The Kentucky Building Code

Third Edition
1985

Judith G. Walden
Editor, Kentucky Edition



KENTUCKY DEPARTMENT OF HOUSING

The 127 Building — U.S. 127 South
Frankfort, Kentucky 40601
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EFFECTIVE DATES

On February 15, 1980 the *Kentucky Building Code* became mandatorily effective for all buildings in Kentucky in excess of three stories; or in excess of 20,000 square feet; or intended for assembly, educational, institutional, or high hazard occupancy; or business or industrial occupancy in excess of 100 persons; or for use as a frozen food locker plant.

The *Kentucky Building Code* became mandatorily effective for other buildings on a county wide basis on the following schedule:

February 15, 1980

Boyd, Campbell, Daviess, Fayette, Franklin, Jefferson, Kenton, McCracken and Warren.

August 15, 1981

Allen, Anderson, Barren, Bath, Bell, Boone, Bourbon, Boyle, Bracken, Breathitt, Bullitt, Caldwell, Calloway, Carroll, Carter, Christian, Clark, Clay, Crittenden, Estill, Fleming, Floyd, Fulton, Gallatin, Graves, Grayson, Greenup, Hardin, Harlan, Harrison, Henderson, Henry, Hopkins, Jessamine, Johnson, Knox, Larue, Laurel, Letcher, Lewis, Logan, Madison, Magoffin, Marshall, Marion, Mason, Mercer, Montgomery, Muhlenberg, Nelson, Nicholas, Oldham, Pendleton, Perry, Pike, Powell, Pulaski, Robertson, Rowan, Scott, Shelby, Simpson, Taylor, Todd, Union, Washington, Wayne, Webster, Whitley, Woodford.

August 15, 1982

Adair, Ballard, Breckinridge, Butler, Carlisle, Casey, Clinton, Cumberland, Edmonson, Elliott, Garrard, Grant, Green, Hancock, Hart, Hickman, Jackson, Knott, Lawrence, Lee, Leslie, Lincoln, Livingston, Lyon, McCreary, McLean, Martin, Menifee, Meade, Metcalfe, Monroe, Morgan, Ohio, Owen, Owsley, Rockcastle, Russell, Spencer, Trigg, Trimble and Wolfe.

Any local government may extend the *Kentucky Building Code* coverage to include single family dwellings within its jurisdiction.

The second edition of the *Kentucky Building Code* became effective February 3, 1982. The effective date of this third edition is July 9, 1985.

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PREFACE

The *Kentucky Building Code* is essentially the *BOCA Basic/National Building Code* published by the Building Officials and Code Administrators, International, Inc., with a new administrative section written to conform with Kentucky law and other selective additions, deletions or changes.

The *Kentucky Building Code* includes the State Plumbing Code which is referenced in Article 22. It includes the *National Electrical Code,* 1984 Edition, NFiPA #70, published by the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269. This publication is not included herein because of its bulk and specialized use. However, it is readily available from the publisher.

The *Kentucky Building Code* states regulations in terms of measured performance rather than in rigid specification of materials and, in this way, makes possible the acceptance of new materials and methods of construction which can be evaluated by accepted standards, without the necessity of adopting cumbersome amendments for each variable condition.

By presenting the purposes to be accomplished rather than the method to be followed, the code allows the designer the widest possible freedom and does not hamper development. It accepts nationally recognized standards as the criteria for evaluation of minimum safe practice, or for determining the performance of materials or systems of construction. The application of these standards is stated in the text of the code requirements, and the standards are listed and identified in the appendices of the code, making it practical and convenient to update any standard as it is revised or reissued by the sponsoring agency.

This edition presents the code as amended through July 9, 1985.

This code may be amended by proposals to the Kentucky Board of Housing, Buildings and Construction by code enforcement officials, industry and design professionals, and other interested persons and organizations. Changes are discussed in an open meeting of the board. Changes approved are printed in the Kentucky Administrative Register and forwarded to the BOCA organization for inclusion in their mailings to BOCA's Kentucky members.

IN TRIBUTE TO THE NATIONAL BUILDING CODE

This edition of the *Basic/National Building Code* is the first edition of the *BOCA Basic Building Code* to incorporate the word "National" in its title. In the tenth edition, to be published in 1987, the word "Basic" will be dropped altogether, with 1987 and subsequent editions being titled the *BOCA National Building Code.*

This development springs from an agreement between BOCA International and the American Insurance Association. The original *National Building Code*, first published in 1905 by AIA's predecessor organization, the National Board of Fire Underwriters, was the premier model building code in the United States. AIA announced in 1980 that it would cease publication of the document (1976 being the most recent edition), and in 1982 BOCA and AIA reached the agreement whereby BOCA would assume title rights to the nation's original model code.

The contribution of the *National Building Code* in the development of construction and fire safety in the United States is too great to measure. Massive conflagration in America's major cities during the second half of the 19th Century had brought vast destruction of lives and property. It was of paramount importance that construction economy be tempered with crucial fire safety considerations, and it was the *National Building Code* which first accomplished this noble effort.

Through 14 editions, eight of which were complete revisions, the *National Building Code* pioneered the development of such fundamental code principles as height and area requirements, means of egress, fireresistive construction, shaft enclosure, parapets, fire walls and doors, firestopping and suppression systems. It established the basic format and scope from which today's model construction codes would evolve.

During the code's 75-year history, other model codes were developed — including the *BOCA Basic Building Code* in 1950 — by professional societies of construction code officials. Growing professionalization of code officials and their active, democratic involvement in the code revision process caused the code groups' documents to gradually eclipse the *National Building Code* in popularity and usage. The insurance industry, cognizant that the model code organizations were fulfilling well the purposes for which their document was first established, announced in 1980 that the *National Building Code* would cease publication.

The *Basic/National Building Code*, as published here by BOCA International, is neither superintended nor endorsed by the American Insurance Association or the insurance industry.

Note to Kentucky Building Code Users

Double vertical lines have been added in the margins adjacent to all passages of the code text which are Kentucky changes to the original text of the *BOCA Basic/National Building Code/1984.*

Until November 30, 1985, the building official shall accept plans in conformity with the requirements of either this edition or the 1983 Edition of the *Kentucky Building Code.* After November 30, 1985, all plans shall be designed to conform with this edition.

Single vertical lines in the margin indicate approved changes to the text of BOCA code requirements since BOCA's 1981 Edition. Editorial changes are not so marked. New with this edition is the use of asterisks in the margins to indicate provisions which BOCA has either deleted or relocated elsewhere in the code.

The values stated in U.S. customary units are to be regarded as code requirements. The metric equivalents of U.S. customary units may be approximate.

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ARTICLE 1

ADMINISTRATION AND ENFORCEMENT OF THE KENTUCKY BUILDING CODE

Department of Housing, Buildings and Construction

SECTION 101.0 DEFINITIONS

101.1 Board of Housing or "Board" means the Kentucky Board of Housing, Buildings and Construction.

101.2 BOCA means Building Officials and Code Administrators International, Inc.

101.3 Building means any combination of materials, whether portable or fixed, which comprises a structure or non-mine underground area affording facilities or shelter for any human occupancy, whether infrequent or regular. The word "building" shall be construed wherever used herein as if followed by the words "or part or parts thereof and all equipment therein" unless the context clearly requires a different meaning. "Building" shall also mean swimming pools constructed below grade on site, but not swimming pools assembled above grade on site. "Building" shall not mean a mobile home, or a farm dwelling or other farm buildings and structures incident to the operation and maintenance of the farm if such farm structures are located outside the boundary of a municipality and are not used in the business of retail trade or used as a place of regular employment for ten or more people or structures used in the storage or processing of timber products.

101.4 Commissioner means the Commissioner of the Department of Housing, Buildings and Construction.

101.5 Department means the Department of Housing, Buildings and Construction.

101.6 Fire official means the Chief of the Fire Department or of the Fire Prevention Bureau, or if there is not a jurisdictional fire department or fire prevention bureau, such officer as shall be designated by the appointing authority of the jurisdiction or his duly appointed representative, to enforce the provisions of KRS 227.300 and 815 KAR 10:020.

101.7 Industrialized building system or "building system" means a structure or component thereof which is wholly or in substantial part fabricated in an off site manufacturing facility for installation or assembly on a permanent foundation at a building site in Kentucky. "Industrialized building system" includes a building of any size or for any use, all or any component part of which is of closed construction made from precast concrete panels, or precut wood sections fabricated to individual specifications in an off site manufacturing facility, and assembled in accordance with the manufacturer's instructions.

101.8 KAR means Kentucky Administrative Regulations.

101.9 KBC means Kentucky Building Code.

101.10 KRS means Kentucky Revised Statutes.

101.11 Major structural change means alterations or repairs made within any period of 12 months, costing in excess of 50 percent of the physical value of the structure, as determined by a comparison of the extent/value of the alterations involved and the replacement value of the structure at the time the plans for the alterations are approved, using the BOCA chart for construction costs.

101.12 Person means a person, partnership, corporation or other legal entity.

101.13 Single family dwelling means one unit providing complete independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation, and which is not connected to any other unit or buildings.

101.14 Trade or brand name house means any single structure made of precut or prefabricated panels, sections or individual pieces that are sold or prefabricated under a name that identifies both the manufacturer and a particular type of structure he makes, and that are assembled on a permanent foundation by conventional homebuilding and electrical and plumbing installation techniques.

SECTION 102.0 SCOPE

This regulation shall supersede any and all other conflicting administration and enforcement provisions which may be incorporated by reference within the KBC.

102.1 The KBC shall control all matters concerning the construction, alteration, addition, remodeling, use and occupancy classifications of all buildings in the state.

102.2 Trade or brand name houses shall be constructed in accordance with the applicable provisions of the KBC.

102.3 The provisions of the KBC relating to single family dwellings, that are not trade or brand name houses or industrialized building systems, shall be mandatory only after a local government, by ordinance, extends the application of the KBC to those units. However, the State Plumbing Code and the National Electrical Code shall be applicable to these units, whether or not the local government passes an ordinance. A local government may not enforce any building code other than the KBC on such units.

102.4 Unless otherwise specifically provided within the KBC, all references to article or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such article, section or provision of the KBC.

102.5 The provisions of this code relating to the construction, repair, alteration, enlargement, restoration and moving of buildings or structures shall not be mandatory for existing buildings or structures identified and classified by the state or local government authority as historic buildings, subject to the approval of the board of appeals when such buildings are judged by the building official to be safe and in the interest of public health, safety and welfare regarding any proposed construction, alteration, repair, enlargement, restoration and relocation. The building official may require submission of architectural and engineering plans and specifications bearing the professional seal of the designer prior to a determination.

102.6 The KBC shall be construed to secure its expressed intent which is to secure public safety, health and welfare insofar as they are affected by building construction quality, electrical systems, plumbing, energy, boiler, safety, handicapped accessibility, life safety from hazards of fire and explosion and other disasters. It is the further expressed intent of this code to avoid duplicative plan review and inspection of new construction and to gather together in one set of regulations all the requirements relating to the construction of buildings in the state to enable builders, owners and building officials to be adequately informed.

SECTION 103.0 APPLICABILITY

103.1 The provisions of the KBC shall cover all matters affecting or relating to buildings, and structures, as set forth in Section 102.0 above.

103.2 No person shall construct a building or structure, extend, repair, remove or alter in violation of these provisions, except for ordinary repairs as identified in Section 104.0 and except further that the raising, lowering, or moving of a building or structure as a unit necessitated by a change in legal grade or widening of a street shall be permitted provided the building or structure is not otherwise altered or its use or occupancy changed.

103.3 Any requirement for structural, fire or sanitary safety of a building essential for the safety of the occupants thereof, and which is not specifically covered by this code, shall be determined by other regulations of the department or other applicable law.

103.4 Any person who violates any provision of the article or any other provision of the Kentucky Building Code shall be subject to the penalties provided in Section 119.0.

SECTION 104.0 ORDINARY REPAIRS

104.1 Ordinary repairs to structures may be made without application or notice to the building official. Ordinary repair means any nonstructural reconstruction or renewal of any part of an existing building for the purpose of its maintenance, or decoration, and shall include, but not be limited to, the replacement or installation of nonstructural components of the building such as roofing, siding, windows, storm windows, insulation, drywall or lath and plaster, or any other replacement, in kind, that does not alter the structural integrity, alter the occupancy or use of the building, or affect, by rearrangement, exitways and means of egress; but shall not include additions to, or alteration of, or relocation of any standpipe, water supply, sewer, drainage, gas, soil, waste, vent or similar piping, electric wiring or mechanical equipment including furnaces and hot water heaters or other work affecting public health or safety.

SECTION 105.0 INSTALLATION OF SERVICE EQUIPMENT

105.1 When the installation, extension, alteration or repair of an elevator, moving stairway, mechanical equipment, refrigeration, air conditioning or ventilating apparatus, plumbing, gas piping, electrical wiring, heating system or other equipment is specifically controlled by the provisions of this code, it shall be unlawful to use such equipment until a certificate of approval has been issued therefor by the building official or other agency having jurisdiction.

SECTION 106.0 EXISTING STRUCTURES

106.1 Continuation of existing use: The legal use and occupancy of any structure existing on the date of adoption of this code or for which it has been heretofore approved may be continued without change except as may be specifically covered in this code for existing structures or fire prevention codes set forth in 815 KAR 10:020 or as may be deemed necessary by the building official for the general safety and welfare of the occupants and the public.

106.2 Change in use: It shall be unlawful to make any change in the use or occupancy of any structure or portion thereof which would subject it to any special provisions of this code without approval of the building official; such approval shall be granted if the building official finds that such structure

meets the intent of the provisions of law governing building construction for the proposed new use and occupancy, and that such change does not result in any greater hazard to public safety or welfare. In making his decision, the building official may require a written opinion from a design professional.

106.3 Additions, alterations or repairs: Additions, alterations or repairs may be made to any structure without requiring the existing structure to comply with all the requirements of this code, provided such work conforms to that required of a new structure. Additions, alterations or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building. Any building plus new additions shall not exceed the height, number of stories and area specified for new buildings.

106.4 Alterations or repairs to an existing structure which are nonstructural and do not adversely affect any structural member of any part of the structure having a required fireresistance rating may be made with the same materials of which the structure is constructed.

SECTION 107.0 DEPARTMENTS OF BUILDING INSPECTION

107.1 Each local government singularly or by association with other local governments shall employ a building official or inspector and other code enforcement personnel as necessary to enforce this code within its jurisdiction. The department shall be responsible for the enforcement of this code as it pertains to the buildings assigned by law to it.

107.2 All building officials shall be appointed by the chief appointing authority for the respective jurisdiction, and shall meet the qualifications for the position which may be established by the appointing authority, in addition to the requirements for certification of Kentucky building code inspectors as detailed in 815 KAR 7:070.

107.3 Official records shall be kept of all business and activities of the various local building departments or state building departments specified in provisions of the KBC, and all such records shall be open to the public inspection at all appropriate times under the terms and conditions of KRS Chapter 61.

SECTION 108.0 DUTIES AND POWERS OF THE BUILDING OFFICIAL

108.1 The local government shall designate the persons to be charged with the responsbilitity of enforcing the KBC within its community and it shall neither adopt nor enforce any ordinance regulating buildings which conflicts with the KBC. The local building official shall be responsible for the examination and approval of plans and specifications for the following buildings:

108.1.1 All buildings classified as storage, residential, miscellaneous and/or utility occupancies so long as they do not exceed three stories in height or 20,000 square feet of floor area.

108.1.2 All buildings classified as assembly, business or mercantile occupancies having a capacity which does not exceed 100 persons.

108.1.3 All churches having a capacity of 400 or less persons and 6,000 or less square feet of total floor area.

108.1.4 All buildings classified as factory or industrial occupancies having a capacity which does not exceed 100 persons.

SECTION 109.0 DUTIES AND POWERS OF THE DEPARTMENT

109.1 It shall be the responsbiliity of the department to review plans and specifications, issue permits and to determine compliance with the KBC for the following buildings:

(a) All buildings classified as assembly occupancies having a capacity in excess of 100 persons, except churches having a capacity of 400 or less persons and 6,000 or less square feet of total floor area;

(b) All buildings classified as educational occupancies;

(c) All buildings classified as institutional occupancies;

(d) All buildings classified as business and mercantile occupancies having a capacity in excess of 100 persons;

(e) All buildings classified as industrial and factory occupancies having a capacity in excess of 100 persons;

(f) All frozen food locker plants;

(g) All buildings classified as high hazard occupancies;

(h) All other buildings containing in excess of three stories or 20,000 square feet of floor area;

(i) All industrialized building systems regardless of occupancy classification.

109.2 Any local government may petition to the department for additional plan review responsbility. Such petition shall include the evidence of the local government's capability to perform those functions, as required by regulations of the board. Denials of such petitions are appealable to the board.

109.3 The appropriate official shall make all the required inspections, or he may accept reports of inspection by authoritative and recognized services or individuals; and all reports of such inspection shall be in writing and certified by a responsible officer of such authoritative service or by the responsible individual.

109.4 The building official or his authorized representative should carry proper credentials of his respective office for the purpose of inspecting buildings and premises and the performance of his duty under this code.

109.5 The board shall have the powers as may be necessary in the interest of public safety, health and general welfare, to adopt and promulgate amendments to the code and other rules and regulations which are necessary to implement this code and by means of the appeals board procedures, to issue interpretations which shall be binding upon the appellant and the building official. The building official shall implement the provisions of this code to secure the intent thereof.

109.6 In the absence of provisions not specifically contained in this code or

approved rules and orders, the regulations, specifications and standards listed in Appendix A, Referenced Standards shall be deemed to represent accepted engineering practice with respect to the materials, equipment, systems or methods of construction therein specified, and shall therefore be acceptable.

SECTION 110.0 NEW MATERIALS AND MODIFICATIONS

110.1 It is the purpose of the KBC to set forth performance objectives so as to facilitate new technologies, techniques and materials; therefore, alternate materials and equipment may be used, provided such an alternative has been tested and listed by nationally recognized testing and research laboratories approved by the board.

110.2 The building official may accept as supporting data to assist him in his determinations duly authenticated research reports from BOCA or from other approved authenticated sources, for all materials or assemblies proposed for use which are not specifically provided for in the KBC.

110.3 Used materials, equipment and devices may be used provided they have been retested and placed in good and proper working condition and approved by the building official.

110.4 When there are practical difficulties involved in carrying out structural or mechanical provisions of this code or of an approved rule, the building official having plan review responsibility may vary or modify such provision upon application of the owner or his representative only if the spirit and intent of the law shall be observed and equivalent safeguards provided. The application for modification and the final decision of the building official shall be in writing. When a modification is granted by a local building official, a copy of the application and the decision shall be forwarded to the department and the local fire official.

110.5 The board may withdraw authority for plan review from a local building department where it finds, upon petition of the department, that the local inspection agency is not adequately performing any portion of its program and thereafter, allow the department to preempt that portion of a local program.

SECTION 111.0 INSPECTIONS

111.1 Before issuing a permit, the appropriate building officials may examine or cause to be examined all buildings, structures and sites for which an application has been filed for a permit required by this code. No construction shall begin on buildings covered by this regulation until a local building official has issued a permit for such construction or if there is no local official, an official representing the department has issued a letter releasing the plans for construction, if the department has plan review responsibility.

111.2 After issuing a building permit or letter for a building over which he has plan review responsibility, the building official shall conduct inspections from time to time during and upon completion of work and he shall maintain a record of all such examinations and inspections and of all violations of the KBC.

111.3 The building official may accept reports of approved inspection services which satisfy the requirements of the appropriate governmental entity.

111.4 Inspections for KBC compliance of trade or brand name homes shall be the responsibility of the local building official.

111.5 In-plant inspections in production and manufacturing facilities for industrialized building systems as well as on-site inspection shall be conducted by the department or its authorized agent pursuant to 815 KAR 7:020. The local building official shall be responsible to inspect such systems only for location under applicable local ordinances.

111.6 Upon completion of the building, the owner or agent of the facility shall request a final inspection. The building official shall set a time for said inspection and notify the owner or agent and the fire official. If compliance with the approved plans and permit has been achieved, a certificate of occupancy shall be issued, as described in Section 117.0. If compliance has not been achieved, any violations shall be noted and immediately communicated to the owner or agent.

111.7 The building official shall cooperate with the fire official by allowing the fire official to inspect all buildings during construction. Any recommendations made by the fire official relating to fire safety in construction of a building shall be considered by the building official and if a certificate of occupancy is issued contrary to said written recommendations the building official shall give written notification of his decision to the fire official and the department at once.

SECTION 112.0 RIGHT OF ENTRY

112.1 Applicants for building permits shall be deemed to consent to inspection during construction and upon completion of construction for the purpose of determining that such building is constructed in compliance with the *Kentucky Building Code*, and the inspector may enter upon the premises during any reasonable hour.

SECTION 113.0 APPLICATION FOR PERMIT REQUIRED

113.1 It shall be unlawful to construct, enlarge, or alter a structure; or change the type of occupancy of a building requiring greater strength, exiting or sanitary provisions; or to change to another use; or to install or alter any equipment for which provision is made or the installation of which is required by KBC, without first filing an application with the appropriate building official in writing and obtaining the required permit or letter therefore; except

that ordinary repairs, as defined in Section 104.0 which do not involve any violation of KBC, shall be exempt from this provision.

113.2 The application for a permit shall be submitted in writing and in such form as the department may prescribe and shall be accompanied by the required fee.

113.3 The application shall contain a general description of the proposed work, its location, the use and occupancy of all parts of the building or structure and of all portions of the site or lot not covered by the building or structure, and such additional information as may be required by the building official.

113.4 Application for permit shall be made by the owner or lessee of the building or structure, or agent of either, or by the licensed engineer or architect employed in connection with the proposed work. If the application is made by a person other than the owner in fee, it shall be accompanied by a duly verified affidavit of the owner, or the qualified person making the application, that the proposed work is authorized by the owner in fee and that the applicant is authorized to make such application. The full names and addresses of the owner, lessee, applicant and of the responsible officers, if the owner or lessee is a corporate body, shall be stated in the application.

113.5 The application for the permit shall be accompanied by specifications and plans drawn to scale, with sufficient clarity and detail dimensions to show the nature and character of the work to be performed. The building official shall cooperate with the fire official by allowing the fire official to review all plans. Any recommendations made by the fire official relating to fire safety in construction of a building shall be considered by the building official and he shall report his decision to the fire official at once. When quality of materials is essential for conformity to the KBC, specific information shall be given to establish such quality; and the KBC shall not be cited, or the term "legal" or its equivalent be used, as a substitute for specific information. The building official may waive the requirement for filing plans when the work involved is of a minor nature.

113.6 Site plan: There shall also be a site plan showing to scale the size and location of all new construction and all existing structures on the site, distances from lot grades; and it shall be drawn in accordance with an accurate boundary line survey.

113.7 Engineering details: The building official may require adequate details of structural, mechanical and electrical work including computations, stress diagrams and other essential technical data to be filed. All engineering plans and computations shall bear the signature of the responsible design professional. Plans for buildings more than two stories in height shall indicate how required structural and fireresistance rating integrity will be maintained, and where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and systems.

113.8 An application for permit for any proposed work should be deemed to have been abandoned six months after date of filing, unless such application has been diligently prosecuted or a permit shall have been issued; except that for reasonable cause, the building official may grant one or more extensions of time for additional periods not exceeding 90 days each.

113.9 Subject to the limitations of Section 113.0, amendments to a plan, application or other records accompanying the same, may be filed at any time before completion of the work for which the permit is sought or issued and such amendments shall be deemed a part of the original application and shall be filed therewith.

113.10 The building official may revoke a permit or approval issued under the KBC in case of any false statements or misrepresentation in the application or on the plans.

SECTION 114.0 PERMIT REQUIRED

114.1 The building official shall examine or cause to be examined all applications for permits and amendments thereto within a reasonable time after filing. If the application or the plans do not conform to the requirements of all pertinent laws, he shall reject such application in writing, stating the reasons therefor. If he finds that the proposed work conforms to the requirements of this code and all laws and ordinances applicable thereto, he shall issue a permit therefor as soon as practicable.

114.2 Any permit issued shall become invalid if the authorized work is not commenced within one year after issuance of the permit, or if the authorized work is suspended or abandoned for a period of six months after the time of commencing the work.

114.3 The KBC shall not require changes in the plans, construction or designated use of a building for which a lawful permit has been heretofore issued or otherwise lawfully authorized by approved plans, so long as the substantial construction on the project has commenced within one year from the date the permit was issued.

114.4 The building official shall attach his signature to every permit, or he may authorize a subordinate to affix such signature thereto.

114.5 The building official shall record and communicate to the owner or agent the terms and conditions related to his approval to commence construction.

114.6 The building official may issue a permit for the construction of foundations or any other part of a building or structure before the entire plans and specifications for the whole building or structure have been submitted, provided adequate information and detailed statements have been filed complying with all the pertinent requirements of this code. The holder of such permit for the foundations or other part of a building or structure shall proceed at his

own risk with the building operation and without assurance that a permit for the entire structure will be granted.

114.7 Approved plans: The building official shall stamp or endorse in writing the corrected plans approved, and that set shall be available at the building site, open to inspection of the building official or his authorized representative at all reasonable times.

114.8 A true copy of the building permit shall be available on the site of operation open to public inspection during the entire time of prosecution of the work and until the completion of the same.

SECTION 115.0 CONDITIONS OF PERMIT

115.1 A permit shall not be issued until the fees prescribed by the department or the local government have been paid. The permit shall be a license to proceed with the work and shall not be construed as authority to violate, cancel or set aside any of the provisions of the KBC, except as specifically stipulated by modification or legally granted variation as described in the permit.

115.2 All work shall conform to the appropriate application and plans for which the permit has been issued and any approved amendments thereto and shall be located strictly in accordance with the approved plot plan and any local ordinances governing the location of the building.

115.3 A lot shall not be changed, increased or diminished in area from that shown on the official plot site plan, unless a revised plan showing such changes accompanied by the necessary affadavit of owner or applicant shall have been filed and approved, except that such revised plan will not be required if the change is caused by reason of an official street opening, street widening or other public improvement.

SECTION 116.0 FEES

116.1 A permit to begin work for new construction, alteration or other building operations shall not be issued until the fees prescribed by law shall have been paid to the department or local building department, nor shall an amendment to a permit necessitating an additional fee because of an increase in the estimated cost of the work involved be approved until the additional fee shall have been paid.

116.2 The payment of the fee for the construction, alteration and for all work done in connection with or concurrently with the work contemplated by a building permit, shall not relieve the applicant or holder of the permit from the payment of other fees that may be prescribed by law or ordinance for water taps, sewer connections, electrical permits, erection of signs and display structures, marquees or other appurtenant structures, or fees of inspections, certificates of use and occupancy or other privileges or requirements, both within and without the jurisdiction of building inspection.

116.3 The fee for building permits and other functions performed pursuant to KRS Chapter 198B may be designed to fully cover the cost of the service performed; and the department and each local government is authorized to establish by approved rules or ordinances a schedule of unit rates for buildings and structures of all use groups and types of construction as classified and defined in the KBC.

SECTION 117.0 CERTIFICATE OF USE AND OCCUPANCY

117.1 No building on which site preparation and assembly were begun, after the Kentucky Building Code becomes effective as to that building, shall be occupied until the appropriate building official has issued a certificate of occupancy certifying that the building was constructed in conformance with the standards of the Kentucky Building Code, or assembled or installed in conformance with application instructions; except that:

117.1.1 A building for which a permit was legally granted prior to the effective date of the KBC may be constructed and occupied under the provisions of relevant regulations in force at the time the permit was issued, provided that substantial construction has commenced within one year from the date the permit was issued;

117.1.2 A building for which plans were prepared at least three months prior to the effective date of the KBC in a locality not then requiring a building permit may be completed and occupied without a building permit.

117.2 A building or structure hereafter enlarged, extended or altered to change from one use group to another or to a different use within the same use group, in whole or part, and a building or structure hereafter altered for which a certificate of use and occupancy has not been heretofore issued, shall not be occupied or used until the certificate shall have been issued by the building official, certifying that the work has been completed in accordance with the provisions of the approved permit; except that any use or occupancy, which was not discontinued during the work or alteration, shall be discontinued within 30 days after the completion of the alteration unless the required certificate is secured from the building official.

117.3 After a change of use has been made in a building or structure, the reestablishment of a prior use that would not have been legal in a new building of the same type of construction is prohibited unless the building complies with all applicable provisions of this code. A change from one prohibited use, for which a permit has been granted, to another prohibited use shall be deemed a violation of this code.

117.4 Upon the request of the holder of a permit, the building official may issue a temporary certificate of occupancy for a building or structure, or part thereof, before the entire work covered by the permit shall have been completed, provided such portion or portions may be occupied safely prior to full completion of the building or structure without endangering life or public welfare.

117.5 When a building or structure is entitled thereto, the building official shall issue a certificate of use and occupancy within ten days after written application. The certificate shall certify compliance with the provisions of this code and the purpose for which the building may be used in its several parts. The certificate of use and occupancy may specify the following information from the KBC, the use group, in accordance with the provisions of Article 3; the fire grading as defined in Article 4 and Table 1402, the maximum live load on all floors as prescribed in Article 9; the occupancy load in the building and all parts thereof as defined in Article 2 and Article 8; and any special stipulations and conditions of the building permit.

SECTION 118.0 POSTING STRUCTURES

118.1 Every building and structure and part thereof designed for business, factory and industrial, high hazard, mercantile, or storage use (Use Groups, B, F, H, M and S) as defined by the KBC shall be posted on all floors by the owner with a suitably designed placard in a form designated by the department, which shall be securely fastened to the structure in a readily visible place, stating the use group, and the occupancy loads.

118.2 Every room constituting a place of assembly shall have the occupancy load of the room posted in a conspicuous place, near the main exit from the room. Approved signs shall be maintained in a legible manner by the owner or his authorized agent. Signs shall be durable and shall indicate the number of occupants permitted for each room use.

118.3 All posting signs shall be furnished by the owner and shall be of permanent design; they shall not be removed or defaced and, if lost, removed or defaced, shall be immediately replaced.

SECTION 119.0 VIOLATIONS AND REMEDIES

119.1 It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, remove, use or occupy any building or structure or equipment regulated by the KBC, or cause same to be done, contrary to or in conflict with or in violation of any of the provisions of this code.

119.2 The building official shall serve a notice of violation or order on the person responsible for erection, construction, alteration, extension, repair, removal, demolition, use or occupancy of a building or structure in violation of this code or in violation of a permit or certificate issued under the provisions of this code; and such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

119.3 If the notice of violation is not complied with promptly, the building official shall request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation or to require the removal or termination of the unlawful use of the building or of the order or direction made pursuant thereto.

119.4 Penalties: Any person who shall violate a provision of the KBC or shall fail to comply with any of the requirements thereof or who shall erect, construct, alter or repair a building or structure in violation of an approved plan or proper direction of the building official, or of a permit or certificate issued under the provisions of the KBC, shall be subject to such penalties as may be provided by KRS 198B.990 and other applicable law.

119.5 Injunctive relief: The department or any local agency enforcing the uniform state building code may obtain injunctive relief from any court of competent jurisdiction to enjoin the offering for sale, delivery, use, occupancy or construction of any building on which construction was begun after the effective date of said code, upon an affidavit of the department or the local government agency specifying the manner in which the construction, or if a building existing prior to the effective date of said code, the reconstruction, alteration, repair or conversion does not conform to the requirements of KBC.

119.6 No person shall hinder an inspector enforcing any of the provisions of this code in the performance of his lawful duties under this chapter.

SECTION 120.0 NOTICE TO OWNER

120.1 Upon notice from the building official that work on any building or structure is being prosecuted contrary to the provisions of this code or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work; and shall state the conditions under which work may be resumed.

120.2 Unlawful continuance: Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as he is directed to perform to remove a violation or unsafe conditions, shall be liable to the restraints provided in Section 119.0.

SECTION 121.0 AUTHORITY FOR EXISTING BUILDINGS

121.1 Upon the issuance of a final approval of a facility and the issuance of a lawful certificate of occupancy with respect to a particular facility, the building official's authority and responsibility as to that facility is ended so far as the KBC is concerned, unless the facility later becomes subjected to the KBC by virtue of Section 106.0.

121.2 Other local or state law must be consulted to determine the existence of other powers given to the building official, such as those related to demolition or authority over unsafe structures, which are not specifically awarded him or her in the KBC.

121.3 State Fire Marshal's Office and the local fire official designated by the local government shall continue to be the persons responsible for enforcement of the standards of safety for existing buildings and shall also inspect for

fire safety maintenance after a building has been given a final certificate by the building official, under KRS Chapter 227, and 815 KAR 10:015.

SECTION 122.0 LOCAL BOARD OF APPEALS

122.1 The mayor, chairman of the board of trustees or county judge executive of a local government which is enforcing the Kentucky Building Code may, upon approval of the local legislative body, appoint a local appeals board, consisting of at least five technically qualified persons with professional experience related to the building industry, three of which must not be employees of the local government, to hear appeals of the decisions of the local building official.

122.2 Local governments which are enforcing the Kentucky Building Code may cooperate with each other and provide a local appeals board and shall adhere to the provisions of KRS Chapter 65 when entering into such cooperative agreements.

122.3 No local building official or employee of a local inspection department may sit on a local appeals board if such board is hearing an appeal to a decision rendered by his department. No member of a local appeals board shall hear an appeal in a case in which he has financial interest.

122.4 Any party to a decision by the local building official may appeal that decision to the local appeals board. Upon receipt of an appeal from a qualified party, the local appeals board shall convene a hearing to consider the appeal within 15 days of receipt.

122.5 All parties to the appeal shall be notified of the time and place of the hearing by letter mailed by certified mail no later than ten days prior to the date of hearing.

122.6 The local appeals board shall render a decision within five working days after the hearing. The board may uphold, amend or reverse the decision of a local building official, and there shall be no appeal from the decision of the local appeals board other than by appeal to the board.

SECTION 123.0 APPEALS PROCEDURES

123.1 Where a local appeals board exists, a party must first appeal to the local board when aggrieved by a decision of the local building official.

123.2 A party, including the fire official, aggrieved by a decision of a local building official where no local appeals board exists may appeal directly to the board. The board shall further hear appeals directly from a party aggrieved by the decision of an agent of the department.

123.3 Application for appeal may be made when it is claimed in writing that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction can be used, or that the building official has refused to grant a modification to the provisions of this code

covering the manner of construction or material to be used in the erection, alteration or repair of a building or structure.

123.4 The board may appoint five or more of its members, excluding the chairman of the board, to consider the recommendations of the commissioner or to conduct hearings, and those appointed shall act in all matters concerning the appeal for the entire board.

123.5 The board may adopt such rules, regulations and by-laws as are necessary to conduct said appeals; and no member of the board or committee may vote on any matter which will result in his direct or indirect financial gain.

123.6 Appeals to the board shall be in writing and shall be addressed to the Commissioner of Housing, Buildings and Construction, The 127 Building, U.S. 127 South, Frankfort, Kentucky 40601; Attention: Appeals Board. Such appeals shall include citations of those provisions of the Kentucky Building Code which are at issue, an explanation as stated in subsection (3) of why the decision of the state building official or local building official relative to those provisions is being contested and a copy of the decision rendered by the local appeals board, if any.

123.7 The commissioner shall immediately notify the board when an appeal is received. The commissioner or a designated employee of the department shall then investigate the evidence pertaining to such an appeal, based upon the results of such investigation, and make recommendations to the board or committee on the disposition of the case in question.

123.8 No employee of the department shall investigate or make recommendation on an appeal to his own decision, but shall defer in such cases to employees who are not party to the decision which lead to the appeal.

123.9 In conducting such investigation, the commissioner or the designated representatives, acting for the department, shall have the authority to administer oaths and affirmations, issue subpoenas authorized by law, rule upon offers of proof and receive relevant evidence, take or cause depositions to be taken, regulate the course of any hearings they may schedule, and hold conferences for the settlement or simplification of the issue by consent of the parties.

123.10 The commissioner shall cause such investigation to be completed, and forwarded with written recommendation to the board within 30 days after receiving such an appeal.

SECTION 124.0 ACTION OF THE BOARD

124.1 Upon receiving the written recommendations of the commissioner, the board may decide to accept such recommendations, or it may decide to convene a hearing to consider the question further. Upon receipt of the recommendations of the commissioner, the board shall render a decision on each appeal at its regularly scheduled meeting but no later than 30 days after receipt of such recommendations.

124.2 If the board has authorized an appeals committee to hear an appeal, the committee shall act for the board in all matters related to the appeal.

124.3 Should the board's decision be to schedule a hearing on the appeal, such hearing shall occur within 30 days of such decision, and all parties to such hearing shall be immediately notified in writing of the time and place of such hearing by the commissioner. The board may further exercise the same powers of investigation as granted to the commissioner in Section 123.0. The board shall render a decision within ten days of any appeals hearing it may conduct.

124.4 The board may uphold, amend or reverse the decision of a local appeals board, a local building official or the state building official; and the decision of the board shall be final.

