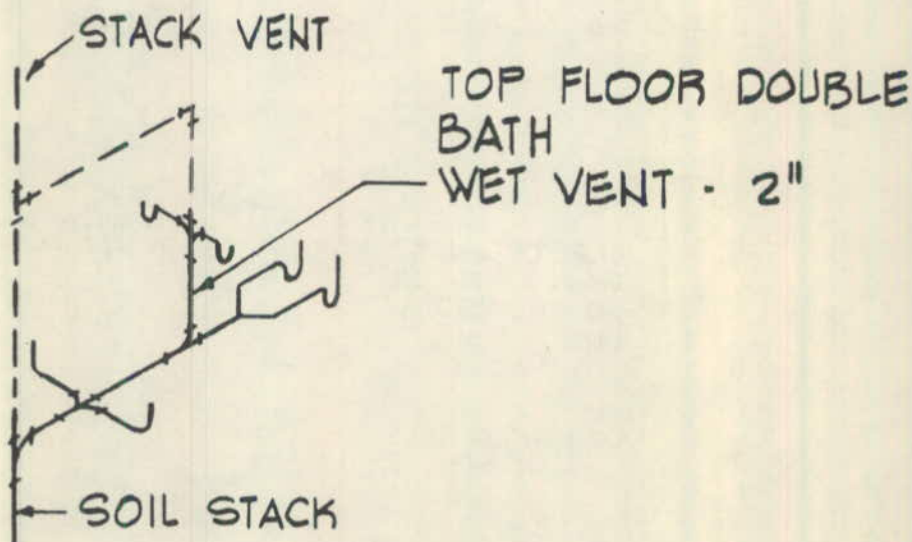
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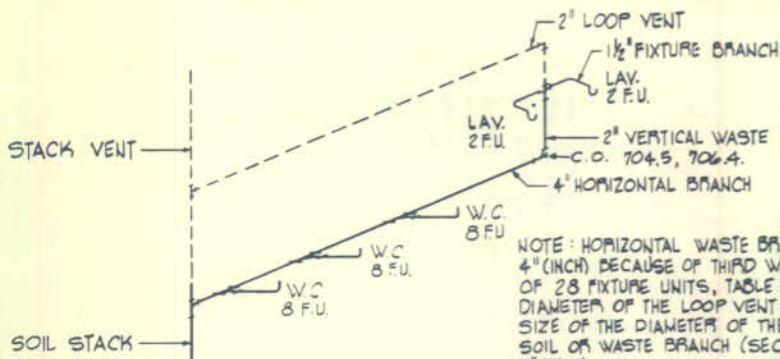
1408.1



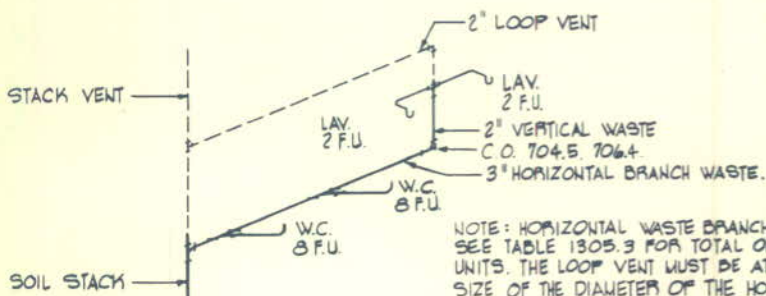
1412.1



1412.2

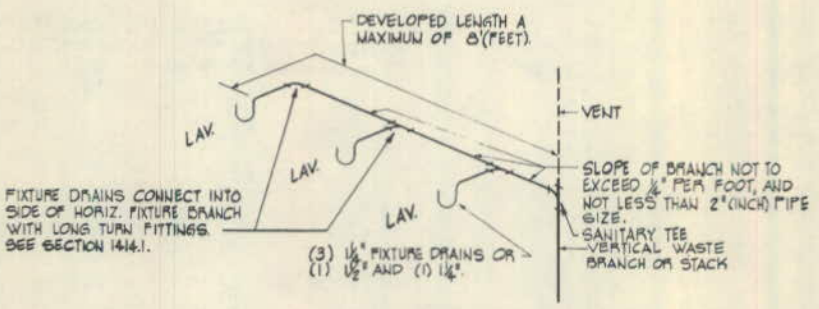
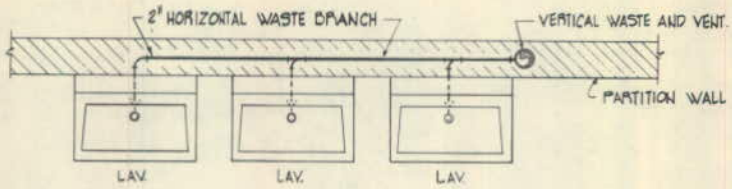


NOTE: HORIZONTAL WASTE BRANCH MUST BE 4" (INCH) BECAUSE OF THIRD W.C. FOR TOTAL OF 28 FIXTURE UNITS, TABLE 1305.3. THE DIAMETER OF THE LOOP VENT SHALL BE $\frac{1}{2}$ THE SIZE OF THE DIAMETER OF THE HORIZONTAL SOIL OR WASTE BRANCH (SECTION 1421.4) OF 2" (INCH).
THE WATER CLOSETS ARE CONNECTED THRU A COMBINATION FITTING LAYING HORIZONTAL FOR MAXIMUM AIR PASSAGE.



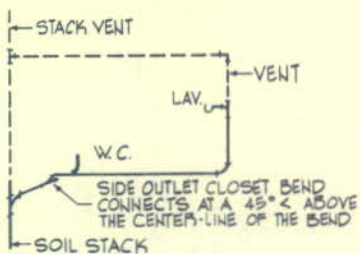
NOTE: HORIZONTAL WASTE BRANCH MAY BE 3" (INCH), SEE TABLE 1305.3 FOR TOTAL OF 20 FIXTURE UNITS. THE LOOP VENT MUST BE AT LEAST $\frac{1}{2}$ THE SIZE OF THE DIAMETER OF THE HORIZONTAL WASTE BRANCH (SECTION 1421.4). HOWEVER, TABLE 1421.5 REQUIRES THE VENT TO BE 2" (INCH) PROVIDING THE LENGTH OF THE VENT DOES NOT EXCEED 60' (FEET).

HORIZONTAL BRANCHES

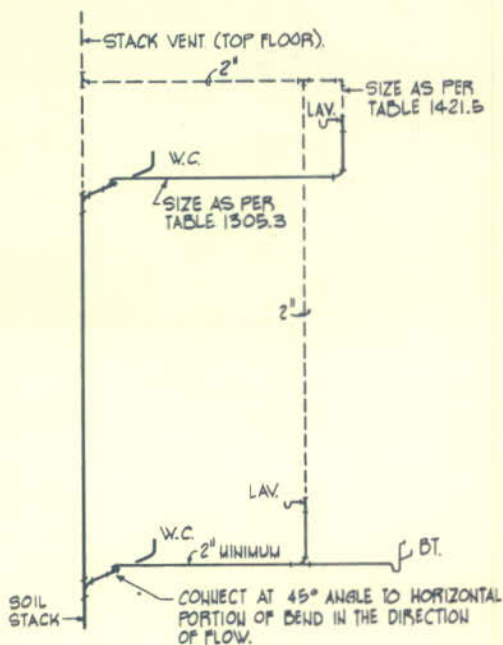


NOTE: THIS APPLIES TO NOT MORE THAN THREE LAVATORIES OR ONE SINK AND ONE LAVATORY.

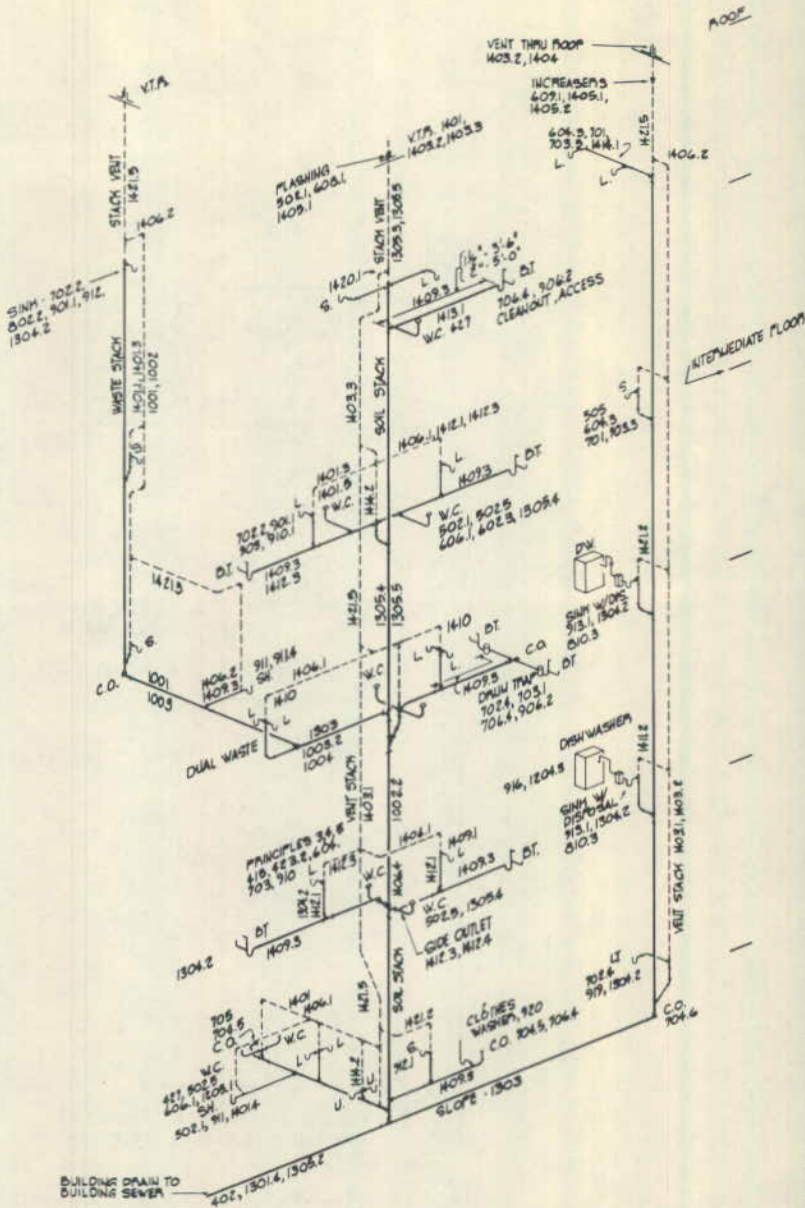
INDIVIDUAL FIXTURE VENT - EXCEPTION
SECTION 1414.1.



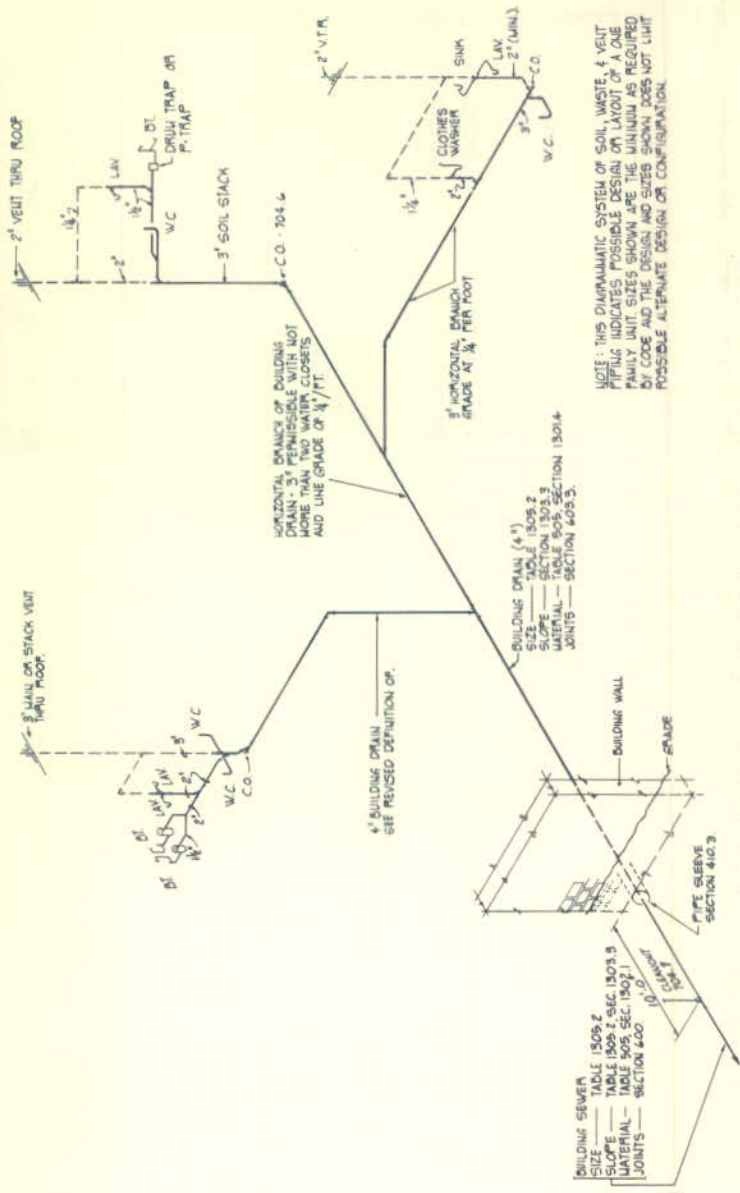
SIDE INLET CLOSET BEND
SEE SECTION 1406.4



MULTI-STORY GROUPS - 1412.4



D.W.V. FOR APARTMENT BUILDING



SOIL, WASTE, & VENT PIPING FOR ONE-FAMILY UNIT (WHERE APPLICABLE).

APPENDIX G

GENERAL STATUTES PERTAINING TO THE PLUMBING CODE

Reprinted below is a law relating to safety features of certain water heaters or tanks as provided by the North Carolina General Statutes, Chapter 66, Section 27.1. The law was ratified by the 1965 North Carolina Legislative Assembly and became effective January 1, 1966.

A BILL TO BE ENTITLED AN ACT RELATING TO SAFETY FEATURES OF CERTAIN HOT WATER HEATERS.

The General Assembly of North Carolina do enact:

66-27.1. (a) No individual, firm, corporation or business shall install, sell or offer for sale any automatic hot water tank or heater of 120 gallon capacity or less which does not have installed thereon by the manufacturer of such tank or heater an American Society of Mechanical Engineers and National Board of Boiler and Pressure Vessel Inspectors approved type pressure-temperature relief valve, and so labeled by the manufacturer's identification stamped or cast upon the tank or heater or upon a plate secured to it.

(b) No individual, firm, corporation or business shall install, sell, or offer for sale any relief valve, whether it be pressure type, temperature type or pressure-temperature type, which does not carry the stamp of approval of the American Society of Mechanical Engineers and the National Board of Boiler and Pressure Vessel Inspectors.

66-27.2. (a) No individual, firm, corporation or business shall install, sell or offer for sale any hot water supply storage tanks or heaters of 120 gallon capacity or less which utilize dip tubes, supply and hot water nipples, supply water baffles or heat traps that have not been tested to withstand a temperature of 400 degrees Fahrenheit labeled by the manufacturer.

(b) No individual, firm, corporation or business shall install, sell, or offer for sale any water baffles or heat traps, which are not constructed and tested to withstand a temperature of 400 degrees Fahrenheit without deterioration in any manner and such baffles or heat traps to be so labeled by the manufacturer.

66-27.3. Violation of any provision of this Act is hereby made a misdemeanor punishable by fine or imprisonment, or both, in the discretion of the Court.

66-27.4. Nothing in this Act shall be interpreted as relieving any individual, firm, corporation or business from complying with additional protective regulations relating to the safety features of hot water heaters as may be prescribed by local law, county or municipal charter or ordinance; provided, however, that no local law, county or municipal charter or ordinance shall fix or govern the temperature of pressure settings of a pressure-temperature relief valve or an automatic hot water tank or heater

covered by this Act if there is installed on such tank or heater a pressure-temperature relief valve having settings in compliance with the North Carolina Building Code.

66-27.5. All laws and clauses of laws in conflict with this Act are hereby repealed.

66-27.6. This Act shall become effective January 1, 1966.

CHAPTER 87 - ARTICLE 2

PLUMBING AND HEATING CONTRACTORS

G.S. 87-21. DEFINITIONS; CONTRACTORS LICENSED BY BOARD, EXAMINATION; POSTING LICENSE, ETC.

(a) Definitions. For the purpose of this article:

(1) The word "plumbing" is hereby defined to be the system of pipes, fixtures, apparatus and appurtenances, installed upon the premises, or in a building, to supply water thereto and to convey sewage or other waste therefrom.

(5) Any person, firm or corporation, who for a valuable consideration, installs, alters or restores, or offers to install, alter or restore, either plumbing, heating group number one, or heating group number two, or heating group number three, or any combination thereof, as defined in this article, shall be deemed and held to be engaged in the business of plumbing or heating contracting.

(6) The word "contractor" is hereby defined to be a person, firm or corporation engaged in the business of plumbing or heating contracting.

(c) To Whom Article Applies—The requirements of this article shall apply only to persons, firms or corporations who engage in, or attempt to engage in, the business of plumbing or heating contracting, or any combination thereof, in cities or towns having a population of more than 3500 in accordance with the last official United States census. The provisions of this article shall not apply to those who make minor repairs or minor replacements to an already installed system of plumbing or heating.

CHAPTER 143.

STATE DEPARTMENTS, INSTITUTIONS, AND COMMISSIONS.

ARTICLE 8.

PUBLIC BUILDING CONTRACTS.

Sec.
143-135.1 State buildings exempt from municipal building requirements; considered on recommendations by municipalities.

ARTICLE 9.

BUILDING CODE COUNCIL AND BUILDING CODE.

Sec.
143-136. Building Code Council created; membership.

Sec.

143-137. Organization of Council; rules and regulations; meetings; staff; fiscal affairs.
143-138. North Carolina State Building Code.
143-139. Enforcement of Building Code.
143-140. Hearings before enforcement agencies as to questions under Building Code.
143-141. Appeals to Building Code Council.
143-142. Further duties of the Building Code Council.
143-143. Effect on certain existing laws.

§ 143-135.1. State buildings exempt from municipal building requirements; consideration of recommendations by municipalities.—Buildings constructed by the State of North Carolina or any agency or institution of the State under plans and specifications approved by the Budget Bureau shall not be subject to inspection by any municipal authorities and to municipal building codes and requirements. Inspection fees fixed by municipalities shall not be applicable to such construction, except where inspection is requested by the owning agency. Municipal authorities may, however, inspect any plans or specifications for any such construction and all recommendations made by them with respect thereto shall be given careful consideration by the Budget Bureau. (1951, c. 1104, s. 4.)

ARTICLE 9.

BUILDING CODE COUNCIL AND BUILDING CODE.

§ 143-136. Building Code Council created; membership.—(a) Creation; Membership; Terms.—There is hereby created a Building Code Council, which shall be composed of nine members appointed by the Governor, consisting of one registered architect, one licensed general contractor, one registered engineer practicing structural engineering, one registered engineer practicing mechanical engineering, one registered engineer practicing electrical engineering, one licensed plumbing and heating contractor, one municipal building inspector, a representative of the public who is not a member of the building construction industry, and a representative of the engineering staff of a State agency charged with approval of plans of state-owned buildings. Of the members initially appointed by the Governor, three shall serve for terms of two years each, three shall serve for terms of four years each, and three shall serve for terms of six years each. Thereafter, all appointments shall be for terms of six years. The Governor may remove appointive members at any time. Neither the architect nor any of the above-named engineers shall be engaged in the manufacture, promotion or sale of any building material, and any member who shall, during his term, cease to meet the qualifications for original appointment (through ceasing to be a practicing member of the profession indicated or otherwise) shall thereby forfeit his membership on the Council.

The Governor may make appointments to fill the unexpired portions of any terms vacated by reason of death, resignation, or removal from office. In making such appointment, he shall preserve the composition of the Council required above.

(b) Compensation.—Members of the Building Code Council other than any who are employees of the State shall receive seven dollars (\$7.00) per day, including necessary time spent in traveling to and from their place of residence within the State to any place of meeting or while traveling on official business of the Council. In addition, all members shall receive mileage and subsistence according to State practice while going to and from any place of meeting, or when on official business of the Council. (1957, c. 1138; 1965, c. 1145.)

NOTES Chapter 1138 of 1957 Session Laws repealed Article 9 entitled "Building Code" which was enacted in 1933.

§ 143-137. Organization of Council; rules and regulations; meetings; staff; fiscal affairs.—(a) First Meeting; Organization; Rules and Regulations.—Within thirty days after its appointment, the Building Code Council shall meet on call of the Commissioner of Insurance. The Council shall elect from its appointive members a chairman and such other officers as it may choose, for such terms as it may designate in its rules and regulations. The Council shall adopt such rules and regulations not inconsistent herewith as it may deem necessary for the proper discharge of its duties. The chairman may appoint members to such committees as the work of the Council may require.

(b) Meetings.—The Council shall meet regularly, at least once every six months, at places and dates to be determined by the Council. Special meetings may be called by the chairman on his own initiative and must be called by him at the request of two or more members of the Council. All members shall be notified by the chairman in writing of the time and place of regular and special meetings at least seven days in advance of such meeting. Five members shall constitute a quorum. All meetings shall be open to the public.

(c) Staff.—Personnel of the Division of Engineering of the Department of Insurance shall serve as a staff for the Council. Such staff shall have the duties of

- (1) Keeping an accurate and complete record of all meetings, hearings, correspondence, laboratory studies, and technical work performed by or for the Council, and making these records available for public inspection at all reasonable times;
- (2) Handling correspondence for the Council.

(d) Fiscal Affairs of the Council.—All funds for the operations of the Council and its staff shall be appropriated to the Department of Insurance for the use of the Council. All such funds shall be held in a separate or special account on the books of the Department of Insurance, with a separate financial designation or code number to be assigned by the Budget Bureau or its agent. Expenditures for staff salaries and operating expenses shall be made in the same manner as the expenditure of any other Department of Insurance funds. The Department of Insurance may hire such additional personnel as may be necessary to handle the work of the Building Code Council, within the limits of funds appropriated for the Council and with the approval of the Council. (1957, c. 1138.)

§ 143-138. North Carolina State Building Code.—(a) Preparation and Adoption.—The Building Code Council is hereby empowered to prepare and adopt, in accordance with the provisions of this article, a North Carolina State Building Code. Prior to the adoption of this Code, or any part thereof, the Council shall hold at least one public hearing in the city of Raleigh. A notice of such public hearing shall be given once a week for two successive calendar weeks in a newspaper published in Raleigh, said notice to be published the first time not less than fifteen days prior to the date fixed for said hearing. The Council may hold such other public hearings and give such other notice as it may deem necessary.

(b) Contents of the Code.—The North Carolina State Building Code, as adopted by the Building Code Council, may include reasonable and suitable classifications of buildings, both as to use and occupancy; general building

restrictions as to location, height, and floor areas; rules for the lighting and ventilation of buildings; requirements concerning means of egress from buildings; regulations governing construction and precautions to be taken during construction; regulations as to permissible materials, loads and stresses; regulations of chimneys, heating appliances, elevators, and other facilities connected with the buildings; regulations governing plumbing, heating, air-conditioning for the purpose of comfort cooling by the lowering of temperature, and electrical systems (regulations for which electric systems may be the National Electric Code, as approved by the American Standards Association and filed with the Secretary of State); and such other reasonable rules and regulations pertaining to the construction of buildings and the installation of particular facilities therein as may be found reasonably necessary for the protection of the occupants of the building, its neighbors, and members of the public at large.

The Code may contain provisions regulating every type of building, wherever it might be situated in the State; provided, however, that such regulations shall not apply to the following types of buildings, unless the governing body of the municipality or the county wherein such buildings are located shall by vote adopt a resolution making the regulations applicable to one or more of such types of buildings:

- (1) Dwellings; and outbuildings used in connection therewith;
- (2) Apartment buildings used exclusively as the residence of not more than two families;
- (3) Temporary buildings or sheds used exclusively for construction purposes, not exceeding twenty feet in any direction and not used for living quarters.

The governing body of any municipality or county is hereby authorized to adopt such a resolution.

Provided further, that nothing in this article shall be construed to make any building regulations applicable to farm buildings located outside the corporate limits of any municipality.

Provided further, that no building permit shall be required under such Code from any State agency for the construction of any building the total cost of which is less than twenty thousand dollars (\$20,000.00), except public or institutional buildings.

For information of users thereof, the Code shall include as appendices

- (1) Any boiler regulations adopted by the Board of Boiler Rules,
- (2) Any elevator regulations relating to safe operation adopted by the Commissioner of Labor, and
- (3) Any regulations relating to sanitation adopted by the State Board of Health which the Building Code Council believes pertinent.

In addition, the Code may include references to such other regulations of special types, such as those of the Medical Care Commission and the Department of Public Instruction as may be useful to persons using the Code. No regulations issued by other agencies than the Building Code Council shall be construed as a part of the Code, nor supersede that Code, it being intended that they be presented with the Code for information only.

Nothing in this article shall extend to or be construed as being applicable to the regulation of the design, construction, location, installation, or operation of equipment for storing, handling, transporting, and utilizing liquefied petroleum gases for fuel purposes or anhydrous ammonia or other liquid fertilizers.

(c) Standards to Be Followed in Adopting the Code.—All regulations contained in the North Carolina State Building Code shall have a reasonable and substantial connection with the public health, safety, morals, or general welfare, and their provisions shall be construed liberally to those ends. Requirements of the Code shall conform to good engineering practice, as evidenced generally by the requirements of the National Building Code of the National Board of Fire Underwriters, the Southern Standard Building Code of the Southern Building Code Congress, the Uniform Building Code of the Pacific Coast Building Officials Conference, the Basic Building Code of the Building Officials Conference of America, Inc., the National Electric Code, the Building Exits Code of the National Fire Protection Association, the American Standard Safety Code for Elevators, Dumbwaiters, and Escalators, the Boiler Code of the American Society of Mechanical Engineers, Standards of the National Board of Fire Underwriters for the Installation of Gas Piping and Gas Appliances in Buildings, and standards promulgated by the American Standards Association, Underwriters' Laboratories, Inc., and similar national agencies engaged in research concerning strength of materials, safe design, and other factors bearing upon health and safety.

(d) Amendments of the Code.—The Building Code Council may from time to time revise and amend the North Carolina State Building Code, either on its own motion or upon application from any citizen, State agency, or political subdivision of the State. In adopting any amendment, the Council shall comply with the same procedural requirements and the same standards set forth above for adoption of the Code.