124.5 The chairman of the board shall notify the appropriate building official and he or she shall take immediate action in accordance with the decision of the board.

124.6 There shall be no appeal from the board's decision except to the circuit court within whose jurisdiction the property in question is located. Application for review shall be made to the proper court within 30 days following that decision.

SECTION 125.0 CONSTRUCTION CONTROL AND RESPONSIBILITIES

125.1 The provisions of this section shall define the responsibility of the building official in relation to design professionals and the circumstances under which the department or the local building official shall be authorized to accept design professional's affirmation in their plans and specifications as to compliance with various provisions of this code.

125.2 All new, alteration, repair, expansion, addition or modification work involving the practice of professional architecture and engineering as defined by KRS Chapters 322 and 323 shall be prepared by registered professional architects or engineers as certified by the state; and all plans, computations and specifications required for a building permit application for such work must be prepared by or under the direct supervision of the registered architect or engineer and bear his seal and signature in accordance with those statutes.

SECTION 126.0 VALIDITY

126.1 In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts of provisions thereof, which may or shall be determined to be legal; and it shall be presumed that this code would have been passed without such illegal or invalid parts or provisions.

126.2 Any invalid part of this code shall be segregated from the remainder of this code by the court holding such part invalid, and the remainder shall remain effective.

126.3 The invalidity of any provision in any section of the KBC as applied to existing buildings and structures shall not be held to affect the validity of such section in its application to buildings and structures hereafter erected.

SECTION 127.0 EFFECTIVE DATES FOR KBC APPLICATION

127.1 Any building required by Section 109.0 (1) to be submitted to the Department of Housing, Buildings and Construction and which has not been submitted and accepted for construction prior to February 15, 1980, must be constructed in compliance with the applicable provisions of the KBC.

127.2 Any building required by Section 108.0 to be submitted to a local government for plan review and which has not been lawfully approved for construction prior to the following timetables shall be constructed in compliance with the applicable provisions of the KBC:

127.2.1 In all local governments in a county containing a first or second class city or urban county government, no later than February 15, 1980.

127.2.2 In all local governments in a county where the largest city is of the third or fourth class, no later than August 15, 1981.

127.2.3 In all local governments in a county containing no city larger than fifth or sixth class, no later than August 15, 1982.

SECTION 128.0 ALTERNATIVE CODES

128.1* Whenever the department has entered into a contractual obligation requiring enforcement of applicable federally approved codes, the department shall approve plans and make inspections using those federal codes as an alternative to other applicable provisions of the KBC so long as equivalent safety is maintained. Any facility of an occupancy type subject to review by the federal codes may use this section.

SECTION 129.0 DAY CARE CENTERS

129.1 Family child day care homes, group day care homes, child day care centers and day nurseries which comply with the provisions of the Life Safety Code, NFiPA Pamphlet #101, shall be deemed to have satisfied all the life safety requirements of the Kentucky Building Code.

SECTION 130.0 FEE SCHEDULES

130.1 Submission of Plans and Fees.

130.1.1 All plans and specifications required to be submitted to the depart-

* Facilities licensed by the state as Ambulatory Surgical Centers which do not receive any reimbursement from the Federal government may be constructed under the provisions of the KBC for Business Occupancy. However, if these same facilities at a later date desire to participate in a Federal reimbursement program, they must comply with the provisions of Section 12-6 (new health care centers) of the 1981 Life Safety Code.

ment under the *Kentucky Building Code* shall be accompanied by the applicable fee as set forth in this regulation rounded to the nearest dollar.

130.1.2 All fees required herein shall be in check form payable to the Kentucky State Treasurer.

130.1.3 No approval for construction shall be issued by the department until all required fees have been paid.

130.1.4 The plan review fees required by this regulation are intended to cover the cost of corresponding inspections for compliance with such plans.

130.2 New construction: Departmental plan review fees for new buildings shall be calculated by multiplying the total square footage times the cost per square foot of each occupancy type as listed in the following table. Total square footage will be determined by the outside dimensions of the building. Minimum fee for review of plans under this section will be fifty dollars ($50).

OCCUPANCY TYPE	COST PER SQUARE FOOT
Residential (excluding single family dwellings and duplexes)	2 cents
Assembly occupancies	
Nightclub/restaurants	3.5 cents
All other assembly	3 cents
Educational	2 cents
Day care centers	2 cents
Business	2 cents
Mercantile	2 cents
Industrial factories	2 cents
Warehouses	1.5 cents
Institutional	2.5 cents
Frozen food plants	2 cents
High hazard	3 cents
All other nonresidential	2 cents

130.2.2 Plan review fees for additions to existing buildings, which do not require the entire building to conform to the *Kentucky Building Code,* shall be calculated in accordance with Section 130.1 by the measurement of the square footage of the addition, only, as determined by the outside dimensions of the addition. Minimum fee for review of plans under this section will be fifty dollars ($50).

130.2.3 Plan review fees for existing buildings in which the use group or occupancy type is changed shall be calculated in accordance with Section 130.1 by using the total square footage of the entire building or structure under the new occupancy type as determined by the outside dimensions. Minimum fee for review of plans under this section will be fifty dollars ($50).

130.2.4 Plan review fees for alterations and repairs not otherwise covered by this section shall be calculated by multiplying the cost for the repairs by .001.

130.3 Specialized fees: In addition to the fees required by Section 130.2, the following fees must be paid for the specialized plan reviews listed:

130.3.1 Sprinkler fees:

AUTOMATIC SPRINKLER REVIEW FEE TABLE

Sprinkler Heads	Plan Review Fee
4-200	$ 50
201-300	60
301-400	80
401-750	100
over 750	$100 plus 10 cents per sprinkler over 750

130.3.2 Fire detection system review fee: $10 per 5,000 square feet up to 70,000 square feet; over 70,000 square feet — $140 plus $15 per each additional 20,000 square feet.

130.3.3 Standpipe plan review fee: $30 (Combination standpipe and riser plans will be reviewed under automatic sprinkler review fee schedule).

130.3.4 Carbon dioxide suppression system review fee: 1 to 200 pounds of agent — $50; over 200 pounds of agent — $50 plus 2 cents per pound in excess of 200 pounds.

130.3.5 Halon suppression system review fee: Up to 35 pounds of agent — $50; over 35 pounds — $50 plus 5 cents per pound in excess of 35 pounds.

130.3.6 Foam suppression system review fee: $1 per gallon of foam concentrate. The fee for review of plans under this section shall not be less than $50 or more than $1,000.

130.3.7 Commercial range hood review fee: $20.00 per hood.

130.3.8 Dry chemical systems review fee (except range hoods): 1 to 30 pounds of agent — $30; over 30 pounds of agent — $30 plus 20 cents per pound in excess of 30 pounds.

130.3.9 Flammable liquid or pressure tank fee: $25 for the first tank and $5 for each additional tank. (6 Ky. R. 486; eff. 4-1-80; Am. 9 Ky. R. 497; eff. 12-1-82.)

ARTICLE 2

DEFINITIONS

SECTION 200.0 GENERAL

200.1 Scope: Unless otherwise expressly stated, the following terms shall, for the purpose of this code, have the meanings indicated in this article.

200.2 Interchangeability: Words used in the present tense include the future; words used in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural the singular.

200.3 Terms defined in other codes: Where terms are not defined in this article and are defined in the plumbing, fire prevention or mechanical codes listed in Appendix A, they shall have the meanings ascribed to them as in those codes.

200.4 Terms not defined: Where terms are not defined through methods authorized by this section, they shall have their ordinarily accepted meanings such as the context may imply.

SECTION 201.0 GENERAL DEFINITIONS

Accepted engineering practice: That which conforms to accepted principles, tests or standards of nationally recognized technical or scientific authorities.

Accessory structure: A building the use of which is incidental to that of the main building and which is located on the same lot.

Addition: An extension or increase in floor area or height of a building or structure.

Airplane hangar, private: A hangar for the storage of four or less single motor planes in which volatile or flammable oil is not handled, stored or kept other than that contained in the fuel storage tank of the plane.

Airplane hangar, public: A building for the storage, care or repair of private or commercial airplanes not included in the term "private airplane hangar."

Alarm system, automatic fire: A manual fire alarm system containing automatic detecting device(s) which actuate a fire alarm signal (see Section 1716.0).

Alarm system, manual fire: An interior alarm system composed of sending stations and signaling devices in a building, operated on an electrical circuit, so arranged that the operation of any one station will ring all signals throughout the building and at one or more approved locations (see Section 1717.0).

Alarm system, sprinkler: An alarm activated by water flow from a sprinkler system (see Section 1704.0).

Alley: A secondary thoroughfare less than 30 feet (9144 mm) in width dedicated for the public use of vehicles and pedestrians, affording access to abutting property.

Alteration: As applied to a building or structure, means a change or rearrangement in the structural parts or in the means of egress; or an enlargement, whether by extending on a side or by increasing in height; or the moving from one location or position to another.

* **Anchor store:** An exterior perimeter department store or major merchandising or magnet center having direct access to a mall and having its required exits independent of the mall (see Section 619.0).

Approved: Approved by the building official or other authority having jurisdiction.

Approved agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official.

Approved material, equipment and methods: Material, equipment and methods evaluated and approved by the building official (see Section 107.0).

Approved rules: The legally adopted rules of the building official (see Section 110.0).

Appurtenant structure: A device or structure attached to the exterior or erected on the roof of a building designed to support service equipment or used in connection therewith, or for advertising or display purposes, or other similar uses.

Architectural terra cotta: Plain or ornamental hard burned plastic clay units, larger in size than brick, with glazed or unglazed ceramic finish (see Articles 11, 13).

Area, building: The area included within surrounding exterior walls (or exterior walls and fire walls) exclusive of vent shafts and courts. Areas of the building not provided with surrounding walls shall be included in the building area if included within the horizontal projection of the roof or floor above (see Section 501.0).

Areaway (form of construction): An uncovered subsurface space adjacent to a building.

Assembly, place of: A room or space accommodating 50 or more individuals for religious, recreational, political, social or amusement purposes, or for the consumption of food and drink, including all connected rooms or spaces with a common means of egress and entrance.

Assembly, place of, outdoor: Premises used or intended to be used for public gatherings of 200 or more individuals in other than buildings.

Attic: The space between the ceiling beams of the top story and the roof rafters.

Attic, habitable: A habitable attic is an attic which has a stairway as a means of access and egress and in which the ceiling area at a height of $7^1/_3$ feet (2235 mm) above the attic floor is not more than one-third the area of the floor next below.

Automatic: As applied to fire protection devices, automatic refers to a device or system providing an emergency function without the necessity of human intervention and activated as a result of a predetermined temperature rise, rate of rise of temperature, or increase in the level of combustion products; such as incorporated in an automatic sprinkler system, automatic fire door, etc.

Automatic fire suppression system: An engineered system using carbon dioxide (CO_2), dry chemical, a halogenated extinguishing agent, or an automatic sprinkler system to automatically detect and suppress a fire through fixed piping and nozzles.

Basement: That portion of a building the average height of which is at least half below grade, which is ordinarily used for purposes such as storage, laundry facilities, household tool shops, and installation and operation of heating, cooling, ventilating facilities, but which is not ordinarily used for purposes of general household habitation (see "Story" and "Above grade").

Bay (part of a structure): The space between two adjacent piers or mullions or between two adjacent lines of columns.

Brick

Calcium silicate brick (sand lime brick): A building unit made of sand and lime.

Clay or shale: A solid masonry unit of clay or shale, usually formed into a rectangular prism while in the plastic state and burned or fired in a kiln.

Concrete brick: A solid masonry unit having a shape approximately a rectangular prism and composed of inert aggregate particles embedded in a hardened cementitious matrix.

Hollow brick: A masonry unit of clay or shale whose net cross-sectional area in any plane parallel to the bearing surface is not less than 60 percent or more than 75 percent of its gross cross-sectional area measured in the same plane.

Building: Any structure used or intended for supporting or sheltering any use or occupancy. For application of this code, each portion of a building completely separated from other portions by fire walls complying with Section 1407.0 shall be considered as a separate building.

Building, existing: Any structure erected prior to the adoption of the appropriate code, or one for which a legal building permit has been issued.

Building line: The line established by law, beyond which a building shall not extend, except as specifically provided by law.

Building official: The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

Building service equipment: The mechanical, electrical and elevator equipment including piping, wiring, fixtures and other accessories, which provides sanitation, lighting, heating, ventilation, fire fighting and transportation facilities essential for the habitable occupancy of the building or structure for its designated use and occupancy.

Building site: The area occupied by a building or structure, including the yards and courts required for light and ventilation, and such areas that are prescribed for access to the street.

Buttress: A projecting part of a masonry wall built integrally therewith to furnish lateral stability which is supported on proper foundations.

* **Central station system:** A system, or group of systems, the operations of which are signaled to, recorded in, maintained and supervised from an approved central station, in which there are competent and experienced observers and operators in attendance at all times whose duty it shall be, upon receipt of a signal, to take such action as shall be required under the rules established for their guidance. Such systems shall be controlled and operated by a person, firm or corporation whose principal business is the furnishing and maintaining of supervised protective signaling service and who does not have interest in protected properties (see Section 1718.0).

Certificate of use and occupancy: The certificate issued by the building official which permits the use of a building in accordance with the approved plans and specifications and which certifies compliance with the provisions of law for the use and occupancy of the building in its several parts together with any special stipulations or conditions of the building permit (see Section 119.0).

Change of use: An alteration by change of use in a building heretofore existing to a new use group which imposes other special provisions of law governing building construction, equipment or means of egress (see Section 103.2).

Child day care center: A facility providing a program less than 24 hours per day per child for the care of more than five children, two and one half years

or older, and who are fully ambulatory and capable of following evacuation instructions (see Section 304.0).

Chimney: A primarily vertical enclosure containing one or more passageways.
Factory-built chimney: A chimney that is factory-made and listed by an approved testing or inspection agency for the venting of gas appliances, gas incinerators and solid or liquid fuel burning appliances.
Masonry chimney: A field-constructed chimney of solid masonry units, bricks, stones, listed hollow masonry units or reinforced concrete.
Metal chimney (smokestack): A field-constructed chimney made of metal.

Combustible material: A combustible material is a material which cannot be classified as noncombustible in accordance with that definition.

Concrete: A mixture of cement, aggregates and water, of such proportions and manipulation as to meet specific requirements.

Concrete, reinforced: Concrete in which reinforcement, other than that provided for shrinkage or temperature changes, is combined in such manner that the two materials act together in resisting forces.

Conflagration hazard: The fire risk involved in the spread of fire by exterior exposure to and from adjoining buildings and structures.

Construction equipment: The construction machinery, tools, derricks, hoists, scaffolds, platforms, runways, ladders and all material handling equipment, safeguards and protective devices used in construction operations.

Construction operation: The erection, alteration, repair, renovation, demolition or removal of any building or structure; and the excavation, filling, grading and regulation of lots in connection therewith.

Construction, type of: See Section 401.0.
Type 1: See Section 402.0.
Type 2: See Section 403.0.
Type 3: See Section 404.0.
Type 4: See Section 405.0.
Type 5: See Section 406.0

Corridor: An enclosed passageway which limits means of egress to a single path of travel. *

Court: An open, uncovered and unoccupied space on the same lot with a building and enclosed wholly or partly by buildings, walls or other enclosing devices.
Inner: Any court enclosed wholly by buildings, walls or other enclosing devices.
Outer: A court extending to and opening upon a street, public alley, or other approved open space, not less than 15 feet (4572 mm) wide, or upon a required yard.

Curb level: The elevation of the street curb as established in accordance with law.

Building or wall height: The elevation of the street grade opposite the center of the wall nearest to and facing the street lot line.
Excavations: The elevation of the street grade nearest to the point of excavation.

Damper, fire: A damper arranged to seal off air flow automatically through part of an air duct system, so as to restrict the passage of heat. The fire damper may also be used as a smoke damper if location lends itself to the dual purpose (see Section 1417.0).

Day nursery: A facility providing a program less than 24 hours per day per child for the care of more than five children, not more than two and one-half years old.

Degree day, heating: A unit, based upon temperature difference and time, used in estimating fuel consumption and specifying nominal heating load of a building in winter. For any one day, when the mean temperature is less than 65 degrees F. (18 degrees C.) there exist as many degree days as there are Fahrenheit (Celsius) degrees difference in temperature between the mean temperature for the day and 65 degrees F. (18 degrees C.) (see Article 24).

Deluge system: An automatic sprinkler system consisting of open sprinklers with water supply valves activated by a separate automatic detection system.

Detecting device, automatic: A device which automatically detects heat, smoke or other products of combustion (see Section 1716.0).

Detector, smoke: An approved, listed detector for sensing visible or invisible particles of combustion (see Section 1716.0).

Door assembly, fire: The assembly of a fire door and its accessories, including all hardware and closing devices and their anchors; and the door frame, when required, and its anchors (see Section 1415.0).

Door, automatic collapsible revolving: A door which is designed, supported and constructed so that the wings will release and fold back in the direction of egress under pressure exerted by persons under panic conditions, providing a means of travel on both sides of the door pivot (see Section 813.0).

Door, automatic fire: A fire door or other opening protective constructed and arranged so that, if open, it shall close when subjected to a predetermined temperature, a predetermined rate of temperature rise, smoke or other products of combustion (see Section 1415.0).

Door, fire: A door and its assembly, so constructed and assembled in place as to give protection against the passage of fire (see Section 1415.0).

Draft regulator: A device which functions to maintain a desired draft in the appliance by automatically reducing the draft to the desired value.

Draftstopping: Building materials installed to prevent the movement of air, smoke, gases and flame to other areas of the building through large

concealed passages such as attic spaces and floor assemblies with suspended ceilings or open web trusses (see Section 1420.0).

Dumbwaiter: A hoisting and lowering mechanism with a car of limited capacity and size which moves in guides in a substantially vertical direction and is used exclusively for carrying material.

Dwellings

Boarding house: A building arranged or used for lodging, with or without meals, for compensation and not occupied as a single family unit.

Dormitory: A space in a building where group sleeping accommodations are provided for persons not members of the same family group, in one room, or in a series of closely associated rooms.

Hotel: Any building containing six or more guest rooms, intended or designed to be used, or which are used, rented or hired out to be occupied or which are occupied for sleeping purposes by guests.

Multi-family apartment house: A building or portion thereof containing more than two dwelling units and not classified as a one or two family dwelling.

One-family dwelling: A building containing one dwelling unit with not more than five lodgers or boarders.

Two-family dwelling: A building containing two dwelling units with not more than five lodgers or boarders per family.

Dwelling unit: A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

Elevator: A hoisting and lowering mechanism equipped with a car or platform which moves in guides for the transportation of individuals or freight in a substantially vertical direction through successive floors or levels of a building or structure (see Section 2107.0).

Freight elevator: An elevator primarily used for carrying freight and on which only the operator and the persons necessary for loading or unloading and employees having special permission of the building official are permitted to ride.

Hand elevator: A freight elevator that is driven by manual power.

Hydraulic elevator: A power elevator in which the motion of the car is obtained through the application of force from liquid under pressure.

Passenger elevator: An elevator for the transportation of individuals.

Power elevator: An elevator in which the motion of the car is obtained through the application of force other than by hand or gravity.

Sidewalk elevator: A freight elevator which operates between a sidewalk or other area exterior to the building and floor levels inside the building below such area, which does not have a landing opening into the building at its upper limit of travel and which is not used to carry automobiles.

Elevator repairs: All work necessary to maintain present elevator equipment in a safe and serviceable condition and to adjust or replace defective,

broken or worn parts with parts made of equivalent material, strength and design, and only where the replacing part performs the same function as the replaced part.

Equipment: Facilities or installations including but not limited to, heating, electrical, ventilating, air conditioning, and refrigerating facilities or installations.

Equipment, existing: Any equipment covered by this code which was installed prior to the effective date of this code, or for which an application for permit to install was filed with the building official prior thereto.

Escalator: A power driven, inclined, continuous stairway used for raising and lowering passengers (see Section 2117.0).

Extinguishing system, carbon dioxide (CO_2): A system to supply CO_2 from a pressurized vessel through fixed pipes and nozzles. The system includes an automatic detection and actuating mechanism (see Section 1708.0).

Extinguishing system, dry chemical: A system consisting of dry chemical and expellant gas storage tanks, fixed piping, and nozzles used to assure proper distribution of an approved extinguishing agent on a specific fire hazard or into a potential fire area. The system includes an automatic detection and actuating mechanism (see Section 1710.0).

Extinguishing system, foam: A special system to discharge, either mechanically or chemically, a foam made from concentrates, over the area to be protected (see Section 1707.0).

Extinguishing system, halogenated: A system of pipes, nozzles, an actuating mechanism and a container of halogenated agent under pressure (see Section 1709.0).

Exit: That portion of a means of egress which is separated from all other spaces of a building or structure by construction or equipment as required in this code to provide a protected way of travel to the exit discharge (see Section 807.0).

Exit access: Exit access is that portion of a means of egress which leads to an entrance to an exit (see Section 810.0).

Exit discharge: That portion of a means of egress between the termination of an exit and a public way (see Section 807.2.1).

Exit, horizontal: A way of passage from one building to an area of refuge in another building on approximately the same level, or a way of passage through or around a wall or partition to an area of refuge on approximately the same level in the same building, which affords safety from fire or smoke from the area of incidence and areas communicating therewith (see Section 814.0).

Exterior envelope: The elements of a building which enclose conditioned spaces through which thermal energy may be transferred to or from the exterior (see Section 2402.0).

Fire area: The floor area enclosed and bounded by fire walls, fire separation assemblies or exterior walls of a building to restrict the spread of fire.

Fire department connection: A connection for fire department use in supplementing or supplying water for standpipes or sprinkler systems (see Section 1713.0).

Fire grading: The fire hazard classification of a building or structure in hours or fractions thereof established for its use group and occupancy in Table 1402.

Fire hazard: The potential degree of fire severity existing in the use and occupancy of a building, classified as high, moderate or low.

High: All uses which involve the storage, sale, manufacture or processing of highly combustible, volatile flammable or explosive products which are likely to burn with extreme rapidity and produce explosions or large volumes of smoke, poisonous fumes or gases in the event of fire.

Moderate: All uses which involve the storage, sale, manufacture or processing of materials which are likely to burn with moderate rapidity and a considerable volume of smoke, but which do not produce either poisonous fumes or explosions, in the event of fire.

Low: All uses which involve the storage, sale or manufacture of materials that do not ordinarily burn rapidly, nor produce excessive smoke, poisonous fumes or explosions in the event of fire.

Fire protection: The provision of construction safeguards and exit facilities; and the installation of fire alarm, fire detecting and fire extinguishing service equipment, to reduce the fire risk and the conflagration hazard. *

Fire protection system: A system including systems, devices and equipment to detect a fire, actuate an alarm or suppress or control a fire or any combination thereof.

Fireresistance: That property of materials or their assemblies which prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

Fireresistance rating: The time in hours or fractions thereof that materials or their assemblies will resist fire exposure as determined by the fire test specified in this code (see Section 1403.1.1).

Fire separation, exterior fire exposure: The distance in feet measured from the building face to the closest interior lot line, to the center line of a street or public way or to an imaginary line between two buildings on the same property.

Firestopping: Building materials installed to prevent the movement of flame and gases to other areas of a building through small concealed passages in building components such as floors, walls and stairs. *

Flameresistance: That property of materials or combinations of component materials which restricts the spread of flame as determined by the flameresistance tests specified in this code (see Section 1404.0).

Flame spread: The propagation of flame over a surface.

Flame spread rating: The measurement of flame spread on the surface of materials or their assemblies as determined by the tests specified in this code (see Section 1404.0).

Flammable: Subject to easy ignition and rapid flaming combustion.

Floor area, gross: Gross floor area shall be the floor area within the perimeter of the outside walls of the building under consideration, without deduction for hallways, stairs, closets, thickness of walls, columns, or other features.

Floor area, net: For the purpose of determining the number of persons for whom exits are to be provided, net floor area shall be the actual occupied area, not including accessory unoccupied areas or thickness of walls.

Floor fill: The fill between the structural floor arch or slab and the finished flooring.

Floor filling: The type of short-span floor construction in fireresistive buildings installed between structural steel framing to serve as a combination structural floor slab or arch and fireproof protection of the framing.

Floor finish: The finish placed on top of the floor arch, slab or other structural floor element.

Foyer: The enclosed space surrounding or in the rear of the auditorium of a theater or other place of assembly which is completely shut off from the auditorium and is used as an assembly or waiting space for the occupants.

Garage, private: A garage for four or less passenger motor vehicles without provision for repairing or servicing such vehicles for profit (see Section 608.0).

Garage, public: A building or structure for the storage or parking of more than four passenger motor vehicles or motor powered boats, or more than one commercial motor vehicle; and in which provision may be made for the dispensing of gasoline, oil or similar products for the servicing of such vehicles. Public garages shall be classified according to their specific use in one of the following groups (see Section 609.0).

Group 1: A public garage in which provision is made for the care, storage, repair or painting of motor vehicles.

Group 2: A public garage used exclusively for passenger vehicles that will accommodate not more than nine passengers.

Grade: A reference plane representing the average of finished ground level adjoining the building at all exterior walls. When the finished ground level slopes away from the exterior walls, the reference plane shall be established by the lowest points within the area between the building and the lot line or, when the lot line is more than 6 feet (1829 mm) from the building, between the building and a point 6 feet (1829 mm) from the building.

Grade hallway, grade lobby, grade passageway: An enclosed hallway or corridor that is an element of an exit; and terminating at a street or an open space or court communicating with a street.

Grandstand: Any structure, except movable seating and sectional benches, intended primarily to support individuals for the purposes of assembly, but this definition shall not apply to the permanent seating in theatres, churches, auditoriums and similar buildings (see Section 611.0).

Gross leasable area: The gross leasable area is the total floor area designed for tenant occupancy and exclusive use. The area of tenant occupancy is measured from the center lines of joint partitions to the outside of the tenant walls (see Section 619.0).

Habitable space: Space in a structure for living, sleeping, eating, or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility spaces and similar areas are not considered habitable space.

Heated space: A space within a building which is provided with a positive heat supply. Finished living space within a basement, or registers or heating devices designed to supply heat to a basement space shall define that space as heated space.

Height

Building: The vertical distance from grade to the top of the highest roof beams of a flat roof, or the mean level of the highest gable or slope of a hip roof.

Court: The vertical distance from the lowest level of the court to the mean height of the top of the enclosing walls.

Story: The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost story, from the top of the floor finish to the top of the ceiling joists, or, when there is not a ceiling, to the top of the roof rafters.

Walls: The vertical distance from the foundation wall or other immediate support of such wall to the top of the wall.

Hereafter: After the time that this code becomes effective.

Heretofore: Before the time that this code became effective.

Hoist, material platform: A power or manually operated suspended platform conveyance operating in guide rails for the exclusive raising or lowering of materials, which is operated and controlled from a point outside the conveyance.

Hoisting and conveying equipment, special: Manually or power operated hoisting, lowering or conveying mechanisms, other than elevators, escalators or dumbwaiters for the transport of persons or freight in a vertical, inclined or horizontal direction on one floor or in successive floors.

Automotive lift: A fixed mechanical device for raising an entire motor vehicle above the floor level, but not through successive floors of the building or structure (see Section 2115.0).

Conveyors: A system of machinery and manual or mechanized devices other than elevator and dumbwaiter equipment, consisting of belts, chains, rollers, buckets, aprons, slides and chutes and other miscellaneous equipment for hoisting, lowering and transporting materials and merchandise in

packages or in bulk in any direction in a building or structure (see Section 2116.0).

Freight lift: A power operated raising and lowering device for transporting freight vertically, operating entirely within one story of the building or structure.

Manlifts: A power operated belt device with steps and handholds for transporting persons in a vertical position through successive floors or levels of the building or structure (see Section 2113.0).

Hoisting and elevating equipment, miscellaneous: All power operated hoisting and elevating equipment for raising, lowering and moving persons or merchandise from one level to another such as inclined elevators, slings and hooks, tiering and piling machines not permanently located in a fixed position, mine elevators, skip hoists for blast furnaces, stage and orchestra lifts, lift bridges and temporary builders' hoists and similar equipment.

Inspection, special: Professional supervision as herein required of the installation, fabrication, erection or placement of components and/or connections requiring special expertise to ensure adequacy.

Jurisdiction: The governmental unit which has adopted this code under due legislative authority.

Label: A plate, tag or other device permanently and prominently affixed to a product or material indicating that it has been tested and evaluated by an approved agency (see Section 1104.3).

Lintel: A beam placed over an opening or recess in a wall which supports the wall construction above.

Load: Forces or other actions that arise on structural systems from the weight of all permanent construction, occupants and their possessions, environmental effects, differential settlement and restrained dimensional changes.

Dead load: The weight of all permanent structural and nonstructural components of a building, such as walls, floors, roofs, ceilings, stairways and fixed service equipment.

Duration of load: The period of continuous application of a given load, or the aggregate of periods of intermittent applications of the same load.

Earthquake load: The assumed lateral load acting in any horizontal direction on the structural frame due to the kinetic action of earthquakes.

Impact load: The load resulting from moving machinery, elevators, craneways, vehicles, and other similar forces and kinetic loads.

Internal load: The forces resulting from the restraint of movement of construction materials or differential movement of a combination of materials caused by the effects of expansion or contraction due to temperature changes, shrinkage, moisture changes, creep, differential settlement or combinations thereof.

Lateral soil load: The lateral pressure in pounds per square foot (psf) (kilograms per square meter [kg/m^2]) due to the weight of the adjacent soil, including due allowance for hydrostatic pressure and possible surcharge

from fixed or moving loads.

Live load: The weight superimposed by the use and occupancy of the building, not including the wind load, earthquake load, or dead load.

Wind load: The lateral pressure on the building or structure in pounds per square foot (psf) (kilograms per square meter [kg/ m^2]) due to wind blowing in any direction.

Loading ramp: A hinged, nonportable device, either mechanical or hydraulic, hand or power operated, used for spanning gaps or adjusting heights between loading surface and carrier or between loading surface and loading surface.

Lobby: The enclosed vestibule between the principal entrance to the building and the doors to the main floor of the auditorium or assembly room of the theater or place of assembly, or to the main floor corridor of a business building.

Lot: A portion or parcel of land considered as a unit.

Corner lot: A lot with two adjacent sides abutting upon streets or other public spaces.

Interior lot: A lot which faces on one street or with opposite sides on two streets.

Lot line: A line dividing one lot from another, or from a street or any public place.

Lot line, interior: Any lot line other than one adjoining a street or public space.

Lot line, street: The lot line dividing a lot from a street or other public way.

Mall: A mall is a roofed over common pedestrian area serving more than one tenant located within a covered mall building (see Section 619.0).

Mall building, covered: A building enclosing a number of tenants and occupancies such as retail stores, drinking and dining establishments, entertainment and amusement facilities, offices, and other similar uses wherein two or more tenants have a main entrance into one or more malls. Anchor stores shall not be considered as part of the covered mall building (see Section 619.0).

Masonry: A built-up construction or combination of building units or materials of clay, shale, concrete, glass, gypsum, stone or other approved units bonded together with mortar or monolithic concrete. Reinforced concrete is not classed as masonry.

Ashlar facing masonry: Facing of solid rectangular units larger in size than brick and of burned clay or shale, natural or cast stone, with sawed, dressed and squared beds and mortar joints.

Ashlar masonry: Masonry composed of bonded, rectangular units, larger in size than brick, with sawed, dressed or squared beds and mortar joints.

Solid masonry: Masonry consisting of solid masonry units laid contiguously with the joints between the units filled with mortar, or consisting of plain concrete.

Masonry unit

Clay: A building unit larger in size than a brick, composed of burned clay, shale, fire clay or mixtures thereof.

Concrete: A building unit or block larger in size than 12 by 4 by 4 inches (305 mm by 102 mm by 102 mm) made of cement and suitable aggregates.

Hollow: A masonry unit whose net cross-sectional area in any plane parallel to the bearing surface is less than 75 percent of its gross cross-sectional area measured in the same plane.

Solid: A masonry unit whose net cross-sectional area in every plane parallel to the bearing surface is 75 percent or more of its gross cross-sectional area measured in the same plane.

Means of egress: A continuous and unobstructed path of travel from any point in a building or structure to a public way, and consisting of three separate and distinct parts: (a) the exit access, (b) the exit and (c) the exit discharge. A means of egress comprises the vertical and horizontal means of travel and shall include intervening room spaces, doors, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts and yards (see Article 8).

Member

Primary: Any member of the structural frame of a building or structure used as a column, grillage beam, or to support masonry walls and partitions, including trusses, isolated lintels spanning an opening of 8 feet (2438 mm) or more, and any other member required to brace a column or a truss.

Secondary: Any member of the structural framework other than a primary member, including filling-in beams of floor systems.

Membrane structures

Air-inflated structure: A building where the shape of the structure is maintained by air pressurization of cells or tubes to form a barrel vault over the usable area. Occupants of such a structure do not occupy the pressurized area used to support the structure.

Air-supported structure: A building wherein the shape of the structure is attained by air pressure and occupants of the structure are within the elevated pressure area. Air supported structures are of two basic types:

Single skin: Where there is only the single outer skin and the air pressure is directly against that skin.

Double skin: Similar to a single skin, but with an attached liner which is separated from the outer skin and provides an air space which serves for insulation, acoustic, aesthetic or similar purposes.

Cable-restrained air-supported structure: A structure in which the uplift is resisted by cables or webbings which are anchored to either foundations or dead men. Reinforcing cable or webbing may be attached by various methods to the membrane or may be an integral part of the membrane. This is not a cable-supported structure.

Membrane: As it pertains to membrane structures, a thin, flexible, impervious material capable of being supported by an air pressure of 1.5 inches of water column (373 P) (see Section 621.0).

Membrane-covered cable structure: A nonpressurized structure in which a mast and cable system provides support and tension to the membrane weather barrier and the membrane imparts structural stability to the structure.

Membrane-covered frame structure: A nonpressurized building wherein the structure is composed of a rigid framework to support tensioned membrane which provides the weather barrier.

Noncombustible membrane structure: A membrane structure in which the membrane and all component parts of the structure are noncombustible.

Tent: Any structure, enclosure or shelter constructed of canvas or pliable material supported by any manner except by air or the contents it protects.

Mezzanine(s): An intermediate level or levels between the floor and ceiling of any story with an aggregate floor area of not more than 33 percent of the floor area of the story in which the level or levels are located (see Section 622.0).

Mobile unit: A structure of vehiclular, portable design, built on a chassis and designed to be moved from one site to another, and to be used with or without a permanent foundation.

Mortar: A plastic mixture of approved cementitious materials, fine aggregates and water used to bond masonry or other structural units.

Motel: A hotel as defined in this code.

Moving walk: A type of passenger carrying device on which passengers stand or walk, and in which the passenger carrying surface remains parallel to its direction of motion and is uninterrupted.

Noncombustible: This is a general, relative term. Its precise meaning is defined in this code for specific applications.

Noncombustible building material: See Section 1403.0.

Nominal dimension

Lumber: A dimension that may vary from actual dimensions as provided in DOC PS 20 listed in Appendix A.

Masonry: A dimension that may vary from actual masonry dimensions by the thickness of a mortar joint but not to exceed one-half inch (13 mm).

Occupancy: The purpose for which a building, or part thereof, is used or intended to be used.

Occupant load: The total number of persons that are permitted to occupy a building, or portion thereof, at any one time (see Section 806.0).

Occupiable room: A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes, or in which occupants are engaged at labor; and which is equipped with means of egress, light, and ventilation facilities meeting the requirements of this code.

Occupied: As applied to a building, shall be construed as though followed by the words "or intended, arranged or designed to be occupied."

Open well: A floor opening, series of floor openings or an atrium connecting two or more stories which does not meet requirements for a covered shaft with respect to enclosure (see Section 620.0).

* **Owner:** Any person, agent, firm, or corporation having a legal or equitable interest in the property.

Panel (part of a structure): The section of a floor or wall comprised between the supporting frame of two adjacent rows of columns and girders or column bands of floor construction.

Parking structure, open: A structure for the parking of passenger cars wherein two or more sides of such structure are not less than 50 percent open on each floor or level for 50 percent of the distance from the floor to the ceiling, and wherein provision for the repairing of such vehicles is not made. Such open parking structures are not classified as public garages, but shall comply with the requirements of Section 617.0.

Particle board: Particle board is a mat-formed panel consisting of particles of wood or a combination of wood particles and wood fibers bonded together with synthetic resins or other suitable bonding systems (see Section 1124.0).

Penthouse: An enclosed structure above the roof of a building, other than a roof structure or bulkhead, occupying not more than 33 1/3 percent of the roof area.

Permit: An official document or certificate issued by the authority having jurisdiction authorizing performance of a specified activity.

Person: Includes a corporation or co-partnership as well as an individual.

Plastic

Light diffusing system: A suspended construction consisting in whole or in part of lenses, panels, grids or baffles suspended below independently mounted electrical lighting sources.

Plastic glazing: Plastic materials which are glazed or set in frame or sash and not held by mechanical fasteners which pass through the glazing material.

Plastic roof panels: Plastic materials which are fastened to structural members, or to structural panels or sheathing, and which are used as light transmitting media in roofs.

Plastic wall panels: Plastic materials which are fastened to structural members, or to structural panels or sheathing, and which are used as light transmitting media in exterior walls.

* **Reinforced plastic, glass fiber:** Plastic reinforced with glass fiber having not less than 20 percent of glass fibers by weight.

Thermosetting material: A plastic material which is capable of being changed into a substantially nonreformable product when cured.

Thermoplastic material: A plastic material which is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

Plenum: An enclosed portion of the building structure, so designed to allow the movement of air, that forms part of an air distribution system.

Positive heat supply: Heat deliberately supplied to a space by design, such as a supply register, radiator or heating element. Also, heat indirectly supplied to a space through uninsulated surfaces of service water heaters and space heating components, such as furnaces, boilers and heating and cooling distribution systems which continually maintain air temperature within the space of 50 degrees F. (10 degrees C.) or higher during normal operation.

Posted use and occupancy: The posted classification of a building in respect to use, fire grading, floor load and occupant load (see Section 122.0).

Posted sign: The tablet, card, or plate which defines the use, occupancy, fire grading and floor loads of each story, floor or parts thereof for which the building or part thereof has been approved.

Prefabricated: Construction materials or assembled units fabricated prior to erection or installation in a building or structure.

Prefabricated building: The completely assembled and erected building or structure, including the service equipment, of which the structural parts consist of prefabricated individual units or subassemblies; and in which the service equipment may be either prefabricated or installed on-site.

Prefabricated subassembly: A built-up combination of several structural elements designed and fabricated as an assembled section of wall, ceiling, floor or roof, to be incorporated into the structure by field erection of two or more such subassemblies.

Prefabricated unit: A built-up section forming an individual structural element of the building, such as a beam, girder, plank, strut, column or truss; the integrated parts of which are prefabricated prior to incorporation into the structure, including the necessary means for erection and connection at the site to complete the structural frame.

Prefabricated unit service equipment: A prefabricated assembly of mechanical units, fixtures and accessories comprising a complete service unit of mechanical equipment, including bathroom and kitchen plumbing assemblies, unit heating and air conditioning systems and loop wiring assemblies of electric circuits.

Preservative treatment (treated material): Unless otherwise noted, is impregnation under pressure with a wood preservative. Wood preservative is any suitable substance that is toxic to fungi, insects, borers, and other living wood destroying organisms.

Professional engineer or architect: An individual technically and legally qualified to practice the profession of engineering or architecture.

Proprietary (local) system: An electrical alarm system capable of automatically notifying building supervisory personnel of a water flow or an impairment of a sprinkler system (see Section 1718.0).

Protected construction: That in which all structural members are constructed, chemically treated, covered or protected so that the individual unit or the combined assemblage of all such units has the required fireresistance rating specified for its particular use or application in Table 401; and includes protected combustible and protected noncombustible construction.

Public way: Any street, alley or other parcel of land open to the outside air leading to a public street; deeded, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width of not less than 10 feet (3048 mm).

Reconstruction: The process of reproducing by new construction the exact form and detail of a vanished building, structure or object or a part thereof as it appeared at a specific period of time.

Rehabilitation: The process of returning a property to a state of utility through repair or alteration which makes possible an efficient contemporary use of while preserving those portions or features of the property which are significant to historical, architectural and cultural values.

Remote station system: An electric alarm system capable of automatically notifying the public or private fire department, or other approved constantly attended location, when the system is activated (see Section 1718.0).

Repair: The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

* **Required:** Shall be construed to be mandatory by provisions of this code.

Restoration: The process of accurately recovering the form and details of the property and its setting as it appeared at a particular period of time by means of the removal of later work or by the replacement of missing earlier work.

Riser: The vertical supply pipes in a sprinkler system or standpipe system.

Roof: The roof slab or deck with its supporting members, not including vertical supports.

Roof covering: The covering applied to the roof for weather resistance, fireresistance or appearance (see Section 1427.0).

Roof structure: An enclosed structure on or above the roof of any part of a building (see Section 1426.0).

Rubble

Coursed rubble: Masonry composed of roughly shaped stones fitting approximately on level beds and well bonded.

Random rubble: Masonry composed of roughly shaped stones laid without regularity of coursing but well bonded and fitted together to form well defined joints.

Rough or ordinary rubble: Masonry composed of unsquared field stones

laid without regularity of coursing but well bonded.
Rubble masonry: Masonry composed of roughly shaped stones.

Runway: An aisle or walkway constructed or maintained as a temporary passageway for pedestrians or vehicles.

Scaffold: Any elevated platform which is used for supporting workmen, materials or both (see Section 1814.0).

Self-closing: As applied to a fire door or other opening protective, means normally closed and equipped with an approved device which will insure closing after having been opened for use.

Shaft, covered: An interior enclosed space extending through one or more stories of a building, connecting openings in successive floors, or floors and roof; and covered at the top.

Shaft, open: An exterior, enclosed space extending through one or more stories of a building, enclosed with walls of the required weather and fireresistance rating for exterior walls, and open to the sky at the top.

Shall: The term, when used in this code, shall be construed as mandatory.

Shotcrete: Mortar or concrete pneumatically projected at high velocity onto a surface.

Sign: Any fabricated sign or outdoor display structure, including its structure, consisting of any letter, figure, character, mark, point, plane, marquee sign, design, poster, pictorial, picture, stroke, stripe, line, trademark, reading matter or illuminating device, constructed, attached, erected, fastened or manufactured in any manner whatsoever so that the same shall be used for the attraction of the public to any place, subject, person, firm, corporation, public performance, article, machine or merchandise whatsoever, and displayed in any manner out of doors for recognized advertising purposes (see Article 19).
Closed sign: A sign in which more than 50 percent of the entire area is solid or tightly enclosed or covered.
Ground sign: A sign supported by uprights or braces in or upon the ground surface.
Marquee sign: A sign attached to or hung from a marquee, canopy or other covered structure, projecting from and supported by the building and extending beyond the building wall, building line or street lot line.
Open sign: A sign in which at least 50 percent of the enclosed area is uncovered, or open to the transmission of wind.
Projecting sign: A display sign which is attached directly to the building wall, and which extends more than 15 inches (381 mm) from the face of the wall.
Portable sign: A sign, usually of a temporary nature, not securely anchored to the ground or to a building or structure and which obtains some or all of its structural stability with respect to wind or other normally applied forces by means of its geometry or character.

Roof sign: A sign which is erected, constructed and maintained above the roof of the building.

Temporary sign: A sign constructed of cloth, fabric or other light temporary material with or without a structural frame intended for a limited period of display; including decoration displays for holidays or public demonstrations.

Wall sign: A sign which is painted on or attached directly to a fence or on the surface of masonry, concrete, frame or other approved building walls, and which extends not more than 15 inches (381 mm) from the face of the fence or wall.

Slidescape: A straight or spiral chute, erected on the interior or exterior of a building, which is designed as a means of human egress direct to a street or other public way.

Smokeproof enclosure: An enclosed stairway, with access from the floor area of the building either through outside balconies or ventilated vestibules, opening on a street, yard or open court; and with a separately enclosed direct exit to the street at the grade floor (see Section 818.0).

Sprinkler, automatic: A device, connected to a water supply system, that opens automatically at a predetermined fixed temperature and disburses a spray of water (see Section 1704.0).

Sprinkler system, automatic: A sprinkler system, for fire protection purposes, is an integrated system of underground or overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above ground is a network of specially or hydraulically designed piping installed in a building, structure or area, generally overhead, and to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area (see Section 1704.0).

Sprinkler system, limited area: An automatic sprinkler system consisting of not more than 20 sprinklers for use in a room or space enclosed by construction assemblies as required by this code (see Section 1705.0).

Sprinkler system, occupancy: An automatic sprinkler system servicing a use group in a building enclosed by construction assemblies as required by this code (see Section 1704.2).

Stabilization: The process of applying measures designed to re-establish a weather resistant enclosure and the structural stability of an unsafe or deteriorated property while maintaining the essential form as it exists.

Stage: A partially enclosed portion of a building which is designed or used for the presentation of plays, demonstrations or other entertainment wherein scenery, drops or other effects may be installed or used.

Stairway: One or more flights of stairs, and the necessary landings and platforms connecting them, to form a continuous and uninterrupted pas-

sage from one floor to another. A flight of stairs, for the purposes of this code, shall have at least three risers.

Standpipe: A standpipe system is an arrangement of piping, valves, hose outlets and allied equipment installed in a building or structure. The outlets are located in such a manner that water can be discharged in streams or spray patterns through hoses and nozzles attached to such hose outlets for the purpose of extinguishing a fire and so protecting the occupants. This is accomplished by connections to water supply systems or by pumps, tanks and other equipment necessary to provide an adequate supply of water to the hose outlets.

Steel construction, cold-formed: That type of construction made up entirely, or in part, of steel structural members cold-formed to shape from sheet or strip steel such as roof deck, floor and wall panels, studs, floor joists, roof joists and other structural elements.

Steel joist: Any steel structural member of a building or structure made of hot-rolled or cold-formed solid or open web sections, or riveted or welded bar, strip or sheet steel members, or slotted and expanded, or otherwise deformed rolled sections.

Steel member, structural: Any steel structural member of a building or structure consisting of a rolled steel structural shape other than cold formed steel, light gage steel or steel joist members.

Story: That portion of a building comprised between a floor and the floor or roof next above which is not a basement or attic (also see "Mezzanine").

Story above grade: Any story having its finished floor surface entirely above grade except that a basement shall be considered as a story above grade when the distance from grade to the finished surface of the floor above the basement is more than 6 feet (1829 mm) for more than 50 percent of the total perimeter or more than 12 feet (3658 mm) at any point.

Street: A public thoroughfare (such as street, avenue or boulevard) which has been dedicated for public use.

Structure: That which is built or constructed.

Thermal resistance (*R*): A measure of the ability to retard the flow of heat. The *R* value is the reciprocal of thermal conductance expressed in units of hr · ft^2 · °F. per Btu.

Thermal transmittance (*U*): The coefficient of heat transmission (air-to-air) expressed in units of Btu per hour per square foot per degrees F. (Watts per square meter per degree K.). It is the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films. The *U* value applies to combinations of different materials used in series along the heat flow path and also to single materials that comprise a building section and includes cavity air spaces and surface air films on both sides of a building element.

Thermal transmittance (U_o): Overall (average) heat transmission of a gross area of the exterior building envelope, expressed in units of Btu per hour per square foot per degrees F. (Watts per square meter per degree K.). The U_o value applies to the combined effect of the time rate of heat flows through the various parallel paths, such as windows, doors and opaque construction areas, comprising the gross area of one or more exterior building components, such as walls, floor or roof/ceiling.

Tile: A ceramic surface unit, usually relatively thin in relation to facial area, made from clay or a mixture of clay and other ceramic materials, called the body of the tile, having either "glazed" or "unglazed" face and fired above red heat in the course of manufacture to a temperature sufficiently high to produce specific physical properties and characteristics.

Tile, structural clay: A hollow masonry unit composed of burned clay, shale, fire clay or mixtures thereof, and having parallel cells.

Use (used): The purpose for which the building or structure is designed, used or intended to be used.

Use, accessory: A use incidental to the principal use of a building as defined or limited by the provisions of the local zoning laws.

Use group: The classification of a building or structure based on the purpose for which it is used as listed in Article 3.

Use Group A assembly (see Section 302.0).
Use Group B business (see Section 303.0).
Use Group E educational (see Section 304.0).
Use Group F factory and industrial (see Section 305.0).
Use Group H high hazard (see Section 306.0).
Use Group I institutional (see Section 307.0).
Use Group M mercantile (see Section 308.0).
Use Group R residential (see Section 309.0).
Use Group S storage (see Section 310.0).
Use Group U utility and miscellaneous (see Section 311.0).

Ventilation: The natural or mechanical process of supplying air to, or removing air from, any space. Such air may or may not be conditioned.

Vertical opening: An opening through a floor or roof.

Wall

Apron wall: That portion of a skeleton wall below the sill of a window.

Bearing wall: A wall supporting any vertical load in addition to its own weight.

Cavity wall: A wall built of masonry units or of plain concrete, or a combination of these materials, arranged to provide an air space within the wall, and in which the inner and outer parts of the wall are tied together with metal ties.

Composite wall: A wall built of a combination of two or more masonry units of different materials bonded together, one forming the backup and

the other the facing elements.

Curtain wall: A nonbearing enclosure wall not supported at each story.

Faced wall: A wall in which the masonry facing and backing are so bonded as to exert common action under load.

Fire separation wall: A fireresistance rated assembly of materials having protected openings, and designed to restrict the spread of fire (see Section 1409.0).

Fire wall: A fireresistance rated wall, having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof (see Section 1407.0).

Foundation wall: A wall below the floor nearest grade serving as a support for a wall, pier, column or other structural part of a building.

Hollow wall: A wall built of masonry units so arranged as to provide an air space within the wall, and in which the facing and backing of the wall are bonded together with masonry units.

Nonbearing wall: A wall which does not support vertical loads other than its own weight.

Parapet wall: That part of any wall entirely above the roof line.

Party wall: A fire wall on an interior lot line used or adapted for joint service between two buildings (see Section 1407.0).

Retaining wall: A wall designed to resist the lateral displacement of soil or other material.

Skeleton or panel wall: A nonbearing wall supported by each story on a skeleton frame.

Spandrel wall: That portion of a skeleton wall above the head of a window or door.

Veneered wall: A wall having a facing of masonry or other weather resisting noncombustible materials securely attached to the backing, but not so bonded as to exert common action under load.

Water spray fixed system: A system using water in a form having a predetermined pattern, particle size, velocity and density discharged from specially designed nozzles or devices.

Water supply, automatic: Water supplied through a gravity or pressure tank or automatically operated fire pumps, or from a direct connection to an approved municipal water main (see Section 1712.0).

Width

Inner court: As applied to an inner court, means its least horizontal dimension.

Outer court: As applied to an outer court, means the shortest horizontal dimension measured in a direction substantially parallel with the principal open end of such court.

Winder: A step in a winding stairway.

Window

Bay window: A window projecting beyond the wall line of the building and

extending down to the foundation.

Fire window: A window constructed and glazed to give protection against the passage of fire (see Section 1416.0).

Oriel window: A window projected beyond and suspended from the wall of the building or cantilevered therefrom.

Writing: The term shall be construed to include handwriting, typewriting, printing, photo offset or any other form of reproduction in legible symbols or characters.

Written notice: A notification in writing delivered in person to the individual or parties intended; or delivered at, or sent by certified or registered mail to the last residential or business address of legal record.

Yard: An unoccupied open space other than a court.

Zoning: The reservation of certain specified areas within a community or city for building and structures, or use of land, for certain purposes with other limitations such as height, lot coverage and other stipulated requirements.

ARTICLE 3

USE GROUP CLASSIFICATION

SECTION 300.0 GENERAL

300.1 Scope: The provisions of this article shall control the classification of all buildings and structures as to use group.

300.2 Application of other laws: The provisions of this article shall not be deemed to nullify any provisions of the zoning law or any other statute of the jurisdiction pertaining to the location or use of buildings, except as may be specifically required by the provisions of this code.

SECTION 301.0 CLASSIFICATION

301.1 General: All buildings and structures shall be classified with respect to use in one of the use groups listed below.

1. Use Group A assembly (see Section 302.0).
2. Use Group B business (see Section 303.0).
3. Use Group E educational (see Section 304.0).
4. Use Group F factory and industrial (see Section 305.0).
5. Use Group H high hazard (see Section 306.0).
6. Use Group I institutional (see Section 307.0).
7. Use Group M mercantile (see Section 308.0).
8. Use Group R residential (see Section 309.0).
9. Use Group S storage (see Section 310.0).
10. Use Group U utility and miscellaneous (see Section 311.0).

301.2 Fire grading of buildings: All buildings and structures shall be graded in accordance with the degree of fire hazard of their use in terms of hours and fractions of an hour and as regulated by Section 1402.0.

301.3 New uses: The building official shall establish by approved rules the degree of hazard involved and the fire grading of any use not specifically provided for in this code.

SECTION 302.0 USE GROUP A, ASSEMBLY BUILDINGS

302.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group A which are used or designed for places of assembly as

defined in this code. Assembly type uses with a total occupant load less than 50 shall be classified as Use Group B.

302.2 Use Group A-1, theaters: Buildings of Use Group A-1 shall be further classified as described in Sections 302.2.1 and 302.2.2.

302.2.1 Use Group A-1-A structures: This use group shall include all theaters and other buildings used primarily for theatrical or operatic performances and exhibitions, arranged with a raised stage, proscenium curtain, fixed or portable scenery loft, lights, motion picture booth, mechanical appliances or other theatrical accessories and equipment, and provided with fixed seats.

302.2.2 Use Group A-1-B structures: This use group shall include all theaters without a stage and equipped with fixed seats used for motion picture performances.

302.3 Use Group A-2 structures: This use group shall include all buildings and places of public assembly, without theatrical stage accessories, designed for use as dance halls, night clubs and for similar purposes, including all rooms, lobbies and other spaces connected thereto with a common means of egress and entrance.

302.4 Use Group A-3 structures: This use group shall include all buildings with or without an auditorium in which persons assemble for amusement, entertainment or recreation, and incidental motion picture, dramatic or theatrical presentations, lectures or other similar purposes without theatrical stage other than a raised platform; and principally used without permanent seating facilities, including art galleries, exhibition halls, museums, lecture halls, libraries, restaurants other than night clubs, and recreation centers; and buildings designed for other similar assembly purposes including passenger terminals.

302.5 Use Group A-4 structures: This use group shall include all buildings used as churches and for similar religious purposes.

302.6 Use Group A-5 structures: This use group shall include grandstands, bleachers, coliseums, stadiums, tents and similar structures for outdoor assembly use; and shall comply with the provisions of this code for special uses and occupancies (see Article 6).

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SECTION 303.0 USE GROUP B, BUSINESS BUILDINGS

303.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group B which are used for the transaction of business, for the rendering of professional services, or for other services that involve stocks of goods, wares or merchandise in limited quantities for use incidental to office uses or sample purposes.

303.2 List of business uses: The uses listed in Table 303.2 are indicative of and shall be classified as Use Group B.

Table 303.2
USE GROUP B, BUSINESS USES

Animal hospitals, kennels, pounds	Fire stations
Automobile and other motor vehicle showrooms	Florists and nurseries
Banks	Laboratories; testing and research
Barber shops	Laundries; pickup and delivery stations and self-service
Beauty shops	Police stations
Car wash	Post offices
Civic administration	Print shops
Clinic, outpatient	Professional services; attorney, dentist, physician, engineer, etc.
Dry cleaning; pickup and delivery stations and self-service	Radio and television stations
Electronic data processing	Telephone exchanges

SECTION 304.0 USE GROUP E, EDUCATIONAL BUILDINGS

304.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group E which are used for gathering people together for the purpose of instruction; including, among others, schools, colleges, universities, academies and child day care centers. Educational type uses with a total occupant load less than 50 shall be classified as Use Group B.

Exception: School buildings, or parts thereof, for vocational training shall be classified in the same use group as the vocation taught.

SECTION 305.0 USE GROUP F, FACTORY AND INDUSTRIAL BUILDINGS

305.1 General: All buildings and structures, or parts thereof, in which occupants are engaged in performing work or labor in the fabricating, assembling or processing of products or materials shall be classified in Use Group F; including, among others, factories, assembling plants, industrial laboratories and all other industrial and manufacturing uses, except those of Use Group H involving highly combustible, flammable or explosive products and materials.

305.2 Use Group F-1 structures: Factory and industrial uses which are not otherwise classified as low hazard Use Group F-2, shall be classified as moderate hazard factory and industrial, Use Group F-1. The manufacturing processes listed in Table 305.2 shall be indicative of and included in Use Group F-1.

305.3 Use Group F-2 structures: Factory and industrial uses which involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard shall be classified as Use Group F-2. Except as herein provided, buildings of Use Group F-2 shall comply with the requirements of the code for buildings of Use Group F-1. The manufacturing processes listed in Table 305.3 shall be indicative of and included in Use Group F-2.

Table 305.2
USE GROUP F-1 MODERATE HAZARD FACTORY AND INDUSTRIAL USES

Aircraft	Food processing
Appliances	Furniture
Athletic equipment	Hemp and jute products
Automobiles and other motor vehicles	Laundries
Bakeries	Leather and tanneries, excluding enameling or japanning
Beverages, alcoholic	Machinery
Bicycles	Millwork and woodworking, wood distillation
Boat building	Motion picture and television filming
Boiler works	Musical instruments
Brooms or brushes	Optical goods
Business machines	Paper mills or products
Cameras and photo equipment	Plastic products
Canneries, including food products	Printing or publishing
Clothing	Recreational vehicles
Condensed and powdered milk manufacture	Refuse incinerators
Construction and agricultural machinery	Shoes
Disinfectants	Soaps and detergents
Dry cleaning using other than flammable liquids in cleaning or dyeing operations or other than classified in Table 306.2	Sugar refineries
Electric light plants and power houses	Textile mills, including canvas, cotton cloth, bagging, burlap, carpets and rags
Electrolytic reducing works	Tobacco
Electronics	Trailers
Engines, including rebuilding	Upholstery and manufacturing shops
Film, photographic	

Table 305.3
USE GROUP F-2, LOW HAZARD FACTORY AND INDUSTRIAL USES

Beverages, nonalcoholic	Gypsum
Brick and masonry	Ice
Ceramic products	Metal fabrication and assembly
Foundries	Water pumping plants
Glass products	

305.3.1 Special industrial uses: All buildings and structures designed to house low hazard industrial processes, including, among others, the production and distribution of electric, gas or steam power and rolling mills and foundries, requiring large areas and unusual heights to accommodate craneways or special machinery and equipment, shall be exempt from the height and area limitations of Table 501.

*

SECTION 306.0 USE GROUP H, HIGH HAZARD BUILDINGS

306.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group H which are used for the manufacturing, processing, generation or storage of corrosive, highly toxic, highly combustible, flammable or explosive materials that constitute a high fire or explosion hazard, including loose combustible fibers, dust and unstable materials.

306.2 List of high hazard uses: The processes, materials and manufactures listed in Table 306.2 are indicative of and shall be classified as Use Group H.

Table 306.2
USE GROUP H, HIGH HAZARD USES

Combustible dust and any similar solid material sufficiently comminuted for suspension in still air which, when so suspended, is capable of self-sustained combustion.

Combustible fibers and any similar readily ignitable and free burning fibers such as cotton, sisal, henequen, jute, hemp, tow, cocoa fiber, oakum, baled waste, baled wastepaper, kapok, hay, straw, excelsior, Spanish moss and other like material.

Combustible liquids having a flash point at or above 100 degrees F. (38 degrees C.). Combustible liquids shall be subdivided as follows:

Class II liquids shall include those having flash points at or above 100 degrees F. (38 degrees C.), and below 140 degrees F. (60 degrees C.).

Class III-A liquids shall include those having flash points at or above 140 degrees F. (60 degrees C.) and below 200 degrees F. (93 degrees C.).

Corrosive liquids which, when in contact with living tissue, will cause severe damage to such tissue by chemical action or are liable to cause fire when in contact with organic matter or with certain chemicals such as acids and alkaline caustic liquids.

Explosive material and any chemical compound, mixture or device, the primary and common purpose of which is to function by explosion with substantially simultaneous release of gas and heat, the resultant pressure being capable of destructive effects.

Flammable liquids having a flash point below 100 degrees F. (38 degrees C.), and having a vapor pressure not exceeding 40 psia (276 kPa) at 100 degrees F. (38 degrees C.). Class I liquids shall include those having flash points below 100 degrees F. (38 degrees C.), and may be subdivided as follows:

Class I-A shall include those having flash points below 73 degrees F. (23 degrees C.) and having a boiling point below 100 degrees F. (38 degrees C.).

Class I-B shall include those having flash points below 73 degrees F. (23 degrees C.) and having a boiling point at or above 100 degrees F. (38 degrees C.).

Class I-C shall include those having flash points at or above 73 degrees F. (23 degrees C.) and below 100 degrees F. (38 degrees C.).

The flash point of liquids having a flash point at or below 175 degrees F. (79 degrees C.), except for fuel oils and certain viscous materials, shall be determined in accordance with ASTM D56 listed in Appendix A.

The flash point of liquids having a flash point above 175 degrees F. (79 degrees C.), except for fuel oils, shall be determined in accordance with ASTM D92 listed in Appendix A.

The flash point of fuel oil and certain viscous materials having a flash point at or below 175 degrees F. (79 degrees C.) shall be determined in accordance with ASTM D93 listed in Appendix A.

Flammable gas having a flammability range with air greater than 1 percent by volume which is a liquid while under pressure and having a vapor pressure in excess of 27 psia (186 kPa) at a temperature of 100 degrees F. (38 degrees C.).

Table 306.2 (cont'd.)
USE GROUP H, HIGH HAZARD USES

Flammable solids and any similar solid substance other than one classified as explosive, which is liable to cause fires through friction, through absorption of moisture, through spontaneous chemical change or as a result of retained heat from manufacturing or processing.
Liquefied petroleum gas which is composed predominately of the following hydrocarbons or mixtures of them, such as: propane, propylene, butane (normal butane or isobutane) and butylenes.
Nitromethane which is a combustible liquid which at 599 degrees F. (315 degrees C.) and 915 psig (6309 kPa) decomposes explosively and is an unstable material.
Oxidizing materials and any similar substances that readily yield oxygen to stimulate combustion, such as sodium nitrate, potassium chlorate and pyroxylin plastic.
Organic peroxide.
Unstable materials which polymerize, decompose, condense or become self-reactive when exposed to air, water, heat, shock or pressure.

306.2.1 Exceptions: The following shall not be classified as Use Group H:

1. Any building or portion of a building containing less than the exempt amount of those materials shown in Table 306.2.1 when maintained in accordance with the fire prevention code listed in Appendix A.
2. Buildings containing rooms conforming to the requirements of Article 6 and the fire prevention code listed in Appendix A for such hazardous material.
3. Rooms containing flammable liquids in tightly-closed containers of one gallon (0.0038 m^3) capacity or less for retail sale or private use on the premises and in quantities not exceeding 2 gallons per square foot (0.082 m^3/m^2) of room area.
4. Rooms used for preparation or storage of food products for retail sale on the premises.
5. Retail paint salesrooms with quantities of paint not exceeding 2 gallons per square foot (0.082 m^3/m^2) of room area.
6. Liquor stores and distributors without bulk storage.
7. The storage or use of materials for agricultural purposes for use on the premises.
8. Closed systems housing flammable or combustible liquids or gases used for the operation of machinery or equipment.
9. Cleaning establishments which utilize combustible liquid solvents having a flash point of 140 degrees F. (60 degrees C.) or higher in closed systems employing equipment listed by an approved testing laboratory, provided this use is separated from all other areas of the building by 1 hour fireresistance rated construction.
10. Cleaning establishments which utilize a liquid solvent having a flash point at or above 200 degrees F. (93 degrees C.).
11. Refrigeration systems.
12. Tire retail stores without bulk storage.

Table 306.2.1
EXEMPT AMOUNTS OF HAZARDOUS MATERIALS, LIQUIDS AND CHEMICALS

	Material	Maximum quantities[e]
1.	Flammable liquids	
	Class I-A	30 gal.[b]
	Class I-B	60 gal.[b]
	Class I-C	90 gal.[b]
2.	Combustible liquids[c]	
	Class II	120 gal.[b]
	Class III-A	250 gal.[b]
3.	Combination flammable liquids[a]	120 gal.[b]
4.	Flammable gases	3,000 cu. ft. at one atmosphere of pressure at 70° F.
5.	Liquefied flammable gases	60 gal.
6.	Combustible fibers — loose	100 cu. ft.
7.	Combustible fibers — baled	1,000 cu. ft.
8.	Flammable solids	500 lbs.
9.	Unstable materials	No exemptions
10.	Corrosive liquids	55 gal.
11.	Oxidizing material — gases	6,000 cu. ft.
12.	Oxidizing material — liquids	50 gal.
13.	Oxidizing material — solids	500 lbs.
14.	Organic peroxides	10 lbs.
15.	Nitromethane (unstable materials)	No exemptions
16.	Ammonium nitrate	1,000 lbs.
17.	Ammonium nitrate compound mixtures containing more than 60% nitrate by weight	1,000 lbs.
18.	Highly toxic material and poisonous gas	No exemptions
19.	Smokeless powder	20 lbs.[d]
20.	Black sporting powder	5 lb.[d]

Note a. Containing not more than the exempt amounts of Class 1-A, 1-B or 1-C flammable liquids.

Note b. Quantities may be increased by 100 percent in areas which are not accessible to the public. In buildings where automatic fire suppression systems are installed, the quantities may be increased 100 percent in the areas accessible to the public.

Note c. Tank storage up to 660 gallons for fuel burning equipment meeting the requirements of the mechanical code or the fire prevention code listed in Appendix A shall be permitted.

Note d. Quantities in the amount specified by NFiPA 495 may be permitted when stored in accordance with NFiPA 495 listed in Appendix A.

Note e. 1 gallon = 0.00379 m^3; 1 cubic foot = 0.028 m^3; 1 pound = 0.454 kg.

SECTION 307.0 USE GROUP I, INSTITUTIONAL BUILDINGS

307.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group I in which people suffering from physical limitations because of health or age are harbored for medical or other care or treatment, or in which people are detained for penal or correction purposes, or in which the liberty of the inmates is restricted.

307.2 Use Group I-1 structures: This use group shall include buildings housing six or more individuals who, because of age, mental instability or other reasons, must live in a supervised environment but who are physically capable of responding to an emergency situation without personal assistance. Included in this group are uses such as facilities for children, aged persons, mentally impaired and convalescents including: convalescent facilities, group

homes, homes for the aged, mentally retarded care facilities, nursing homes (ambulatory), orphanages and residential care facilities. Occupancies such as the above with five or less occupants shall be classified as a residential use group.

307.3 Use Group I-2 structures: This use group shall include all buildings used for housing people suffering from physical limitations because of health or age, including, among others, day nurseries, hospitals, sanitariums, infirmaries, orphanages and homes for aged and infirm.

307.4 Use Group I-3 structures: This use group shall include all buildings designed for the detention of people under restraint, including, among others, jails, prisons, reformatories, insane asylums and similar uses.

*

SECTION 308.0 USE GROUP M, MERCANTILE BUILDINGS

308.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group M which are used for display and sales purposes involving stocks of goods, wares or merchandise incidental to such purposes and accessible to the public; including, among others, retail stores, motor fuel service stations, shops and salesrooms and markets. Highly combustible goods shall be limited to small quantities that do not constitute a high hazard; and if not so limited, the construction shall comply with the requirements for Use Group H as set forth in the provisions of Section 306.0 and Tables 401 and 501.

*

SECTION 309.0 USE GROUP R, RESIDENTIAL BUILDINGS

309.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group R in which families or households live, or in which sleeping accommodations are provided for individuals with or without dining facilities, excluding those that are classified as institutional buildings.

309.2 Use Group R-1 structures: This use group shall include all hotels, motels, boarding houses and similar buildings arranged for shelter and sleeping accommodations and in which the occupants are primarily transient in nature, making use of the facilities for a period of less than 30 days.

309.3 Use Group R-2 structures: This use group shall include all multiple family dwellings having more than two dwelling units and shall also include all dormitories, boarding houses and similar buildings arranged for shelter and sleeping accommodations in which the occupants are primarily not transient in nature.

Exception: See Section 1409.1.2 for multiple single-family dwelling units.

309.4 Use Group R-3 structures: This use group shall include all buildings arranged for the use of one- or two-family dwelling units, including not more than five lodgers or boarders per family.

Exception: See Section 1409.1.2 for multiple single-family dwelling units.

309.5 Use Group R-4 structures: This use group shall include all detached one- or two-family dwellings not more than three stories in height, and their accessory structures as indicated in the *One and Two Family Dwelling Code* listed in Appendix A. All such structures shall be designed and built in accordance with the requirements of this code for a Use Group R-3 structure, or with the requirements of the *One and Two Family Dwelling Code*, except that the requirements of the State Plumbing Code (Article 22) shall supersede those conflicting requirements of the *One and Two Family Dwelling Code.* This choice shall be made by the builder at the time of plans submission. Nevertheless, any builder may use Exception #3 of Section 809.4 to determine minimum size of egress windows. *

SECTION 310.0 USE GROUP S, STORAGE BUILDINGS

310.1 General: All buildings and structures, or parts thereof, shall be classified in Use Group S which are used primarily for the storage of goods, wares or merchandise, except those of Use Group H that involve highly combustible or explosive products or materials; including, among others, warehouses, storehouses and freight depots.

310.2 List of moderate hazard uses: Buildings used for the storage of moderate hazard contents which are likely to burn with moderate rapidity, but which do not produce either poisonous gases, fumes or explosives, including, among others, the materials listed in Table 310.2, shall be classified in Use Group S-1.

Table 310.2
USE GROUP S-1 STORAGE USES, MODERATE HAZARD

Bags, cloth, burlap and paper	Linoleum
Bamboo and rattan	Livestock shelters
Baskets	Lumber yards
Belting, canvas and leather	Motor vehicle repair shops
Books and paper in rolls or packs	Petroleum warehouses for storage of lubricating oils with a flash point of 200 degrees F. (93.33 degrees C.) or higher
Boots and shoes	Photo engraving
Buttons, including cloth covered, pearl or bone	Public garages (Group 1) and stables
Cardboard and cardboard boxes	Silk
Clothing, woolen wearing apparel	Soap
Cordage	Sugar
Furniture	Tobacco, cigars, cigarettes and snuff
Furs	Upholstering and mattress manufacturing
Glue, mucilage, paste and size	Wax candles
Horn and combs, other than celluloid	
Leather, enameling or japanning	

310.3 List of low hazard uses: Low hazard uses shall include buildings used for the storage of noncombustible materials, and of low hazard wares that do not ordinarily burn rapidly such as products on wood pallets or in paper cartons without significant amounts of combustible wrappings. Such products may have a negligible amount of plastic trim such as knobs, handles or

film wrapping. Such uses shall be classified as Use Group S-2 including, among others, the materials listed in Table 310.3.

Table 310.3
USE GROUP S-2 STORAGE USES, LOW HAZARD

Asbestos	Electrical coils
Chalk and crayons	Electrical motors
Food products	Dry cell batteries
Glass	Metal parts
Mirrors	New empty cans
Foods in noncombustible containers	Stoves
Frozen foods	Washers and dryers
Meats	Metal cabinets
Fresh fruits and vegetables in nonplastic trays or containers	Glass bottles, empty or filled with noncombustible liquids
Dairy products in nonwaxed coated paper containers	Gypsum board
	Inert pigments
Beer or wine up to 12% alcohol in metal, glass or ceramic containers	Ivory
	Metals
Oil filled and other types of distribution transformers	Porcelain and pottery
	Public garages (Group 2)
Cement in bags	Talc and soapstones
Metal desks with plastic tops and trim	

* **310.4 Tobacco auction warehouses:** Warehouses, for the sale of tobacco only, of Type 1, Type 2, or Type 3 construction, may be constructed without a sprinkler system when all of the following requirements have been met:

1. The initial submission of plans to the Department of Housing, Buildings and Construction shall include a signed certificate by the owner that the warehouse will be used solely for the sale of tobacco on a seasonal basis or for the storage of noncombustibles.
2. A manual fire alarm and automatic fire and smoke detection system with notification to the local fire service shall be provided with installation in accordance with Section 1717.0 of this code.
3. An 18 foot paved and posted fire lane surrounding the entire perimeter of the building shall be provided and be accessible from a public street.
4. A 50 foot fire separation shall be maintained between the warehouse and the lot line and the warehouse and the nearest building.

SECTION 311.0 USE GROUP U, UTILITY AND MISCELLANEOUS USES

* **311.1 General:** Buildings and structures of an accessory character and miscellaneous structures not classified in any specific use group shall be constructed, equipped and maintained to meet the requirements of this code commensurate with the fire and life hazard incidental to their use. Utility and miscellaneous uses shall include fences over 6 feet (1829 mm) high, tanks, cooling towers, retaining walls and buildings such as private garages, carports, sheds and agricultural buildings.

SECTION 312.0 DOUBTFUL USE CLASSIFICATION

312.1 General: When a building or structure is proposed for a use not specifically provided for in this code or the classification of which is doubtful, such building or structure shall be included in the use group which it most nearly resembles in respect to the existing or proposed life and fire hazard, and it shall be so classified by the building official.

SECTION 313.0 MIXED USE AND OCCUPANCY

313.1 Two or more uses: When a building is occupied for two or more uses, not included in the same use group, one of the following shall apply:

1. The provisions of the code applying to each use shall apply to such parts of the building as come within that use group; and if there are conflicting provisions, the requirements securing the greater public safety shall apply to the entire building.
2. The mixed uses shall be completely separated, both horizontally and vertically, by fire separation walls and floor/ceiling assemblies having a fireresistance rating corresponding to the highest fire grading prescribed in Table 1402 for the separate uses. Each part of the building shall be separately classified to use. The most restrictive height and area limitations in this code for the mixed uses shall apply to the entire building, or except as otherwise provided for in this code.
3. The mixed uses shall be completely separated by fire walls having a fireresistance rating corresponding to the highest fire grading prescribed in Table 1402 for the separate uses. Each use group shall then comply with the provisions of this code applicable to that group.