(e) Effect upon Local Building Codes.—The North Carolina State Building Code shall apply throughout the State, from the time of its adoption. However, any political subdivision of the State may adopt a building code or building rules and regulations, provided that before any such building code or regulations or any amendments thereto shall be effective they must be officially approved by the Building Code Council as providing adequate minimum standards to preserve and protect health and safety, in accordance with the provisions of subsection (c) above. Such approval shall be taken as conclusive evidence that a local code supersedes the State Building Code in its particular political subdivision. This article shall not affect any existing building codes or regulations until the North Carolina State Building Code has been legally adopted by the Building Code Council.

(f) Effect upon Existing Laws.—Until such time as the North Carolina State Building Code has been legally adopted by the Building Code Council pursuant to this article, the North Carolina Building Code adopted by the Council and the Commissioner of Insurance in 1953 shall remain in full force and effect. Such Code is hereby ratified and adopted.

(g) Publication and Distribution of Code.—The Building Code Council shall cause to be printed, after adoption by the Council, the North Carolina State Building Code and each amendment thereto. It shall, at the State's expense, distribute copies of the Code and each amendment to State and

local governmental officials, departments, agencies, and educational institutions, as is set out in the table below. (Those marked by an asterisk will receive copies only on written request to the Council.)

OFFICIAL OR AGENCY	NUMBER OF COPIES
State Departments and Officials	
Governor	1
Lieutenant-Governor	1
Auditor	1
Treasurer	1
Secretary of State	1
Superintendent of Public Instruction	3
State Board of Education	2
Attorney General	5
Commissioner of Agriculture	1
Commissioner of Labor	3
Commissioner of Insurance	5
State Board of Health	10
Medical Care Commission	3
State Highway Commission	3
Adjutant General	1
Utilities Commission	1
Budget Bureau	3
Department of Conservation and Development	3
State Board of Public Welfare	7
Justices of the Supreme Court	1 each
Clerk of the Supreme Court	1
Judges of the Superior Court	* 1 each
Emergency Judges of the Superior Court	* 1 each
Special Judges of the Superior Court	* 1 each
Solicitors of the Superior Court	* 1 each
State Library	2
Supreme Court Library	2
State Senators	* 1 each
Representatives of General Assembly	* 1 each
Other State-supported institutions, at the discretion of the Council	* 1 each
Schools	
University of North Carolina at Chapel Hill	*25
North Carolina State College of Agriculture and Engineering of the University of North Carolina ..	*15
Women's College of the University of North Carolina .	* 1
A & T State University at Greensboro	* 5
All other State supported colleges and universities in the State of North Carolina	* 1 each
Local Officials	
Clerks of the Superior Courts	1 each
Registers of Deeds of the Counties	* 1 each
Chairmen of the Boards of County Commissioners ..	* 1 each
City Clerk of each incorporated municipality	1 each

In addition, the Building Code Council shall make additional copies available at such price as it shall deem reasonable to members of the general public.

(h) Violations.—Any person who shall be adjudged to have violated this article or the North Carolina State Building Code shall be guilty of a misdemeanor and shall upon conviction be liable to a fine, not to exceed fifty dollars (\$50.00), for each offense. Each thirty days that such violation continues shall constitute a separate and distinct offense. (1957, c. 1138.)

NOTE: The 1936 and 1953 Editions of the State Building Code had the force of Law according to Court decisions. The Supreme Court recognized the Building Code adopted by the Building Code Council and referred to provisions therein in Court decisions in 1955 and 1961. (See General Statutes printed by the Mitchie Co. for complete references on Court decisions.)

§ 143-139. **Enforcement of Building Code.**—(a) Procedural Requirements.—Subject to the provisions set forth herein, the Building Code Council shall adopt such procedural requirements in the North Carolina State Building Code as shall appear reasonably necessary for adequate enforcement of the Code while safe-guarding the rights of persons subject to the Code.

(b) General Building Regulations.—The Insurance Commissioner shall have general supervision, through the Division of Engineering of the Department of Insurance, of the administration and enforcement of all sections of the North Carolina State Building Code pertaining to plumbing, electrical systems, general building restrictions and regulations, heating and air conditioning, fire protection, and the construction of buildings generally, except those sections of the Code, the enforcement of which is specifically allocated to other agencies by subsections (c) and (d) below. The Insurance Commissioner, by means of the Division of Engineering, shall exercise his duties in the enforcement of the North Carolina State Building Code (including local building codes which have superseded the State Building Code in a particular political subdivision pursuant to G.S. 143-138(e) in cooperation with local officials and local inspectors duly appointed by the governing body of any municipality or board of county commissioners pursuant to article 11, chapter 160 of the General Statutes of North Carolina, or G.S. 160-200(29), or G.S. 153-9(47) and (52), or any other applicable statutory authority.

(c) Boilers.—The Bureau of Boiler Inspection of the Department of Labor shall have general supervision of the administration and enforcement of those sections of the North Carolina State Building Code which pertain to boilers of the types enumerated in article 7 of chapter 95 of the General Statutes.

(d) Elevators.—The Department of Labor shall have general supervision of the administration and enforcement of those sections of the North Carolina State Building Code which pertain to elevators, moving stairways, and amusement devices such as merry-go-rounds, roller coasters, Ferris wheels, etc. (1957, c. 1138; 1963, c. 811.)

§ 143-140. **Hearings before enforcement agencies as to questions under Building Code.**—Any person desiring to raise any question under this article or under the North Carolina State Building Code shall be entitled to a full hearing before the appropriate enforcement agency, as designated in the preceding section. Upon request in writing by any such person, the enforcement agency shall appoint a time for the hearing, giving such

person reasonable notice thereof. The enforcement agency, through an appropriate official, shall conduct a full and complete hearing of the matters in controversy and make a determination thereof within a reasonable time thereafter. The person requesting the hearing shall, upon request, be furnished a written statement of the decision, setting forth the facts found, the decision reached, and the reasons therefor. In the event of dissatisfaction with such decision, the person affected shall have the options of

- (1) Appealing to the Building Code Council or
- (2) Appealing directly to the superior court, as provided in § 143-141. (1957, c. 1138.)

§ 143-141. Appeals to Building Code Council.—(a) Method of Appeal.—Whenever any person desires to take an appeal to the Building Code Council from the decision of a State enforcement agency relating to any matter under this article or under the North Carolina Building Code, he shall within thirty days after such decision give written notice to the Building Code Council through the Division of Engineering of the Department of Insurance that he desires to take an appeal. A copy of such notice shall be filed at the same time with the enforcement agency from which the appeal is taken. The chairman of the Building Code Council shall fix a reasonable time and place for a hearing, giving reasonable notice to the appellant and to the enforcement agency. Such hearing shall be not later than the next regular meeting of the Council. The Building Code Council shall thereupon conduct a full and complete hearing as to the matters in controversy, after which it shall within a reasonable time give a written decision setting forth its findings of fact and its conclusions.

(b) Interpretations of the Code.—The Building Code Council shall have the duty, in hearing appeals, to give interpretations of such provisions of the Building Code as shall be pertinent to the matter at issue. Where the Council finds that an enforcement agency was in error in its interpretation of the Code, it shall remand the case to the agency with instructions to take such action as it directs.

(c) Variations of the Code.—Where the Building Code Council finds on appeal that materials or methods of construction proposed to be used are as good as those required by the Code, it shall remand the case to the enforcement agency with instructions to permit the use of such materials or methods of construction. The Council shall thereupon immediately initiate procedures for amending the Code as necessary to permit the use of such materials or methods of construction.

(d) Further Appeals to the Courts.—Whenever any person desires to take an appeal from a decision of the Building Code Council or from the decision of an enforcement agency (with or without an appeal to the Building Code Council), he may take an appeal either to the Wake County Superior Court or to the superior court of the county in which the proposed building is to be situated, in accordance with the provisions of article 33 of chapter 143 of the General Statutes. (1957, c. 1138.)

§ 143-142. Further duties of the Building Code Council.—(a) Recommended Statutory Changes.—It shall be the duty of the Building Code Council to make a thorough study of the building laws of the State, including both the statutes enacted by the General Assembly and the rules and regulations adopted by State and local agencies. On the basis of such

study, the Council shall recommend to the 1959 and subsequent General Assemblies desirable statutory changes to simplify and improve such laws.

(b) **Recommend Changes in Enforcement Procedures.**—It shall be the duty of the Building Code Council to make a thorough and continuing study of the manner in which the building laws of the State are enforced by State, local, and private agencies. On the basis of such studies, the Council may recommend to the General Assembly any statutory changes necessary to improve and simplify the enforcement machinery. The Council may also advise State agencies as to any changes in administrative practices which could be made to improve the enforcement of building laws without statutory changes. (1957, c. 1138.)

§ 143-143. **Effect on certain existing laws.**—Nothing in this article shall be construed as abrogating or otherwise affecting the power of any State department or agency to promulgate regulations, make inspections, or approve plans in accordance with any other applicable provisions of law not in conflict with the provisions herein. (1957, c. 1138.)

CHAPTER 153.

COUNTIES AND COUNTY COMMISSIONERS.

ARTICLE 2.

COUNTY COMMISSIONERS.

Sec.

153-9. Powers of board.

(47) County Plumbing Inspectors.

(52) County Building Inspectors.

(47). **County Plumbing Inspectors.**—The county commissioners may designate and appoint one or more plumbing inspectors whose duties shall be: To inspect and approve the installation of all plumbing and water systems, either or both, hereafter installed in unincorporated areas; to issue certificates of approval of such inspections; to enforce all State and local laws governing plumbing installations and materials, to collect inspection fees, determined by the county commissioners, and deliver same to the county treasurer; and to furnish a surety bond approved by the county commissioners. The county commissioners may pay the plumbing inspector a fixed salary, or apply inspection fees collected in lieu thereof, for services rendered. It shall be unlawful for the plumbing inspector to be financially connected in any way with persons, firms or corporations who install plumbing systems or sell plumbing fixtures, and his services may be terminated when deemed wise and necessary by the county commissioners.

This section shall apply only to Beaufort, Bladen, Buncombe, Cumberland, Durham, Forsyth, Granville, Guilford, Harnett, Haywood, Montgomery, Onslow, Pamlico, Rockingham, Rowan, Stanly, Stokes, Surry, Transylvania, Wake and Wayne counties. (1953, c. 984; 1955, cc. 144, 942, 1171; 1957, cc. 415, 456, 1286, 1294; 1959, cc. 399, 1031; 1961, cc. 763, 884, 1036.)

(52). **County Building Inspectors.**—The board of county commissioners may appoint one or more building inspectors to serve at the will of the

board, whose duties shall be: To enforce the State Building Code adopted under article 9 of chapter 143 of the General Statutes; to enforce any county building regulations adopted under G.S. 143-138(b) or 143-138(e); to enforce any county zoning ordinance or ordinances; to collect inspection fees determined by the board of county commissioners, which the board is hereby authorized to impose, and deliver same to the county treasurer; to furnish a surety bond for the faithful performance of his duties and the safeguarding of any public funds coming into his hands, approved as to amount, form, and solvency of sureties by the board of county commissioners; and to carry out such related duties as may be specified by the board of county commissioners.

In lieu of appointing a separate building inspector, the board of county commissioners may designate as county building inspectors:

- (1) A building inspector of any other county or counties, with the approval of the board of county commissioners of such other county or counties;
- (2) A municipal building inspector of any municipality or municipalities within the county, with the approval of the municipal governing body;
- (3) The county fire marshal;
- (4) The county electrical inspector appointed under the provisions of G.S. 160-122;
- (5) A county plumbing inspector appointed under the provisions of G.S. 153-9(47); or
- (6) Any other person or persons whom they deem to be qualified.

The board of county commissioners may pay a building inspector a fixed salary or may in lieu thereof reimburse him for his services by paying over any inspection fees which he collects. The board of county commissioners may make necessary appropriations for the special purpose of paying the salary or salaries of county building inspectors and any expenses pertaining to building inspection.

The board of county commissioners may enter into and carry out contracts with any municipality or municipalities within the county, or with any other county or counties, under which the parties agree to support a joint building inspection department. The board of county commissioners and the municipal governing body may make any necessary appropriations for such a purpose.

On official request of the governing body of any municipality within the county, the board of county commissioners may direct the county building inspector to exercise his powers within said municipality, and he shall thereupon be empowered to do so until such time as the municipal governing body officially withdraws its request.

This subsection shall not apply to Cherokee, Clay, Graham, Lenoir, and Macon Counties. (1950, c. 940.)

ARTICLE 11
REGULATION OF BUILDINGS
CHAPTER 160.
MUNICIPAL CORPORATIONS.

§ 160-118. Local inspector of buildings.—The chiefs of fire departments hereinbefore provided for shall also be local inspectors of buildings for the cities or towns for which they are appointed and shall perform the duties required herein and shall make all reports required by the Insurance Commissioner, and shall make all inspections and perform such duties as may be required by the State law or city or town ordinance or by the said Insurance Commissioner: Provided, however, that any city or town may appoint and reasonably remunerate a local inspector of buildings, in which case the chief of fire department shall be relieved of the duties herein imposed. (1905, c. 506, s. 6; Rev., s. 2982; 1915, c. 192, s. 2; C. S., s. 2741.)