313.1.1 High hazard uses: A place of public assembly or education shall not be permitted in a building classified in Use Group H.

313.2 Incidental uses: Where the use is supplemental to the main use of the building and the area devoted to such use does not occupy more than 10 percent of the area of any floor nor more than the basic area permitted by Table 501, the building shall be classified according to the main use. Where the incidental use is a higher hazard than the main use, it shall be constructed and segregated by fireresistance rated construction as required in Section 313.1.

ARTICLE 4

TYPES OF CONSTRUCTION CLASSIFICATION

SECTION 400.0 GENERAL

400.1 Scope: The provisions of this article shall control the classification of all buildings as to type of construction.

400.2 Application of other laws: The provisions of this article shall not be deemed to nullify any provisions of the zoning law or any other statute of the jurisdiction pertaining to the location, or type of construction of buildings, except as may be specifically required by the provisions of this code.

SECTION 401.0 CONSTRUCTION CLASSIFICATION

401.1 General: All buildings and structures erected or to be erected, altered or extended in height or area shall be classified in any one or in a combination of the five construction types defined in Table 401 and Sections 402.0 through 406.0.

401.2 False designation: A building shall not be designated a given type of construction unless it conforms to the minimum requirements for that type. It shall be unlawful to post, or use, or designate, or advertise a building as of a given type of construction unless it complies with the minimum code requirements for that type.

401.3 Minimum requirements: When a type of construction is used that is superior to the minimum herein required for any specified use, height and area of the building, nothing in this code shall be construed to require full compliance with the specifications for the higher type; but the designated construction classification of the building shall be that of the lesser type, unless all the requirements for the higher type are fulfilled.

401.4 Noncombustibility requirements: Where a structure or a part of a structure is required to be constructed of noncombustible construction, the use of combustible elements shall be permitted subject to the limitations of this section without altering the construction classification.

Table 401
FIRERESISTANCE RATINGS OF STRUCTURE ELEMENTS (IN HOURS)

Structure element Note a		Type of construction Section 401.0									
		Noncombustible					Noncombustible/Combustible			Combustible	
		Type 1 Section 402.0		Type 2 Section 403.0			Type 3 Section 404.0		Type 4 Section 405.0	Type 5 Section 406.0	
		Protected		Protected		Unprotected	Protected	Unprotected	Heavy timber	Protected	Unprotected
		1A	1B	2A	2B	2C	3A	3B	4	5A	5B
Exterior walls	(Section 1406.0 and Note b)										
1 Fire separation of 30' or more	Bearing	4	3	2	1	0	2	2	2	1	0
	Nonbearing	0	0	0	0	0	0	0	0	0	0
Fire separation of less than 6'	Bearing	4	3	2	1½	1	2	2	2	1	1
	Nonbearing	2	2	1½	1	1	2	2	2	1	1
Fire separation of 6' or more but less than 11'	Bearing	4	3	2	1	0	2	2	2	1	1 Note i
	Nonbearing	2	2	1½	1	0	2	2	2	1	1 Note i
Fire separation of 11' or more but less than 30'	Bearing	4	3	2	1	0	2	2	2	1	1 Note i
	Nonbearing	1½	1½	1	1	0	1½	1½	2 See Sec. 405.1	1	1 Note i
2 Fire walls and party walls (Section 1407.0)		4	3	2	2	2	2	2	2	2	2
		← Not less than fire grading of use group—(see Table 1402) →									
3 Fire separation assemblies (Sections 313.0, 1409.0 and 1412.0)		← Fireresistance rating corresponding to fire grading of use group—(see Table 1402) →									
4 Fire enclosures of exits, exit hallways and stairways (Section 816.9.2, 1409.0 and Note c).		2	2	2	2	2	2	2	2	2	2
5 Shafts (other than exits) and elevator hoistways (Section 1410.0 and Note c)		2	2	2	2	2	2	2	2	1	1
		← Noncombustible →									
6 Exit access corridors (Note g)		1	1	1	1	1	1	1	1	1	1
		← Note e →									
Separation of tenant spaces		1	1	1	1	0	1	0	1	1	0
		← Note e →									
7 Dwelling unit separations		1	1	1	1	1	1	1	1	1	1
		← Note e →									
Other nonbearing partitions		0	0	0	0	0	0	0	0	0	0
		← Note e →									

Table 401 (cont'd.)
FIRERESISTANCE RATINGS OF STRUCTURE ELEMENTS (IN HOURS)

8 Interior bearing walls, bearing partitions, columns, girders, trusses (other than roof trusses) and framing (Section 1411.0)	Supporting more than one floor	4	3	2	1	0	1	0	see Sec. 405.0	1	0
	Supporting one floor only	3	2	1½	1	0	1	0	see Sec. 405.0	1	0
	Supporting a roof only	3	2	1½	1	0	1	0	see Sec. 405.0	1	0
9 Structural members supporting wall (Section 1411.0 and Note h)		3	2	1½	1	0	1	0	1	1	0
		← Not less than fireresistance rating of wall supported →									
10 Floor construction including beams (Section 1412.0)		3	2	1½	1	0	1	0	see Sec. 405.0 Note d	1	0
11 Roof construction, including beams, trusses and framing, arches and roof deck (Section 1412.0 and Note f)	15' or less in height to lowest member	2	1½	1	1	0	1	0	see Sec. 405.0 Note d	1	0
				← Note e →							
	More than 15 but less than 20' in height to lowest lowest member	1	1	1	0	0	0	0	see Sec. 405.0 Note d	1	0
		← Note e →									
	20' or more in height to lowest member	0	0	0	0	0	0	0	see Sec. 405.0 Note d	0	0
		← Note e →									

Note a. For special high hazard uses involving a higher degree of fire severity and higher concentration of combustible contents, the fireresistance rating requirements for structural elements shall be increased accordingly (see Section 600.2).

Note b. The fire separation or fire exposure in feet as herein limited applies to the distance measured from the building face to the closest interior lot line, the center line of a street or public space or an imaginary line between two buildings on the same property (see definition of fire separation, exterior fire exposure in Section 201.0).

Note c. Exit and shaft enclosures connecting three floor levels or less shall have a fireresistance rating of not less than 1 hour (see Sections 1409.1.3 and 1410.3).

Note d. In Type 4 construction, members which are of material other than heavy timber shall have a fireresistance rating of not less than 1 hour (see Section 1224.2).

Note e. Fire-retardant treated wood, complying with Section 1403.5.1 may be used as provided in Section 1403.5.2 (see Section 1405.7).

Note f. Where the omission of fire protection from roof trusses, roof framing and decking is permitted, roofs in buildings of Type 1 and Type 2 construction shall be constructed of noncombustible materials without a specified fireresistance rating, or of Type 4 construction in buildings not over five stories or 65 feet in height (see Section 1413.4).

Note g. In all occupancies except Use Groups R-1 and R-2, exit access corridors serving 30 or fewer occupants may have a zero fireresistance rating. Exit access corridors contained within a dwelling unit shall not be required to have a fireresistance rating (see Section 810.4).

Note h. Structural members supporting fireresistance rated exit access corridor walls in buildings of Types 2C, 3B or 5B construction shall not be required to be fireresistance rated unless required by other provisions of this code (see Section 1409.4).

Note i. The exterior walls of buildings or structures of Type 5B construction with a fire separation of less than 15 feet shall have a fireresistance rating of not less than 1 hour except buildings of Use Group R-2, R-3 or U (see Section 1406.2).

Note j. 1 foot = 304.8 mm.

401.4.1 Roofs, floors and walls: Combustible elements in roofs, floors and walls may be used for the following components:

1. Interior finish and trim materials as regulated by Sections 1421.0, 1422.0 and 1423.0.
2. Light transmitting plastics as permitted by Article 23.
3. Fire-retardant treated wood as permitted by Section 1403.0.
4. Mastics and caulking materials applied to provide flexible seals between components of exterior wall construction.
5. Roof covering materials as regulated by Section 1427.0.
6. Thermal and sound insulation as permitted by Sections 1120.4, 1316.0, 1317.0, 1407.4 and 1427.4.
7. Exterior veneer and trim as permitted by Sections 1308.0 and 1425.2.
8. Nailing or furring strips as permitted by Sections 1400.3.1 and 1422.0.
9. Windows and doors as permitted by Section 1414.5.
10. Heavy timber as permitted by Sections 1405.6 and 1413.2.
11. Partitions as permitted by Section 1405.7.
12. Roof structures as permitted by Section 1426.0.

401.4.2 Ducts: Nonmetallic ducts as permitted by the mechanical code listed in Appendix A.

401.4.3 Piping: Combustible piping materials as permitted by the mechanical and plumbing codes listed in Appendix A.

401.4.4 Electrical: Insulated electrical wiring and related components as regulated by NFiPA 70 listed in Appendix A.

SECTION 402.0 TYPE 1 CONSTRUCTION

402.1 General: Buildings and structures of Type 1 construction are those in which the walls, partitions, structural elements, floors, ceilings, roofs, and the exits are constructed and protected with approved noncombustible materials to afford the fireresistance rating specified in Table 401, except as otherwise specificially regulated by the provisions of Article 14. Type 1 buildings shall be further classified as Types 1A and 1B. Fire-retardant treated wood may be used as specified in Table 401 and Section 1403.5.

SECTION 403.0 TYPE 2 CONSTRUCTION

403.1 General: Buildings and structures of Type 2 construction are those in which the walls, partitions, structural elements, floors, ceilings, roofs, and the exits are constructed of approved noncombustible materials meeting the fireresistance rating requirements specified in Table 401, except as further regulated in Article 14. Type 2 buildings shall be further classified as Types 2A, 2B, and 2C. Fire-retardant treated wood may be used as specified in Table 401 and Section 1403.5.

SECTION 404.0 TYPE 3 CONSTRUCTION

404.1 General: Buildings and structures of Type 3 construction are those in which the exterior, fire and party walls are constructed of masonry or other approved noncombustible materials of the required fireresistance rating and structural properties; and the floors, roofs and interior framing are wholly or partly of wood or of metal or other approved construction; the fire and party walls are ground supported, except that girders and their supports carrying walls of masonry shall be protected to afford the same degree of fireresistance rating of the walls supported thereon; and all structural elements shall have the required fireresistance rating specified in Table 401.

404.2 Type 3A: Structures of Type 3A construction shall include all Type 3 buildings in which the interior structural elements are wholly or partly of fire protected wood of not less than 2 inch nominal thickness, or of other approved protected combustible materials, or of metal protected and insulated to afford the fireresistance rating specified in Table 401.

404.3 Type 3B: Structures of Type 3B construction shall include all Type 3 buildings in which the interior structural members are of wood of not less than 2 inch nominal thickness or consist of other combustible or noncombustible materials with protection of less than 1 hour fireresistance rating.

SECTION 405.0 TYPE 4 CONSTRUCTION

405.1 General: Buildings and structures of Type 4 construction are those in which the exterior walls are of noncombustible materials having a fireresistance rating not less than that specified in Table 401 and the interior structural members are of solid or laminated wood without concealed spaces. The elements of Type 4 construction shall comply with the provisions of this section (see Section 1224.0 for construction details).

Exception: Where a fire separation of 20 feet (6096 mm) to 30 feet (9144 mm) is provided, nonbearing exterior walls shall have a fireresistance rating of not less than 1 hour.

405.2 Columns: Wood columns may be sawn or glued laminated and shall be not less than 8 inches, nominal, in any dimension when supporting floor loads and not less than 6 inches, nominal, in width and not less than 8 inches, nominal, in depth when supporting roof and ceiling loads only. Columns shall be continuous or superimposed and connected in an approved manner.

405.3 Floor framing: Beams and girders of wood may be sawn or glued laminated timber and shall be not less than 6 inches, nominal, in width and not less than 10 inches, nominal, in depth. Framed sawn or glued laminated timber arches which spring from the floor line and support floor loads shall be not less than 8 inches, nominal, in any dimension. Framed timber trusses supporting floor loads shall have members of not less than 8 inches, nominal, in any dimension.

405.4 Roof framing: Framed or glued laminated arches for roof construction which spring from the floor line or from grade and do not support floor loads shall have members not less than 6 inches, nominal, in width and not less than 8 inches, nominal, in depth for the lower half of the height and not less than 6 inches, nominal, in depth for the upper half. Framed or glued laminated arches for roof construction which spring from the top of walls or wall abutments, framed timber trusses, and other roof framing which does not support floor loads shall have members not less than 4 inches, nominal, in width and not less than 6 inches, nominal, in depth. Spaced members may be composed of two or more pieces not less than 3 inches, nominal, in thickness when blocked solidly throughout their intervening spaces or when such spaces are tightly closed by a continuous wood cover plate of not less than 2 inches, nominal, in thickness, secured to the underside of the members. Splice plates shall be not less than 3 inches, nominal, in thickness. When protected by approved automatic sprinklers under the roof deck, framing members shall be not less than 3 inches, nominal, in width.

405.5 Flooring: Floors shall be without concealed spaces and shall be of sawn or glued laminated plank, splined, or tongue and groove, of not less than 3 inches, nominal, in thickness covered with 1 inch, nominal, dimension tongue and groove flooring, laid crosswise or diagonally, or ½ inch plywood or ½ inch particle board; or of planks not less than 4 inches, nominal, in width, set on edge close together and well spiked, and covered with 1 inch nominal, dimension flooring, or ½ inch plywood, or ½ inch particle board. The lumber shall be laid so that no continuous line of joints will occur except at points of support. Floors shall not extend closer than ½ inch (13 mm) to walls. Such ½ inch (13 mm) spaces shall be covered by a molding fastened to the wall either above or below the floor and so arranged that it will not obstruct the swelling or shrinkage movements of the floor. Corbeling of masonry walls under floor may be used in place of molding.

405.6 Roofs: Roofs shall be without concealed spaces and roof decks shall be sawn or glued laminated, splined or tongue and groove plank, not less than 2 inches, nominal, in thickness, 1⅛ inch thick interior plywood (exterior glue), or of planks not less than 3 inches, nominal, in width, set on edge close together and laid as required for floors. Other types of decking may be used if providing equivalent fireresistance rating and structural properties.

405.7 Walls: Walls shall be of solid wood construction formed by not less than two layers of 1 inch matched boards or laminated construction of a 4 inch thickness, or of 1 hour fireresistance rated construction.

405.8 Exterior structural members: Where a fire separation of 20 feet (6096 mm) or more is provided, wood columns and arches conforming to heavy timber sizes may be used externally.

SECTION 406.0 TYPE 5 CONSTRUCTION

406.1 General: Buildings and structures of Type 5 construction are those in which the exterior walls, bearing walls, partitions, floor and roof construction

are constructed of any materials permitted by this code and in which the structural elements have the required fireresistance ratings specified in Table 401. Type 5 buildings shall be further classified as Types 5A and 5B.

ARTICLE 5

GENERAL BUILDING LIMITATIONS

SECTION 500.0 GENERAL

500.1 Scope: The provisions of this article control the height and area of all buildings hereafter erected, and extensions to existing buildings hereafter altered or enlarged as a function of the type of construction, use group, exterior exposure and accessibility of buildings and structures for fire fighting purposes.

*

SECTION 501.0 GENERAL AREA AND HEIGHT LIMITATIONS

501.1 General: The areas and heights of all buildings and structures between exterior walls, or between exterior walls and fire walls, shall be governed by the type of construction and the use group classification as defined in Articles 3 and 4 and shall not exceed the limits fixed in Table 501, except as these may be specifically modified by other provisions of this code.

501.2 Area limit: The area limitations specified in Table 501 shall apply to the maximum horizontally projected area of all buildings fronting on a street, or public space not less than 30 feet (9144 mm) in width accessible to a public street.

501.3 Height limit: The height in feet and number of stories above grade specified in Table 501 shall apply to all buildings and to all separate parts of a building enclosed within lawful fire walls complying with the provisions of Article 14. A basement shall be considered as a story above grade when the distance from grade to the finished surface of the floor above the basement is more than 6 feet (1829 mm) for more than 50 percent of the total perimeter or more than 12 feet (3658 mm) at any point.

501.4 Multi-story buildings: Buildings two stories in height may be built to the same area limits provided in Table 501 for one story buildings. In buildings over two stories in height, the area limits of Table 501 for one story buildings shall be reduced as specified in Table 501.4.

Table 501
HEIGHT AND AREA LIMITATIONS OF BUILDINGS

Height limitations of buildings (shown in upper figure as stories and feet above grade), and area limitations of one or two story buildings facing on one street or public space not less than 30 feet wide (shown in lower figure as area in square feet per floor). See Note a.

N.P. — Not permitted
N.L. — Not limited

Use Group		Type of construction									
		Noncombustible					Noncombustible/Combustible			Combustible	
		Type 1		Type 2			Type 3		Type 4	Type 5	
		Protected Note b		Protected		Unprotected	Protected	Unprotected	Heavy timber	Protected	Unprotected
	Note a	1A	1B	2A	2B	2C	3A	3B	4	5A	5B
A-1-A Assembly, theaters	With stage and scenery	N.L.	6 St. 75′ 14,400	4 St. 50′ 11,400	2 St. 30′ 7,500	1 St. 20′ 4,800	2 St. 30′ 6,600	1 St. 20′ 4,800	2 St. 30′ 7,200	1 St. 20′ 5,100	N.P.
A-1-B Assembly, theaters	Without stage (motion picture theaters)	N.L.	N.L.	5 St. 65′ 19,950	3 St. 40′ 13,125	2 St. 30′ 8,400	3 St. 40′ 11,550	2 St. 30′ 8,400	3 St. 40′ 12,600	1 St. 20′ 8,925	1 St. 20′ 4,200
A-2 Assembly, night clubs and similar uses		N.L.	4 St. 50′ 7,200	3 St. 40′ 5,700	2 St. 30′ 3,750	1 St. 20′ 2,400	2 St. 30′ 3,300	1 St. 20′ 2,400	2 St. 30′ 3,600	1 St. 20′ 2,550	1 St. 20′ 1,200
A-3 Assembly	Lecture halls, recreation centers, terminals, restaurants other than night clubs	N.L.	N.L.	5 St. 65′ 19,950	3 St. 40′ 13,125	2 St. 30′ 8,400	3 St. 40′ 11,550	2 St. 30′ 8,400	3 St. 40′ 12,600	1 St. 20′ 8,925	1 St. 20′ 4,200
A-4 Assembly, churches	Note d	N.L.	N.L.	5 St. 65′ 34,200	3 St. 40′ 22,500	2 St. 30′ 14,400	3 St. 40′ 19,800	2 St. 30′ 14,400	3 St. 40′ 21,600	1 St. 20′ 15,300	1 St. 20′ 7,200
B Business		N.L.	N.L.	7 St. 85′ 34,200	5 St. 65′ 22,500	3 St. 40′ 14,400	4 St. 50′ 19,800	3 St. 40′ 14,400	5 St. 65′ 21,600	3 St. 40′ 15,300	2 St. 30′ 7,200
E Educational	Note c,d	N.L.	N.L.	5 St. 65′ 34,200	3 St. 40′ 22,500	2 St. 30′ 14,400	3 St. 40′ 19,800	2 St. 30′ 14,400	3 St. 40′ 21,600	1 St. 20′ 15,300	1 St. 20′ 7,200
F Factory and industrial		N.L.	N.L.	6 St. 75′ 22,800	4 St. 50′ 15,000	2 St. 30′ 9,600	3 St. 40′ 13,200	2 St. 30′ 9,600	4 St. 50′ 14,400	2 St. 30′ 10,200	1 St. 20′ 4,800
H High hazard	Note e	5 St. 65′ 16,800	3 St. 40′ 14,400	3 St. 40′ 11,400	2 St. 30′ 7,500	1 St. 20′ 4,800	2 St. 30′ 6,600	1 St. 20′ 4,800	2 St. 30′ 7,200	1 St. 20′ 5,100	N.P.
I-1 Institutional, residential care		N.L.	N.L.	9 St. 100′ 19,950	4 St. 50′ 13,125	3 St. 40′ 8,400	4 St. 50′ 11,550	3 St. 40′ 8,400	4 St. 50′ 12,600	3 St. 40′ 8,925	2 St. 35′ 4,200
I-2 Institutional, incapacitated		N.L.	8 St. 90′ 21,600	4 St. 50′ 17,100	2 St. 30′ 11,250	1 St. 20′ 7,200	2 St. 30′ 9,900	1 St. 20′ 7,200	2 St. 30′ 10,800	1 St. 20′ 7,650	N.P.
I-3 Institutional, restrained		N.L.	6 St. 75′ 18,000	4 St. 50′ 14,250	2 St. 30′ 9,375	1 St. 20′ 6,000	2 St. 30′ 8,250	1 St. 20′ 6,000	2 St. 30′ 9,000	1 St. 20′ 6,375	N.P.

M Mercantile	N.L.	N.L.	6 St. 75′ 22,800	4 St. 50′ 15,000	2 St. 30′ 9,600	3 St. 40′ 13,200	2 St. 30′ 9,600	4 St. 50′ 14,400	2 St. 30′ 10,200	1 St. 20′ 4,800
R-1 Residential, hotels	N.L.	N.L.	9 St. 100′ 22,800	4 St. 50′ 15,000	3 St. 40′ 9,600	4 St. 50′ 13,200	3 St. 40′ 9,600	4 St. 50′ 14,400	3 St. 40′ 10,200	2 St. 35′ 4,800
R-2 Residential, multi-family	N.L.	N.L.	9 St. 100′ 22,800	4 St. 50′ 15,000 Note f	3 St. 40′ 9,600	4 St. 50′ 13,200 Note f	3 St. 40′ 9,600	4 St. 50′ 14,400	3 St. 40′ 10,200	2 St. 35′ 4,800
R-3 Residential, one and two family	N.L.	N.L.	4 St. 50′ 22,800	4 St. 50′ 15,000	3 St. 40′ 9,600	4 St. 50′ 13,200	3 St. 40′ 9,600	4 St. 50′ 14,400	3 St. 40′ 10,200	2 St. 35′ 4,800
S-1 Storage, moderate	N.L.	N.L.	5 St. 65′ 19,950	4 St. 50′ 13,125	2 St. 30′ 8,400	3 St. 40′ 11,550	2 St. 30′ 8,400	4 St. 50′ 12,600	2 St. 30′ 8,925	1 St. 20′ 4,200
S-2 Storage, low Note g	N.L.	N.L.	7 St. 85′ 34,200	5 St. 65′ 22,500	3 St. 40′ 14,400	4 St. 50′ 19,800	3 St. 40′ 14,400	5 St. 65′ 21,600	3 St. 40′ 15,300	2 St. 30′ 7,200
U Utility, miscellaneous	N.L.	N.L.								

Notes applicable to Table 501

Note a. See the following sections for general exceptions to Table 501:
Section 501.4 Allowable area reduction for multi-story buildings.
Section 502.2 Allowable area increase due to street frontage.
Section 502.3 Allowable area increase due to automatic fire suppression system installation.
Section 503.1 Allowable height increase due to automatic fire suppression system installation.
Section 504.0 Unlimited area one story buildings.

Note b. Buildings of Type 1 construction permitted to be of unlimited tabular heights and areas are not subject to special requirements that allow increased heights and areas for other types of construction (see Section 502.5).

Note c. The tabular area of one story school buildings of Use Group E may be increased 200 percent provided every classroom has at least one door opening directly to the exterior of the building. Not less than one-half of the required exits from any assembly room included in such buildings shall also open directly to the exterior of the building (see Section 502.4).

Note d. Auditoriums in buildings of Use Groups A-4 and E of Type 2B, 3A, 4 or 5A construction may be erected to 65 feet in height, and of Type 2C, 3B or 5B construction to 45 feet in height (see Section 503.2).

Note e. For exceptions to height and area limitations of buildings of Use Group H, see Article 6 governing the specific use. For other special fireresistive requirements governing specific uses, see Section 1405.0.

Note f. For exceptions to height of buildings of Use Group R-2 of Types 2B and 3A construction, see Section 1405.5.

Note g. For height and area exceptions for open parking structures, see Section 617.0.

Note h. 1 foot = 304.8 mm; 1 square foot = 0.093 m^2.

Table 501.4
PERCENT REDUCTION OF AREA LIMITS

No. of stories	Type of construction		
	1A & 1B	2A	2B, 2C, 3A, 3B, 4, 5A, 5B
1	None	None	None
2	None	None	None
3	None	5%	20%
4	None	10%	20%
5	None	15%	30%
6	None	20%	40%
7	None	25%	50%
8	None	30%	60%
9	None	35%	70%
10	None	40%	80%

SECTION 502.0 AREA EXCEPTIONS

502.1 General: The provisions of this section shall modify the area limits of Table 501 as herein specified.

502.2 Street frontage increase: When a building or structure has more than 25 percent of the building perimeter fronting on a street or other unoccupied space not less than 30 feet (9144 mm) in width accessible from a street by a posted fire lane not less than 18 feet (5486 mm) in width, the tabular areas may be increased 2 percent for each 1 percent of such excess frontage.

502.3 Automatic fire suppression system: When a building of other than Use Group H is equipped throughout with an approved automatic fire suppression system, the tabular areas may be increased by 200 percent for one and two story buildings and 100 percent for buildings more than two stories in height.

502.4 School buildings: When every classroom of a one story school building of Use Group E has at least one door opening directly to the exterior of the building, the tabular area of Table 501 may be increased 200 percent. Not less than one-half of the required exits from any assembly room included in such buildings shall also open directly to the exterior of the building.

502.5 Type 1 construction: Buildings of Type 1 construction permitted to be of unlimited tabular heights and areas in Table 501 are not subject to the special requirements that allow increased heights and areas for other types of construction.

SECTION 503.0 HEIGHT EXCEPTIONS

503.1 Automatic fire suppression systems: When a building of other than Use Group H is equipped throughout with an approved automatic fire suppression system, the building may be erected one story and 20 feet (6096 mm) higher than specified in Table 501.

503.2 Auditoriums: Auditoriums in Use Groups A-4 and E of Type 2B, 3A, 4 or 5A construction may be erected to 65 feet (19812 mm) in height, and of Type 2C, 3B or 5B construction to 45 feet (13716 mm) in height.

SECTION 504.0 UNLIMITED AREAS

504.1 One story buildings: In other than Type 5 construction, the area of all buildings of Use Groups A-3, B, F, M and S not including high hazard uses, which do not exceed one story or 85 feet (25908 mm) in height shall not be limited provided the exit facilities comply with the provisions of Article 8, an automatic fire suppression system is provided throughout complying with the provisions of Section 1702.0 and the building is isolated as specified in Section 504.2.

Exceptions

1. Buildings and structures of special industrial uses according to Section 305.3.1 shall be exempt from the above height limits and fire separation requirements and the automatic fire suppression system requirements may be waived by the building official when such installations would be detrimental or dangerous to the specific use and occupancy.
2. A fire suppression system shall not be required for buildings of Type 2 or Type 4 construction used exclusively for storage of noncombustible material, not packed or crated in combustible material.

504.1.1 School buildings: One story school buildings of Use Group E of Type 2, 3A or 4 construction may be unlimited in area when a direct exit to the outside of the building is provided from each classroom and the building is equipped with an approved automatic fire suppression system throughout. A fire separation shall be provided on all sides of such buildings as specified in Section 504.2.

504.1.2 Indoor recreation buildings: Indoor participant sport areas such as tennis courts, skating rinks, swimming pools and equestrian clubs may be unlimited in area and exempt from the automatic fire suppression system requirements provided the requirements of Sections 504.1.2.1 through 504.1.2.4 are met.

504.1.2.1 Exits: Direct exits to the outside are provided for all the occupants of the recreation area.

504.1.2.2 Posting: The recreation area is conspicuously posted as to use and occupant load.

504.1.2.3 Fire alarm system: The building is equipped with a manual fire alarm system.

504.1.2.4 Fire suppression: All other areas are equipped with an automatic fire suppression system.

504.2 Fire separation: The minimum fire separation on all sides of one story buildings of unlimited area shall be determined by the type of construction

and fireresistance rating of the exterior wall adjacent thereto as specified in Table 504.2.

Table 504.2
MINIMUM FIRE SEPARATION FOR TYPE OF CONSTRUCTION

Type of construction	Fire-resistance rating of exterior bearing walls	Minimum fire separation	Bearing & non-bearing portions of exterior walls		Minimum fire separation
			Fireresistance rating of wall	Fireresistance rating of opening protective	
2A	2 hr.	30 ft.	—	—	—
2B	1 hr.	40 ft.	2 hr.	1½ hr.	30 ft.
2C	0 hr.	50 ft.	3 hr.	3 hr.	30 ft.
3A	2 hr.	40 ft.	3 hr.	3 hr.	30 ft.
3B	2 hr.	50 ft.	4 hr.	3 hr.	30 ft.
4	2 hr.	40 ft.	3 hr.	3 hr.	30 ft.

Note a. 1 foot = 304.8 mm.

504.3 Roof vents: The roof system of one-story buildings of unlimited area when of Type 2, 3 or 4 construction shall be provided with smoke and heat vents in accordance with Table 504.3.

Table 504.3
ROOF VENT REQUIREMENTS

Heat release content	Max. vent spacing between centers (feet) [a]	Floor area per square foot of open vent area (square feet) [a]
Low (scattered small quantities of combustible material)	150	150
Moderate (uniformly distributed moderate quantities of combustible material)	120	100

Note a. 1 foot = 304.8 mm; 1 square foot = 0.093 m^2.

504.4 Travel distance: The maximum length of exit access travel distance in unlimited area buildings shall be 400 feet (122 m).

SECTION 505.0 EXISTING BUILDINGS

505.1 Alteration limitations: These provisions shall not be deemed to prohibit alterations within the limitations of Sections 106.0 and 505.2, provided an unlawful change of use is not involved.

505.1.1 Minor changes: Changes, alterations or repairs to the interior of a building or to the front facing a street or other public space may be permitted, provided such changes, in the opinion of the building official, do not increase the size or the fire hazard of the building, or endanger the public safety, and are not specifically prohibited by this code.

505.1.2 Existing projections: A change or enlargement shall not be made to an existing part of a building now projecting beyond the street lot line or building line where such is established by law, except in conformity to the provisions of Section 507.0 governing new construction.

505.2 Increase in height and area: It shall be unlawful to increase the height or area of an existing building or structure, unless the building or structure is of a type of construction permitted for new buildings or structures of the increased height and area as regulated by Section 501.0 and made to conform with the requirements of this code in respect to means of egress, fire protection, light and ventilation.

SECTION 506.0 STREET ENCROACHMENTS

506.1 General: Except as herein provided, a part of any building hereafter erected and additions to an existing building heretofore erected shall not project beyond the lot lines or beyond the building line when such line is established by the zoning law or any other statute controlling building construction.

506.2 Below grade: A part of a building hereafter erected below grade that is necessary for structural support of the building shall not project beyond the lot lines, except that the footings of street walls or their supports located at least 8 feet (2438 mm) below grade may project not more than 12 inches (305 mm) beyond the street lot line.

506.3 Above grade: All projections hereafter permitted beyond the street lot line or the building line above grade shall be so constructed as to be readily removable without endangering the safety of the building.

506.4 Projections necessary for safety: In any specific application, the building official may designate by approved rules such architectural features and accessories which are deemed desirable or necessary for the health or safety of the public and the extent to which they may project beyond the street lot line or the building line where such is established by statute, subject to all provisions and restrictions that may otherwise be prescribed by law, ordinance or rule of the authorities having jurisdiction over streets or public spaces.

506.5 Permit revocable: Any permit granted or permission expressed or implied in the provisions of this code to construct a building so as to project beyond the street lot line or building line shall be revocable by the jurisdiction at will.

506.6 Existing encroachments: Parts of existing buildings and structures which already project beyond the street lot line or building line may be

maintained as constructed until their removal is directed by the proper authorities of the jurisdiction.

SECTION 507.0 PERMISSIBLE STREET PROJECTIONS

507.1 General: Subject to such provisions as may be otherwise prescribed by law or ordinance, or by rules of the authorites having jurisdiction over streets, highways, and public spaces, the following projections, as described in Sections 507.2 through 507.11.1, shall be permitted beyond the street lot line or the building line, as the case may be.

507.2 Cornices and eaves: Main cornices or roof eaves located at least 12 feet (3658 mm) above the curb level shall project not more than 3 feet (914 mm).

507.3 Architectural decorations: Belt courses, lintels, sills, architraves, pediments and similar architectural decorations shall project not more than 4 inches (102 mm) when less than 10 feet (3048 mm) above the curb level, and not more than 10 inches (254 mm) when 10 feet (3048 mm) or more above the curb level.

507.4 Ornamental columns: Ornamental columns, or pilasters, including the bases and moldings which emphasize the main entrance of the building, shall project not more than 12 inches (305 mm).

507.5 Entrance steps: Entrance steps and doors shall project not more than 12 inches (305 mm) and shall be guarded by check pieces not less than 3 feet (914 mm) high, or shall be located between ornamental columns or pilasters.

507.6 Oriel windows: Oriel windows with the lowest portion at least 10 feet (3048 mm) above the curb level shall project not more than 2½ feet (762 mm).

507.7 Balconies: Balconies located at least 10 feet (3048 mm) above the curb level shall project not more than 3 feet (914 mm), except that when the balcony is required in connection with a fire escape or exterior stairway as an element of a means of egress, the projection shall not exceed 4 feet (1219 mm).

507.8 Awnings: Retractable or fixed awnings shall have clearances above the grade, and shall be installed in accordance with the requirements of Section 510.0.

507.9 Awning covers or boxes: Awning covers or boxes located at least 8 feet (2438 mm) above the curb level shall not project more than 3 feet (914 mm).

507.10 Marquees: For the purpose of this section, a marquee shall include any object or decoration attached to or a part of said marquee.

507.10.1 Projection and clearance: The horizontal clearance between a marquee and the curb line shall be not less than 2 feet (610 mm). A marquee projecting more than two-thirds of the distance from the property line to the curb line shall be not less than 10 feet (3048 mm) above the ground or pavement below.

507.10.2 Thickness: The maximum height or thickness of a marquee measured vertically from its lowest to its highest point shall not exceed 3 feet (914

mm) when the marquee projects more than two-thirds of the distance from the property line to the curb line, and shall not exceed 9 feet (2743 mm) when the marquee is less than two-thirds of the distance from the property line to the curb line.

507.10.3 Roof construction: The roof or any part thereof may be a skylight of approved plastics, or wired glass not less than ¼ inch thick with a single pane not more than 18 inches (457 mm) wide. Every roof and skylight of a marquee shall be sloped to downspouts which shall conduct any drainage from the marquee in a manner not to spill over the sidewalk.

507.10.4 Location prohibited: Every marquee shall be so located as not to interfere with the operation of any exterior standpipe, and not to obstruct the clear passage of stairways or exit discharge from the building or the installation or maintenance of street lighting.

507.10.5 Construction: A marquee shall be supported entirely from the building and constructed of noncombustible material. Marquees shall be designed and constructed to withstand wind or other lateral loads and live loads as required in Article 9 of this code. Structural members shall be protected to prevent deterioration.

507.11 Vaults: Vaults below the sidewalk level shall extend not closer than 3 feet (914 mm) to the curb line; and the construction and use of such vaults shall be subject to the terms and conditions of the authority or legislative body having jurisdiction.

507.11.1 Areaways: Areaways shall not project beyond the street lot line more than 4 feet (1219 mm); provided that every such areaway shall be covered over at the street grade by an approved grating of metal or other noncombustible material.

SECTION 508.0 PERMISSIBLE YARD AND COURT ENCROACHMENTS

508.1 General: A part of any building or structure shall not extend into side courts, inner courts or yards required for light and ventilation of habitable and occupiable rooms by the provisions of Article 7, or by the zoning law or other statutes controlling building construction, except as hereinafter provided; but the encroachment shall not exceed 20 percent of the legal area of yard or court required for light and ventilation purposes.

508.2 Roof eaves: Roof eaves shall project not more than 3 feet (914 mm) beyond the face of the wall.

508.3 Steps and architectural features: Steps, window sills, belt courses and similar architectural features, rain leaders and chimneys shall project not more than 2 feet (610 mm) beyond the face of the wall.

508.4 Exterior stairways and fire escapes: Outside stairways, smokeproof tower balconies, fire escapes or other required elements of a means of egress shall not project more than 4 feet (1219 mm) beyond the face of the wall.

SECTION 509.0 SPECIAL AND TEMPORARY PROJECTIONS

509.1 Alley projections: The permissible projection beyond street lot lines shall apply in general to building projections into alleyways, except as may be modified by the authority having jurisdiction or by special deed restriction.

509.2 Special permits: When authorized by special permit, vestibules and storm doors may be erected for periods of time not exceeding seven months in any one year, and shall not project more than 3 feet (914 mm) nor more than one-fourth the width of the sidewalk beyond the street lot line. Temporary entrance awnings may be erected with a minimum clearance of 7 feet (2134 mm) to the lowest portion of the hood or awning when supported on removable steel, or other approved noncombustible supports.