§ 160-119. Town aldermen failing to appoint inspectors.—If the aldermen or commissioners of any city or town shall fail or refuse to appoint a chief of the fire department, or shall fail or refuse to reasonably remunerate him, they shall be guilty of a misdemeanor. The section shall not apply to the aldermen or commissioners of any city or town, where such city or town is by law exempt from the law regulating and controlling the erection and inspection of buildings. (1905, c. 506, s. 4; Rev., s. 3607; C. S., s. 2742.)

§160-126. Building Permits.—Before a building is begun the owner of the property shall apply to the inspector for a permit to build. This permit shall be given in writing and shall contain a provision that the building shall be constructed according to the requirements of the building law, a copy of which shall accompany the permit. No permit shall be issued unless the plans and specifications are identified by the name and address of the author thereof, and where the General Statutes of North Carolina require that plans for certain types of construction be prepared only by a registered architect or a registered engineer, no permit shall be issued unless such plans and specifications bear the North Carolina seal of a registered architect or of a registered engineer. As the building progresses the inspector shall make as many inspections as may be necessary to satisfy him that the building is being constructed according to the provisions of this law. As soon as the building is completed the owner shall notify the inspector who shall proceed at once to inspect the said building and determine whether or not the flues and the building are properly constructed in accordance with the building law. If the building meets the requirements of the building law the inspector shall then issue to the owner of the building a certificate which shall state that he has complied with the requirements of the building law as to that particular building, giving description and locality and street number if numbered. The inspector shall keep his record so that it will show readily by reference all such buildings as are approved. The inspector shall report to the Insurance Commissioner every person neglecting to secure such permit and certificate, and also bring the matter before the mayor, recorder or municipal court for their attention and action. (1905, c. 506, s. 26; Rev., s. 2986; 1915, c. 192, s. 3; C. S., s. 2748, amended May 24, 1957.)

§ 160-154. To what towns applied.—This article shall apply only to incorporated cities and towns of over one thousand inhabitants according to the last United States census, and such other cities and towns in the State as shall by a vote of their board of aldermen or governing body adopt this article. (1905, c. 506, s. 35; Rev., s. 3011; 1915, c. 192, s. 16; C. S., s. 2776.)

CHAPTER 160—ARTICLE 18

POWERS OF MUNICIPAL CORPORATIONS.

§ 160-200. Corporate powers.—In addition to and coordinate with the power granted to cities in subchapter I of this chapter, and any acts affecting such cities, all cities shall have the following powers:

(15). To regulate and *control plumbers* and plumbing work, and to enforce efficiency in the same by examination of such plumbers and inspection of such plumbing work.

(28). To *condemn* and remove any and all *buildings*, partially destroyed or otherwise, in the city limits, or cause them to be removed at the expense of the owner or owners, when dangerous to life, health, or other property, under such just rules and regulations as it may by ordinance establish; and likewise to suppress any and all other nuisances maintained in the city.

(29). To *provide for all inspections* which may be expedient, proper, or necessary for the welfare, safety, and health of the city and its citizens, and regulate the fees for such inspection.

(34). To regulate and *control electricians* and electrical work and to enforce efficiency in the same by examination of such electricians and inspection of such electrical work.

(41). To *adopt by reference* thereto in an ordinance any published technical code or any standards or regulations promulgated by any public agency. Upon such adoption, such technical code, standards, or regulations shall have the force of law within the jurisdiction of the municipality, subject to the provisions of G.S. 143-138(e); provided, that any municipality adopting by reference any technical code, standards, or regulations under authority of this section shall maintain conveniently accessible for public inspection an official copy of the same.

RELATED LAWS PERTAINING TO THE BUILDING INDUSTRY

(See HANDBOOK OF N. C. BUILDING LAWS)

Published by N. C. Building Construction Congress,
Available from N. C. Chapter, AIA,
115 W. Morgan St., Raleigh, N. C. 27602

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STANDARD FOR THE INSTALLATION OF GAS APPLIANCES AND GAS PIPING

ASA Z21.30 — 1964

NFPA No. 54 — 1964

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PART 1 - GENERAL

1.1 SCOPE

1.1.1 Applicability:

This standard applies to the design, fabrication, installation, tests and operation of appliance and piping systems for fuel gases such as natural gas, manufactured gas, undiluted liquefied petroleum gases, liquefied petroleum gas-air mixtures, or mixtures of any of these gases, as follows:

(a) Low pressure (not in excess of $\frac{1}{2}$ pound per square inch of 14 inches water column) domestic and commercial piping systems extending from the outlet of the meter set assembly, or the outlet of the service regulator when a meter is not provided, to the inlet connections of appliances.

(b) The installation and operation of domestic and commercial appliances supplied at pressures of $\frac{1}{2}$ pound per square inch or less.

1.1.2 Nonapplicability:

This standard does not apply to:

(a) Gas piping systems for industrial installations at any pressure or any other gas piping system operating at pressures greater than $\frac{1}{2}$ pound per square inch. For piping in such installations refer to ASME Code for Pressure Piping, Section 2 of ASA B31.1-1955 and Addenda B31.1a-1961.*

(b) Gas equipment supplied through piping systems covered in 1.1.2(a), and

(c) Gas equipment designed and installed for specific manufacturing, production, processing and power generating applications.

1.1.3 Other Standards:

In applying this standard, reference should also be made to the manufacturer's instructions, serving gas supplier regulations, and local building, heating, plumbing or other codes in effect in the area in which the installation is made.

1.1.4 "Approved:"

The word "approved," as used in this standard, means acceptable to the authority having jurisdiction.

1.2 QUALIFIED INSTALLING AGENCY

Installation and replacement of gas piping or gas appliances and repair of gas appliances shall be performed only by a qualified installing agency. By the term "qualified installing agency" is meant any individual, firm, corporation, or company which either in person or through a representative is engaged in and is responsible for the installation or replacement of gas piping on the outlet side of the meter, or of the service regulator when a meter is not provided, or the connection, installation or repair of gas

*Available from the American Standards Association, Inc., 10 East 40th Street, New York, New York, 10016, or the American Society of Mechanical Engineers, 345 East 47th St., New York, New York, 10017.

appliances, who is experienced in such work, familiar with all precautions required, and has complied with all the requirements of the authority having jurisdiction.

1.3 GENERAL PRECAUTIONS

1.3.1 Turn Gas Off:

All gas piping or gas appliance installation shall be performed with the gas turned off to eliminate hazards from leakage of gas.

1.3.2 Notification of Interrupted Service:

It shall be the duty of the installing agency when the gas supply is to be turned off, to notify all affected consumers.

1.3.3 Before Turning Gas Off:

Before turning off the gas to premises for the purpose of installation, repair, replacement or maintenance of gas piping or appliances, all burners shall be turned off. When two or more consumers are served from the same supply system, precautions shall be exercised to assure that only service to the proper consumer is turned off.

1.3.4 Checking for Gas Leaks:

Soap and water solution, or other material acceptable for the purpose, shall be used in locating gas leakage. Matches, candles, flame or other sources of ignition shall not be used for this purpose.

1.3.5 Use of Lights:

Artificial illumination used in connection with a search for gas leakage shall be restricted to electric hand flashlights (preferably of the safety type) or approved safety lamps. In searching for leaks, electric switches should not be operated. If electric lights are already turned on, they should not be turned off.

1.3.6 Working Alone:

An individual shall not work alone in any situation where accepted working practice dictates that two or more men are necessary to perform the work safely.

1.3.7 Handling of Liquid from Drips:

Liquid which is removed from a drip in existing gas piping shall be handled with proper precautions, and shall not be left on the consumer's premises.

1.3.8 No Smoking:

When working on piping which contains or has contained gas, smoking shall not be permitted.

1.3.9 Handling Flammable Liquids:

Flammable liquids used by the installer shall be handled with proper precautions and shall not be left within the premises from the end of one working day to the beginning of the next.

1.3.10 Work Interruptions:

When interruptions in work occur, the system shall be left in a safe and satisfactory condition.

PART 2 – GAS PIPING INSTALLATION

2.1 PIPING PLAN

It is recommended that before proceeding with the installation of a gas piping system, a piping sketch or plan be prepared showing the proposed location of the piping as well as the size of different branches. Adequate consideration should be given to future demands, and provisions made for added gas service.

Before any final plans or specifications are completed, the serving gas supplier or the authority having jurisdiction should be consulted.

When an additional appliance is to be served through any present gas piping, capacity of the existing piping shall be checked for adequacy, and replaced with larger piping if necessary.

2.2 PROVISION FOR METER LOCATION

The meter location shall be such that the meter can be easily read and the connections are readily accessible for servicing. Location, space requirements, dimensions, and type of installation shall be acceptable to the serving gas supplier.

Gas piping at multiple meter installations shall be plainly marked by a metal tag or other permanent means attached by the installing agency, designating the building or the part of the building being supplied.

2.3 INTERCONNECTIONS

2.3.1 Interconnections Supplying Separate Consumers:

When two or more meters, or two or more service regulators when meters are not provided, are installed on the same premises and supply separate consumers, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators.

2.3.2 Interconnections for Stand-By Fuels:

When a supplementary gas for stand-by use is connected down-stream from a meter or a service regulator when a meter is not provided, a suitable device to prevent backflow shall be installed. A three-way valve installed to admit the stand-by supply and at the same time shut off the regular supply may be used for this purpose.

2.4 SIZE OF PIPING TO GAS APPLIANCES

2.4.1 Size of Piping for Gas Appliances:

Gas piping shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure between the meter, or service regulator when a meter is not provided, and the appliance or appliances. The size of gas piping depends upon the following factors:

- (a) Allowable loss in pressure from meter, or service regulator when a meter is not provided, to appliance.
- (b) Maximum gas consumption to be provided.
- (c) Length of piping and number of fittings.
- (d) Specific gravity of the gas.
- (e) Diversity factor.

2.4.2 Gas Consumption:

The quantity of gas to be provided at each outlet shall be determined, whenever possible, directly from the manufacturer's Btu rating of the appliance which will be installed. In case the ratings of the appliances to be installed are not known, Table 1 is given to show the approximate consumption of average appliances of certain types in Btu per hour.

To obtain the cubic feet per hour of gas required, divide the total Btu input of all appliances by the average Btu heating value per cubic foot of the gas. The average Btu per cubic foot of the gas in the area of the installation may be obtained from the serving gas supplier.

2.4.3 Gas Piping Size:

(a) Capacities in cubic feet per hour of 0.60 specific gravity gas for different sizes and lengths are shown in Tables 2A and 2B for iron pipe or equivalent rigid pipe and in Table 2C for semirigid tubing. Tables 2A and 2C are based upon a pressure drop of 0.3 inch water column, whereas Table 2B is based upon a pressure drop of 0.5 inch water column. In using these tables no additional allowance is necessary for an ordinary number of fittings. The serving gas supplier shall designate which Table(s) shall be used.

(b) Capacities in thousands of Btu per hour of undiluted liquefied petroleum gases based on a pressure drop of 0.5 inch water column for different sizes and lengths are shown in Table 4A for iron pipe or equivalent rigid pipe and in Table 4B for semirigid tubing. In using these tables no additional allowance is necessary for an ordinary number of fittings.

(c) Gas piping systems that are to be supplied with gas of a specific gravity of 0.70 or less, can be sized directly from Tables 2A, 2B and 2C unless the authority having jurisdiction specifies that a gravity factor be applied. When the specific gravity of the gas is greater than 0.70 the gravity factor shall be applied.

Application of the gravity factor converts the figures given in Tables 2A, 2B and 2C to capacities with another gas of different specific gravity. Such application is accomplished by multiplying the capacities given in Tables 2A, 2B and 2C by the multipliers shown in Table 3. In case the exact specific gravity does not appear in the Table, choose the next higher value specific gravity shown.

(d) To determine the size of each section of gas piping in a system within the range of Tables 2A, 2B, 2C, 4A or 4B proceed as follows: (A sample calculation is presented in Appendix B.)

1. Determine the gas demand of each appliance to be attached to the piping system. When Tables 2A, 2B, or 2C are to be used to select the piping size, calculate the gas demand in terms of cubic feet per hour for each piping system outlet. When Tables 4A or 4B are to be used to select the piping size, calculate the gas demand in terms of thousands of Btu per hour for each piping system outlet.

2. Measure the length of piping from the gas meter or service regulator when a meter is not provided, to the most remote outlet in the building.

3. In Tables 2A, 2B, 2C, 4A or 4B, whichever is appropriate, select the column showing that distance or the next longer distance if the Table does not give the exact length. This is the only distance used

Table 1
Approximate Gas Input for Some Common Appliances

Appliance	Input Btu per hr. (Approx.)
Range, Free Standing, Domestic	65,000
Built-In Oven or Broiler Unit, Domestic	25,000
Built-In Top Unit, Domestic	40,000
Water Heater, Automatic Storage 30 to 40 Gal. Tank	45,000
Water Heater, Automatic Storage 50 Gal. Tank	55,000
Water Heater, Automatic Instantaneous (2 gal. per minute	142,800
Capacity (4 gal. per minute	285,000
(6 gal. per minute	428,400
Water Heater, Domestic, Circulating or Side-Arm	35,000
Refrigerator	3,000
Clothes Dryer, Type 1 (Domestic)	35,000
Gas Light	2,500
Incinerator, Domestic	35,000

For specific appliances or appliances not shown above, the input should be determined from the manufacturer's rating.