SECTION 510.0 AWNINGS AND CANOPIES

510.1 Permit: A permit shall be obtained from the building official for the erection, repair or replacement of any fixed awning, canopy or hood except as provided in Section 510.1.1, and for any retractable awning located at the first story level and extending over the public street or over any portion of a court or yard beside a building serving as a passage from a required exit or exit discharge to a public street.

510.1.1 Exemption from permit: A permit shall not be required for the erection, repair or replacement of fixed or retractable awnings installed on buildings of Use Group R-3 unless they project over public property, or for retractable awnings installed above the first story or where the awning does not project over the public street or over any court or yard serving as a passage from a required exit to a public street.

510.2 Retractable awnings: There shall be a minimum clearance of 7 feet (2134 mm) from the sidewalk to the lowest part of the framework or any fixed portion of any retractable awning, except that the bottom of the valance of canvas awnings may extend to 6 feet 9 inches (2057 mm) above the sidewalk. Retractable awnings shall be securely fastened to the building and shall not extend closer than 12 inches (305 mm) from the curb line. They shall be equipped with a mechanism or device for raising and holding the awning in a retracted or closed position against the face of the building.

510.3 Fixed or permanent awnings: The clearance from the sidewalk to the lowest part of any fixed or permanent awning shall be the same as required in Section 510.2 for retractable awnings. Fixed or permanent awnings installed above the first story shall not project more than 4 feet (1219 mm).

510.4 Canopies: Canopies shall be constructed of a metal framework, with an approved covering, attached to the building at the inner end and supported at the outer end by not more than two stanchions with braces anchored in an approved manner and placed not less than 2 feet (610 mm) in from the curb line. The horizontal portion of the framework shall be not less than 8 feet (2438 mm) nor more than 12 feet (3658 mm) above the sidewalk and the

clearance between the covering or valance and the sidewalk shall be not less than 7 feet (2134 mm). The width of canopies shall not exceed 8 feet (2438 mm).

510.5 Special applications of awnings: Rigid awnings supported in whole or part by members resting on the ground and used for patio covers, car ports, summer houses or other similar uses shall comply with the requirements of Section 510.6 for design and construction. Such structures shall be braced as required to provide rigidity.

510.6 Design and construction: Fixed awnings, canopies and similar structures shall be designed and constructed to withstand wind or other lateral loads and live loads as required by Article 9 of this code with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration.

SECTION 511.0 TEMPORARY STRUCTURES

511.1 General: Pursuant to a variance granted by the board of appeals under the provisions of Section 123.0, the building official may issue a permit for temporary construction as approved by the board of appeals. Such permits shall be limited as to time of service, but such temporary construction shall not be permitted for more than one year.

511.2 Special approval: All temporary construction shall conform to structural strength, fire safety, means of egress, light, ventilation and sanitary requirements of this code necessary to insure the public health, safety and general welfare.

511.3 Termination of approval: The building official is hereby authorized to terminate such special approval and to order the demolition of any such construction at his discretion, or as directed by a decision of the board of appeals.

SECTION 512.0 PHYSICALLY HANDICAPPED AND AGED

512.1 Requirements for accessibility of the handicapped: Please see 815 KAR 7:060 for construction requirements providing accessibility to the handicapped, Article 25 of this code.

ARTICLE 6

SPECIAL USE AND OCCUPANCY REQUIREMENTS

SECTION 600.0 GENERAL

600.1 Scope: In addition to the general requirements of this code governing the location, construction and equipment of all buildings and structures, and the fireresistance ratings, height and area limitations of Tables 401 and 501, the provisions of this article shall control all buildings and structures designed for special uses and occupancies as herein provided.

Chemical plants, packing plants, grain elevators, refineries, flour mills and other similar structures may be constructed in accordance with the recognized practices and requirements of the specific industry. The building official may permit such variations from the requirements of this code as will secure reasonable and economical construction with the necessary fire, life and property safeguards. In granting such variations, due regard shall be given to the isolation of the structure, the fire hazard and the exposure to surrounding property.

600.2 Special high hazards: When necessary to resist a higher degree of fire severity than specified herein, for high concentrations of combustible contents and for buildings of high hazard uses which exceed five stories or 65 feet (19812 mm) in height, the building official may require higher fireresistance ratings than the requirements of Table 401 governing the fireresistance ratings of types of construction and protection of structural elements.

600.3 Means of egress: The means of egress for buildings of special uses and occupancies shall conform to the requirements of Article 8, except as may be modified by more restrictive provisions of this article for specific uses.

600.4 Heating and venting: The requirements herein prescribed for the installation of heating and venting appliances and equipment shall be construed as supplemental to the provisions of Articles 7 and 15, and the mechanical code listed in Appendix A.

600.5 Equipment rooms: Heating and ventilating equipment in occupancies involving fire hazards from flammable vapors, dust, combustible fibers or other highly combustible substances shall be installed and protected against fire and explosion hazards in accordance with the mechanical code listed in

Appendix A. Rooms containing such equipment shall be segregated by construction of not less than 2 hour fireresistance rating except as may be required for specific uses, without openings in the enclosure walls and with means of direct ingress and egress from the exterior, or such equipment shall be located in accessory structures segregated from the main building.

600.6 Segregation of storage spaces: All rooms and spaces used for the storage of volatile and flammable materials shall be separately enclosed and segregated with fireresistance rated construction as herein required for specific uses and occupancies.

600.7 Restricted locations: Except as otherwise specifically provided for herein, buildings of Use Group H shall not be located within 200 feet (60960 mm) of the nearest wall of a building classified in Use Group A, E or I.

SECTION 601.0 EXPLOSION HAZARDS

601.1 Explosion relief: Every structure, room or space occupied for uses involving explosion hazards shall be equipped and vented with explosion relief systems and devices arranged for automatic release under predetermined increase in pressure as herein provided for specific uses.

601.2 Venting devices: Venting devices to relieve the pressure resulting from explosive air-vapor mixtures shall consist of windows, skylights, vent flues or releasing roof or wall panels which discharge directly to the open air or to a public place or other unoccupied space not less than 20 feet (6096 mm) in width on the same lot. Such releasing device shall be so located that the discharge end shall be not less than 10 feet (3048 mm) vertically and 20 feet (6096 mm) horizontally from window openings or means of egress facilities in the same or adjoining buildings or structures. The exhaust shall always be in the direction of least exposure and never into the interior of the building.

601.3 Area of vents: The aggregate clear vent relief area shall be regulated by the type of construction of the building and shall be not less than prescribed below.

1. Heavy reinforced concrete frame, 1 square foot (0.093 m^2) for 80 cubic feet (2.24 m^3) of volume.
2. Light structural steel frame and ordinary construction, 1 square foot (0.093 m^2) for 65 cubic feet (1.82 m^3) of volume.
3. Light wood frame construction, 1 square foot (0.093 m^2) for 50 cubic feet (1.40 m^3) of volume.

The combined area of open windows, pivoted sash or wall panels arranged to open under internal pressure shall not be less than 10 percent of the area of the enclosure walls, with not less than 50 percent of the opening arranged for automatic release.

601.4 Construction of vents: All explosion relief devices shall be of an approved type constructed of lightweight, noncombustible and corrosion-resistive materials, and the discharge end shall be protected with approved screens of not more than ¾ inch (19 mm) mesh, arranged to blow out under relatively low pressures.

SECTION 602.0 FLAMMABLE AND COMBUSTIBLE LIQUIDS

602.1 Main storage: Main storage systems of flammable and combustible liquids shall be constructed and installed in accordance with NFiPA 30 and the fire prevention code listed in Appendix A.

602.2 Construction of enclosures: Process rooms shall be separated from other uses and occupancies by walls, floors and ceilings of not less than 2 hour fireresistance rating with 1½ hour fire doors or the approved labeled equivalent complying with Article 14. The interior door openings shall be provided with noncombustible sills not less than 6 inches (152 mm) high and the room shall be vented as required in Section 601.1. Floors shall be waterproofed and drained to comply with Section 1312.0.

602.3 Enclosure openings: Openings shall not be permitted in the enclosure walls within 11 feet (3353 mm) of adjoining property lines or with a fire separation of less than 11 feet (3353 mm) from any building or structure not part of the installation. *

SECTION 603.0 FIRE PREVENTION CODE

603.1 Inspections: All buildings and structures involving the use and handling of flammable or explosive materials and other hazardous uses and occupancies, and buildings of Use Groups A and E, shall be inspected in accordance with the fire prevention code listed in Appendix A.

603.2 Coordination of inspections: The building, fire and health officials and other administrative agencies of the jurisdiction to whom the authority is delegated to inspect buildings and structures in respect to the maintenance of safe conditions of use and occupancy shall immediately notify the respective official of any violation of the provisions of this code or the fire prevention code listed in Appendix A and health rules and regulations.

603.3 Housekeeping: Periodic inspections of existing uses and occupancies shall be made by the appropriate fire official to insure maintenance of good housekeeping conditions. *

SECTION 604.0 LIQUEFIED PETROLEUM GAS FACILITIES

604.1 General: The design and construction of propane, butane, propylene, butylene and other liquefied petroleum gas distribution facilities shall conform to the applicable provisions of this section. The storage and handling of liquefied petroleum gas systems shall conform to the fire prevention code listed in Appendix A. The design and installation of piping, equipment and systems which utilize liquefied petroleum gas shall be in accordance with the mechanical code listed in Appendix A. Liquefied petroleum gas facilities shall be ventilated in accordance with the mechanical code listed in Appendix A.

604.2 Construction: Liquefied petroleum gas distribution facilities shall be constructed in accordance with Section 604.3 for separate buildings, Section 604.4 for attached buildings or Section 604.5 for rooms within buildings.

604.3 Separate buildings: When located in separate buildings, such buildings shall be used exclusively for that purpose or for other purposes having similar hazards. Such buildings shall be limited to one story in height.

604.3.1 Floors: The floor shall not be located below ground level and any spaces beneath the floor shall be solidly filled or shall be left unenclosed.

604.3.2 Materials: Walls, floors, ceilings, columns and roofs shall be constructed of noncombustible materials. Exterior walls, ceilings and roofs shall be constructed of lightweight material designed for explosion venting or, if of heavy construction such as solid brick masonry, concrete block or reinforced concrete construction, explosion venting windows or panels in walls or roofs shall be provided having an explosion venting area of at least 1 square foot (0.093 m^2) for each 50 cubic feet (1.40 m^3) of the enclosed volume.

604.4 Attached buildings: Liquefied petroleum gas facilities may be located in an attached structure when the attached perimeter does not exceed 50 percent of the perimeter of the space enclosed and shall comply with Sections 604.3 and 604.4.1. Where the attached perimeter exceeds 50 percent, such facilities shall comply with Section 604.5.

604.4.1 Walls: Common walls at points at which structures are attached shall have a fireresistance rating of not less than 1 hour with no openings. Common walls for attached structures used only for storage of LP-Gas are permitted to have doors which shall be protected by ¾ hour opening protectives. Such walls shall be designed to withstand a static pressure of at least 100 pounds per square foot (psf) (488.2 kg/m^2). This provision may be waived if the building to which the structure is attached is occupied by operations or processes having a similar hazard.

604.5 Rooms within buildings: When liquefied petroleum gas facilities are located in rooms within buildings, such rooms shall be located in the first story and shall have at least one exterior wall with sufficient exposed area to permit explosion venting as provided in Section 604.5.1. The building in which the room is located shall not have a basement or unventilated crawl space and the room shall comply with Sections 604.5.1 and 604.5.2.

604.5.1 Materials: Walls, floors, ceilings, and roofs of such rooms shall be constructed of noncombustible materials. Exterior walls and ceilings shall be either of lightweight material designed for explosion venting, or, if of heavy construction such as solid brick masonry, concrete block or reinforced concrete construction shall be provided with explosion venting windows or panels in the walls or roofs having an explosion venting area of at least 1 square foot (0.093 m^2) for each 50 cubic feet (1.40 m^3) of enclosed volume.

604.5.2 Common construction: Walls and floor/ceiling assemblies common to the room and to the building within which it is located shall have a fireresistance rating of not less than 1 hour with no openings. Common walls for rooms used only for storage of LP-Gas are permitted to have doorways which shall be equipped with ¾ hour opening protectives. Such walls and ceiling shall be designed to withstand a static pressure of at least 100 psf (488.2

kg/m^2). These provisions may be waived if the building within which the room is located is occupied by operations or processes having a similar hazard.

SECTION 605.0 MOTION PICTURE PROJECTION ROOMS, SCREENING ROOMS AND SOUND STAGES

605.1 General: The provisions of this section shall apply to rooms in which ribbon type cellulose acetate or other safety film is used in conjunction with electric arc, xenon or other light source projection equipment which develops hazardous gases, dust or radiation. Where cellulose nitrate film is used or stored, such rooms shall comply with NFiPA 40 listed in Appendix A.

Every motion picture machine projecting film as mentioned within the scope of this section shall be enclosed in a projection room. Appurtenant electrical equipment, such as rheostats, transformers and generators, may be within the projection room or in an adjacent room of equivalent construction. There shall be posted on the outside of each projection room door and within the projection room itself a conspicuous sign with 1 inch (25 mm) block letters stating: *Safety Film Only Permitted in this Room.*

605.2 Construction of projection rooms: Every projection room shall be of permanent construction consistent with the construction requirements for the type of building in which the projection room is located. Openings need not be protected.

The room shall have a floor area of not less than 80 square feet (7.44 m^2) for a single machine. Each motion picture projector, floodlight, spotlight or similar piece of equipment shall have a clear working space of not less than 30 inches by 30 inches (762 mm by 762 mm) on each side and at the rear thereof, but only one such space shall be required between two adjacent projectors. The projection room and the rooms appurtenant thereto shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). The aggregate of openings for projection equipment shall not exceed 25 percent of the area of the wall between the projection room and the auditorium. All openings shall be provided with glass or other approved material, so as to completely close the opening.

605.3 Projection booth and equipment ventilation: Projection booths and equipment shall be ventilated in accordance with the mechanical code listed in Appendix A.

605.4 Lighting control: Provision shall be made for control of the auditorium lighting and the emergency lighting systems of theaters from inside of the room and from at least one other convenient point in the building as required in Section 824.3.1.

605.5 Miscellaneous equipment: Each projection room shall be provided with rewind and film storage facilities.

605.6 Screening rooms: Screening rooms shall provide a seating capacity of not more than 30 persons, with not less than two approved means of egress

complying with Article 8. Such rooms shall be enclosed in 1 hour fire separation walls with self-closing fire doors or their approved labeled equivalent at the openings. All seats shall be permanently fixed in position and the arrangement shall comply with the requirements of Section 826.0.

* **605.7 Sound stage construction:** All buildings designed or used as sound stages for motion picture or television film productions shall be protected with an approved two-source automatic sprinkler system complying with the provisions of Article 17; except that the building official may exempt from this requirement rooms designed for housing electrical equipment when constructed of Type 1 construction.

* **605.8 Film laboratories:** Film laboratories shall not be operated in other than buildings or structures of Type 1A construction, equipped throughout with an approved automatic sprinkler system.

605.9 Film exchanges: All film exchanges and depots shall be housed in buildings and structures of Type 1A construction equipped throughout with an approved automatic sprinkler system. All flammable film other than that in process of receipt, delivery or distribution shall be stored in vaults complying with the requirements of Section 605.9.1.

605.9.1 Vaults: Flammable film quantities of more than 1,000 pounds (454 kg) and not more than 10,000 pounds (4540 kg) shall be stored in vaults enclosed in floors, walls and ceilings of not less than 4 hour fireresistance rating. The interior storage volume of the vault shall be not more than 1,500 cubic feet (42 m^3) and the vault shall be constructed vapor- and gas-tight in accordance with the approved rules, with 1½ hour vapor-tight fire doors or the approved labeled fire door assembly equivalent on each side of the door opening. The vault shall be drained and provided with scuppers.

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SECTION 606.0 COMBUSTIBLE DUSTS, GRAIN PROCESSING AND STORAGE

606.1 General: The provisions of this section shall apply to all buildings in which materials producing flammable dusts and particles which are readily ignitable and subject to explosion hazards are stored or handled, including, among others, grain bleachers and elevators, malt houses, flour, feed or starch mills, wood flour manufacturing and manufacture and storage of pulverized aluminum, coal, cocoa, magnesium, spices, sugar or similar material producing dust. The provisions of NFiPA 61A, 61B, 61C, 61D, 65, 85F 651, 653, 654, 655, 664 and the fire prevention code listed in Appendix A, except as herein specifically required, shall be deemed to conform to the requirements of this code.

606.2 Buildings: All such buildings and other occupied structures shall be of Type 1, Type 2 or of laminated planks or lumber sizes qualified for Type 4 construction, within the height and area limits of Table 501 for Use Group H; except that when erected of Type 1 or Type 2 construction, the height and area of grain elevators and similar structures shall be unlimited, and when of Type 4 construction, the structure may be erected to a height of 65 feet (19812 mm)

and except further that, in isolated areas, the height of Type 4 structures may be increased to 85 feet (25908 mm).

606.2.1 Grinding rooms: Every room or space for grinding or other operations producing flammable dust shall be enclosed with floors and walls of not less than 2 hour fireresistance rating when the area is not more than 3,000 square feet (279 m^2), and of not less than 4 hour fireresistance rating when the area is greater than 3,000 square feet (279 m^2).

606.2.2 Conveyors: All conveyors, chutes, piping and similar equipment passing through the enclosures of such rooms or spaces shall be constructed dirt- and vapor-tight, and of approved noncombustible materials complying with Section 2116.0.

606.3 Explosion relief: Means for explosion relief shall be provided as specified in Section 601.0, or such spaces shall be equipped with the equivalent mechanical ventilation complying with the mechanical code listed in Appendix A.

606.4 Grain elevators: Grain elevators, malt houses and buildings for similar uses shall not be located within 30 feet (9144 mm) of interior lot lines or structures on the same lot, except when erected along a railroad right of way.

606.5 Coal pockets: Coal pockets located less than 30 feet (9144 mm) from interior lot lines or structures on the same lot shall be constructed of not less than Type 2A construction. When more than 30 feet (9144 mm) from interior lot lines, or erected along a railroad right of way, such structures may be built of lumber sizes qualifying for Type 4 construction, provided they are not more than 65 feet (19812 mm) in height.

SECTION 607.0 PAINT SPRAYING AND SPRAY BOOTHS

607.1 General: The provisions of this section shall apply to the construction, installation and use of buildings and structures or parts thereof for the spraying of flammable paints, varnishes and lacquers or other flammable materials, mixtures or compounds used for painting, varnishing, staining or similar purpose. All such construction and equipment shall comply with NFiPA 33 and 34 in Appendix A.

607.2 Location of spraying processes: Such processes shall be conducted in a spraying space, spray booth, spray room or shall be isolated in a detached building or as otherwise approved by the building official in accordance with NFiPA 70 and the fire prevention code listed in Appendix A.

607.3 Spray spaces: All spray spaces shall be ventilated with an exhaust system to prevent the accumulation of flammable mist or vapors in accordance with the mechanical code listed in Appendix A. When such spaces are not separately enclosed, noncombustible spray curtains shall be provided to restrict the spread of flammable vapors.

607.3.1 Spray booths: All spray booths shall be constructed of noncombusti-

ble materials and equipped with mechanical ventilating systems in accordance with the mechanical code listed in Appendix A.

607.3.2 Spray rooms: All spray rooms shall be enclosed in partitions of not less than 1 hour fireresistance rating. Floors shall be waterproofed and drained in an approved manner.

607.3.3 Spray storage rooms: Spraying materials in quantities of not more than 20 gallons (0.076 m^3) may be stored in approved cabinets ventilated at top and bottom. When in quantities of more than 20 gallons (0.076 m^3) and not more than 100 gallons (0.38 m^3), they may be stored in approved double walled noncombustible cabinets vented directly to the outer air. All spraying materials in quantities of more than 100 gallons (0.38 m^3) shall be stored in an enclosure of not less than 2 hour fireresistance rating or in a separate exterior storage building. Such storage shall not be in quantities of more than 250 gallons (0.95 m^3), except when stored in isolated storage buildings; and except further that not more than 25 gallons (0.095 m^3) of spraying material shall be stored in buildings in which pyroxylin products are manufactured or stored.

* **607.4 Fire protection:** Sprinkler heads shall be provided in all spray, dip and immersing spaces and storage rooms, and shall be installed in accordance with Article 17. Where buildings containing spray areas are not equipped with an approved automatic sprinkler system, the sprinklers in booths and other spray areas and storage rooms may be supplied from the building water supply when approved by the building official, to comply with the provisions of Section 1705.0.

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SECTION 608.0 PRIVATE GARAGES

608.1 Attached garages: Private garages located beneath rooms in buildings of Use Groups R-1, R-2, R-3 or I-1 shall have walls, partitions, floors and ceilings separating the garage space from the adjacent interior spaces constructed of not less than 1 hour fireresistance rating. Attached private garages shall be completely separated from the adjacent interior spaces and the attic area by means of ½-inch gypsum board or equivalent applied to the garage side. The sills of all door openings between the garage and adjacent interior spaces shall be raised not less than 4 inches (102 mm) above the garage floor. The door opening protectives shall be 1¾-inch solid core wood doors or approved equivalent. In lieu of the required one and three quarter inch (1¾") or 20 minute door, an approved automatic sprinkler head located directly above the door in the garage and properly connected to the domestic water system or an approved automatic heat detector located directly above the door in the garage shall be acceptable in private garages attached to one- and two-family dwellings.

608.1.1 Separation by breezeway: A garage separated by a breezeway not less than 10 feet (3048 mm) in length from a building of Use Group R-3 may be of Type 5B construction, but the junction of the garage and breezeway shall be firestopped to comply with Section 1420.0.

608.2 Other conditions: All private garages not falling within the purview of Sections 608.1 or 608.1.1 attached to or located beneath a building shall comply with the requirements of Section 609.2.3 for public garages. *

608.3 Means of egress: Where living quarters are located above a private garage, required means of egress facilities shall be separated from the garage area with 1 hour fireresistance rated construction.

SECTION 609.0 PUBLIC GARAGES

609.1 General: Public garages shall comply with the applicable requirements of this section. The portions of such buildings and structures in which paint spraying is done shall comply with the requirements of Section 607.0.

609.2 Construction: All Group 1 public garages hereafter erected shall be classified as Use Group S-1 and all Group 2 public garages shall be classified as Use Group S-2 and both shall conform to the height and area limitations of Table 501 except as herein specifically provided. The areas used for dispensing gasoline in such buildings shall be located on the grade floor.

609.2.1 Special height limitations: Public garage buildings shall comply with the height and area limitations of Table 501 for the classification of the use as specified in Section 609.2. Such heights may be increased one additional story when the building is equipped with an approved automatic fire suppression system.

609.2.2 Basements: The first floor construction of public garages of all classifications and public hangars with basements shall be constructed of not less than 2 hour fireresistance rating and shall be water- and vapor-proof. Where openings are provided in the floor, they shall be protected by a curb or ramp not less than 6 inches (152 mm) high above the floor to avoid the accumulation of explosive liquids or vapors and prevent spilling to the lower floor. There shall be not less than two means of egress from such areas, one of which shall be directly to the outside, independent of the exits serving other areas of the building.

609.2.3 Mixed occupancy: A public garage shall not be located within or attached to a building occupied for any other use, unless separated from such other use by walls or floors complying with Table 1402 for fireresistance rating. Such fire separation walls shall be continuous and unpierced by openings; except that door openings equipped with self-closing fire doors complying with Article 14 shall be permitted. In buildings of single occupancy not exceeding the area limitations of Table 501, doors without a fireresistance rating shall be permitted between the garage area and salesroom or offices that are operated in connection with the garage.

609.2.4 Roof storage of motor vehicles and airplanes: When the roof of a building is used for parking or storage of motor vehicles, it shall be provided with a parapet wall or a guardrail constructed in accordance with Section 827.0 and a wheel guard not less than 6 inches (152 mm) in height, located so

as to prevent any vehicle from striking the parapet wall or guardrail. The use of roofs for airplane storage and landing shall be subject to the approval of the Federal Aviation Administration, if required.

609.2.5 Floor construction and drainage: Floors of public garages and airplane hangars shall be graded to drain through oil separators or traps to avoid accumulation of explosive vapors in building drains or sewers as provided in the plumbing code listed in Appendix A. The floor finish shall be of concrete or other approved nonabsorbent, noncombustible material.

609.3 Ventilation: All public garages shall be ventilated in accordance with the mechanical code listed in Appendix A.

* **609.4 Special hazards:** Any process conducted in conjunction with public garages involving volatile flammable solvents shall be segregated or located in a detached building or structure, except as provided in Section 602.0 for the storage and handling of gasoline and other volatile flammables. The quantity of flammable liquids stored or handled in public garages other than in underground storage and in the tanks of motor vehicles shall be not more than 5 gallons (0.019 m^3) in approved safety cans.

SECTION 610.0 STAGES AND PLATFORMS

610.1 Applicability: The provisions of this section shall apply to all parts of buildings and structures which contain stages or platforms and similar appurtenances as herein defined.

* **610.2 Stages:** A stage is a partially enclosed portion of a building which is designed or used for the presentation of plays, demonstrations or other entertainment. A stage shall be further classified as either a legitimate stage, regular stage or thrust stage.

Stage, legitimate: A stage wherein curtains, drops, leg drops, scenery, lighting devices or other stage effects are retractable horizontally or suspended overhead.

Stage, regular: A stage wherein curtains, fixed leg drops, valances, scenery and other stage effects are hung and are not retractable.

Stage, thrust: A platform extending beyond the proscenium arch and into the audience.

610.2.1 Stage floor construction: Openings through all stage floors shall be equipped with tight-fitting, solid wood trap doors not less than 2 inches in nominal thickness with approved safety locks or other materials of equal physical and fire endurance properties.

610.2.1.1 Legitimate stages: Legitimate stages shall be constructed as required for the type of construction, but not less than Type 1B construction except that the portion of the legitimate stage extending back from and 6 feet (1829 mm) beyond the full width of the proscenium opening on each side may be constructed of noncombustible or heavy timber construction covered with a wood floor of not less than 2 inches in nominal thickness. Except for the finished floor, combustible construction shall not extend beyond the plane of the proscenium opening.

610.2.1.2 Regular and thrust stages: Regular stages and thrust stages shall be constructed of materials as required for floors for the type of construction of the building in which located.

610.2.2 Stage rigging loft: The rigging loft, also referred to as a loft or fly, is the space over the stage where scenery and equipment can be out of view. The fly gallery is the narrow raised platform at the side of the legitimate stage from which the lines for flying scenery are manipulated. The gridiron is the arrangement of beams over a legitimate stage supporting the machinery for flying scenery and hanging battens from which lighting is hung. The pin rail is the beam at one side of a legitimate stage through which wooden or metal pins are driven and to which lines from the flies are fastened. The rigging loft, fly galleries, gridiron and pin rails shall be constructed of approved noncombustible materials.

610.2.3 Footlights and stage electrical equipment: Footlights and border lights shall be installed in troughs constructed of noncombustible materials. The switchboard shall be so located as to be readily accessible at all times and the storage or placing of stage equipment against it shall be prohibited.

610.2.4 Exterior stage doors: All required exit discharge door openings to the outer air shall be protected with approved self-closing fire doors, complying with Article 14. All exterior openings which are located on the stage for means of egress or loading and unloading purposes which are likely to be open during occupancy of the theater, shall be constructed with vestibules to prevent air draughts into the auditorium.

610.2.5 Proscenium wall: Legitimate stages shall be completely separated from the seating area by a proscenium wall of not less than 2 hour fireresistance rating extending continuously from foundation to at least 4 feet (1219 mm) above the roof. There shall be no other openings in the wall separating a legitimate stage from the auditorium except the main proscenium opening; two doorways at the stage level, one on each side thereof; and one doorway to the musician's pit from the space below the stage floor. Each such doorway shall not exceed 25 square feet (2.33 m^2) in area and shall be protected with approved automatic or self-closing fire door assemblies complying with Article 14 with a combined fireresistance rating of 1½ hours, or the approved labeled equivalent.

610.2.5.1 Trim, finish and decorative hangings: All moldings and decorations around the proscenium opening shall be constructed entirely of noncombustible material.

610.2.6 Proscenium curtain: The proscenium opening shall be provided with an approved curtain of noncombustible or fire-retardant material so designed and installed that it will protect against passage of flame and smoke for 5 minutes. The curtain shall be operated by an automatic heat activated device to descend instantly and safely and to completely close the proscenium opening at a rate of temperature rise of 15 to 20 degrees F. per minute (0.14 degrees C. to 0.19 degrees C. per second); and by an auxiliary operating device to permit prompt and immediate manual closing of the proscenium opening.

610.2.7 Scenery: All combustible materials used in sets and scenery shall be rendered flameresistant to comply with Article 14.

610.2.8 Stage ventilation: Metal or other approved noncombustible ventilators, equipped with movable shutters or sash shall be provided over stages larger than 500 square feet (46.5m^2) in floor area, constructed to open automatically by approved heat activated devices, with an aggregate clear area of opening not less than 5 percent of the area of the stage, except as otherwise provided in Section 610.2.9. Supplemental means shall be provided for manual operation of the ventilator. Curbs shall be provided as required for skylights in Section 2305.2.

610.2.9 Superimposed theaters: An addition or extension shall not be erected over the stage section of a theater, nor shall a second theater be erected above another. The building official may waive the prohibition against superimposed theaters and construction above the stage when adequate access is provided for fire fighting with direct means of ventilation to the outer air from the stage portion.

610.3 Platforms: A platform is that raised area within a building used for the presentation of music, plays or other entertainment; the head table for special guests; the raised area for lectures and speakers, boxing and wrestling rings; theater-in-the-round; and similar purposes wherein there are no overhead hanging curtains, drops, scenery or stage effects other than lighting. A temporary platform is one installed for use for not more than 30 days.

610.3.1 Materials: Temporary platforms shall be constructed of any approved materials. Permanent platforms shall be constructed of approved materials as required for floors for the required type of construction of the building in which it is located.

610.3.2 Space beneath: The space between the floor and a temporary platform above shall not be used for any purpose other than electrical wiring to platform equipment. When the space between the floor and a permanent platform above is used for any purpose other than electrical wiring or plumbing, the platform shall provide a 1 hour fireresistance rating.

610.4 Dressing and appurtenant rooms: Dressing and appurtenant rooms shall comply with Sections 610.4.1 through 610.4.3.

610.4.1 Construction: Dressing rooms, scene docks, property rooms, workshops and storerooms and all compartments appurtenant to the stage shall be separated from each other and from the stage and all other parts of the building by walls of not less than 1 hour fireresistance rating with approved opening protectives. Such rooms shall not be placed immediately over or under the operating stage area.

Exception: Separation from the stage is not required for stages having a floor area of 500 square feet (46.5 m^2) or less.

610.4.2 Opening protectives: Openings other than to trunk rooms and the necessary doorways at stage level shall not connect such rooms with the stage,

and such openings shall be protected with 1½ hour self-closing fire doors or the approved labeled equivalent complying with Article 14.

610.4.3 Dressing room and stage exits: Each tier of dressing rooms shall be provided with at least two means of egress. Egress stairways from dressing and storage rooms may be unenclosed in the stage area behind the proscenium wall. At least one approved means of egress shall be provided from each side of the stage and from each side of the space under the stage, and from each fly gallery and from the gridiron. A steel ladder shall be provided from the gridiron to a scuttle in the stage roof. *

SECTION 611.0 BLEACHERS, GRANDSTANDS AND FOLDING OR TELESCOPIC SEATING

611.1 General: Bleachers, grandstands and folding or telescopic seating shall be constructed as required by this code and in accordance with NFiPA 102 listed in Appendix A.

611.2 Handrails: Means of egress stairways shall be provided with a handrail on at least one side. The handrail shall be broken as necessary to provide for entrance to the seating platforms.

611.3 Spaces underneath seats: Spaces underneath grandstand seats shall be kept free of all combustible and flammable materials and shall not be occupied or used for other than exits; except that when enclosed in not less than 1 hour fireresistance rated construction, the building official may approve the use of such spaces for other purposes that do not endanger the safety of the public. *

SECTION 612.0 TENTS, AIR-SUPPORTED STRUCTURES AND OTHER TEMPORARY STRUCTURES

612.1 Construction: Tents and air-supported structures shall be constructed as required by this code, the approved rules and NFiPA 102 listed in Appendix A.

612.2 Permits: A special temporary permit shall be secured from the building official for all such installations. Tents, air-supported structures and other temporary structures may be erected for a period not exceeding 90 days for religious, educational, recreational, or similar purposes.

612.3 Location: Tents and air-supported structures shall be located with an accessible unoccupied open space around the perimeter having a minimum width of 50 feet (15240 mm).

612.4 Approved type: Tents, air-supported structures and other temporary structures shall be of an approved type. The applicant for a special temporary permit hereunder shall submit evidence of the adequacy of the temporary structure in accordance with the requirements of Section 110.0 of this code.

612.5 Combustible material: Combustible materials shall not be permitted under stands or seats at any time.

612.6 Combustible trash: The area within and adjacent to tents, air-supported structures or other temporary structures shall be maintained clear of all grass or underbrush creating a fire hazard within a radius of 20 feet (6096 mm). All combustible trash shall be removed from the structure after each performance.

*

SECTION 613.0 MOBILE UNITS

613.1 General: Mobile units, as defined in Section 201.0, shall be designed, constructed and maintained to be transported from one location to another and not mounted on a permanent foundation. A mobile unit placed on a permanent foundation or on foundation piers shall be designed and constructed to comply with all of the requirements of this code for on-site and prefabricated construction.

613.2 Construction: Residential mobile units shall be of an approved design and constructed in accordance with the applicable ordinances and statutes. All other mobile units shall be designed and constructed in accordance with the requirements of this code. All mobile units on a permanent foundation shall be evaluated, inspected and labeled in-plant in accordance with Section 115.2.3.

613.3 Location: Mobile units shall be located in spaces approved for such use. The provisions of this code shall not be construed to repeal, modify or constitute an alternative to any lawful zoning regulations. In case of conflict between this code or any other ordinance or statute, the most rigid requirements shall apply.

613.3.1 Anchorage and tie-down: Every parking space for mobile units shall be provided with devices for anchoring the unit to prevent overturning or uplift. The owner of the parking space shall anchor or cause to be anchored all mobile units located on the parking space. Where concrete platforms are provided for the parking of the units, anchorage may be by eyelets embedded in the concrete with adequate anchor plates or hooks, or other suitable means. The anchorage shall be adequate to withstand wind forces and uplift as required in Article 9 for buildings and structures, based upon the size and weight of the units.

*

SECTION 614.0 RADIO AND TELEVISION TOWERS

614.1 General: Subject to the structural provisions of Section 915.0 for wind loads and the requirements of Section 1426.0 governing the fireresistance ratings of buildings for the support of roof structures, all radio and television towers shall be designed and constructed as herein provided.

614.2 Location and access: The towers shall be so located and equipped with step bolts and ladders to be readily accessible for inspection purposes. Guy wires or other accessories shall not cross or encroach upon any street or other public space, or over any electric power lines, or encroach upon any other privately owned property without written consent of the owner.

614.3 Construction: All towers shall be constructed of approved corrosion-resistive noncombustible material. Isolated radio towers may be constructed of lumber sizes qualifying for Type 4 construction when not more than 100 feet (30480 mm) in height.

614.4 Loads: The structure shall be designed to resist the wind loads in accordance with ANSI A58.1 listed in Appendix A. Consideration shall be given to conditions involving wind load on ice-covered sections in localities subject to sustained freezing temperatures.

614.4.1 Dead load: Towers shall be designed for the dead load plus ice load in regions where ice formation is likely to occur.

614.4.2 Uplift: Adequate foundations and anchorage shall be provided to resist two times the calculated wind uplift.

614.5 Grounding: All towers shall be permanently and effectively grounded.

SECTION 615.0 RADIO AND TELEVISION ANTENNAE

615.1 Permits not required: Antennae structures for private radio or television reception not more than 12 feet (3658 mm) in height may be erected and maintained on the roof of any building without a building permit. Such a structure, however, shall not be erected so as to injure the roof covering, and when removed from the roof, the roof covering shall be repaired to maintain weather- and water-tightness. The installation of any antennae structure mounted on the roof of a building shall not be erected nearer to the lot line than the total height of the antennae structure above the roof, nor shall such structure be erected near electric power lines or encroach upon any street or other public space.

615.2 Permits required: The approval of the building official shall be secured for all roof mounted antennae structures more than 12 feet (3658 mm) in height above the roof. The application shall be accompanied by detailed drawings of the structure and methods of anchorage. All connections to the roof structure must be properly flashed to maintain water-tightness. The design and materials of construction shall comply with the requirements of Section 614.3 for character, quality and minimum dimension.