Table 2 A
Maximum Capacity of Pipe in Cubic Feet of Gas per Hour
 (Based upon a Pressure Drop of 0.3 Inch Water Column
 and 0.6 Specific Gravity Gas)

Length in Feet	Nominal Iron Pipe Size, Inches								
	½	¾	1	1¼	1½	2	2½	3	4
10	132	278	520	1,050	1,600	3,050	4,800	8,500	17,500
20	92	190	350	730	1,100	2,100	3,300	5,900	12,000
30	73	152	285	590	890	1,650	2,700	4,700	9,700
40	63	130	245	500	760	1,450	2,300	4,100	8,300
50	56	115	215	440	670	1,270	2,000	3,600	7,400
60	50	105	195	400	610	1,150	1,850	3,250	6,800
70	46	96	180	370	560	1,050	1,700	3,000	6,200
80	43	90	170	350	530	990	1,600	2,800	5,800
90	40	84	160	320	490	930	1,500	2,600	5,400
100	38	79	150	305	460	870	1,400	2,500	5,100
125	34	72	130	275	410	780	1,250	2,200	4,500
150	31	64	120	250	380	710	1,130	2,000	4,100
175	28	59	110	225	350	650	1,050	1,850	3,800
200	26	55	100	210	320	610	980	1,700	3,500

in determining the size of any section of gas piping. If the gravity factor is to be applied, the values in the selected column of Tables 2A, 2B or 2C are multiplied by the appropriate multiplier from Table 3.

4. Use this vertical column to locate ALL gas demand figures for this particular system of piping.

5. Starting at the most remote outlet, find in the vertical column just selected the gas demand for that outlet. If the exact figure of demand is not shown, choose the next larger figure below in the column.

6. Opposite this demand figure, in the first column at the left in Tables 2A, 2B, 2C, 4A, or 4B, will be found the correct size of gas piping.

7. Proceed in a similar manner for each outlet and each section of gas piping. For each section of piping determine the total gas demand supplied by that section.

(e) For any gas piping system, for special gas appliances or for conditions other than those covered by Tables 2A, 2B, 2C, 4A or 4B, such as longer runs, or greater gas demands, the size of each gas piping system shall be determined by standard engineering methods acceptable to the authority having jurisdiction and serving gas supplier.

2.4.4 Diversity Factor:

The diversity factor (see Part 7, Definitions) is an important factor in determining the correct gas piping size to be used in multiple family dwellings. It is dependent upon the number and kinds of gas appliances being installed. Consult the serving gas supplier or the authority having jurisdiction for the diversity factor to be used.

2.4.5 Additions to Existing Gas Piping:

Additions to existing utility gas piping shall conform to Tables 2A, 2B or 2C, whichever is designated by the serving gas supplier. Additions to existing undiluted liquefied petroleum gas piping shall conform to Table 4A or 4B. Existing gas piping that does not conform to these provisions shall be replaced by the proper size of pipe or tubing. Additions shall not be made to existing pipe which is smaller than that permitted in Tables 2A, 2B or 4A, or to existing tubing which is smaller than that permitted in Table 2C or 4B.

2.5 GAS PIPING IN MOBILE HOME AND TRAVEL TRAILER PARKS

Gas piping systems in mobile home and travel trailer parks extending from the outlet of a meter set assembly or the outlet of a service regulator when a meter is not provided to the terminal of the gas riser at each trailer site shall comply with the following specific provisions and with all other applicable provisions in Part 1 and Part 2 of this standard.

2.5.1 Protection of Piping:

Piping shall be buried to a sufficient depth or covered in a manner so as to protect the piping system from physical damage.

2.5.2 Prohibited Locations:

Piping shall not be installed under trailer sites and patio slabs adjacent to trailers when an enclosing foundation is used under the trailer.

Table 2B
Maximum Capacity of Pipe in Cubic Feet of Gas per Hour.
 (Based upon a Pressure Drop of 0.5 Inch Water Column
 and 0.6 Specific Gravity Gas)

Length in Feet	Nominal Iron Pipe Size, Inches								
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
10	175	360	680	1,400	2,100	3,950	6,300	11,000	23,000
20	120	250	465	950	1,460	2,750	4,350	7,700	15,800
30	97	200	375	770	1,180	2,200	3,520	6,250	12,800
40	82	170	320	660	990	1,900	3,000	5,300	10,900
50	73	151	285	580	900	1,680	2,650	4,750	9,700
60	66	138	260	530	810	1,520	2,400	4,300	8,800
70	61	125	240	490	750	1,400	2,250	3,900	8,100
80	57	118	220	460	690	1,300	2,050	3,700	7,500
90	53	110	205	430	650	1,220	1,950	3,450	7,200
100	50	103	195	400	620	1,150	1,850	3,250	6,700
125	44	93	175	360	550	1,020	1,650	2,950	6,000
150	40	84	160	325	500	950	1,500	2,650	5,500
175	37	77	145	300	460	850	1,370	2,450	5,000
200	35	72	135	280	430	800	1,280	2,280	4,600

Table 2C
Maximum Capacity of Semirigid Tubing in Cubic Feet of Gas per Hour
 (Based on a Pressure Drop of 0.3 Inch Water Column
 and 0.6 Specific Gravity Gas)

Outside Diameter (Inches)	Length of Tubing (Feet)									
	10	20	30	40	50	60	70	80	90	100
3/8	19	12	10	9	—	—	—	—	—	—
1/2	45	30	24	20	18	17	15	14	13	12
5/8	97	64	52	44	38	35	32	30	28	26
3/4	161	105	88	71	64	59	54	50	46	44
7/8	245	169	135	114	97	91	80	75	71	67

Table 3
Multipliers to be used only with Tables 2A, 2B and 2C
when Applying the Gravity Factor

Specific Gravity	Multiplier	Specific Gravity	Multiplier
.35	1.31	1.00	.78
.40	1.23	1.10	.74
.45	1.16	1.20	.71
.50	1.10	1.30	.68
.55	1.04	1.40	.66
.60	1.00	1.50	.63
.65	.96	1.60	.61
.70	.93	1.70	.59
.75	.90	1.80	.58
.80	.87	1.90	.56
.85	.84	2.00	.55
.90	.82	2.10	.54

Table 4A
Maximum Capacity of Pipe in Thousands of Btu per Hour
of Undiluted Liquefied Petroleum Gases
 (Based on a Pressure Drop of 0.5 Inch Water Column)

Nominal Iron Pipe Size, Inches	Length of Pipe (Feet)											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	567	393	315	267	237	217	196	185	173	162	146	132
1	1071	732	590	504	448	409	378	346	322	307	275	252
1 1/4	2205	1496	1212	1039	913	834	771	724	677	630	567	511
1 1/2	3307	2299	1858	1559	1417	1275	1181	1086	1023	976	866	787
2	6221	4331	3465	2992	2646	2394	2205	2047	1921	1811	1606	1496

Table 4B
Maximum Capacity of Semirigid Tubing in Thousands of Btu
per Hour of Undiluted Liquefied Petroleum Gases
 (Based on a Pressure Drop of 0.5 Inch Water Column)

Outside Diameter (Inches)	Length of Tubing (Feet)									
	10	20	30	40	50	60	70	80	90	100
3/8	39	26	21	19	—	—	—	—	—	—
1/2	92	62	50	41	37	35	31	29	27	26
5/8	199	131	107	90	79	72	67	62	59	55
3/4	329	216	181	145	131	121	112	104	95	90
7/8	501	346	277	233	198	187	164	155	146	138

2.5.3 Location, Protection and Sizing of Riser:

The gas riser to each trailer site should be placed in the rear one-third section of the site and not less than 18 inches from the roadside wall of the trailer. It shall be located and protected or supported so as to minimize the likelihood of damage by moving vehicles. The minimum size of the gas piping outlet at a trailer site shall be $\frac{3}{4}$ inch for other than undiluted liquefied petroleum gases.

2.5.4 Location of Shutoff Valves:

(a) Outlets for the individual trailers and gas piping to any building supplied by the system shall be provided with a readily accessible approved valve which cannot be locked in the open position.

(b) A readily accessible valve shall be provided near the point of gas delivery for shutting off the entire trailer park system. The valve provided by the serving gas supplier may be considered acceptable for this purpose provided it is readily accessible.

2.5.5 Connection of Trailer:

Trailers shall be connected to the gas piping system with rigid pipe, listed connectors or semirigid tubing. Connectors having aluminum exterior surfaces shall not be used.

2.5.6 Demand Factors:

(a) The hourly volume of gas required for any trailer site gas outlet or any section of a trailer park gas piping system may be computed from Table 5.

(b) Other gas equipment or appliances, other than trailer site outlets, shall be computed at the manufacturer's maximum cubic foot per hour input rating or from Table 1 and shall be added to the figures given in Table 5.

Table 5
Demand Factors for use in Calculating Gas Piping systems in Trailer Parks

No. of Trailer Sites	Btu Per Hour Per Trailer Site
1	125,000
2	117,000
3	104,000
4	96,000
5	92,000
6	87,000
7	83,000
8	81,000
9	79,000
10	77,000
11 - 20	66,000
21 - 30	62,000
31 - 40	58,000
41 - 60	55,000
Over 60	50,000

2.6 ACCEPTABLE PIPING MATERIALS

2.6.1 Piping Material:

(a) PIPE. Gas pipe shall be steel or wrought-iron pipe complying with the American Standard for Wrought-Steel and Wrought-Iron Pipe, ASA B36.10-1959.* Threaded copper, brass, or aluminum alloy pipe in iron pipe sizes may be used with gases not corrosive to such material except that aluminum alloy pipe shall not be used in exterior locations, or underground, or where it is in contact with masonry, plaster, or insulation, or is subject to repeated corrosive wettings. Aluminum alloy pipe shall comply with specification ASTM B-241 (except that the use of alloy 5456 is prohibited) and shall be suitably marked at each end of each length indicating compliance with ASTM specifications.**

(b) TUBING. When acceptable to the serving gas supplier, seamless copper, aluminum alloy, or steel tubing may be used with gases not corrosive to such material. Copper tubing shall be of standard type K or L, or equivalent, complying with specification ASTM B88-62 and having a minimum wall thickness for each tubing size in compliance with ASTM specifications.** Aluminum alloy tubing shall be of standard Type A or B, or equivalent, complying with specification ASTM B-318-62, having a minimum wall thickness for each tubing size, and being suitably marked every 18 inches in compliance with ASTM specifications.** Aluminum alloy tubing shall not be used in exterior locations, or underground, or where it is in contact with masonry, plaster, or insulation, or is subject to repeated corrosive wettings.

(c) PIPING JOINTS AND FITTINGS. Pipe joints may be screwed, flanged or welded, and nonferrous pipe may also be soldered or brazed with material having a melting point in excess of 1,000° F. Tubing joints shall either be made with approved flared gas tubing fittings, or be soldered or brazed with a material having a melting point in excess of 1,000° F. Compression type tubing fittings shall not be used for this purpose.

Fittings (except stopcocks or valves) shall be malleable iron or steel when used with steel or wrought-iron pipe, and shall be copper or brass when used with copper or brass pipe or tubing, and shall be aluminum alloy when used with aluminum alloy pipe or tubing. When approved by the authority having jurisdiction, special fittings may be used to connect steel or wrought-iron pipe. Cast-iron fittings in sizes 6 inches and larger may be used to connect steel and wrought-iron pipe when approved by the authority having jurisdiction.

2.6.2 Workmanship and Defects:

Gas pipe or tubing and fittings shall be clear and free from cutting burrs and defects in structure or threading and shall be thoroughly brushed, and chip and scale blown.

Defects in pipe or tubing or fittings shall not be repaired. When defective pipe, tubing or fittings are located in a system the defective material shall be replaced.

*Available from the American Standards Association, Inc., 10 East 40th Street, New York, New York, 10016.

**Available from American Society for Testing and Materials, 1916 Race St., Philadelphia, Pa., 19103.

2.6.3 Pipe Coating:

When in contact with material exerting a corrosive action, piping and fittings coated with a corrosion resisting material shall be used.

2.6.4 Use of Old Piping Material:

Gas pipe, tubing, fittings, and valves removed from any existing installation shall not be again used until they have been thoroughly cleaned, inspected and ascertained to be equivalent to new material.

2.6.5 Joint Compounds:

Joint compounds (pipe dope) shall be applied sparingly and only to the male threads of pipe joints. Such compounds shall be resistant to the action of liquefied petroleum gases.

2.7 PIPE THREADS

2.7.1 Specifications for Pipe Threads:

Pipe and fitting threads shall comply with the American Standard for Pipe Threads (Except Dryseal), B2.1-1960.*

2.7.2 Damaged Threads:

Pipe with threads which are stripped, chipped, corroded, or otherwise damaged shall not be used.

2.7.3 Number of Threads:

Pipe shall be threaded in accordance with Table 6.

Table 6
Specifications for Threading Pipe

Iron Pipe Size (Inches)	Approximate Length of Threaded Portion (Inches)	Approximate No. of Threads to be Cut
1/2	3/4	10
3/4	3/4	10
1	7/8	10
1 1/4	1	11
1 1/2	1	11
2	1	11
2 1/2	1 1/2	12
3	1 1/2	12
4	1 5/8	13

2.8 CONCEALED PIPING IN BUILDINGS

2.8.1 Minimum Size:

No gas pipe smaller than standard 1/2 inch iron pipe size shall be used in any concealed location.

*Available from the American Standards Association, Inc., 10 East 40th Street, New York, New York, 10016.

2.8.2 Piping in Partitions:

Concealed gas piping should be located in hollow rather than solid partitions. Tubing shall not be run inside walls or partitions unless protected against physical damage. This rule does not apply to tubing which passes through walls or partitions.

2.8.3 Piping in Floors:

(a) Except as provided in 2.8.3(b), gas piping in solid floors such as concrete shall be laid in channels in the floor suitably covered to permit access to the piping with a minimum of damage to the building. When piping in floor channels may be exposed to excessive moisture or corrosive substances, it shall be suitably protected.

(b) When approved by the authority having jurisdiction and acceptable to the serving gas supplier, gas piping may be embedded in concrete, floor slabs constructed with portland cement. Piping shall be surrounded with a minimum of 1½ inches of concrete and shall not be in physical contact with other metallic structures such as reinforcing rods or electrical neutral conductors. When piping may be subject to corrosion at point of entry into concrete slab, it shall be suitably protected from corrosion. Piping shall not be embedded in concrete slabs containing quickest additives or cinder aggregate.

2.8.4 Connections in Original Installations:

When installing gas piping which is to be concealed, unions, tubing fittings, running threads, right and left couplings, bushings, and swing joints made by combinations of fittings shall not be used.

2.8.5 Reconnections:

When necessary to insert fittings in gas pipe which has been installed in a concealed location, the pipe may be reconnected by use of a ground joint union with the nut center-punched to prevent loosening by vibration. Reconnection of tubing in a concealed location is prohibited.

2.9 PIPING UNDERGROUND

2.9.1 Protection of Piping:

Piping shall be buried a sufficient depth or covered in a manner so as to protect the piping from physical damage.

2.9.2 Protection Against Corrosion:

(a) Gas piping in contact with earth or other material which may corrode the piping, shall be protected against corrosion in an approved manner. When dissimilar metals are joined underground, an insulated coupling shall be used. Piping shall not be laid in contact with cinders.

(b) Underground piping for manufactured gas shall be one size larger than that specified by Table 2A or Table 2B, as designated by the serving gas supplier, but in no case less than 1¼ inch.

2.9.3 Piping Through Foundation Wall:

Underground gas piping, when installed below grade through the outer foundation or basement wall of a building, shall be either encased in a

sleeve or otherwise protected against corrosion. The piping or sleeve shall be sealed at the foundation or basement wall to prevent entry of gas or water.

2.9.4 Piping Underground Beneath Buildings:

When the installation of gas piping underground beneath buildings is unavoidable, the piping shall be encased in a conduit. The conduit shall extend into a normally usable and accessible portion of the building and, at the point where the conduit terminates in the building, the space between the conduit and the gas piping shall be sealed to prevent the possible entrance of any gas leakage. The conduit shall extend at least 4 inches outside the building, be vented above grade to the outside and be installed in a way as to prevent the entrance of water.

2.10 INSTALLATION OF PIPING

Drips, grading, protection from freezing, and branch pipe connections, as provided for in 2.10.2, 2.10.4, 2.10.7, and 2.10.14(a), shall apply only when other than dry gas is distributed and climatic conditions make such provisions necessary.

2.10.1 Building Structure:

The building structure shall not be weakened by the installation of any gas piping. Before any beams or joists are cut or notched, special permission should be obtained from the authority having jurisdiction.

2.10.2 Gas Piping to be Graded:

All gas piping shall be graded not less than ¼ inch in 15 feet to prevent traps. All horizontal lines shall grade to risers and from the risers to the meter, or to service regulator when a meter is not provided, or to the appliance.

2.10.3 Piping Supports:

(a) Gas piping in buildings shall be supported with pipe hooks, metal pipe straps, bands or hangers suitable for the size of piping, and of adequate strength and quality, and located at proper intervals so that the piping cannot be moved accidentally from the installed position. Gas piping shall not be supported by other piping.

(b) Spacing of supports in gas piping installations shall not be greater than shown in Table 7.

Table 7
Support of Piping

Size of Pipe (Inches)	(Feet)	Size of Tubing (Inch O.D.)	(Feet)
½	6	½	4
¾ or 1	8	⅝ or ¾	6
1¼ or larger (horizontal)	10	⅞ or 1	8
1¼ or larger (vertical)	every floor level		

2.10.4 Protect against Freezing:

Gas piping shall be protected against freezing temperatures. When piping must be exposed to wide ranges or sudden changes in temperatures, special care shall be taken to prevent stoppages.

2.10.5 Overhanging Rooms:

When there are overhanging kitchens or other rooms built beyond foundation walls, in which gas appliances are installed, care shall be taken to avoid placing the gas piping where it will be exposed to low temperatures (40° F or below the manufactured gas) or to extreme changes of temperatures. In such cases the gas piping shall be brought up inside the building proper and run around the sides of the room, in the most practical manner.

2.10.6 Do not Bend Pipe:

Gas pipe shall not be bent. Fittings shall be used when making turns in gas pipe.

2.10.7 Provide Drips Where Necessary:

A drip shall be provided at any point in the line of pipe where condensate may collect. When condensation is excessive, a drip should be provided at the outlet of the meter. This drip should be so installed as to constitute a trap wherein an accumulation of condensate will shut off the flow of gas before it will run back into the meter.

2.10.8 Location and Size of Drips:

All drips shall be installed only in such locations that they will be readily accessible to permit cleaning or emptying. A drip shall not be located where the condensate is likely to freeze. The size of any drip shall be determined by the capacity and the exposure of the gas piping which drains to it and in accordance with recommendations of the serving gas supplier.

2.10.9 Use Tee:

If dirt or other foreign material is a problem, a tee fitting with the bottom outlet plugged or capped shall be used at the bottom of any pipe riser (see Figure 1).

2.10.10 Avoid Clothes Chutes, etc.:

Gas piping inside any building shall not be run in or through an air duct, clothes chute, chimney or gas vent, ventilating duct, dumb waiter, or elevator shaft.

2.10.11 Cap All Outlets:

(a) Each outlet, including a valve or cock outlet, shall be securely closed gastight with a threaded plug or cap immediately after installation and shall be left closed until an appliance is connected thereto. Likewise, when an appliance is disconnected from an outlet and the outlet is not to be used again immediately, it shall be securely closed gastight. The outlet shall not be closed with tin caps, wooden plugs, corks, or by other improvised methods.

(b) The above provision does not prohibit the normal use of a listed quick-disconnect device.

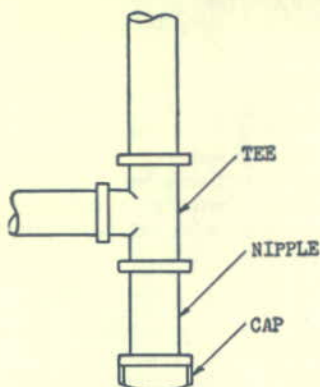


Fig. 1. Suggested Method of Installing Tee.

2.10.12 Location of Outlets:

The unthreaded portion of gas piping outlets shall extend at least one inch through finished ceilings and walls, and when extending through floors shall be not less than 2 inches above them. The outlet fitting or the piping shall be securely fastened. Outlets shall not be placed behind doors. Outlets shall be far enough from floors, walls and ceilings to permit the use of proper wrenches without straining, bending or damaging the piping.

2.10.13 Prohibited Devices:

No device shall be placed inside the gas piping or fittings that will reduce the cross-sectional area or otherwise obstruct the free flow of gas.

2.10.14 Branch Pipe Connection:

(a) All branch outlet pipes shall be taken from the top or sides of horizontal lines and not from the bottom.

(b) When a branch outlet is placed on a main supply line before it is known what size of pipe will be connected to it, the outlet shall be of the same size as the line which supplies it.

2.10.15 Electrical Bonding and Grounding:

(a) A gas piping system within a building shall be electrically continuous and bonded to any grounding electrode, as defined by the National Electrical Code, ASA C1-1962 (NFPA No. 70).*

(b) Underground gas service piping shall not be used as a grounding electrode except when it is electrically continuous uncoated metallic piping, and its use as a grounding electrode is acceptable both to the serving gas supplier and to the authority having jurisdiction, since gas piping systems are often constructed with insulating bushings or joints, or are of coated or nonmetallic piping.

*Available from the National Fire Protection Association, 60 Batterymarch St., Boston, Mass. 02110 in pamphlet form and in the National Fire Codes, Volume 5. Also available from the American Standards Association, Inc., 10 East 40th St., New York, N. Y. 10016.

2.11 GAS SHUTOFF VALVES

2.11.1 Accessibility of Gas Valves:

Main gas shutoff valves controlling several gas piping systems shall be placed an adequate distance from each other so they will be easily accessible for operation and shall be installed so as to be protected from physical damage. It is recommended that they be plainly marked with a metal tag attached by the installing agency so that the gas piping systems supplied through them can be readily identified. It is advisable to place a shutoff valve at every point where safety, convenience of operation, and maintenance demands.

2.11.2 Shutoff Valves for Multiple House Lines:

(a) In multiple tenant buildings supplied through a master meter or one service regulator when a meter is not provided, or where meters or service regulators are not readily accessible from the appliance location, an individual shutoff valve for each apartment, or for each separate house line, shall be provided at a convenient point of general accessibility.

(b) In a common system serving a number of individual buildings, shutoff valves shall be installed at each building.

2.12 TEST OF PIPING FOR TIGHTNESS

Before any system of gas piping is finally put in service, it shall be carefully tested to assure that it is gas tight. Where any part of the system is to be enclosed or concealed, this test should precede the work of closing in. To test for tightness, the piping may be filled with the fuel gas, air or inert gas, but not with any other gas or liquid. OXYGEN SHALL NEVER BE USED.

(a) Before appliances are connected, piping systems shall stand a pressure of at least six inches mercury or three pounds gage for a period of not less than ten minutes without showing any drop in pressure. Pressure shall be measured with a mercury manometer or slope gage, or an equivalent device so calibrated as to be read in increments of not greater than one-tenth pound. The source of pressure shall be isolated before the pressure tests are made.

(b) Systems for undiluted liquefied petroleum gases shall stand the pressure test in accordance with 2.12(a), or, when appliances are connected to the piping system, shall stand a pressure of not less than ten inches water column for a period of not less than ten minutes without showing any drop in pressure. Pressure shall be measured with a water manometer or an equivalent device so calibrated as to be read in increments of not greater than one-tenth inch water column. The source of pressure shall be isolated before the pressure tests are made.

2.13 LEAKAGE CHECK AFTER GAS TURN ON

2.13.1 Close All Gas Outlets:

Before turning gas under pressure into any piping, all openings from which gas can escape shall be closed.

2.13.2 Check for Leakage:

Immediately after turning on the gas, the piping system shall be checked by one of the following methods to ascertain that no gas is escaping:

(a) CHECKING FOR LEAKAGE USING THE GAS METER

Immediately prior to the test it should be determined that the meter is in operating condition and has not been bypassed.

Checking for leakage can be done by carefully watching the test dial of the meter to determine whether gas is passing through the meter. To assist in observing any movement of the test hand, wet a small piece of paper and paste its edge directly over the center line of the hand as soon as the gas is turned on. Allow five minutes for a one-half foot dial and proportionately longer for a larger dial in checking for gas flow. This observation should be made with the test hand on the upstroke.

In case careful observation of the test hand for a sufficient length of time reveals no movement, the piping shall be purged and a small gas burner turned on and lighted and the hand of the test dial again observed. If the dial hand moves (as it should), it will show that the meter is operating properly. If the test hand does not move or register flow of gas through the meter to the small burner, the meter is defective and the gas should be shut off and the serving gas supplier notified.

(b) CHECKING FOR LEAKAGE NOT USING A METER

This can be done by attaching to an appliance orifice a manometer or equivalent device calibrated so that it can be read in increments of 0.1 inch water column, and momentarily turning on the gas supply and observing the gaging device for pressure drop with the gas supply shut off. No discernible drop in pressure shall occur during a period of 3 minutes.

(c) WHEN LEAKAGE IS INDICATED

If the meter test hand moves, or a pressure drop on the gage is noted, all appliances or outlets supplied through the system shall be examined to see if they are shut off and do not leak. If they are found tight there is a leak in the piping system. The gas supply shall be shut off until the necessary repairs have been made, after which the test specified in 2.13.2(a) or (b) shall be repeated.

2.14 PURGING

2.14.1 Purging All Gas Piping:

(a) After piping has been checked, all gas piping shall be fully purged. A suggested method for purging the gas piping to an appliance is to disconnect the pilot piping at the outlet of the pilot valve. Piping shall not be purged into the combustion chamber of an appliance.

(b) The open end of piping systems being purged shall not discharge into confined spaces or areas where there are sources of ignition unless precautions are taken to perform this operation in a safe manner by ventilation of the space, control of purging rate, and elimination of all hazardous conditions.

2.14.2 Light Pilots:

After the gas piping has been sufficiently purged, all appliances shall be purged and the pilots lighted. The installing agency shall assure itself that all piping and appliances are fully purged before leaving the premises.

APPENDIX A

Work on Gas Supply System

This appendix applies only to work on gas supply systems ahead of the outlet of the meter set assembly, or of the service regulator when a meter is not provided.

Serving Gas Supplier's Main

No person, unless in the employ of, or having permission from, the serving gas supplier, shall open or make connections with a gas main.

Service Gas Piping

No person, unless in the employ of, or having permission from, the serving gas supplier, shall repair, alter, open or make connections to the service gas piping, or do any other work on the parts of the gas supply system up to the meter set assembly or the service regulator when a meter is not provided.