SECTION 616.0 SWIMMING POOLS

616.1 General: Pools used for swimming or bathing shall be in conformity with the requirements of this section, provided, however, these regulations shall not be applicable to any such pool less than 24 inches (610 mm) deep or having a surface area less than 250 square feet (23.25 m^2), except when such pools are permanently equipped with a water recirculating system or involve structural materials. For purposes of this code, pools are classified as private swimming pools or public swimming pools, as defined in Section 616.2. Materials and constructions used in swimming pools shall comply with the applicable requirements of this code.

616.2 Classification of pools: Any constructed pool which is used, or intended to be used, as a swimming pool in connection with a building of Use Group R-3 and available only to the family of the householder and his private guests shall be classified as a private swimming pool. Any swimming pool other than a private swimming pool shall be classified as a public swimming pool.

616.3 Plans and permits: A swimming pool or appurtenances thereto shall not be constructed, installed, enlarged or altered until plans have been submitted and a permit has been obtained from the building official. The approval of all city, county and state authorities having jurisdiction over swimming pools shall be obtained before applying to the building official for a permit. Certified copies of these approvals shall be filed as part of the supporting data for the application for the permit.

616.3.1 Plans: Plans shall accurately show dimensions and construction of the pool and appurtenances and properly established distances to lot lines, buildings, walks and fences, as well as details of water supply system, drainage and water disposal systems, and all appurtenances pertaining to the swimming pool. Detail plans of structures, vertical elevations, and sections through the pool showing depth shall be included.

616.4 Locations: Private swimming pools shall not encroach on any front or side yard required by this code, or the governing zoning law, except by specific rules of the jurisdiction in which it may be located. A wall of a swimming pool shall not be located less than 6 feet (1829 mm) from any rear or side property line or 10 feet (3048 mm) from any street property line, except by specific rules of the jurisdiction in which it may be located.

616.5 Structural design: The pool structure shall be engineered and designed to withstand the expected forces to which it will be subjected.

616.5.1 Wall slopes: To a depth up to 5 feet (1524 mm) from the top, the wall slope shall not be more than one unit horizontal in five units vertical (1:5).

616.5.2 Floor slopes: The slope of the floor on the shallow side of the transition point shall not exceed one unit vertical to seven units horizontal (1:7). For public pools greater than 1,200 square feet (111.6 m^2) the slope of the floor on the shallow side of transition point shall not exceed one unit vertical to ten units horizontal (1:10). The transition point between shallow and deep water shall not be more than 5 feet (1524 mm) deep.

616.5.3 Surface cleaning: All swimming pools shall be provided with a recirculating skimming device or overflow gutters to remove scum and foreign matter from the surface of the water. Where skimmers are used for private pools, there shall be at least one skimming device for each 1,000 square feet (93 m^2) of surface area or fraction thereof. For public pools where water skimmers are used, there shall be at least one skimming device for each 600 square feet (55.8 m^2) of surface area or fraction thereof. Where overflow gutters are used they shall not be less than 3 inches (76 mm) deep, pitched to a slope of one unit vertical to 48 units horizontal (1:48) toward drains, and constructed so they are safe, cleanable and that matter entering the gutters will not be washed out by a sudden surge of entering water.

616.5.4 Walkways: All public swimming pools shall have walkways not less than 4 feet (1219 mm) in width extending entirely around the pool. Where curbs or sidewalks are used around any swimming pool they shall have a slip-resistant surface for a width of not less than 1 foot (305 mm) at the edge of the pool, and shall be so arranged to prevent return of surface water to the pool.

616.5.5 Steps and ladders: At least one means of egress shall be provided from private pools. Public pools shall provide ladders to other means of egress at both sides of the diving section and at least one means of egress at the shallow section; or at least one means of egress in the deep section and the shallow section if diving boards are not provided. Treads of steps and ladders shall have slip-resistant surfaces and handrails on both sides, except that handrails may be omitted when there are not more than four steps or when they extend the full width of the side or end of the pool.

616.6 Water supply: All swimming pools shall be provided with a potable water supply, free of cross connections with the pool or its equipment.

616.6.1 Water treatment: Public swimming pools shall be designed and installed so that there is a pool water turnover at least once every 8 hours. Filters shall not filter water at a rate in excess of 3 gallons per minute, per square foot (0.0020 $m^3/s \cdot m^2$) of surface area. The treatment system shall be so designed and installed to provide in the water, at all times when the pool is in use, excess chlorine of not less than 0.4 parts per million (ppm) or more than 0.6 ppm, or excess chloramine between 0.7 and 1.0 ppm, or disinfection may be provided by other approved means. Acidity/alkalinity of the pool water shall not be below 7.0 or more than 7.5. All recirculating systems shall be provided with an approved hair and lint strainer installed in the system ahead of the pump.

Private swimming pools shall be designed and installed so that there is a pool water turnover at least once every 18 hours. Filters shall not filter water at a rate in excess of 5 gallons per minute per square foot (0.0034 $m^3/s \cdot m^2$) of surface area. The pool owner shall be instructed in proper care and maintenance of the pool by the supplier or builder, including the use of high test calcium hypochlorite (dry chlorine) or sodium hypochlorite (liquid chlorine) or equally effective germicide and algaecide, and the importance of proper pH (alkalinity and acidity) control.

616.6.2 Drainage systems: The swimming pool and equipment shall be equipped to be completely emptied of water and the discharged water shall be disposed of in an approved manner that will not create a nuisance to adjoining property.

616.7 Appurtenant structures: All appurtenant structures, installations, and equipment, such as showers, dressing rooms, equipment houses or other buildings and structures, including plumbing, heating, and air conditioning, amongst others appurtenant to a swimming pool, shall comply with all applicable requirements of this code and the zoning law.

616.7.1 Accessories: All swimming pool accessories shall be designed, constructed, and installed so as not to be a safety hazard. Installations or structures for diving purposes shall be properly anchored to insure stability.

616.8 Equipment installations: Pumps, filters, and other mechanical and electrical equipment for public swimming pools shall be enclosed in such a manner as to be accessible only to authorized persons and not to bathers. Construction and drainage shall be such as to avoid the entrance and accumulation of water in the vicinity of electrical equipment.

616.9 Swimming pool safety devices: Every person owning land on which there is situated a swimming pool, which contains 24 inches (610 mm) or more of water in depth at any point, shall erect and maintain thereon an adequate enclosure either surrounding the property or pool area, sufficient to make such body of water inaccessible to small children. Such enclosure, including gates therein, shall be not less than 4 feet (1219 mm) above the underlying ground. All gates shall be self-latching with latches placed 4 feet (1219 mm) above the underlying ground and otherwise made inaccessible from the outside to small children.

A natural barrier, hedge, pool cover or other protective device approved by the governing body may be used so long as the degree of protection afforded by the substituted devices or structures is not less than the protection afforded by the enclosure, gate and latch described herein.

Table 616
MINIMUM WATER DEPTHS AND DISTANCE BASED ON BOARD HEIGHT

Board height	Minimum depth at D_1[a] directly under end of board	Distance[a] between D_1 and D_2	Minimum depth at[a] D_2
2'2" (⅔ meter)	7'0"	8'0"	8'6"
2'6" (¾ meter)	7'6"	9'0"	9'0"
1 meter	8'6"	10'0"	10'0"
3 meter	11'0"	10'6"	12'0"

Note a. 1 foot = 304.8 mm.

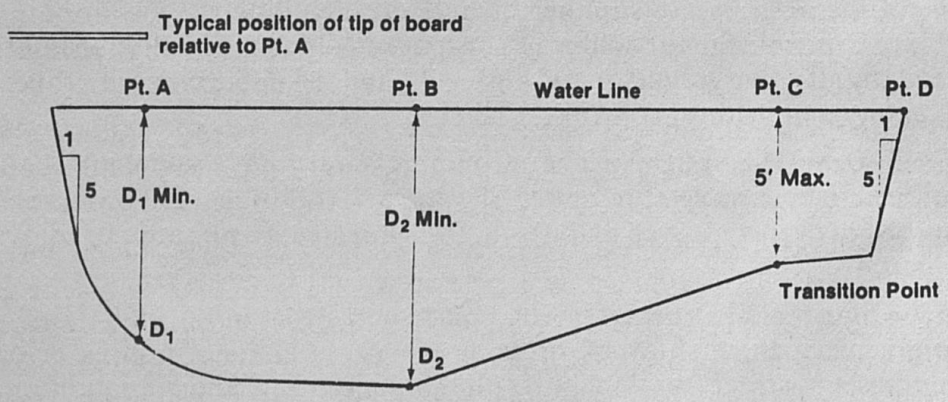


Figure 616
MINIMUM WATER DEPTHS AND DISTANCE BASED ON BOARD HEIGHT

616.9.1 Diving boards: Minimum water depths and distances for diving hoppers for all pools, based on board height above water, shall comply with Table 616.

Diving boards higher than 3 meters shall conform to the recommendations of the 1983 Rules and Regulations of United States Diving, Inc., listed in Appendix A.

The maximum slope permitted between point D_2 and the transition point shall not exceed one unit vertical to three units horizontal (1:3) in public pools and one unit vertical to one unit horizontal (1:1) in private pools. D_1 is the point directly under the end of the diving boards. D_2 is the point at which the floor begins to slope upwards to the transition point.

SECTION 617.0 OPEN PARKING STRUCTURES

617.1 General: Open passenger vehicle parking structures are those structures used for the parking or storage of passenger motor vehicles designed to carry not more than nine persons, and include the two general types indicated in Sections 617.1.1 and 617.1.2.

617.1.1 Ramp type parking structures: Ramp type parking structures are those employing a series of continuously rising floors or a series of interconnecting ramps between floors permitting the movement of passenger automobiles under their own power to and from the street level.

617.1.2 Mechanical type parking structures: Mechanical type parking structures are those employing specially designed parking machines, elevators, lifts, conveyors, moving cranes, dollies or other devices for moving passenger automobiles to and from the street level.

617.2 General construction requirements: Passenger vehicle structures shall be constructed of noncombustible materials throughout, including structural framing, floors, roofs and walls. Any enclosed rooms or spaces on the premises shall comply with the applicable requirements of this code.

617.3 Separations: Parking structures may be erected without exterior walls except that an enclosure wall with not less than 2 hour fireresistance rating and without openings therein shall be provided when located with a fire separation of less than 6 feet (1829 mm).

617.4 Basements: Basements, if used for parking of vehicles, shall be sprinklered in accordance with the provisions of Section 1702.0 and shall be ventilated in accordance with the mechanical code listed in Appendix A.

617.5 Gasoline dispensing: Areas used for dispensing of gasoline in parking structures shall be located on the grade floor.

617.6 Heights and areas: Heights and areas of open parking structures shall not exceed the limits specified in Table 617, except that open parking structures of Types 2B and 2C construction may be 75 feet (22860 mm) in height and unlimited in area when at least 50 percent open on all sides and when the horizontal distance from any point on any level to an exterior wall opening on

a street, alley, courtyard or any other permanent open space does not exceed 200 feet (60960 mm).

Table 617
HEIGHT AND AREA LIMITATION FOR OPEN PARKING STRUCTURES

Type of construction	Height	Area in square feet
1A and 1B	Unlimited	Unlimited
2A	12 Stories—120 feet	Unlimited
2B	10 Stories—100 feet	50,000
2C	8 Stories— 85 feet	30,000
2B and 2C[a]	2 Stories— 25 feet	Unlimited

Note a. Types 2B and 2C construction may be 75 feet (22,860 mm) in height and unlimited in area when at least 50 percent open on all sides and when the horizontal distance from any point on any level to an exterior wall opening on a street, alley, courtyard or any other permanent open space does not exceed 200 feet (see Section 617.6).
Note b. 1 foot = 304.8 mm; 1 square foot = 0.093 m^2.

The areas of structures wherein more than 25 percent of the perimeter has frontage on street or other open space leading to a street, each of which is not less than 30 feet (9144 mm) wide, may be increased as provided in Section 502.2. When an automatic sprinkler system is installed in accordance with Section 1704.0 in Types 2B and 2C construction, the area may be unlimited. The above limits of height permit parking on the roof.

617.7 Protective guardrails: All wells, shafts and other open, exposed spaces throughout, except first floor, shall be enclosed and protected with continuous walls or protective guardrails constructed in accordance with Section 827.0, except that in those structures wherein vehicles are hoisted to the desired level and placed in the parking space entirely by approved mechanical means, the continuous wall or protective guardrail may be omitted on the side of the parking levels adjacent to the space occupied by the hoisting and placing equipment.

617.8 Wheel guards: Wheel guards made of noncombustible material shall be placed wherever required.

617.9 Means of egress: For means of egress requirements, see Section 809.5.

SECTION 618.0 HIGH-RISE BUILDINGS

618.1 Applicability: The provisions of this section shall apply to all buildings of Use Groups B, R-1 and R-2 when such buildings have floors used for human occupancy located more than 75 feet (22860 mm) above the lowest level of fire department vehicle access.

618.2 Maintenance and inspection: All fire protection systems shall be maintained in an operative condition at all times and shall be periodically inspected and tested in accordance with the fire prevention code listed in Appendix A. Maintenance inspections shall be made quarterly and logged in a journal kept available for inspection.

618.3 Options: All buildings and structures shall be provided with either an approved automatic fire suppression system according to Section 618.3.1 or safe areas of refuge (compartmentation) according to Section 618.3.2.

618.3.1 Automatic fire suppression system: When provided as required herein, the automatic fire suppression system shall be installed throughout the building. The system shall be designed using the parameters set forth in Article 17 and the requirements of Sections 618.3.1.1 through 618.3.1.3.

618.3.1.1 Shutoff valves and water flow devices: Shutoff valves and a water flow device shall be provided for each floor.

618.3.1.2 Valve supervision: Valves shall be supervised by a continuously manned control station or central station.

618.3.1.3 Secondary water supply: In addition to the main water supply, in Seismic Zones 2 and 3, a secondary on-site supply of water equal to the hydraulically calculated sprinkler design demand plus 100 gallons per minute (0.0063 m^3/s) additional for the total standpipe system shall be provided. This supply shall have a duration of 30 minutes, but need not exceed 10,000 gallons (37.90 m^3).

618.3.1.4 Automatic fire suppression system alternatives: When a complete automatic fire suppression system is installed throughout, modifications to this code are permitted as described in Sections 618.3.1.4.1 through 618.3.1.4.10.

618.3.1.4.1 Type of construction: The type of construction required by this code may be modified as indicated in Table 618.

Table 618
TYPE OF CONSTRUCTION MODIFICATIONS PERMITTED FOR HIGH-RISE BUILDINGS

Type of construction set forth in Table 401	Modified type of construction permitted hereunder
1A	1B
1B	2A
2A	2B

618.3.1.4.2 Fireresistance ratings: The fireresistance rating of exit access corridors and vertical separation of tenant spaces shall not be required in Use Group B buildings and may be reduced to ½ hour in Use Groups R-1 and R-2 buildings; and the wall or partitions may be terminated at the lowest portion of the fireresistance rated assembly above.

618.3.1.4.3 Shaft enclosures: Vertical shafts other than stairway enclosures and elevator hoistway enclosures may be reduced to 1 hour fireresistance rating when sprinklers are installed within the shafts at alternate floors.

618.3.1.4.4 Doors: The exit access and corridor doors need not meet the requirements of Section 810.4, except they shall be self-closing and tight-fitting.

618.3.1.4.5 Standpipe system: The 1½-inch hose line, nozzle, rack and cabinet may be omitted as set forth in Section 1711.5.1.

618.3.1.4.6 Travel distance: The exit access travel distance set forth in Table 807 may be increased to 300 feet (91440 mm).

618.3.1.4.7 Smokeproof enclosures: Smokeproof enclosures as set forth in Section 818.0 may be omitted, but required stairways greater than 75 feet (22860 mm) in height shall be pressurized to a minimum of 0.15 inches of water column (37.33 Pa) and a maximum of 0.35 inch of water column (87.10 Pa) in the shaft relative to the building with all stairway doors closed.

618.3.1.4.8 Spandrel walls, eyebrows and compartmentation: Spandrel walls, eyebrows and compartmentation are not required; however, the fireresistance rating of the floors and junctures of exterior walls with each floor must be maintained.

618.3.1.4.9 Fire dampers: Fire dampers, other than those needed to maintain the fireresistance rating of the floor/ceiling assembly, are not required. Where fire dampers will interfere with the operation of the smoke control system, approved alternate protective devices shall be utilized.

618.3.1.4.10 Windows: Operable windows required by Section 809.4 for emergency egress or rescue may be omitted.

618.3.2 Areas of refuge (compartmentation): Areas of refuge conforming to Sections 618.3.2.1 through 618.3.2.6 may be provided as an alternate to the automatic fire suppression system in buildings up to 12 stories or 150 feet (45720 mm) in height (see Section 1702.6).

618.3.2.1 Division of floor areas: Every story shall be divided into two or more areas of approximately the same size with no single area exceeding 15,000 square feet (1395 m^2). The wall and doors between the areas of refuge shall be constructed as required for a horizontal exit in Section 814.0.

618.3.2.2 Stairways and elevators: Each area of refuge (compartment) shall contain a minimum of one enclosed exit stairway and each compartment shall have access to an elevator which may serve additional compartments. When elevators are directly accessible to more than one compartment, the elevator lobby shall be separated from the compartments by not less than 2 hour fireresistance rated construction with tight-fitting opening protectives having fireresistance ratings of not less than 1½ hours.

618.3.2.3 Exterior openings: Openings in exterior walls, where such openings are within 5 feet (1524 mm) of each other horizontally on adjacent floors or located vertically above one another, shall be protected by approved flame barriers either extending 30 inches (762 mm) beyond the exterior wall in the plane of the floor or by approved vertical panels complying with Section 1406.3.

618.3.2.4 Wall construction: Walls used for compartmenting a building shall have a fireresistance rating of not less than 2 hours. Duct penetrations of this wall shall not be permitted. Ferrous or copper piping and conduit may

penetrate or pass through the wall only if the openings around such piping and conduit are sealed with impervious noncombustible materials sufficiently tight to prevent the transfer of smoke or combustion gases from one side of the wall to the other and are so maintained. The fire door serving as the horizontal exit between compartments shall be so installed, fitted and gasketed that it will provide a substantial barrier to the passage of smoke and shall comply with Section 814.2.1.

618.3.2.5 Floor/ceiling construction: The fireresistive floor or the floor/ceiling construction shall extend to and be tight against the exterior wall so that the fireresistive integrity between stories is maintained. Penetrations or other installations which will impair the fireresistive integrity of the floor or floor/ceiling assembly shall not be permitted (see Section 1403.1).

618.3.2.6 Manual fire alarm system: A manual fire alarm system (pull boxes) shall be provided.

618.4 Smoke detection systems: A smoke detector suitable for the intended use shall be installed in accordance with Sections 618.4.1 through 618.4.3.

618.4.1 Room locations: A smoke detector shall be installed in every mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar room unless such rooms are protected with an automatic fire suppression system.

618.4.2 Duct locations: A smoke detector shall be installed in each connection to a vertical duct or riser serving two or more stories from return air ducts or plenums of heating, ventilating and air conditioning systems, except that in buildings of Use Group R, an approved smoke detector may be used in each return air riser carrying not more than 5,000 cubic feet per minute (cfm) (2.36 m^3/s) and serving not more than ten air inlet openings.

618.4.3 Operation: The actuation of any detector required by this section shall operate the voice alarm system and shall place into operation all equipment necessary to prevent the recirculation of smoke.

618.5 Alarm and communication systems: Alarm and communication systems shall be provided. The alarm and communication systems shall be so designed and installed that damage to any terminal unit or speaker will not render more than one zone of the system inoperative.

A single communication system may be designed to serve the voice alarm, public address and fire department communication system as indicated in Sections 618.5.1 through 618.5.3.

618.5.1 Voice alarm system: The operation of any smoke detector, sprinkler, water flow device or manual fire alarm station shall automatically activate a voice alarm system. Activation of the system shall automatically sound an alert signal to the desired areas. The voice alarm system shall provide a predetermined message on a selective basis to the area where the alarm originated and shall provide information and give direction to the occupants. The alarm shall be designed to be heard clearly by all occupants within the

building or designated portions thereof as is required for the public address system.

The central control station shall contain controls for the voice alarm system so that a selective or general voice alarm may be manually initiated.

The system shall be continuously electrically supervised against component failure of the audiopath, including amplifiers, speaker wiring, switches and electrical contacts and shall detect opens, shorts and grounds which might impair the function of the system.

618.5.2 Public address system: A public address communication system designed to be clearly heard by all occupants of the building shall operate from the central control station. It shall be established on a selective or general basis to the following terminal areas; elevators, elevator lobbies, corridors, exit stairways, rooms and tenant spaces exceeding 1,000 square feet (93 m^2) in area, dwelling units in Use Group R-2 and guest rooms or suites in Use Group R-1.

618.5.3 Fire department communication system: A two-way fire department communication system shall be provided for fire department use. It shall operate between the central control station and every elevator, elevator lobby and entry to an enclosed exit stairway.

618.6 Central control station: A central control station for fire department operations shall be provided in a location approved by the fire department. It shall contain the voice alarm and public address system panels; the fire department communications panel; fire detection and alarm system annunciator panels; an annunciator which visually indicates the floor location of elevators and whether they are operational; status indicators and controls for air handling systems; controls for unlocking all stairway doors simultaneously; sprinkler valve and water flow detector display panels; emergency power, light and system controls; and status indicators and a telephone for fire department use with controlled access to the public telephone system.

618.7 Smoke control: Natural or mechanical ventilation for the removal of products of combustion shall be provided in every story and shall consist of one of the following methods described in Sections 618.7.1 through 618.7.3.

618.7.1 Panels or windows: Panels or windows shall be provided in the exterior walls which can be opened remotely from an approved location other than the fire floor. Such venting facilities shall be provided at the rate of 20 square feet per 50 lineal feet (1.86 m^2 per 15240 mm) of exterior wall in each story and shall be distributed around the perimeter at not more than 50 foot (15240 mm) intervals. Such windows or panels and their controls shall be clearly identified.

> **Exception:** When a complete automatic fire suppression system is installed, windows or panels manually openable from within the fire floor or approved fixed tempered glass may be used in lieu of the remotely operated openable panels and windows. Such windows shall be clearly identified and shall be of the size and spacing indicated above.

618.7.2 Mechanical system: When a complete and approved automatic fire suppression system is installed, the mechanical air handling equipment may be designed to accomplish smoke removal. Under fire conditions, the return and exhaust air shall be moved directly to the outside without recirculation to other sections of the building. The air handling system shall provide a minimum of one exhaust air change each 10 minutes for the area involved.

618.7.3 Other designs: Any other approved design may be provided which will adequately remove smoke from each compartment served in an unsprinklered building, provided the system is tested and approved by the building official before the building is certified for occupancy.

618.8 Elevators: Elevator operation and installation shall be in accordance with Article 21. Elevator service shall be provided for fire department emergency access to all floors. Said elevator cab shall be of such size to accommodate an ambulance cot 24 inches (610 mm) by 76 inches (1930 mm) in its horizontal open position. Except for the main entrance level, all elevators shall open into a lobby (which may serve additional elevators) separated from the remainder of the building by 1 hour fireresistance rated construction. Exit stairways, chutes, janitor closets, guest or tenant rooms and service rooms shall not open into the elevator lobby.

Exception: In completely sprinklered buildings, 1 hour rated elevator lobbies are not required in a building equipped with a mechanical smoke control system that will restrict smoke and hot gases from entering the elevator shaft on the fire floor.

618.9 Standby power, light and emergency systems: Standby power, light and emergency systems shall comply with the requirements of Sections 618.9.1 through 618.9.3.

618.9.1 Standby power: A standby power system conforming to Section 2007.0 shall be provided. If the standby system is a generator set inside a building, it shall be located in a separate room of 2 hour fireresistance rated construction. System supervision with manual start and transfer features shall be provided at the central control station.

618.9.1.1 Fuel supply: An on-premises fuel supply sufficient for not less than 2 hours full demand operation of the system shall be provided.

Exception: Where the system is supplied with pipeline natural gas and is approved by the building official.

618.9.1.2 Capacity: The standby system shall have a capacity and rating that would supply all equipment required to be operational at the same time. The generating capacity need not be sized to operate all the connected electrical equipment simultaneously.

618.9.1.3 Connected facilities: All power, lighting, signal and communication facilities specified in Sections 618.4, 618.5, 618.6, 618.7, 618.8 and 618.9 as applicable and electrically powered fire pumps required to maintain pressure, shall be transferable to the standby source. Service shall be provided for access to all floors by at least one elevator when standby power is connected.

618.9.2 Separate circuits and fixtures: Separate lighting circuits and fixtures shall be required sufficient to provide light with an intensity of not less than 1 footcandle (10.76 lux) measured at floor level in all egress corridors, stairways, smokeproof enclosures, elevator cars and lobbies and other areas which are clearly a part of the escape route.

618.9.2.1 Other circuits: All circuits supplying lighting for the central control station and mechanical equipment rooms shall be transferable to the standby source.

618.9.3 Emergency systems: *Exit* signs, exit illumination as required by Section 824.0, and elevator car lighting, are classified as emergency systems and shall operate within 10 seconds of failure of the normal power supply and may also be connected to the standby source.

618.10 Exits: Exits shall comply with other requirements of this code and Sections 618.10.1 and 618.10.2.

618.10.1 Door operation: All stairway doors which are to be locked from the stairway side shall have the capability of being unlocked simultaneously without unlatching upon a signal from the central control station.

618.10.2 Stairway communication system: A telephone or other two-way communications system connected to an approved emergency service which operates continuously shall be provided at not less than every fifth floor in each required stairway where other provisions of this code permit the doors to be locked.

618.11 Seismic consideration: In Seismic Zones 2 and 3, the anchorage of elevator drive and suspension systems, emergency power and lighting facilities, fire pumps and all other fire protection equipment and systems shall be designed in accordance with Section 916.3 for a lateral force based on C_p values of 0.5 unless data approved by the building official substantiating a lesser value is furnished.

SECTION 619.0 COVERED MALL BUILDINGS

619.1 Scope: The provisions of this section shall apply to buildings or structures defined herein as covered mall buildings not exceeding three floor levels in height at any one point. Except as specifically required by this section, covered mall buildings shall meet all applicable provisions of this code.

Exceptions: When approved by the building official, the following uses need not comply with the provisions of this section.

1. Terminals for transportation facilities.
2. Foyers and lobbies in buildings of Use Groups R-1, R-2 or B.
3. Buildings need not comply with the provisions of this section when they comply totally with all other applicable provisions of this code.

619.2 Lease plan: The permit holder shall provide both the building and fire departments with a lease plan showing the locations of each occupancy and its means of egress after the certificate of occupancy has been issued. Such plans

shall be kept current. Modifications or changes in occupancy or use shall not be made from that shown on the lease plan without prior approval of the building official.

619.3 Tenant separations: Each tenant space shall be separated from other tenant spaces by a wall having a fireresistance rating of not less than 1 hour. The separation wall shall extend from the floor to the underside of the ceiling. Except as required by other provisions of this code, the ceiling need not be a fireresistive assembly. A separation is not required in attic spaces above tenant separation walls nor is a tenant separation wall required between any tenant space and a mall, except for occupancy separations required elsewhere in this code.

619.3.1 Anchor store openings: Openings between an anchor store and the pedestrian area of a mall need not be protected.

619.4 Egress: Each individual occupancy within the covered mall building shall be provided with a means of egress in accordance with other provisions of this code. Measurements may be made to the entrance to the mall.

619.4.1 Travel distance: The maximum length of exit access travel from any point within the mall to an approved exit along the natural and unobstructed path of travel shall not exceed 200 feet (60960 mm). *

619.4.2 Anchor store exits: Anchor stores shall provide the required number of exits and units of exit width directly to the exterior. The occupant load of anchor stores opening into the mall shall not be included in determining exit requirements for the mall.

619.4.3 Dead ends: The dead end of a mall shall not exceed twice its width.

619.4.4 Design occupant load: In determining required exit facilities of the mall, the number of occupants for whom exit facilities are to be provided shall be based on gross leasable area of the covered mall building (excluding anchor stores) and shall be based on Table 619.

Table 619
FLOOR AREA ALLOWANCE PER OCCUPANT FOR COVERED MALLS

Square feet per person	Gross leasable area (sq. ft.)
30	under 150,000
40	150,001-350,000
50	over 350,000

Note a. 1 square foot = 0.093 m^2.

619.4.5 Exit access width: The minimum width of exit access passageways and corridors from a mall shall be 66 inches (1676 mm).

619.4.6 Exit distribution: The required units of exit width and exits shall be distributed equally throughout the mall.

619.4.7 Storage prohibited: Storage is prohibited in exit corridors which are also used for service to the tenants. Such corridors shall be posted with conspicuous signs so stating.

619.5 Mall width: The minimum width of the mall shall be 20 feet (6096 mm). There shall be a minimum of 10 feet (3048 mm) clear exit width to a height of 8 feet (2438 mm) between any projection of a tenant space bordering the mall and the nearest kiosk, vending machine, bench, display opening, or other obstruction to egress travel.

The mall width shall be sufficient to accommodate the occupant load emptying into the immediately adjacent mall as determined by Section 619.4.4 for all occupancies except Use Groups A and E which shall be determined by Section 806.0.

619.6 Structural elements: The structural elements of the covered mall building shall be of Types 1, 2 or 4 construction.

619.6.1 Floor/ceiling assemblies: Floor/ceiling assemblies and their supporting columns and beams within multi-level covered malls shall be of 1 hour fireresistance rated noncombustible construction.

619.7 Roof coverings: Roof coverings for covered mall buildings shall be Class A, B or C as required by Section 1427.0.

619.8 Use Group A-1 and A-2 occupancies: Use Group A-1 and A-2 occupancies shall be located in the covered mall building so that their main entrance is immediately adjacent to a principal entrance to the mall and shall have not less than one-half of their required exits opening directly to the exterior of the covered mall building.

619.9 Fire suppression: The covered mall and all buildings connected thereto shall be provided throughout with an approved automatic fire suppression system. The system shall be installed in such a manner that when any portion of the system serving tenant spaces is shut down, the portion of the system serving the mall will remain operational.

619.9.1 Supervision: All sprinkler control valves shall be electrically supervised and connected to either the fire department or to an approved supervisory service.

619.10 Standpipes: There shall be a fire department standpipe outlet connected to a supply capable of delivering 250 gallons per minute (gpm) (0.022 m^3/s) located within the mall at each entrance to an exit passageway, corridor or enclosed stairway and at exterior exits.

619.11 Fire extinguishers: Approved fire extinguishers shall be provided as required by the fire prevention code listed in Appendix A.

619.12 Fire emergency ventilating system: The mall and adjacent tenant spaces shall be equipped with an approved automatic exhaust system. Smoke control equipment serving the mall shall be sized to provide a minimum of six air changes per hour for malls having a volume of 600,000 cubic feet (16800 m^3) or less, and a minimum of four air changes per hour for malls having a volume of more than 600,000 cubic feet (16800 m^3). The volume shall be measured from the entrance to tenant spaces and to a height of 12 feet (3658 mm) above each pedestrian area. Exhaust inlets for the mall shall be located a

minimum of 6 feet (1829 mm) above the walking surface. Necessary outside air to accomplish the required air changes per hour shall be provided.

619.12.1 Activation: The exhaust system shall be activated by smoke detectors complying with NFiPA 72E listed in Appendix A, by operation of the sprinkler system, and manually. A smoke detector shall be installed in the return air portion of every heating and cooling system ahead of any fresh air intake. The activation system shall be installed in an approved manner.

619.12.2 Operation: The approved automatic exhaust system may be a separate system or may be integrated with an approved air conditioning system. Where a separate system is provided, operation of the fire emergency ventilating system shall automatically shut down the air conditioning system or any other devices which interfere with the effective operation of the fire emergency ventilating system.

619.12.2.1 Tenant space zones: When a fire occurs within a tenant space zone, that zone shall operate at 100 percent exhaust and supply air to that zone shall be shut down. Adjoining tenant space zones shall go to normal operation and the mall system shall operate at 100 percent fresh air supply.

619.12.2.2 Mall system: When a fire occurs within the mall, the mall system shall operate at 100 percent exhaust and adjoining tenant spaces shall go to normal operation.

619.13 Fire department access to equipment: Controls for air conditioning systems, sprinkler risers and valves, or other fire detection, suppression or control elements shall be accessible to and properly identified for use by the fire department.

619.14 Plastic panels and plastic signs: Within every story or level and from side wall to side wall of each tenant space, approved plastic panels and signs shall be limited as specified in Sections 619.14.1 through 619.14.4.

619.14.1 Area: The panels and signs shall not exceed 20 percent of the wall area facing the mall.

619.14.2 Height and width: The panels and signs shall not exceed a height of 36 inches (914 mm); except if the panel or sign is vertical, the height shall not exceed 96 inches (2438 mm) and the width shall not exceed 36 inches (914 mm).

619.14.3 Location: The panels and signs shall be located a minimum distance of 18 inches (457 mm) from adjacent tenants.

619.14.4 Encasement: All edges and the backs shall be fully encased in metal.

619.15 Kiosks: Kiosks and similar structures (temporary or permanent) shall meet the requirements of Sections 619.15.1 through 619.15.4.

619.15.1 Construction: Combustible kiosks or other structures shall not be located within the covered mall unless constructed of fire-retardant treated wood throughout conforming to Section 1403.5.

619.15.2 Fire suppression: Kiosks or similar structures that are covered or

have roofs and are located within the covered mall shall be protected by an approved automatic fire suppression system.

619.15.3 Horizontal separation: The minimum horizontal separation between kiosks and other structures within the covered mall shall be 20 feet (6096 mm).

619.15.4 Maximum area: Kiosks or similar structures shall have a maximum area of 300 square feet (27.90 m^2).

619.16 Security grilles and doors: Horizontal sliding or vertical security grilles or doors which are a part of a required means of egress shall conform to Sections 619.16.1 through 619.16.4.

619.16.1 Open position: They must remain secured in the full open position during the period of occupancy by the general public.

619.16.2 Closed position: Doors or grilles shall not be brought to the closed position when there are more than ten persons occupying spaces served by a single exit or 50 persons occupying spaces served by more than one exit.

619.16.3 Operation: The doors or grilles shall be openable from within without the use of any special knowledge or effort when the space is occupied.

619.16.4 Limitation: When two or more exits are required, not more than one half of the exits may be equipped with horizontal sliding or vertical rolling grilles or doors.

619.17 Parking structures: An attached garage for the storage of passenger vehicles having a capacity of not more than nine persons or an open parking structure may be considered as a separate building when it is separated from the covered mall building by an fire separation wall having a fireresistance rating of not less than 2 hours.

SECTION 620.0 OPEN WELLS

620.1 General: Open wells are to be classified as either atriums (Section 620.2) or floor openings (Section 620.3) and shall be permitted in all buildings in other than Use Group H when provided with the protection herein required.

620.1.1 Fire suppression: An approved electrically supervised automatic fire suppression system shall be installed throughout all floor areas connected by the open well in accordance with the provisions of Article 17, except those floor areas separated from the open well by fire separation assemblies conforming to Table 401 and for floor openings meeting the exceptions in Section 620.3.

620.1.2 Use: The floor of the open well shall not be used for other than low fire hazard uses and only approved materials and decorations may be used in the open well space.

Exception: The open well floor area may be used for any approved use when the individual space is provided with an automatic fire suppression system.

620.1.3 Exits: An open well connecting not more than three floor levels may contain an exit as permitted by Section 816.10.

620.1.4 Standby power: All equipment required to provide smoke control shall be provided with standby source of power in compliance with Section 2007.0.

620.1.5 Acceptance of the smoke control system: Before the certificate of occupancy is issued, the smoke control system shall be tested in an approved manner to show compliance with the requirements of this section.

620.1.6 Inspections of the smoke control systems: All operating parts of the smoke control system (including dampers) shall be tested by the owner every three months and a log of the tests shall be kept for examination by the fire department. At six-month intervals the system shall be inspected and operated in accordance with the fire prevention code listed in Appendix A.

620.2 Atriums: Atriums shall be constructed as herein required except atriums connecting not more than two stories shall not be required to be equipped with a smoke control system as indicated in Section 620.2.1. For purposes of this section, the volume of the atrium shall include all spaces not separated from the atrium in accordance with Section 620.2.2.

620.2.1 Smoke control: A smoke control system shall be designed to control the migration of products of combustion in the atrium spaces. A mechanically operated air handling system shall be installed that will exhaust smoke either entering or developed within the atrium. Exhaust openings shall be located in the ceiling or in a smoke trap area immediately adjacent to the ceiling of the atrium. Supply openings sized to provide 50 percent of the exhaust volume shall be located at the lowest level of the atrium.

620.2.1.1 Supply air: When the height of the atrium is 55 feet (16764 mm) or less, supply air may be introduced by gravity provided smoke control is accomplished. When the height of the atrium is more than 55 feet (16764 mm), supply air shall be introduced mechanically from the floor of the atrium and be directed vertically toward the exhaust outlets. In atriums over six stories in height or having open floors above the second story, supplemental supply air may be introduced at upper levels.

620.2.1.2 Exhaust: The atrium smoke control system shall exhaust not less than the following quantities of air:

1. For atriums having a volume of not more than 600,000 cubic feet (16800 m^3), including the volume of any levels not physically separated from the atrium, not less than 40,000 cfm (18.88 m^3/s) nor less than six air changes per hour.
2. For atriums having a volume of more than 600,000 feet (16800 m^3), including the volume of any levels not physically separated from the atrium, not less than four air changes per hour.

620.2.1.3 Smoke detectors: Smoke detectors shall be installed at the perimeter and on the ceiling of the atrium and on the underside of each floor level that is

open to the atrium space. Detectors shall be located in accordance with their listing.

620.2.1.4 Smoke control activation: The smoke control system required for the atrium spaces shall be activated by the fire suppression system, by smoke detectors required by Section 620.2.1.3, and by manual controls provided for fire department use. The system shall not be activated by a manual fire alarm system required by Section 1717.0. Manual controls shall be located in the central control station or other location approved by the fire department. When the smoke control system is activated, other air handling systems which may interfere with its function shall shut off automatically.

620.2.1.5 Other approved methods: Any other approved design which will achieve the same level of smoke control as described in this section may be used in lieu of these requirements.

620.2.2 Enclosure of atriums: Atrium spaces shall be separated from adjacent spaces by a 1 hour fire separation wall as required for corridors.

Exceptions

1. In residential occupancies, openings may be unprotected when the floor area of each guest room or dwelling unit does not exceed 1,000 square feet (93 m^2) and each room or unit has an approved means of egress not entering the atrium.
2. Adjacent spaces may be separated from the atrium by fire windows or by a tempered, wired or laminated glass wall subject to the following:
   a. The glass shall be protected by a specially designed automatic fire sprinkler system. The sprinkler system shall completely wet the entire surface of the glass wall when actuated. When there are walking surfaces on both sides of the glass, both sides of the glass shall be so protected.
   b. The glass shall be in a gasketed frame and installed in such a manner that the framing system may deflect without breaking (loading) the glass before the sprinkler system operates.
   c. Obstructions, such as curtain rods, drapery traverse rods, curtains, drapes or similar materials shall not be installed between the sprinkler heads and the glass.
3. The adjacent spaces of any three floors of the atrium shall not be required to be separated from the atrium; however, these spaces shall be included in the atrium volume according to Section 620.2.

620.2.3 Alarm: In all buildings with an atrium, a fire alarm system shall be required. The alarm shall be initiated by either the fire suppression system or the activation of two or more smoke detectors in the atrium. Such buildings of Use Group A, E or M shall be provided with voice alarms complying with the requirements of Section 618.5.1.

620.2.4 Travel distance: In other than the lowest level of the atrium, when the required means of egress is through the atrium space, the exit access travel distance shall not exceed 150 feet (45720 mm).

620.3 Floor openings: Floor openings including unenclosed supplemental stairways or escalators conforming to Section 2117.3 shall be permitted when protected on every floor pierced by the opening with an approved automatic exhaust system or by other approved smoke control method as herein required to prevent the passage of products of combustion to the story above.

Exceptions

1. Supplemental stairways conforming to Section 816.8.
2. In other than Use Group I, floor openings shall be permitted which serve only one adjacent floor, are not connected with an exit access corridor or openings serving other floors, and are not concealed within the building construction.
3. In buildings having an approved automatic fire suppression system throughout, escalator openings which are protected by a draft curtain and a closed sprinkler water curtain conforming to NFiPA 13 listed in Appendix A.

620.3.1 Smoke control: The approved automatic exhaust system may be a separate unit or integrated with an approved air handling system and shall be thermostatically controlled to operate simultaneously with the detection of fire.

620.3.1.1 Capacity of exhaust system: The exhaust system shall be of adequate capacity to create a controlled draft in the floor opening with sufficient velocity of flow over the entire area of the floor opening under normal conditions of window and door openings in the building.

620.3.1.2 Operation of mechanical system: The exhaust system herein required shall be so arranged as to automatically stop the operation of the normal mechanical air handling and ventilating systems, and close the dampers of the return air duct connections, in the event of fire.

620.3.2 Draftstop: An approved draftstop shall be installed at each story of the floor opening. The draftstop shall enclose the perimeter of the opening and shall extend from the ceiling downward at least 18 inches (457 mm) on all sides. Automatic sprinklers shall be provided around the perimeter of the opening and within 2 feet (610 mm) of the draftstop. The distance between the sprinklers shall not exceed 6 feet (1829 mm) center to center.

SECTION 621.0 MEMBRANE STRUCTURES

621.1 General: The provisions of this section shall apply to air-supported, air-inflated, membrane-covered cable and membrane-covered frame structures, collectively known as membrane structures, erected for a period of 90 days or longer. Those erected for a shorter period of time shall comply with applicable provisions of the fire prevention code listed in Appendix A and Section 612.0.

Exception: Membrane structures covering water storage facilities, water clarifiers, water treatment plants, sewage treatment plants, and similar

facilities not used for human occupancy need meet only the requirements of Section 621.2.2 and Section 621.5.

621.2 Construction requirements: Construction of membrane structures shall comply with Sections 621.2.1 through 621.2.5.

621.2.1 Type of construction: Membrane structures shall be classified as Type 5B construction.

Exceptions

1. All noncombustible membrane structures may be classified as Type 2C construction.
2. Noncombustible frame or cable supported structures covered by an approved membrane per Section 621.2.2 may be classified as Type 2C construction.
3. Heavy timber frame-supported structures covered by an approved membrane per Section 621.2.2 may be classified as Type 3B construction.
4. A noncombustible membrane structure used exclusively as a roof and located more than 20 feet (6096 mm) above any floor, balcony or gallery is deemed to comply with the roof construction for Type 1 and Type 2 construction, provided that such a structure complies with the requirements of this section.

621.2.2 Membrane material: Membranes shall be either noncombustible as defined by Section 1403.4, or flame resistant conforming to NFiPA 701 listed in Appendix A.

Exception: Plastic less than 20 mil thickness used in greenhouses and for aquaculture pond covers need not be flame-resistant.

621.2.3 Applicability of other provisions: Except as specifically otherwise required by this section, membrane structures shall meet all applicable provisions of this code. The membrane shall meet roof covering requirements of Section 1427.3.

621.2.4 Allowable floor areas: The area of a membrane structure shall not exceed the limits set forth in Table 501, except as provided in Section 502.0.

621.2.5 Maximum height: Membrane structures shall not exceed one story nor shall they exceed the height limits in feet set forth in Table 501.

Exception: Noncombustible membrane structures serving as roof construction only.

621.3 Inflation systems: Air-supported and air-inflated structures shall be provided with primary and auxiliary inflation systems to meet the minimum requirements of Sections 621.3.1 and 621.3.2.

621.3.1 Equipment requirements: The inflation system shall consist of one or more blowers and shall include provisions for automatic control to maintain the required inflation pressures. The system shall be so designed as to prevent overpressurization of the system.

In addition to the primary inflation system, in buildings exceeding 1,500

square feet (140 m^2) in area, an auxiliary inflation system shall be provided with sufficient capacity to maintain the inflation of the structure in case of primary system failure. The auxiliary inflation system shall operate automatically if there is a loss of internal pressure or if the primary blower system becomes inoperative.

Blower equipment shall meet the following requirements:

1. Blowers shall be powered by continuous rated motors at the maximum power required for any flow condition as required by the structural design.
2. Blowers shall be provided with inlet screens, belt guards and other protective devices as may be required by the building official to provide protection from injury.
3. Blowers shall be housed within a weather-protecting structure.
4. Blowers shall be equipped with backdraft check dampers to minimize air loss when inoperative.
5. Blower inlets shall be located to provide protection from air contamination. Location of inlets shall be approved by the building official.

621.3.2 Standby power: Whenever an auxiliary inflation system is required, an approved standby power generating system shall be provided. The system shall be equipped with a suitable means for automatically starting the generator set upon failure of the normal electrical service and for automatic transfer and operation of all the required electrical functions at full power within 60 seconds of such normal service failure. Standby power shall be capable of operating independently for a minimum of 4 hours.

621.4 Support provisions: A system capable of supporting the membrane in the event of deflation shall be provided in all air-supported and air-inflated structures having an occupant load of more than 50 or when covering a swimming pool regardless of occupant load. Such system shall maintain the membrane at least 7 feet (2134 mm) above the floor, seating area or surface of the water.

Exception: Membrane structures used as a roof for Type 1 or Type 2 construction shall be maintained not less than 20 feet (6096 mm) above floor or seating areas.

621.5 Engineering design: All membrane structures shall be structurally designed in accordance with criteria approved by the building official and developed by an engineer or architect licensed by the state to practice as such.

SECTION 622.0 MEZZANINES

622.1 General: A mezzanine or mezzanines in compliance with this section shall be considered a portion of the floor below. Such mezzanines shall not contribute to the building area as regulated by Section 501.2. Such mezzanines shall not contribute to the number of stories or height as regulated by Section 501.3.

622.2 Area limit: The aggregate area of a mezzanine or mezzanines within a story shall not exceed one-third of the area of that story.

Exception: Buildings and structures for special industrial uses according to Section 305.3.1 when of Types 1 or 2 construction may have mezzanines which do not exceed two-thirds of the area of that story.

622.3 Egress: Each occupant of a mezzanine with an occupant load of more than 50 or in which the travel distance to an exit exceeds 75 feet (22860 mm) shall have access to at least two independent means of egress.

ARTICLE 7

INTERIOR ENVIRONMENTAL REQUIREMENTS

SECTION 700.0 GENERAL

700.1 Scope: The provisions of this article shall govern the means of light, ventilation and sound transmission control required in all buildings intended for human occupancy. Every building and structure hereafter erected and every building room or space which is changed in use shall be constructed, arranged and equipped to conform to the requirements of this article.

700.2 Buildings on same lot: If more than one building is hereafter placed on a lot, or if a building is placed on the same lot with existing buildings, the several buildings may be treated as a single structure for the purpose of this article, provided equivalent uncovered lot area or other adequate sources of light and ventilation are furnished for all buildings intended for human occupancy.

SECTION 701.0 PLANS AND SPECIFICATIONS

701.1 General: Plans for all buildings and structures other than buildings of Use Groups R-2, R-3, and I-1 which are designed for human occupancy shall designate the number of occupants to be accommodated in the various rooms and spaces, and when means of artificial lighting and ventilation are required, the application shall include sufficient details and description of the mechanical system to be installed as herein required or as specified in the mechanical code listed in Appendix A.

SECTION 702.0 EXISTING BUILDINGS

Deleted by the Kentucky Department of Housing, Buildings and Construction.

SECTION 703.0 LIGHT AND VENTILATION REQUIRED

703.1 Light required: Every room or space intended for human occupancy shall be provided with natural or artificial light.

703.1.1 Bathroom and toilet room lighting: Every bathroom and toilet room shall be provided with artificial light. The illumination shall have an average

intensity of 3 foot candles (32.29 lux) measured at a level of 30 inches (762 mm) above the floor.

703.2 Ventilation required: Every room or space intended for human occupancy shall be provided with natural or mechanical ventilation.

SECTION 704.0 STANDARDS OF NATURAL LIGHT

704.1 General: In the application of the provisions of this article, the standard of natural light for all habitable and occupiable rooms, unless otherwise specifically required by the provisions of Article 6 for special uses and occupancies, shall be based on 250 foot candles (2691 lux) of illumination on the vertical plane adjacent to the exterior of the light transmitting device in the enclosure wall and shall be adequate to provide an average illumination of 6 foot candles (64.58 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

704.2 Minimum glazing area: Every room or space intended for human occupancy shall have an exterior glazing area of not less than 8 percent of the floor area. Natural light may be provided by glazing areas which open onto courts or yards which comply with the requirements of Sections 710.0, 711.0 and 712.0.

704.2.1 Adjoining spaces: Natural light for rooms or spaces without exterior glazing areas may be through an adjoining room. The unobstructed opening to the adjoining room shall be at least 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.33 m^2). The exterior glazing area shall be based on the total floor area being served.

704.3 Stairways: Interior stairways shall be provided with an exterior glazing area of not less than 10 square feet (0.93 m^2) on every floor through which the stairway passes.

704.4 Hallways: Natural light shall be capable of penetrating the full length of the hallway.

SECTION 705.0 ARTIFICIAL LIGHT

705.1 General: Artificial light shall be capable of providing a minimum illumination as specified for natural light.

SECTION 706.0 NATURAL VENTILATION

706.1 General: Natural ventilation of an occupied space shall be through windows, doors, louvres or other natural openings to the outdoor air.

706.2 Ventilation area required: The minimum openable area to the outdoors shall be 4 percent of the floor area being ventilated.

706.2.1 Adjoining spaces: Rooms and spaces without openings to the outdoors may be ventilated through an adjoining room. The unobstructed opening to the adjoining rooms shall be at least 8 percent of the floor area of

the interior room or space, but not less than 25 square feet (2.33 m^2). The ventilation openings to the outdoors shall be based on the total floor area being ventilated.

706.2.2 Openings below grade: Openings below grade shall be acceptable for natural ventilation provided the outside horizontal clear space measured perpendicular to the opening is one and one-half times the depth below the average adjoining grade.

706.3 Contaminants exhausted: Contaminants in the breathing atmosphere shall be exhausted to the outdoor air in accordance with the mechanical code listed in Appendix A.

706.4 Openings on yards or courts: Natural ventilation may be provided by openings onto yards or courts which comply with the requirements of Sections 710.0, 711.0 and 712.0.

706.5 LPG distribution facilities: Liquefied petroleum gas distribution facilities shall be provided with air inlets and outlets arranged so that air movement across the floor of the facility will be as uniform as possible. The total area of both inlet and outlet openings shall be at least 1 square inch (0.00065 m^2) for each square foot (0.093 m^2) of floor area. The bottom of such openings shall not be more than 6 inches (152 mm) above the floor.

SECTION 707.0 MECHANICAL VENTILATION

707.1 General: Mechanical ventilation shall conform to the requirements of the mechanical code listed in Appendix A.

SECTION 708.0 ROOM DIMENSIONS

708.1 Ceiling heights: Habitable (spaces) rooms, other than kitchens, storage rooms and laundry rooms shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Hallways, corridors, bathrooms, toilet rooms, kitchens and habitable basements for use as a recreation room only shall have a ceiling height of not less than 7 feet (2134 mm) measured to the lowest projection from the ceiling.

A clear height from finished floor to ceiling or lowest projection of not less than 7 feet 6 inches (2286 mm) shall be provided in all exit access and occupiable rooms of structures of Use Group A, B, E or M.

If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in only one-half the area thereof. Any portion of the room measuring less than 5 feet (1524 mm) from the finished floor to the finished ceiling shall not be included in any computation of the minimum area thereof.

If any room has a furred ceiling, the prescribed ceiling height is required in two-thirds of the area thereof, but the height of the furred ceiling shall not be less than 7 feet (2134 mm).

Exception: In buildings of Use Group R-3, beams and girders spaced not less than 4 feet (1219 mm) on center may project not more than 6 inches (152 mm) below the required ceiling height.

708.2 Floor area: Every dwelling unit shall have at least one room which shall have not less than 150 square feet (13.95 m^2) of floor area. Other habitable rooms except kitchens shall have an area of not less than 70 square feet (6.51 m^2).

708.3 Width: A habitable room other than a kitchen shall not be less than 7 feet (2134 mm) in any dimension.

SECTION 709.0 VENTILATION OF SPECIAL SPACES

709.1 Roof spaces: Enclosed attics and enclosed rafter spaces formed where ceilings are applied direct to the underside of roof rafters, shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. The openings shall be covered with corrosion resistant mesh not less than ¼ inch (6 mm) nor more than ½ inch (13 mm) in any direction.

709.1.1 Ventilating area: The net free ventilating area shall be not less than $^1/_{150}$ of the area of the space ventilated, except that the area may be $^1/_{300}$ provided at least 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.

709.2 Crawl spaces: Crawl space areas in which the first floor construction does not bear directly on the ground shall be provided with a space under the first floor not less than 18 inches (457 mm) in depth. Crawl space areas, other than those used as an underfloor plenum, shall be ventilated by an approved mechanical means or by openings in exterior foundation walls. Openings shall be located as close to corners as practicable and shall provide cross ventilation on at least two approximately opposite sides. The openings shall be covered with corrosion resistant mesh not less than ¼ inch (6 mm) nor more than ½ inch (13 mm) in any direction.

709.2.1 Opening size: Openings shall have a net area of not less than 1 square foot (0.093 m^2) for each 150 square feet (13.95 m^2) of foundation space. Where an approved vapor barrier is installed over the ground surface, the required net area of openings may be reduced to 10 percent of the above and vents may have manually operable louvers.

709.3 Alternative mechanical ventilation: Enclosed attic, rafter and crawl spaces may be equipped with a mechanical ventilation system conforming to the requirements of the mechanical code listed in Appendix A.

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SECTION 710.0 COURTS

710.1 General: All courts required to serve rooms for natural light or ventilation purposes shall comply with the requirements of this section.

710.2 Minimum width: Every such court shall have a minimum width of 3 inches (76 mm) for each foot (305 mm) of height or fraction thereof, but not

less than 5 feet (1524 mm) for outer courts and twice these values for inner courts.

710.2.1 Irregular court width: In the case of irregular or gore shaped courts, the required minimum width of a court may be deemed to be the average width, provided that such a court shall not be less than 5 feet (1524 mm) at any point.

710.3 Area of court: The cross-sectional area of a required court shall be not less than one and one-half times the square of its width; nor shall the length of any court be more than twice its width.

710.4 Access to court: A door or other means of access shall be provided at the bottom of every court that is not otherwise conveniently accessible for purposes of cleaning.

710.5 Air intakes: Every court serving one or more habitable rooms that does not open for its full height on one or more sides to a street or legal yard shall be connected at or near the bottom with a street or yard by a horizontal intake or passage of fireresistive construction. Such intake or passage shall have a cross-sectional area of not less than 21 square feet (1.95 m^2) and shall remain fully open at both ends and unobstructed for its full size and length, except that grilles of noncombustible construction complying with the approved rules may be permitted at the ends of the intake.

710.5.1 Fireresistance rating: The walls, floors and ceilings of such intakes or passages shall have a fireresistance rating of not less than 2 hours in buildings of Types 1, 2, 3 or 4 construction and not less than 1 hour in Type 5 construction.

710.6 Court walls: When, in the opinion of the building official, windows facing on courts do not receive adequate direct light by reason of peculiar arrangement or orientation, the building official may require the walls to be constructed of light colored masonry, or to be painted and maintained a light color to furnish additional reflected light.

710.7 Court drainage: The bottom of every court shall be properly graded and drained to a public sewer or other approved disposal system complying with the plumbing code listed in Appendix A; and shall be paved with concrete or other nonabsorbent material when required by the building official.

SECTION 711.0 REAR YARDS

711.1 Use Groups R and I: At the rear of every building hereafter erected to be occupied as Use Group R-2, R-3 or I, there shall be maintained a yard of the minimum dimensions herein prescribed. When such yard serves as a required light and ventilation court, its minimum dimensions shall be those required for a court in this article.

711.1.1 Depth of yards: The depth of a required yard between the extreme rear of the building and the rear lot line shall be not less than 15 feet (4572 mm) at any point for a height of 35 feet (10668 mm), and shall increase 4

inches (102 mm) in depth for each additional foot (305 mm) of height above that limit. For a corner lot, the minimum depth shall be not less than 10 feet (3048 mm). When the lot is less than 65 feet (19812 mm) in depth, the required yard may be diminished 6 inches (152 mm) in depth for each foot (305 mm) less than 65 feet (19812 mm).

711.2 Other use groups: In buildings of other than Use Group R-2, R-3 or I, rear yards shall be provided to serve all habitable and occupiable rooms requiring light and ventilation from such source. The lowest level of such yards shall begin at the sill level of the second story windows, with a depth of not less than 10 feet (3048 mm) for a height of 35 feet (10668 mm) and shall increase 3 inches (76 mm) for each additional foot (305 mm) of height above that level.

SECTION 712.0 OBSTRUCTION OF COURTS AND YARDS

712.1 Permissible projections: Every required court and yard shall remain unobstructed for its required area and full height, except for the projections permitted in Section 508.0. In Use Groups R and I, clothes poles, arbors, garden trellises and other such accessories shall not be prohibited in the open spaces at ground level.

712.2 Motor vehicle parking: When approved by the building official, required court and yard areas may be used for automobile parking spaces or private garages not exceeding one story in height when accessory to and only for the use of the occupants of a Use Group R building provided required windows for light and ventilation are not obstructed thereby.

SECTION 713.0 FIRE EMERGENCY VENTILATING SYSTEM

713.1 Where required: Fire emergency ventilating systems shall be provided in buildings of the use groups described in Sections 713.1.1 and 713.1.2.

713.1.1 Use Groups I, R-1 and R-2: In the corridors of buildings of Use Groups I, R-1 and R-2 which exceed 3 stories or 40 feet (12192 mm) in height, and exceed 10,000 square feet (930 m^2) in floor area, and are occupied by more than 50 persons above the first floor or have more than 25 sleeping rooms above the first floor.

713.1.2 Use Group F: In the corridors of all fully enclosed buildings of Use Group F without provision of exterior openings for ventilation purposes.

713.2 Systems: In all buildings and structures herein required to have fire emergency ventilating systems, the corridors shall be constructed with vertical fire vent stacks and lateral fire vent ducts as herein provided, or windows to the outer air, or mechanical ventilating or exhaust systems, or other equivalent approved means for dissipating smoke, heated air and toxic gases directly to the outer air in the event of fire.

713.3 Vent stacks and vent ducts: Where vertical fire vent stacks and lateral fire vent ducts are used, they shall be constructed in accordance with Sections 713.3.1 through 713.3.3.

713.3.1 Fire vent ducts: When the corridors and exits are not ventilated by windows opening directly to the outer air, a system of collecting fire ducts shall be provided in each story of aggregate size to remove the smoke, hot air and noxious fumes or gases in event of fire. Each duct shall be not less than 1 square foot (0.093 m^2) in area located in the corridors, with screened openings complying with the approved rules, constructed as provided for hot air ducts in the mechanical code listed in Appendix A.

713.3.1.1 Thermostatic operation: When not connected to a vent stack, the inlet openings on each story shall be controlled by automatic heat operated devices as required in Section 1410.3 and in accordance with the approved rules.

713.3.2 Fire vent stacks: When the fire ducts do not discharge directly to the outer air in each story, one or more fire vent stacks of adequate capacity shall be installed to accommodate the discharge from the fire duct system in any one floor or enclosed fire area, but an individual stack shall not be less than 4 square feet (0.37 m^2) in area, and all stacks shall terminate in an approved automatic cowl or ventilator outlet above the roof.

713.3.2.1 Location of stacks: The vent stack shall be located in as central a position as practicable with respect to the floor area vented thereby, preferably in the vicinity of vertical shafts, and shall extend continuously to the roof.

713.3.2.2 Vent control of stacks: The vent control of the vertical stacks shall consist of approved noncombustible dampers, shutters, or glazed metal sash designed to open outwardly, located not less than 20 feet (6096 mm) distant from window openings or exit doors in adjoining walls, and shall be equipped with a thermostatic unit arranged to open at a predetermined rate of temperature rise in accordance with the approved rules. Auxiliary mechanical means for manual operation of all vent controls shall be provided in an accessible location designated by the building official.

713.3.2.3 Stack construction: The enclosure shall be constructed to be vapor- and smoke-tight with walls of not less than 2 hour fireresistance rating, and without openings other than the fire duct inlets and the top automatic ventilator outlet.

713.3.3 Mechanical exhaust systems: When mechanical exhaust is required to operate the emergency ventilating system either in horizontal ducts or vertical vent stacks, the installation shall be thermostatically controlled and installed in accordance with the provisions of the mechanical code listed in Appendix A and the approved rules.

SECTION 714.0 WINDOW CLEANING SAFEGUARDS

714.1 General: All buildings and structures over 50 feet (15240 mm) or four stories in height, in which the windows are cleaned from the outside, shall be provided with anchors or other approved safety devices for all window openings. Such anchors, belt terminals or other devices shall be of approved design, and constructed of corrosion-resistive materials securely attached to

the window frames or anchored in the enclosure walls of the building. Cast iron or cast bronze anchors shall be prohibited.

SECTION 715.0 SOUND TRANSMISSION CONTROL IN RESIDENTIAL BUILDINGS

715.1 Scope: This section shall apply to all common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units or between a dwelling unit and adjacent public areas such as halls, corridors, stairs or service areas in all buildings of Use Group R.

715.2 Airborne noise: Walls, partitions and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 45 for airborne noise when tested in accordance with ASTM E90 listed in Appendix A. This requirement shall not apply to dwelling unit entrance doors, but such doors shall be tight-fitting to the frame and sill.

715.3 Structure borne sound: Floor/ceiling assemblies between dwelling units and between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 45 when tested in accordance with ASTM E492 listed in Appendix A.

715.4 Tested assemblies: Assemblies of building construction listed in GA 600, NCMA TEK 69A and BIA TN 5A listed in Appendix A may be accepted as having the STC and IIC ratings specified therein for determining compliance with the requirements of this section.

ARTICLE 8

MEANS OF EGRESS

SECTION 800.0 GENERAL

800.1 Scope: The provisions of this article shall control the design, construction and arrangement of building elements required to provide a reasonably safe means of egress from all buildings and structures hereafter erected, and from all buildings hereafter altered to a new occupant load, or manner of use, or inherent fire hazard.

800.2 Modification of egress requirements: When strict compliance with the provisions of this code is not practical, the building official may accept alternate means of egress which will accomplish the same purpose, by the procedure established in Article 1 for modification of this code, or by adoption of approved rules. Existing buildings shall not be occupied during repairs or alterations unless all existing means of egress and any existing fire protection are continuously maintained, or in lieu thereof, other measures are taken which provide equivalent safety.

800.3 Minimum requirements: It shall be unlawful to alter any building or structure in any manner that will reduce the number of exits or the capacity of exits below the requirements of this code for new buildings of the proposed use and occupancy.

SECTION 801.0 PLANS AND SPECIFICATIONS

801.1 Arrangement of egress: The plans shall show in sufficient detail the location, construction, size and character of all exits together with the arrangement of aisles, corridors, passageways and hallways leading thereto in compliance with the provisions of this code.

801.2 Number of occupants: In other than buildings of Use Groups R-2, R-3 and I-1, the plans and the application for a permit shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces when required by the building official. When not otherwise specified, the minimum number of occupants to be accommodated by the exits shall be determined by the occupant load prescribed in Section 806.0. The posted occupant load of the building shall be limited to that number.

SECTION 802.0 USE AND OCCUPANCY REQUIREMENTS

802.1 New buildings: Every building and structure and part thereof hereafter erected shall have the prescribed number of exits of one or more of the approved types defined in this article. Exits, in combination with the exit access and exit discharge, shall provide safe and continuous means of egress to a street or to an open space with direct access to a street.

802.2 Mixed use groups: In buildings classified in more than one use group, each fire area shall be considered separately in determining the required number, capacity, size and construction of all exits.

802.3 Multiple tenants: When more than one tenant occupies any one floor of a building or structure, each tenant shall be provided with direct access to approved exits.

SECTION 803.0 PROHIBITED USE

803.1 General: Exits and exit access corridors shall not be used as supply or return air ducts or plenums.

Exception: The space between the corridor ceiling and the floor or roof structure above may be used as a return air plenum when the corridor is not required to be of fireresistance rated construction or when the corridor is separated from the plenum by fireresistance rated construction.

SECTION 804.0 EXISTING BUILDINGS

Deleted by the Kentucky Department of Housing, Buildings and Construction.

SECTION 805.0 MAINTENANCE OF EXITS

805.1 Obstructions: It shall be unlawful to obstruct, or reduce in any manner, the clear width of any doorway, hallway, passageway or other means of egress required by the provisions of this code.

805.2 Maintenance: All exterior stairways and fire escapes shall be kept free of snow and ice. They shall be properly painted before and after erection; and shall be scraped and painted as often as necessary to maintain them in safe condition.

SECTION 806.0 OCCUPANT LOAD

806.1 Design occupant load: In determining required facilities, the number of occupants for whom exit facilities shall be provided shall be established by the largest number computed in accordance with each of Sections 806.1.1 through 806.1.3.

806.1.1 Actual number: The actual number of occupants for whom each occupied space, floor, or building, as the case may be, is designed for.

806.1.2 Number by Table 806: The number of occupants computed at the rate of one occupant per unit of area as prescribed in Table 806.

806.1.3 Number by combination: The number of occupants of any space as computed in Sections 806.1.1 or 806.1.2 plus the number of occupants similarly computed for all spaces that discharge through the space in order to gain access to an exit.

806.1.4 Increased occupant load: The occupant load permitted in any building or portion thereof may be increased from that number established for the given use by Table 806 when all other requirements of the code are also met based on such modified number. The building official may require an approved aisle, seating, or fixed equipment diagram to substantiate any increase in occupant load and may require that such diagram be posted.

806.1.5 Maximum occupant load: The occupant load of any space or portion thereof shall not exceed one occupant per 3 square feet (0.28 m^2) of occupiable floor space.

806.1.6 Fixed seats: The occupant load for an assembly or educational area having fixed seats shall be determined by the number of fixed seats installed.

806.2 Mezzanine levels: The occupant load of a mezzanine level discharging through a floor below shall be added to that floor's occupant load, and the capacity of the exits shall be designed for the total occupant load thus established.

806.3 Roofs: Roof areas occupied as roof gardens or for assembly, educational, storage or other purposes shall be provided with exit facilities to accommodate the required occupant load, but there shall not be less than two approved means of egress from roof areas of Use Groups A and E.

806.4 Special or unlisted occupancies: Where data regarding the square feet per person for an occupancy is not listed in Table 806, the occupant load shall be established by the architect or engineer, subject to the approval of the building official.

806.5 Conflicts: When there are special requirements for specific occupancies and uses which differ from general requirements herein prescribed, such special provisions shall take precedence.

806.6 Nonsimultaneous occupancy: The occupant load of toilets, locker rooms, meeting rooms, storage rooms, employee cafeterias, and similar rooms or spaces that are not occupied at the same time as other rooms or spaces on the same floor of a building, may be omitted from the occupant load calculation of the floor on which they are located, to the extent that such spaces only serve occupied rooms on the same floor.

806.7 Modifications: The modifications indicated in Sections 806.7.1 and 806.7.2 may be used in determining the occupant load.

806.7.1 Approved alternative basis: When the actual occupant load of any space will be significantly different than that determined by Table 806, the building official may establish an alternative basis for the determination of the occupant load. The space occupied by permanent fixtures or displays may serve to reduce the occupant load.

Table 806
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

Use	Floor area in square feet per occupant
Assembly with fixed seats	See Section 806.1.6
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
Standing space	3 net
Unconcentrated (tables and chairs)	15 net
Bowling alleys, allow 5 persons for each alley including 15 feet of runway, and for additional areas	7 net
Business areas	100 gross
Court rooms—other than fixed seating areas	40 net
Educational	
Classroom area	20 net
Shops and other vocational room areas	50 net
Industrial areas	200 gross
Institutional areas	
Inpatient treatment areas	240 gross
Outpatient areas	100 gross
Sleeping areas	80 gross
Library	
Reading rooms	50 net
Stack area	100 gross
Mercantile, basement and grade floor areas	30 gross
Areas on other floors	60 gross
Storage, shipping areas	100 gross
Parking garages	200 gross
Residential	200 gross
Storage areas, mechanical equipment room	300 gross

Note a. 1 foot = 304.8 mm; 1 square foot = 0.093 m^2.

806.7.2 Change in use or occupancy: When a building is altered or changed in occupancy or use so as to require enlarged exit facilities, the building official may authorize the alteration or change in occupancy or use without an enlargement of exit facilities, provided the occupant load is limited to that accommodated by the existing exit facilities as determined by the provisions of this code, and the building or space is posted as required in Section 122.0.

SECTION 807.0 TYPES AND LOCATION OF MEANS OF EGRESS

807.1 General: All approved exits, including doorways, passageways, corridors, interior stairways, exterior stairways, escalators, smokeproof enclosures, ramps, horizontal exits, bridges, balconies, fire escapes and combinations thereof shall be arranged and constructed as provided in this code.

807.2 Arrangement: All required exits shall be so located as to be discernable and accessible with unobstructed access thereto; and so arranged as to lead directly to the street or to an area of refuge with supplemental means of egress that will not be obstructed or impaired by fire, smoke or other cause.

807.2.1 Exit discharge: All exits shall discharge directly at a public way or at a

yard, court or open space of the required width and size to provide all occupants with a safe access to a public way.

807.2.2 Egress through adjoining spaces: Egress from a room or space may open into an adjoining or intervening room or area, provided such adjoining room is accessory to the area served, is not of a higher hazard than the room or space from which egress is made and provides a direct means of egress to an exit. A maximum of one exit access shall be permitted to pass through a kitchen, storeroom, restroom, closet or similar space provided that it is not the only means of access to an exit. An exit access shall not pass through a room subject to locking.

Table 807
LENGTH OF EXIT ACCESS TRAVEL [in feet[b]] [a]

Use group	Without fire suppression system	With fire suppression system
A	150	200
B	200	300
E	150	200
F	200	300
H	—	75
I	100	200
M	100	150
R	100	150
S-1	200	300
S-2	300	400

Note a. See the following sections for travel distance requirements for special uses.
Section 504.4: The maximum length of exit access travel in unlimited area buildings shall be 400 feet.
Section 618.3.1.4.6: The exit access travel distance set forth in Table 807 may be increased to 300 feet in high-rise buildings under the automatic fire suppression system alternatives.
Section 619.4.1: The maximum length of exit access travel from any point within a covered mall to an approved exit shall not exceed 200 feet.
Section 809.5: The maximum distance from any point on a parking tier to an exit in open parking structures shall be 300 feet.
Note b. 1 foot = 304.8 mm.

807.2.3 Assembly buildings: All buildings used for assembly purposes shall front on at least one street on which the main entrance and exit discharge shall be located.

807.2.4 Skating rinks: Places of assembly used for the purposes of skating rinks shall not be located below the floor nearest grade.

807.2.5 Foyer: In every theater or similar place of public assembly, not including churches, for theatrical use with stage and scenery loft, a foyer or lobby shall be provided with a net floor area, exclusive of stairs or landings, of not less than 1½ square feet (0.14 m²) for each occupant having access thereto. The use of foyers and lobbies and other available spaces for harboring occupants until seats become available shall not encroach upon the clear floor area herein prescribed or upon the required clear width of front exits.

807.2.5.1 Egress: When the foyer is not directly connected to the public street through the main lobby, an unobstructed corridor or passage shall be provided which leads to, and equals the required minimum width of, main

entrances and exits. A mirror shall not be placed so as to give the appearance of a doorway, exit or passageway.

807.2.5.2 Gradient: The rear foyer shall be at the same level as the back of the auditorium and the means of egress leading therefrom shall not have a steeper gradient than one unit vertical in eight units horizontal (1:8).

807.2.5.3 Construction: The partitions separating the foyer from the auditorium and other adjoining rooms and spaces of theaters shall be constructed of not less than 2 hour fireresistance rating. Opening protectives may be constructed of noncombustible materials without fireresistance rating.

807.2.5.4 Waiting spaces: Waiting spaces for harboring occupants shall be located only on the first or auditorium floor. Separate exits in addition to the required theater exits shall be provided from the waiting space based on an occupancy of one person for each 3 square feet (0.28 m^2) of waiting space area.

807.3 Remote location: Whenever more than one exit is required from any room, space or floor of a building, they shall be placed as remote from each other as practicable, and shall be arranged and constructed to provide direct access in separate directions from any point in the area served so as to minimize the possibility that both may be blocked by any one fire or other emergency condition.

807.4 Length of travel: Except as modified by provisions of Section 809.3 for buildings with one exit, all exits shall be so located that the maximum length of exit access travel, measured from the most remote point to an approved exit along the natural and unobstructed line of travel, shall not exceed the distances given in Table 807; except where the area is subdivided into rooms or compartments, and the egress travel in the room or compartment is not greater than 50 feet (15240 mm) or 100 feet (30480 mm) in use groups equipped with an automatic fire suppression system, the distance shall be measured from the exit access entrance to the nearest exit.

807.5 Elevators: Elevators shall not be accepted as a required element of the means of egress.

SECTION 808.0 CAPACITY OF EXITS

808.1 General: The capacity of means of egress for a floor, balcony, tier or other occupied space shall be sufficient for the occupant load thereof.

808.2 Unit of egress width: The unit of egress width for all approved types of means of egress parts and facilities shall be 22 inches (559 mm) with a credit of one-half unit for each 12 inches (305 mm) width in addition to one or more 22 inch (559 mm) units. Fractions of a unit of width less than 12 inches (305 mm) shall not be credited.

808.3 Design allowance for use groups: Except as may be specifically modified in Article 6, the design capacity per unit of egress width shall be computed in accordance with Table 808 for the specified use groups.