Meter or Service Regulator When a Meter Is Not Provided

No person, unless in the employ of or having permission from the serving gas supplier, shall disconnect the inlet of the gas meter or service regulator when a meter is not provided, nor move such meter or regulator. A gas fitter or plumber may disconnect the outlet of such a meter or regulator from the house piping only when necessary. He shall remake the joint at the meter or service regulator outlet when a meter is not provided, carefully replacing all insulating fittings or insulating parts of such fittings, and shall leave the gas turned off at the meter or regulator unless the serving gas supplier's rules require or allow deviation from this procedure.

Notify Servicing Gas Supplier of Any Repairs Needed

In case any work done by a gas fitter or plumber discloses the need for repairs or alterations on any part of the gas supply system, the servicing gas supplier shall be notified promptly of this fact.

Notify Servicing Gas Supplier of Any Leaks

If gas is leaking from any part of the gas supply system, a gas fitter or plumber not in the employ of the serving gas supplier may make necessary repairs and shall promptly notify the serving gas supplier.

APPENDIX B

Example of Piping System Design Sized in Accordance with 2.4:

Determine the required pipe size of each section and outlet of the piping system shown in Exhibit 1, with a designated pressure drop of 0.50 inch water column. Gas to be used has 0.65 specific gravity and a heating value of 1,000 Btu per cubic foot.

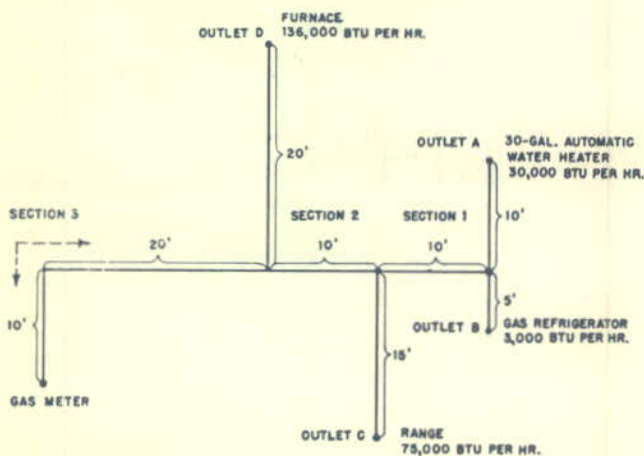


EXHIBIT 1.

SOLUTION:

- (1) Maximum gas demand for outlet A:

$$\frac{\text{Consumption (rating plate input or Table 1 if necessary)}}{\text{Btu of gas}} =$$

$$\frac{30,000 \text{ Btu per hour rating}}{1,000 \text{ Btu per cubic foot}} = 30 \text{ cubic feet per hour} \quad (\text{or } 30 \text{ cfh})$$

Maximum gas demand for outlet B:

$$\frac{\text{Consumption}}{\text{Btu of gas}} = \frac{3,000}{1,000} = 3 \text{ cfh}$$

Maximum gas demand for outlet C:

$$\frac{\text{Consumption}}{\text{Btu of gas}} = \frac{75,000}{1,000} = 75 \text{ cfh}$$

Maximum gas demand for outlet D:

$$\frac{\text{Consumption}}{\text{Btu of gas}} = \frac{136,000}{1,000} = 136 \text{ cfh}$$

- (2) The length of pipe from the gas meter to the most remote outlet (A) is 60 feet. This is the only distance used.

(3) Using the column marked 60 feet in Table 2B (provided this is the Table designated for use by the serving gas supplier):

Outlet A, supplying 30 cfh, requires $\frac{1}{2}$ inch pipe.

Outlet B, supplying 3 cfh, requires $\frac{1}{2}$ inch pipe.

Section 1, supplying outlets A and B, or 33 cfh, requires $\frac{1}{2}$ inch pipe.

Outlet C, supplying 75 cfh, requires $\frac{3}{4}$ inch pipe.

Section 2, supplying outlets A, B and C, or 108 cfh, requires $\frac{3}{4}$ inch pipe.

Outlet D, supplying 136 cfh, requires $\frac{3}{4}$ inch pipe.

Section 3 supplying outlets A, B, C and D, or 244 cfh, requires 1 inch pipe.

(4) If the gravity factor (see 2.4.3 (c)) is applied to this example, the values in the column marked 60 feet of Table 2B would be multiplied by the multiplier (.96) from Table 3, and the resulting cubic feet per hour values would be used to size the piping.

Accumulative Supplement to the

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BUILDING CODE
VOLUME II
PLUMBING

1973 Edition

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Note:

Please insert in back of 1968 Edition of Plumbing Code.

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NOTE: The 1968 Edition of the N. C. PLUMBING CODE was adopted by the STATE BUILDING CODE COUNCIL on Sept. 12, 1967 to be a part of the N. C. STATE BUILDING CODE as per G.S. 143-138.

The following sections of the 1968 Edition of the N. C. State Building Code, Volume II, have been amended, revised, or added by the Building Code Council as follows:

Section 101.3(a) (1969 G.A.)—Revise Section 101.3(a) to read as follows:

The code shall apply to all new buildings, structures, and additions thereto wherever they might be situated in the state of North Carolina.

This code shall not apply to farm buildings located outside the building—regulation jurisdiction of any municipality. (see G.S. 143-138(b) and 160-138(c))

Section 105.3(a) (1969 G.A.)—Delete the following from paragraph (a) of section 105.3:

“in cities or towns having a population of more than 3500, in accordance with the latest official U. S. Census.”

Section 105.4(b) (1969 G.A.)—Delete the following from paragraph (b) of section 105.4:

1. In second sentence—“of more than 3500 population in accordance with the last official U. S. Census.”
2. Entire last sentence.

Section 504.2 (9-12-72)—Revise Section 504.2 to read as follows:

ABS-DWV and PVC-DWV Schedule 40 pipe and fittings, conforming to Table 505, may be used for Plumbing Drainage, Waste and Vents (including building sewers,) both above and below ground, indirect wastes, and interior storm water systems, for buildings not exceeding sixty (60) feet in height.

All installations shall conform to installation instructions of the Plastic Pipe Institute and/or the respective manufacturer.

There shall be no co-mingling of the two materials within a system and where necessary co-mingling shall be done only through the use of proper adapters. All cements shall conform to the standards listed in Table 505. Combination or aerosol cements shall not be used. (see section 602.19)

(9-12-72) Table 505—Materials For Plumbing Installations—Add the following to Table 505.

PLASTIC PIPE AND FITTINGS

MATERIALS	ANSI	ASTM	FS	OTHER STANDARDS-REMARKS
For Interior DWV, Indirect Waste, Sanitary Sewers and Interior Storm Water Systems:				
abs-DWV Pipe* Sch. 40	B72.18-71	D-2661-68	LP-322a	CS-270-65 & NSF Seal of Approval *See Sections 504.2 and 1302.1
abs-DWV Fittings*	B72.18-71	D-2661-68	LP-322a	CS-270-65 & NSF Seal of Approval *See Sections 504.2 and 1302.1
abs-DWV Solvent Cement	B72.23-71	D-2235-67		NSF Seal of Approval
PVC-DWV Pipe* Sch. 40		D-2665-68	LP-320a	CS-272-65 & NSF Seal of Approval *See Sections 504.2 and 1302.1

PVC-DWV-Fittings*		D-2665-68	LP-320a	CS-272-65 & NSF Seal of Approval
PVC-DWV-Solvent Cement	B72.16-71	D-2564-70		*See Sections 504.2 & 1302.1 NSF Seal of Approval

For Exterior Water Service Piping—Lawn Sprinkler Systems

Plastic Pipe and Fittings Pressure Rated

		*			
abs-Pipe	1208	B72.3-67	D-1527-68		CS 218-59
Acrylonitrile	1210	B72.3-71	D-2282-66		CS 254-63 and the NSF Seal of Approval
Butadiene	2112				*See Section 506.6
Styrene	1316				
Fittings			D-2468-68		NSF Seal of Approval
Solvent Cement		B72.23-71	D-2235-67		NSF Seal of Approval
PB-Pipe (*2110)					
Polybutylene		B72.19-71	D-2662-68		NSF Seal of Approval *See Section 506.6
Tubing (2110)*			D-2666-67T		NSF Seal of Approval
PE-Pipe	2305	B72.1-67	D-2104-68	LP-00315b	CS 197-60
Polyethylene & Tubing	2306 3206 3306		D-2239-67		CS 255-63 and the NSF Seal of Approval *See Section 506.6
Fittings (Insert)	3406	B16.27-62	D-2609-67		NSF Seal of Approval
PVC-Pipe	*				
Polyvinyl Chloride	1120 1220	B72.2-67	D-1785-68 D-2241-67	LP-1036	CS 207-60 CS 256-63 & NSF Seal of Approval *See Sect. 506.6
Fittings			D-2467-67		NSF Seal of Approval
Solvent Cement		B72.16-71	D-2564-67		NSF Seal of Approval

For Exterior Storm Water, Area Drains, Subsoil Drainage and Septic Tank Fields

ABS Sewer Pipe & Fittings		D-2751-69		NSF Std 14
ABS Solvent Cement		D-2235-67		NSF Seal Approval
PVC Sewer Pipe & Fittings		D-2729-68		NSF Std 14
Solvent cement		D-2564-67		NSF Seal of Approval

NOTE: The above ABS and PVC Pipe and fittings replaces the ABS and PVC Pipe and fittings shown in Table 505 under standards CS 270-65 and CS 272-65 for "interior plumbing drainage, waste and vents."

Materials	ANSI	ASTM	FS	Other Standards & Remarks
(9-14-71) Non-Metallic Piping				
High Silicon Cast Iron Pipe and Fittings		C4-59T		See Section 1301.6
ABS Composite Sewer Pipe (9-14-71) Plastic Pipe and Fittings		D-2680-70		For underground sewer only
Polypropylene Pipe and Fittings		D-2146T		Schedule 80 for underground, schedule 40 for above grade. See Section 1301.6

(7-21-70) Ferrous Pipe and Fittings

Stainless Steel Water and DWV-Tube		A268-68		Identification according to Section 501.4, grade "G" "H"
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(9-14-71) Table 505

- a) Change referenced standard number for Bituminized Laminated Fiber Pipe from CS-229 to CS-226-59
- (b) Delete. Bituminized Sewer Pipe and Fittings in Table 505 covered by ASTM D-1861-61T, Federal Specification SS-P-356(55) and CS-116-54

(4-14-72)

Change ASTM designation for cast iron pipe and fittings, service weight and extra heavy weight, from A-74-42 to A-74-69.

Section 506.6 (9-12-72)—Plastic Pipe and Fittings Pressure Rated For Water Service Pipe—Add New section as follows:

- (a) In Table 505 these numbers are listed under "Materials" column which represents the ASTM designation numbers assigned to those materials by the joint ASTM-NSF-PPI committee to assist in quick, easy identification of the materials. The numbers appear as a part of the marking on the pipe and/or tubing. These and no others are approved.
- (b) All plastic pipe and fittings approved in Table 505 shall be properly marked as specified by their respective standards. All material shall be installed as recommended by the manufacturer and/or the Plastics Pipe Institute. All water service piping shall have a minimum working pressure of 160 psi, with permanent identification markings.
- (c) No existing metallic water service piping used for electrical grounding shall be replaced with non-metallic pipe or tubing until other grounding means are provided which are satisfactory to the proper administrative authority having jurisdiction.

NOTE: Section 2501 (a) and (c) of Volume I states that no combustible materials shall enter into construction of wall, floor and roof assemblies unless such assemblies have been tested in accordance with ASTM-E-119 where the code requires such assemblies to have an hourly fire resistance rating.

Section 507 (4-14-72)—Add new section as follows:

507—Used Plumbing Fixtures, Piping, Equipment, and Accessories. Before installation all used plumbing fixtures, piping, equipment and accessories shall be inspected and approved by the Plumbing Inspector.

Section 602.4 (7-21-70)—Revise last sentence to read:

Joints in copper or stainless steel water tubing shall be made by the appropriate use of brass or wrought copper water fittings, properly soldered together.

Section 602.15 (1-19-71)—At the end of the first sentence Add: “or other non-corrosive coupling as may be approved by the administrative authority.”

Section 602.16 (1-19-71)—At the end of the first sentence add: “or other non-corrosive coupling as may be approved by the administrative authority.”

Section 602.18 (9-12-72)—Add new section 602.18 as follows:

“602.18—Joining Plastic Water Service Piping

Plastic Pipe and Fittings For Water service piping may be of the insert type, solvent cemented, or may be hot or cold flared as recommended by the manufacturer and/or the Plastics Pipe Institute for the particular materials being used.”

Section 602.19 (9-12-72)—Add new Section 602.19 as follows:

“602.19 Solvent Welded Joints in ABS, PVC Plastic Pipe and Fittings

Solvent Cement joints for all types of plastic piping shall be made in strict accordance with the joining techniques recommended for the various materials. When cleaning is recommended before cementing this shall be strictly adhered to.

All joints shall be square cut, all pipe shall be seated to the bottom of the fitting socket. In no case shall stress be applied at joints for offsetting pipe. No combination or aerosol cements shall be used. All cements shall be that designated for the particular materials being used. In all cases all joints shall carry the seal of approval of the NSF. All defective joints shall be removed and replaced.

Transition to other materials shall be through proper adaptor fittings only.”

Section 603.6 (7-21-70)—Revise title to “Copper and Stainless Steel Water Tube.”

Revise first line of text to read: “Joints in copper or stainless tubing shall be. . .”.

Section 604.1 (7-21-70)—Revise title to “Copper or Stainless steel Tubing to Screwed Pipe Joints”.

Revise first and second line of text to read: “Joints from copper or stainless steel tubing to threaded pipe shall be made by the use of brass adapter fittings.” “The Joint between the copper or stainless steel tube and the fitting. . .”.

Section 604.6 (4-5-67)—Add new section 604.6 as follows:

604.6—Mechanical Pipe Couplings and Fittings

Mechanical pipe couplings and fittings in accordance with (a) and (b) below may be used for roof or storm drains, cold domestic water pipe, fire protection standpipes, and chilled and condenser water piping in air conditioning systems.

(a) Mechanical couplings shall be with housing fabricated in two or more parts of malleable iron castings, in accordance with Federal specifications QQ-1-666C, Grade II. Coupling gasket shall be molded synthetic rubber, per ASTM D-735-61, Grade No. R615BZ. Coupling bolts shall be oval neck track head type with hexagonal heavy nuts per ASTM A-183-60.

- (b) All pipe fittings used shall be fabricated of malleable iron castings in accordance with Federal Specifications QQ-I-666C, Grade II. Where malleable fitting pattern is not available, fittings fabricated from schedule 40 steel pipe or standard wall seamless welding fittings with grooved ends may be used.

Section 915.1 (3-10-70)—Add the following to the end of this section:

“Where floor coverings do not require mopping, scrubbing or hosing down by their maintenance programs and use of the public toilet is restricted to a limited or restricted public, installation of floor drains may be waived by the Plumbing Inspector.”

Table 922 (9-12-72)—Amend footnote No. 10 to read as follows:

“Note 10—Washing machines—water and drain connections in each dwelling or apartment unit unless central washing facilities are provided for the specific use of the occupants on the premises.

Section 1002.4 (7-21-70)—Revise title to “Copper and Stainless Steel Tube”.
Revise first line of text to read: “Copper or stainless steel tube shall be...”.

Section 1003.4 (7-21-70)—Revise title to “Copper and Stainless Steel Tube”.
Revise first line of text to read: “Copper or stainless steel tube shall be...”.

Section 1109.2 (9-14-71)—In second sentence change the word insure to injure.

Section 1205.4 (9-12-72)—Add the following to Section 1205.4:

- (a) Underwriters Laboratories listed double check valve assemblies may be installed in lieu of anti-syphon valve or vacuum breaker. The double check valve assembly, shall be either spring loaded or swing checked design with gate valves before and after check valves for shut-off control and test cocks installed before and after and in between the check valve for sampling taps. The assembly is to be installed in a suitable valve box between the water meter and the sprinkler supply main. It must be readily accessible for inspection and tests and due to the type seats used, they should be inspected on a regular basis to insure that they are functioning satisfactorily.

(12-12-72)

- (b) “Lawn sprinkler systems shall be equipped with an approved Backflow Preventer to protect against contamination of the potable water system. The following devices shall be acceptable:

Anti-Syphon Vacuum Breakers, Reduced Pressure Zone Backflow Preventer, Double Check Type Back Pressure Backflow Preventer equipped with gate valves and test cocks.

Above devices shall first have been certified by a recognized testing laboratory acceptable to the Plumbing Official as meeting the requirements of: ANSI-A-40.6, ASSE-1101, ASSE-1015, ASSE-1013, or AWWA-C-506-69.

Anti-Syphon valves shall be installed downstream of the last control valve, at least 6 inches above the level of the highest sprinkler head.

All protective devices shall be installed in an accessible location, to allow for Inspection and Maintenance and to isolate the sprinkler system from all other piping in the system.”

Section 1205.5 (9-12-72)—Revise Section 1205.5 to read as follows:

“Section 1205.5—Fixture Valve Outlets With Hose Attachments, Hose Bibbs and Lawn Hydrants.

Fixture valve outlets with hose attachments, hose bibbs and lawn hydrants shall be protected by an approved back-siphonage backflow preventer or vacuum breaker on the discharge side of the valve. Back siphonage backflow preventers may be installed directly on hose outlet connection threads. Vacuum breakers shall be installed at least 6” above the highest point of usage. Approved valves shall comply with applicable sections of American Society of Sanitary Engineering Standard—ASSE 1011-Hose Bibb Vacuum Breakers.”

Section 1206.1 (7-21-70) Revise first sentence to read as follows:

Materials for water-distributing pipes and tubing shall be brass, copper water tube minimum Type “M” when used above ground, stainless steel water tube minimum Grade G when used above ground, lead, cast iron, wrought iron, open-hearth-iron or steel, with appropriate approved fittings. Stainless steel shall not be used below ground in tidal areas.”.

Section 1206.1 (3-9-71)—Add new paragraph (b) and (c) to Section 1206.1—Materials as follows:

(b) Underground piping for water service, lawn sprinkling systems, when installed outside of the foundation walls of the building may be Pressure Rated plastic piping as listed in Table 505. In each case the method of installation shall be in accordance with the manufacturer's recommendations as approved by the Plastic Pipe Institute. The minimum working pressure to be 160 PSI, with permanent identification markings.

(c) No existing metallic water service piping used for electrical grounding shall be replaced with non-metallic pipe or tubing until other grounding means are provided which are satisfactory to the proper administrative authority having jurisdiction.

Section 1206.2 (7-21-70)—Revise first sentence to read as follows:

Inaccessible water pipe under floor slab shall be minimum Type “L” copper, minimum Grade “H” stainless steel water tube, brass, lead,

Section 1206.4 (9-12-72 and 3-13-73) Revise Section 1206.4 to read as follows:

The water service pipe may be placed in the same trench and on the same level with the building sewer or drain provided that the sewer or drain is of leaded cast iron or ABS or PVC with solvent cemented joints.

When the above conditions are not met and a common trench is used, the bottom of the water service line must be at least 12 inches above the highest point of the top of the sewer or drain and shall be placed on a solid shelf located at one side of the common trench.

Section 1301.3 (9-12-72)—Revise first paragraph of section to read as follows:

Soil and waste piping for drainage system shall be cast iron, galvanized steel, galvanized wrought iron, lead, brass, borosilicate glass, copper pipe, copper tube, stainless steel tube or schedule 40 ABS or PVC-DWV as allowed in Section 504.2.

Revise paragraph (a) to read as follows:

(a) Vertical soil, waste and vent stacks shall be designed to control expansion and contraction, in accordance with accepted engineering practice, to the satisfaction of the administrative authority.

Section 1301.4 (9-12-72)—Revise Section 1301.4 to read as follows:

All underground drains within buildings shall be cast iron soil pipe, lead, borosilicate glass, extra strength, enclosed in a polystyrene casing, or Schedule 40 ABS or PVC DWV, as allowed in Section 504.2. For buildings six stories or under in height, the underground pipe may be service weight cast iron soil pipe, lead, borosilicate glass, extra strength encased in a polystyrene casing, Type "L" copper, Grade "H" stainless steel or Schedule 40 ABS or PVC DWV, as allowed in Section 504.2.

Black drainage and galvanized malleable fittings may be used on drainage, waste and vents with galvanized pipe."

Section 1301.5 (7-21-70)Add the following to Section 1301.5:

Copper or cast copper alloy fittings shall be used with stainless steel tube.

Section 1301.6 (9-14-71)—Revise Section 1301.6 to read as follows:

Soil and waste piping for acid drainage systems shall be high silicon cast iron, borosilicate glass, polypropylene, or other materials approved by the administrative authority. Acid soil and waste piping shall not be connected to the conventional system within the building unless suitably diluted. (see also Section 1109.2) Fittings shall conform to the type of piping used.

Acid soil and waste piping within buildings when underground shall be heavy schedule borosilicate glass, heavy duty high silicon cast iron or schedule 80 polypropylene with either wrapped or coated fittings on glass piping.

Section 1302.1 (9-12-72 and 3-13-73)—Revise Section 1302.1 to read as follows:

The building sewer, when installed in a separate trench from the water service pipe, shall be cast iron sewer pipe, vitrified-clay sewer pipe, concrete sewer pipe, laminated bituminized fiber sewer pipe, asbestos sewer pipe, schedule 40 ABS or PVC-DWV sewer pipe or ABS composite sewer pipe. Joints shall be water tight and root proof and all materials shall be installed according to the manufacturer's recommendations. (see Appendix C) All pipe and fittings shall bear the manufacturer's name or trademark. Refer to Section 1206.4 for regulations governing the installation of the building sewer and/or drain and water service line in the same trench.

Table 1304.2 (9-14-71)—Change word "Dishwater" under fixture type to read "Dishwasher"

Table 1305.2 (4-14-72)—Change heading of Table to read "Building Drains and Sewers, and Horizontal Branch Drains."

Section 1307.1 (4-14-72)Add the following to Section 1307.1:

The design layout for pumped sewers shall include a check valve near the pump. At the high point of the grade, if the pumped sewer does not discharge into a manhole, it shall be provided with a vent at this point. Cleanouts may be installed if required by the local authority, at spaces required by the local authority.

The piping material selected shall withstand the design head of the pump. Depth shall provide for 18" minimum cover with a minimum depth cover of 24" where vehicle traffic may pass over it.

Section 1401.3 (9-12-72)—Revise Section 1401.3 to read as follows:

Vent piping shall be cast iron, galvanized steel, galvanized wrought iron, lead, brass or copper pipe, copper tube, stainless steel tube or Schedule 40 ABS or PVC DWV, as allowed in Section 504.2."

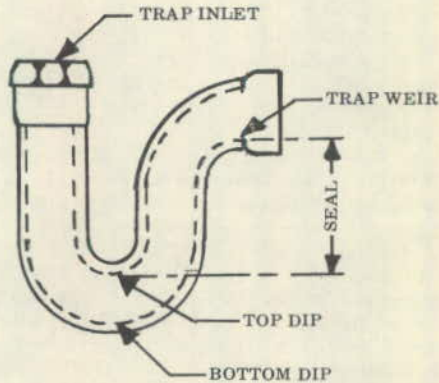
Sections 1401.4 (9-12-72)—Revise Section 1401.4 to read as follows:

Vent piping placed underground shall be cast iron, copper tube of a weight no less than that of copper water tube Type L, Grade H stainless steel water tube or Schedule 40 ABS or PVC DWV as allowed in Section 504.2, provided that other materials may be used for underground vents when found adequate and installed as directed by the plumbing official. Where threaded joints are approved for use underground, they shall be coated and wrapped after installation and tests."

Section 1401.5 (7-21-70)—Add the following to Section 1401.5:

Copper or cast copper alloy fittings shall be used with stainless steel tube.

Table 1409.3 (4-14-72)—Add the following P-Trap drawing showing trap weir and trap seal:



P TRAP

Section 1421.2 (9-14-72)—Revise Section 1421.2 to read as follows:

The diameter of an **individual** or **relief** vent shall not be less than one-half of the diameter of the drain served, but in no case less than 1¼ inches and shall be determined from its length and the total of fixture units connected thereto, as provided in Table 1421.5. Twenty percent of the total length may be installed in a horizontal position.

The diameter of a **circuit** or **loop** vent shall not be less than one-half the pipe size of the horizontal waste line it is venting, but in no case less than 1½ inches, and shall be determined from its length and the total of fixture units connected thereto, as provided in Table 1421.2. The diameter and horizontal length of a circuit or loop vent shall in no case be less than permitted in Table 1421.2.

Add the following Table 1421.2:

TABLE 1421.2—HORIZONTAL CIRCUIT AND LOOP VENT SIZING TABLE

Soil or waste pipe diam. (in.)	Fixture units (msx. no.)	Diameter of circuit or loop vent (in.)					
		1½	2	2½	3	4	5
		Maximum horizontal length (ft.)					
1½	10	20					
2	12	15	40				
2	20	10	30				
3	10	..	20	40	100		
3	30	..	..	40	100		
3	60	..	..	16	80		
4	100	..	7	20	52	200	
4	200	..	6	18	50	180	
4	500	..	..	14	36	140	
5	200	..	..	..	16	70	200
5	1,100	..	..	..	10	40	140

Section 1502 (9-12-72)—Add the following note to Section 1502:

Note: Interior storm drain systems which utilize plastic pipe must use Schedule 40 ABS or PVC DWV pipe and fittings meeting the requirements of Table 505.

Exterior storm water, area drains, subsoil drainage and septic tank fields may use lighter sewer grade ABS or PVC."

Section 1502.1 (7-21-70)—Revise lines 3 and 4 to read as follows:

"ferrous alloys, brass, copper, lead, stainless steel tubing, or ABS or PVC plastic pipe when allowed by code, meeting the requirements of Table 505 may be accepted."

Section 1502.3 (9-12-72)—Revise Section 1502.3 to read as follows:

Building storm drains underground, inside the building shall be of cast iron soil pipe, Type "L" copper water tube or ABS or PVC DWV as required in Table 505.

Section 1502.4 —After "asbestos-cement pipe" in last line revise to read as follows:

"or stainless steel tube Grade "G" may be used."

Appendix D (9-12-72)—Replace Appendix D of N. C. State Plumbing Code with Appendix "B" and Appendix "C" shown in the 1972 amendments to the Southern Standard Plumbing Code, which are available from Southern Building Code Congress, 1116 Brown-Marx Building, Birmingham, Alabama, 35203.

Appendix F (9-12-72)—on page F-8 change developed length a maximum of 8 feet to 5 feet.

on page F-9 change note for vent size as per Table 1421.5 to Table 1421.2.