Table 808
CAPACITY PER UNIT EGRESS WIDTH

Use group	Without fire suppression system Number of occupants		With fire suppression system Number of occupants	
	Stairways	Doors, ramps and corridors	Stairways	Doors, ramps and corridors
A	75	100	113	150
B	60	100	90	150
E	75	100	113	150
F	60	100	90	150
H	—	—	60	100
I-1	60	100	90	100
I-2	22	30	33	45
I-3	60	100	90	150
M	60	100	90	150
R	75	100	113	150
S	60	100	90	150

808.3.1 Main exit: Every assembly and educational use shall be provided with a main exit. The main exit shall be of sufficient width to accomodate one-half of the total occupant load but shall be not less than the total required width of all aisles, exit passageways, and stairways leading thereto and shall be at the level of exit discharge or shall connect to a stairway or ramp leading to a street.

Exceptions

1. A bowling establishment shall have a main exit of sufficient capacity to accommodate 50 percent of the total occupant load without regard to the number of aisles which it serves.
2. In assembly uses such as stadiums, sports arenas, and passenger stations, exits may be distributed around the perimeter of the building provided the total exit width provides 116 2/3 percent of the width needed to accommodate the permitted occupant load.

808.3.1.1 Other exits: Each level of an assembly and educational use shall have access to the main exit and shall be provided with exits of sufficient width to accommodate two-thirds of the total occupant load served by that level. Such exits shall discharge directly to a street or into an exit court, enclosed stairway, outside stairway, or exit passageway leading to a street. Such exits shall be located as far apart as practicable and as far from the main exit as practicable. Such exits shall be accessible from a cross aisle or a side aisle.

Exception: Where only two exits are required, each exit shall be of sufficient width to accommodate not less than one-half the total occupant load.

808.4 Exit design per floor: Where exits serve more than one floor, only the occupant load of each floor considered individually need be used in computing the capacity of the exits at that floor, provided that the exit capacity shall not decrease in the direction of egress travel.

808.5 Egress convergence: When means of egress from floors above and below converge at an intermediate floor, the capacity of the means of egress from the point of convergence shall not be less than the sum of the two.

SECTION 809.0 NUMBER OF EXITS

809.1 General: The following general requirements apply to buildings of all use groups. More restrictive requirements that may be provided in Article 6 for special uses and occupancies shall take precedence over the general provisions of this section.

809.2 Minimum number: Every floor area shall be provided the minimum number of approved independent exits as required by Table 809.2 based on the occupant load, except as modified in Section 809.3.

Table 809.2
MINIMUM NUMBER OF EXITS FOR OCCUPANT LOAD

Occupant load	Minimum number of exits
500 or less	2
501 - 1,000	3
over 1,000	4

809.3 Buildings with one exit: Only one exit shall be required in buildings of Use Group R-3 and in buildings of the use groups and characteristics specified in Table 809.3; and in stories at the level of exit discharge having an occupant load not exceeding 50 persons and an exit access travel distance not exceeding 75 feet (22860 mm).

Table 809.3
BUILDINGS WITH ONE EXIT[a]

Use group	Max. height above grade	Max. size	Max. exit access travel distance	Min. fire-resistance rating of exit enclosure	Min. fire-resistance rating of opening protection
R-2	2 stories	4 dwelling units per floor	50 ft.	1 hour	1 hour
B and S-2	2 stories	3,500 sq. ft. per floor	75 ft.	1 hour	1 hour

Note a. Open parking structures shall have the number of exits prescribed in Section 809.5.
Note b. 1 foot = 304.8 mm; 1 square foot = 0.093 m^2.

809.4 Emergency escape: Every sleeping room below the fourth story in buildings of Use Groups R and I-1 shall have at least one operable window or exterior door approved for emergency egress or rescue. The units must be operable from the inside opening without the use of separate tools. Where windows are provided as a means of egress or rescue, they shall have a sill height not more than 44 inches (1118 mm) above the floor. All egress or rescue windows from sleeping rooms must have a minimum net clear opening of 5.7

square feet (0.53 m^2). The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm).

Bars, grilles or screens placed over emergency escape windows shall be releasable or removable from the inside without the use of a key, tool or excessive force.

Exceptions

1. Grade floor windows may have a minimum net clear opening of 5 square feet (0.47 m^2).
2. In buildings of Use Group R-3, where the sleeping room is provided with a door to a corridor having access to two remote exits in opposite directions, then an outside window or an exterior door for emergency escape from each such sleeping room is not required.
3. Egress windows located on the first and second stories in multiple family dwellings (R-2 and R-3 Use Groups) and one (1) and two (2) family dwellings, may have a minimum net clear opening height dimension of twenty-two (22) inches and a minimum width dimension of twenty (20) inches; and the net clear opening area may be reduced to no less than four (4) square feet. The minimum total glazed area must be five (5) square feet in the case of a ground floor window and not less than five and seven-tenths (5.7) square feet in the case of a second story window. (This exception applies only if the sash frames can be readily broken or removed). Not applicable for HUD projects.

809.5 Open parking structures: Parking structures shall have not less than two exits from each parking tier, except that where vehicles are mechanically parked, only one exit need be provided. The maximum distance from any point on a parking tier to an exit at that tier shall not exceed 300 feet (91440 mm). Unenclosed vehicle ramps may be considered as required exits if pedestrian facilities are provided. Interior exit stairways need not be enclosed.

SECTION 810.0 EXIT ACCESS PASSAGEWAYS AND CORRIDORS

810.1 Access passageway: Direct exit access shall be provided to required exits through continuous passageways, aisles or corridors, conveniently accessible to all occupants and maintained free of obstruction.

810.1.1 Turnstiles and gates: Access through turnstiles, gates, rails or similar devices shall not be permitted unless such a device is equipped to readily swing in the direction of exit travel under a total force of not more than 15 pounds (73.23 N).

810.1.2 Restrictions: The required width of passageways, aisles or corridors shall be maintained free of projections and restrictions; except doors opening into such spaces may reduce the clear width to not less than one-half the required width. When fully open the door shall not project more than 7 inches (178 mm) into the required width.

810.2 Dead ends: Exit access passageways and corridors in all stories which serve more than one exit shall provide direct connection to such exits in opposite directions from any point in the passageway or corridor, insofar as practicable. The length of a dead end corridor shall not be more than 20 feet (6096 mm).

810.3 Width: The width of passageways, aisles and corridors shall be that width required for the capacity as determined by Section 808.0 but not less than 44 inches (1118 mm).

Exceptions

1. In buildings of Use Group I used for the movement of beds, the minimum width shall be 96 inches (2438 mm).
2. In buildings of Use Groups A-4 and E with more than 100 occupants, the minimum width shall be 72 inches (1829 mm).
3. The minimum width may be reduced to 36 inches (914 mm) when servicing an occupant load of 50 or less.
4. Aisles conforming to Section 826.0.

810.4 Enclosures: All corridors serving as exit access, except those contained within a dwelling unit, shall be enclosed in fire separation walls having a fireresistance rating of at least 1 hour.

Exception: In all uses except Use Groups R-1 and R-2, exit access corridors serving 30 or fewer occupants may have a zero fireresistance rating.

810.4.1 Automatic fire suppression system alternatives: When an approved automatic fire suppression system is installed and supervised in accordance with Section 1718.1, parts 1, 2 or 3, and has its water flow alarm device connected to an approved central station system, proprietary system or remote station system of the jurisdiction, a fireresistance rating is not required in Use Groups A-4, B, E, F, M, and S. In Use Groups R-1, R-2 and I-1, the corridor enclosure walls shall have a fireresistance rating of not less than ½ hour. Corridor walls in Use Groups R-1, R-2 and I-1 shall be constructed tight to the underside of the ceiling directly above.

810.4.2 Opening protectives: All door assemblies from rooms opening onto a corridor required to be of fireresistance rated construction shall be self-closing or automatic-closing by smoke detection, with a 20-minute fireresistance rating when tested in accordance with ASTM E152 listed in Appendix A without the hose stream and labeled and listed by an approved agency. All door assemblies from rooms opening onto a corridor, required by Table 401 to be of 2 hour fireresistance rated construction, shall be 1½ hour fire doors.

SECTION 811.0 GRADE PASSAGEWAYS USED AS AN EXIT ELEMENT

811.1 Passageways: Every required interior and exterior exit element which does not adjoin a public way shall be directly connected to the public way or to an open court leading to the public way by an enclosed grade passageway or other unobstructed exit element constructed as provided in this section.

811.2 Vestibule: An exit may discharge into an interior vestibule which is used for ingress and egress only and complies with Sections 811.2.1 and 811.2.2.

811.2.1 Depth and width: The vestibule depth from the exterior of the building is not greater than 10 feet (3048 mm) and the width is not greater than 20 feet (6096 mm).

811.2.2 Separation: The vestibule is separated from the remainder of the level of discharge by self-closing doors and the equivalent of ¼-inch thick wired glass in steel frames.

811.3 Lobby: An exit may discharge into an interior lobby located at the level of exit discharge, provided such lobby shall be provided with an automatic fire suppression system, and any other portion of the floor with access to the lobby shall be provided with an automatic fire suppression system or shall be separated therefrom in accordance with the requirements for the enclosure of exits.

811.4 Width and height: The effective width of the passageway shall be not less than three-quarters of the aggregate width of all required exit stairways leading thereto and all required exit doorways opening into the passageway. Such passageway shall have a minimum width of 44 inches (1118 mm) and a minimum clear ceiling height of 8 feet (2438 mm).

811.5 Maximum stairway limitations: Not more than 50 percent of the required stairways shall discharge through the same passageway.

SECTION 812.0 MEANS OF EGRESS DOORWAYS

812.1 General: The requirements of this section shall apply to all doorways serving as a component or element of a means of egress from habitable and occupiable rooms; except as provided in Sections 816.6, 818.6.1, 818.6.2, 818.7.1 and 819.2.

812.2 Number of doorways: Every room or tenant space with an occupant load of more than 50 or in which the travel distance exceeds 75 feet (22860 mm) shall have at least two egress doorways leading from the room or tenant space to an exit or corridor. All doors shall swing in the direction of egress travel when serving an occupant load of 50 or more or a high hazard use.

Exceptions

1. Use Group R-3.
2. Boiler, incinerator and furnace rooms shall be provided two egress doorways when the area exceeds 500 square feet (46.5 m^2) and individual fuel-fired equipment exceeds 400,000 Btuh (117.24 W) input capacity. Doorways must be separated by horizontal distance equal to one-half of the diagonal dimension of the room. When two doorways are required by this exception, a fixed ladder access out of the room may be provided for one doorway.
3. Institutional I-2 use areas with more than six beds shall be provided two egress doorways.

812.2.1 Entrance and egress doorways: Where separate doors are provided for entrance and egress use, the entrance door shall be clearly marked *Entrance Only* in letters not less than 6 inches (152 mm) in height and legible from both inside and outside.

812.3 Size of doors: The minimum width of single door openings shall provide a clear width of not less than 32 inches (813 mm) except that for door openings within a dwelling unit the clear width shall be not less than 28 inches (711 mm). The maximum width of a door leaf shall be 48 inches nominal. Means of egress doors in Use Group I used for the movement of beds shall be at least 44 inches (1118 mm) wide. When the doorway is subdivided into two or more separate openings, the minimum clear width of one opening shall be not less than 32 inches (813 mm) and each opening shall be computed separately in determining the number of required units of egress width. A door 40 inches (1016 mm) in width shall be deemed the equivalent of two full units of egress width. The height of doors shall not be less than $6^2/_3$ feet (2032 mm), except that within a dwelling unit the height of the doors shall be not less than 6½ feet (1981 mm).

Exception: An egress door serving a storage area of not more than 800 square feet (74 m^2) and which is normally unoccupied shall have a maximum width of 10 feet (3048 mm).

812.4 Location of doors: The required doorways opening from a room or space within a building and leading to an exit access shall be located as remote as practicable from each other. The distance of exit access travel from any point in a room or space to a required exit door shall not exceed the limitations of Section 807.4.

812.5 Door hardware: Every egress door serving an area having an occupant load of more than ten or serving a high hazard occupancy shall be of the side hinged swinging type.

812.5.1 Locks and latches: All egress doors shall be readily openable from the side from which egress is to be made without the use of a key or special knowledge or effort, except for special institutional uses as indicated in Section 812.5.5. Except for dwelling units, draw bolts, hooks and other similar devices shall be prohibited on all egress doors.

812.5.2 Flush and surface bolts: Manually operated or surface mounted flush bolts and surface bolts are prohibited. When egress doors are used in pairs and approved automatic flush bolts are used, the door leafs having the automatic flush bolts shall not have a door knob or surface mounted hardware. The unlatching of any leaf shall not require more than one operation.

812.5.3 Double cylinder dead bolts: Double cylinder dead bolts requiring a key operation on both sides are prohibited on required means of egress in Use Group R and I-1 occupancies.

Exception: Key operation is permitted from a dwelling unit provided the key cannot be removed when the door is locked from the side from which egress is to be made.

812.5.4 Panic hardware: All doors equipped with latching devices in buildings of Use Groups A and E or portions of buildings used for assembly or educational purposes and serving rooms or spaces with an occupant load greater than 100 shall be equipped with approved panic hardware. Acceptable panic hardware will be a door latching assembly incorporating a device which causes the door latch to release and the leaf to open when a force of 15 pounds (73.23 N) is applied in the direction of egress to a bar or panel, the activating portion of which extends not less than one-half the width of the door leaf, and applied at a height greater than 30 inches (762 mm) but less than 44 inches (1118 mm) above the floor. The force shall be applied at the lock side of the door or 30 inches (762 mm) from the hinged side, whichever is farther from the hinge.

812.5.5 Remote control: In rooms of Use Group I-3 occupied as places of detention, approved releasing devices with remote control shall be provided for emergency use unless otherwise specifically approved.

812.5.6 Mechanical operation: All doors which open into enclosed exit stairs, exit passageways or those which are installed to provide fire or smoke barriers across corridors shall be self-closing and be so maintained, or shall be automatic doors which will close upon activation of an approved smoke detector. Where egress doors are arranged to be opened by nonpower operated mechanical devices of any kind, they shall be so constructed that the door may be opened manually and will release under a total force of not more than 15 pounds (73.23 N) applied in the direction of egress travel. The force required to cause the door to swing shall not exceed 30 pounds (146.46 N). Power operated exit doors shall be capable of being opened with not more than 50 pounds (244.10 N) force applied at the normal door knob location when power is lost.

812.6 Door construction: All required egress doors that serve as an element of an exit shall be self-closing or automatic-closing, except for grade floor exit discharge doors.

812.6.1 Grade exit discharge doors: When glazed, doors at grade shall be glazed with approved safety glazing. Approved doors having one or more unframed edges may be used, provided they are constructed of safety glazing not less than ½ inch thick.

812.7 Door arrangement: Doors in series shall have a space between them of not less than 7 feet (2134 mm) when measured in their closed positions.

Exception: Power operated doors and buildings of Use Groups I-1, R-3 and U.

SECTION 813.0 REVOLVING DOORS

813.1 Limitations of use: Revolving doors shall not be used as exit doors.

813.2 Speed control: All approved automatic collapsible revolving doors shall be equipped with an approved speed control governor adjustable to safe

traffic speed as required by the approved rules, but not more than 15 nor less than ten revolutions per minute.

813.3 Construction: All approved automatic collapsible revolving doors shall be constructed as indicated in Sections 813.3.1 through 813.3.4.

813.3.1 Operating mechanism: The collapsing mechanism shall be constructed of stainless steel or other approved corrosion-resistive materials.

813.3.2 Use of wood: The doors may be constructed of wood or other approved materials of similar combustible characteristics with a minimum thickness of 1¼ inches (32 mm).

813.3.3 Floor covering: Approved mats or other floor coverings, not more than ½ inch (13 mm) thick, may be installed within the enclosure when permanently secured to the structural flooring and finished flush with the adjacent floor area.

813.3.4 Glazing: The doors shall be glazed with approved safety glazing as specified in Section 1301.5.6.

SECTION 814.0 HORIZONTAL EXITS

814.1 General: Horizontal exits as herein defined shall be accepted as an approved element of a required means of egress when complying with the requirements of this article. The connection between the areas of refuge as herein specified may be accomplished by protected openings in a fireresistance rated wall, by a vestibule, or by an open air balcony or bridge.

814.2 Separation: The separation between fire areas shall be provided by at least a 2 hour fireresistance rated fire wall or fire separation wall complying with Article 14 and Table 401.

814.2.1 Opening protectives: All fire doors in horizontal exits are to be self-closing or automatically-closing when activated by an approved smoke detector. All doors shall swing in the direction of egress travel. When serving as a dual element of a means of egress, there shall be adjacent openings with swinging fire doors opening in opposite directions.

814.3 Size of doors: Size of openings in fire walls and fire separation walls shall comply with the provisions of Section 1408.0 and 1409.0, but the width of one opening used as a required exit shall not be greater than 88 inches (2235 mm) nor shall the area exceed 80 square feet (7.44 m^2).

814.4 Area of refuge: The discharge area of a horizontal exit shall be either public areas or spaces occupied by the same tenant and each such area of refuge shall be adequate to house the total occupant load of both connected areas. The capacity of areas of refuge shall be computed on a net floor area allowance of 3 square feet (0.28 m^2) for each occupant to be accommodated therein, except for nonambulatory institutional areas which shall be 30 square feet (2.79 m^2) per occupant, not including areas of stairs, elevators and other shafts or courts.

814.5 Unlocked doors: Horizontal exit doors shall be kept unlocked and unobstructed whenever the area on either side of the horizontal exit is occupied.

814.6 Stairway exit: In multi-story buildings, there shall be at least one interior enclosed stairway or smokeproof enclosure on each side of the horizontal exit, and any fire area not having a stairway accessible thereto shall be considered as part of an adjoining section with such stairway; but the length of exit access travel distance to the horizontal exit or the required exit shall not exceed the requirements of Section 807.4.

814.7 Auxiliary elevator: When horizontal exits are provided in floors located 12 or more stories above grade, the required stairway shall be supplemented by at least one passenger elevator maintained ready for use during normal occupancy of the building.

SECTION 815.0 RAMPS

815.1 Capacity: The capacity of a ramp used as an egress component shall be computed in accordance with Section 808.0.

815.2 Minimum dimensions: The minimum dimensions of egress ramps shall comply with Sections 815.2.1 through 815.2.3.

815.2.1 Width: The minimum width of an egress ramp shall be not less than that required for corridors by Section 810.3.

815.2.2 Headroom: The minimum headroom in all parts of the egress ramp shall be not less than 6 feet 8 inches (2032 mm).

815.2.3 Restrictions: Egress ramps shall not reduce in width in the direction of egress travel. Projections into the required ramp and landing width are prohibited except for handrails and stringers. Doors opening onto a landing shall not reduce the clear width to less than 42 inches (1067 mm).

815.3 Maximum slope: The maximum slope of egress ramps shall be one unit vertical in 8 units horizontal (1:8) except ramps required for the physically handicapped according to Section 512.0 in which case the maximum slope shall be one unit vertical in 8 units horizontal (1:8) if the rise is limited to 3 inches (76 mm), one unit vertical in ten units horizontal (1:10) if the rise is limited to 6 inches (152 mm) or one unit vertical in 12 units horizontal (1:12) otherwise.

815.4 Landings: Landings shall be provided at all points of turning, entrance and exit and at doors. Ramps with a slope of greater than one unit vertical in ten units horizontal (1:10) shall not have a vertical rise of greater than 12 feet (3658 mm) between landings. Ramps required for the physically handicapped according to Section 512.0 shall not have a vertical rise greater than 30 inches (762 mm) between landings. All landings shall have a minimum length of 60 inches (1524 mm).

815.5 Guards and handrails: Guards shall be provided on both sides and constructed in accordance with Section 827.0. Handrails conforming to Section 816.5.1 shall be provided on at least one side of every ramp having a slope greater than one unit vertical in 12 units horizontal (1:12). Ramps required by Section 512.0 for the physically handicapped shall have handrails on both sides of the ramp whenever the vertical rise between landings exceeds 6 inches (152 mm).

815.6 Ramp construction: Ramps used as an exit shall conform to the applicable requirements of Section 816.9 as to materials of construction and enclosure.

815.6.1 Surface: For all slopes exceeding one unit vertical in 12 units horizontal (1:12) and wherever the use is such as to involve danger of slipping, the ramp shall be surfaced with approved slip-resistant materials.

SECTION 816.0 INTERIOR STAIRWAYS

816.1 Capacity: The capacity of stairways and doors per unit of exit width shall be computed in accordance with Section 808.0.

816.2 Minimum dimensions: The minimum dimensions of interior exit stairways shall comply with Sections 816.2.1 through 816.2.3.

816.2.1 Width: All interior exit stairways shall be not less than 44 inches (1118 mm) in width, except that such width may be reduced to 36 inches (914 mm) in buildings of single exit construction when permitted by Section 809.3.

816.2.2 Headroom: The minimum headroom in all parts of the stair enclosure shall be not less than 6 feet 8 inches (2032 mm) measured vertically from the tread nosing or from the floor surface of the landing or platform.

816.2.3 Restrictions: Stairways shall not reduce in width in the direction of exit travel. Projections into a stairway are prohibited except for handrails as indicated in Section 816.5.1.1 and for stairway stringers which may project not more than 1½ inches (38 mm).

816.3 Landings and platforms: Landings and platforms of interior exit stairways shall comply with Sections 816.3.1 and 816.3.2.

816.3.1 Width: The least dimension of landings and platforms shall be not less than the required width of stairway.

816.3.2 Vertical rise: In all buildings, a stairway shall not have a height of vertical rise of more than 12 feet (3658 mm) between landings and intermediate platforms.

816.4 Treads and risers: Treads and risers of interior exit stairways shall comply with Sections 816.4.1 and 816.4.2.

816.4.1 Limiting dimensions: The height of risers and width of treads shall be as indicated in Table 816.

Table 816
TREAD AND RISER SIZE[a, c]

Use group	Max. riser	Min. riser	Max. tread	Min. tread
R-3 and within dwelling units in Use Group R-2	8¼ in.	—	—	9 in.
All others[b]	7 in.	4 in.	—	11 in.

Note a. There shall no variation exceeding 3/16" in the depth of adjacent treads or in the height of adjacent risers, and the tolerance between the largest and smallest riser shall not exceed ⅜" in any flight.
Note b. In balconies and galleries, risers and treads shall be as shown in above table, but one tread in each seat platform width may have a greater width to accommodate access to seats. Seating platforms shall be of a uniform width.
Note c. 1 inch = 25.4 mm.

816.4.2 Winders: Winders shall not be permitted in required exit stairways except in Use Group R-3 and stairways serving a single dwelling unit and in ornamental stairways not required as an element of an exit. Such winders shall have a tread width of not less than 9 inches (229 mm) at a point not more than 12 inches (305 mm) from the side where the tread is narrower and the minimum tread width shall not be less than 6 inches (152 mm).

816.5 Stairway guards and handrails: Stairways shall have continuous guards and handrails on both sides, and in addition thereto, stairways more than 88 inches (2235 mm) in required width shall have intermediate handrails dividing the stairway into portions not more than 88 inches (2235 mm) wide. Stairways having a width of less than 44 inches (1118 mm) may have one handrail. Guards shall be constructed in accordance with Section 827.0.

816.5.1 Handrail details: Handrails shall be provided according to the requirements of Sections 816.5.1.1 through 816.5.1.4.

816.5.1.1 Projection: Handrails may project not more than 3½ inches (89 mm) into the required stair width.

816.5.1.2 Height above treads and landings: Handrails shall not be less than 30 inches (762 mm) nor more than 34 inches (864 mm), measured vertically, above the nosing of the treads or above the finished floor of the landing for the horizontal portion of the handrail extension.

816.5.1.3 Handrail ends: Except for stairways within a dwelling unit, handrails shall extend at least 12 inches (305 mm) beyond the top riser and at least 12 inches (305 mm) plus the width of one tread beyond the bottom riser. At the top, the handrail extension shall be parallel to the walking surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser with the remainder parallel to the walking surface. The handrail ends shall be returned to a wall or post.

816.5.1.4 Design load: Handrails shall be designed to resist a simultaneous vertical and horizontal thrust of 50 pounds per lineal foot (74.45 kg/m) applied at the top of the railing.

816.6 Stair exit doors: Stairway exit doors shall comply with Sections 816.6.1 through 816.6.3.

816.6.1 Width: The width of every exit door to or from a stairway shall be not less than the number of units of exit width required for the capacity of the stairway which serves the floor or area from which the exit door leads; but such a door shall not be less than 28 inches (711 mm) in clear width in buildings of Use Group R-3 nor less than 32 inches (813 mm) in clear width in all other use groups.

816.6.2 Direction of swing: All doors shall swing on a landing in the direction of egress travel. When opening, stair exit doors shall not reduce the width of landings to less than one-half the required width. When fully open, the exit door may project 7 inches (178 mm) onto the landing.

Exception: Doors leading from a room or tenant space to a stairway in buildings in which only one exit is required need not swing in the direction of egress travel.

816.6.3 Door construction: All doorway opening protectives, including the frames and hardware, shall be approved self-closing, swinging fire doors, except in buildings of Use Group R-3 where 1¾ inch solid core wood doors are permitted. Labeled fire doors shall have a maximum transmitted temperature end point of not more than 450 degrees F. (232 degrees C.) above ambient at the end of 30 minutes of standard fire test exposure.

816.7 Spiral stairways: Spiral stairways of noncombustible construction may be used as an element of a means of egress in buildings of Use Group R-3 and within a single dwelling unit and from a mezzanine area not more than 250 square feet (23.25 m^2) in area and serving not more than five occupants. The minimum width shall be 26 inches (660 mm) with each tread having a 7½ inch (191 mm) minimum tread width at 12 inches (305 mm) from the narrow edge. All treads shall be identical and the rise shall be not more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1981 mm) shall be provided.

816.7.1 Circular stairways: Circular stairways may be used as an element of egress when a minimum tread width of 10 inches (254 mm) is provided and the smaller radius is not less than twice the width of the stairway.

816.8 Supplemental stairways: Stairways which are not a required means of egress element, serving one adjacent floor and not connected with a corridor or stairway serving other floors, may be used in all use groups except Use Group I.

816.9 Stairway construction: All required interior stairways shall be built of materials consistent with the types of materials permitted in Table 401 for the type of construction of the building; except that wood handrails shall be permitted for all types of construction. Such stairways shall have solid treads and landing platforms, and all finish floor surfaces shall be of slip-resistant materials.

816.9.1 Strength: All stairways, platforms, landings and exits in other than buildings of Use Group R-3 shall be adequate to support a live load of 100 pounds per square foot (488.20 kg/ m^2) and a concentrated load of 300 pounds (136.20 kg).

816.9.2 Enclosures: Required interior exit stairways shall be enclosed in fire separation assemblies of the fireresistance rating specified in Table 401. An exit enclosure shall not be used for any purpose other than means of egress. A space below a stairway shall be enclosed as required or kept open. Only exit doors shall open into the stairway enclosure.

Exceptions

1. Exits in buildings of Use Group R-3.
2. Exits serving and contained within a single residential dwelling unit.
3. Exits in communicating floor levels as provided in Section 816.10.
4. Supplemental stairways as provided in Section 816.8.
5. Exits in open parking structures as provided in Section 809.5.

816.10 Communicating floors: In any building, other than Use Group H, provided with an automatic fire suppression system, not more than three communicating floor levels may be permitted without enclosure or protection between such areas, provided all the conditions described in Sections 816.10.1 through 816.10.4 are met.

816.10.1 Location of floors: The lowest, or next to the lowest, level is a street floor.

816.10.2 Open communication: The entire area, including all communicating floor levels, is sufficiently open and unobstructed to be assumed that a fire or other dangerous condition in any part will be immediately obvious to the occupants of all communicating levels and areas.

816.10.3 Egress capacity: Egress capacity is simultaneously sufficient for all the occupants of all communicating levels and areas, all communicating levels in the same fire area being considered as a single floor area for purposes of determination of required egress capacity.

816.10.4 Other exits: Each floor level, considered separately, has at least one-half of its individual required egress capacity provided by an exit or exits leading directly out of that area without traversing another communicating floor level or being exposed to the spread of fire or smoke therefrom.

816.11 Discharge identification: Stairways which continue beyond the floor of discharge shall be interrupted at the floor of discharge by partitions, doors or other effective means of preventing persons from continuing past the floor of discharge while egressing. A sign shall be provided at each floor landing in all interior stairways more than three stories in height, designating the floor level above the floor of discharge.

SECTION 817.0 ACCESS TO ROOF

817.1 By stairway or ladder: In buildings more than three stories in height except those with a roof slope greater than four units vertical in 12 units horizontal (4:12), access to the roof shall be provided by means of a stairway or a ladder and trap door. The ladder shall not be on the exterior of the building. Where the roof is used as a roof garden or for other habitable

purposes, sufficient stairways shall extend to it to provide the necessary exit facilities from the roof as required for such occupancy. Roof trap doors shall be constructed to comply with Section 1426.2.

817.1.1 Optional stairway or ladder: Buildings not required to have a stairway or ladder to the roof, as described above, may include such a stairway or ladder at the discretion of the designer of the building. The stairway or ladder shall conform to the provisions of this section, except that ladders may be placed on the exterior of the building. The siderails of exterior ladders shall be carried over the coping or parapet to afford hand-hold. The ladder shall be metal, and if it exceeds 20 feet (6096 mm) in height, shall have a protective cage or other safety device. Other design details of such exterior ladders are subject to the approval of the building official.

817.2 Roof enclosures: Stairways extending through roofs shall be enclosed in roof structures of fireresistance rated construction meeting the requirements of Section 1426.0.

SECTION 818.0 SMOKEPROOF ENCLOSURES

818.1 General: A smokeproof enclosure shall consist of an interior exit stairway conforming to Section 816.0, enclosed from the highest point to the lowest point, and meeting the requirements of this section. When access is required to the roof by Section 817.0, such access shall be from the smokeproof enclosure where such is required.

818.2 Where required: At least one of the required exits shall be a smokeproof enclosure in buildings having floors used for human occupancy located more than 75 feet (22860 mm) above the lowest level of fire department vehicle access.

Exception: Buildings of Use Groups B, R-1 and R-2 complying with the area of refuge (compartmentation) option of Section 618.0.

818.2.1 Fire suppression system alternative: When the building is provided with an automatic fire suppression system throughout, the smokeproof enclosure may be eliminated provided all interior exit stairways are pressurized to a minimum of 0.15 inches of water column (37.33 Pa) and a maximum of 0.35 inches of water column (87.10 Pa) in the shaft relative to the building with all stairway doors closed.

818.3 Access: Access to the smokeproof enclosure shall be from every story and shall be by way of a vestibule or by way of an open exterior balcony.

818.4 Outlet: The smokeproof enclosure shall discharge onto a street, yard or open court with direct access to a public way, or into a grade passageway leading to a public way. The grade passageway shall be without other openings and shall be separated from the remainder of the building by 2 hour fireresistance rated construction.

818.5 Construction: The walls of the smokeproof enclosure and the vestibule shall provide a 2 hour fireresistance rating without openings other than the

required doorways. The open exterior balcony shall be constructed in accordance with the fireresistance rating requirements for floor construction.

818.6 Smokeproof enclosure by natural ventilation: The provisions of Sections 818.6.1 through 818.6.4 shall apply to ventilation of smokeproof enclosures by natural means.

818.6.1 Balcony doors: Where access to the smokeproof enclosure is by way of an open exterior balcony, the door assembly into the enclosure shall have a 1½ hour fireresistance rating; and shall be maintained self-closing, or shall be automatic-closing by actuation of a smoke detector.

818.6.2 Vestibule doors: Where access to the smokeproof enclosure is by way of a vestibule, the door assembly into the vestibule shall have a 1½ hour fireresistance rating and the door assembly from the vestibule to the stairs shall have not less than a 20 minute fireresistance rating. Doors shall be maintained self-closing or shall be automatic-closing by actuation of a smoke detector.

818.6.3 Vestibule ventilation: Each vestibule shall have a minimum net area of 16 square feet (1.49 m^2) of opening in a wall facing an outer court, yard, or public way at least 20 feet (6096 mm) in width.

818.6.4 Vestibule size: The minimum dimension of the vestibule shall be not less than the required width of the corridor leading to it.

818.7 Smokeproof enclosure by mechanical ventilation: The provisions of Sections 818.7.1 through 818.7.8 shall apply to ventilation of smokeproof enclosures by mechanical means.

818.7.1 Vestibule doors: The door assembly from the building into the vestibule shall have a 1½ hour fireresistance rating and the door assembly from the vestibule to the stairway shall have not less than a 20 minute fireresistance rating. The door to the stairway shall be provided with a drop sill or other provisions to minimize air leakage. The doors shall be self-closing or automatic-closing by smoke detection or in the event of a power failure.

818.7.2 Vestibule size: The vestibule shall have a minimum width of 44 inches (1118 mm) and a minimum length of 72 inches (1829 mm) in the direction of exit travel.

818.7.3 Vestibule ventilation: The vestibule shall be supplied with not less than one air change per minute, and exhausted at a rate sufficient to maintain an underpressure relative to the atmosphere of 0.05 inch of water column (12.44 Pa), and of 0.10 inch of water column (24.88 Pa) relative to the stair shaft. Supply air shall enter and exhaust air shall discharge from the vestibule through separate, tightly constructed ducts used only for that purpose. Supply air shall enter the vestibule within 6 inches (152 mm) of the floor level. The top of the exhaust register shall be located at the top of the smoke trap but not more than 7 inches (152 mm) down from the top of the trap and shall be entirely within the smoke trap area. Doors, when in the open position, shall not obstruct duct openings. Duct openings may be provided with controlling

dampers, if needed, to meet the design requirements, but such are not otherwise required.

818.7.3.1 Engineered ventilation system: A specially engineered system may be used. Such an engineered system shall provide 2,500 cubic feet per minute (cfm) (1.18 m^3/s) exhaust from a vestibule when in emergency operation and shall be sized to handle three vestibules simultaneously. The smoke detectors located outside each vestibule shall, upon release, open the supply and exhaust duct dampers in that affected vestibule.

818.7.4 Smoke trap: The vestibule ceiling shall be at least 20 inches (508 mm) higher than the door opening into the vestibule to serve as a smoke and heat trap and to provide an upward moving air column. The height may be decreased when justified by design and test.

818.7.5 Stair shaft air movement system: The stair shaft shall be provided with a dampered relief opening at the top and supplied with sufficient air to discharge a minimum of 2,500 cfm (1.18 m^3/s) through the relief opening while maintaining a minimum positive pressure of 0.05 inch of water column (12.44 Pa) in the shaft relative to atmosphere with all doors closed.

818.7.6 Ventilating equipment: The activation of ventilating equipment shall be by a smoke detector installed outside the vestibule door in an approved location. When the closing device for the stair shaft and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall operate at the levels specified in Sections 818.7.3 and 818.7.5.

818.7.7 Standby power: Mechanical vestibule and stair shaft ventilation systems and detector systems shall be powered by an approved standby power system conforming to Sections 2007.0 and 618.9.1.

818.7.8 Acceptance and testing: Before the mechanical equipment is approved by the building official, it shall be tested in the building official's presence to confirm that it is operating in compliance with these requirements.

SECTION 819.0 EXTERIOR STAIRWAYS

819.1 As required exit: Exterior stairways conforming to the requirements for interior stairways as required in Section 816.0, except as to enclosures and fire doors and except as herein specifically modified, may be accepted as an element of a required means of egress in buildings not exceeding five stories or 65 feet (19812 mm) in height for other than buildings of Use Groups I-2 and I-3. Exterior stairways and exit access balconies in climates subject to snow or ice shall be protected to prevent accumulation of same.

819.1.1 Location and arrangement: Exterior stairways may be utilized where at least one door from each tenant space opens onto a roofed-over open balcony served by at least two stairways, except that one stairway may be provided as permitted in Section 809.3, so located as to provide a choice of independent, unobstructed means of egress directly to the grade. The stairways shall be located remotely from each other. Balconies shall conform to

the same width requirements as corridors as required by Section 810.0. The maximum travel distance from any tenant space to the nearest stairway shall be as specified in Table 807. Balconies and stairways shall be located at least 10 feet (3048 mm) from adjacent property lot lines and from other buildings on the same lot unless openings in such buildings are protected by ¾ hour fireresistance rated doors or windows. *

819.2 Opening protectives: Openings below and within 10 feet (3048 mm) horizontally of the stairway shall be protected with approved ¾ hour fireresistance rated automatic opening protectives.

Exceptions

1. Buildings two stories or less in height.
2. Openings may be unprotected when two independent exterior stairways serve an exterior balcony.

819.3 Location: All required exterior stairways shall be located so as to lead directly to a street or open space with direct access to a street; or when located on the rear of the building may lead through a passageway at grade complying with Section 811.0. Exterior stairways shall not project beyond the street lot line.

819.4 Construction: Exterior stairs, porches and balconies shall be constructed of materials consistent with the types of materials permitted in Table 401 for the type of construction of the building to which the stairway is attached.

SECTION 820.0 ESCALATORS

820.1 When acceptable: Escalators of the horizontal slip-resistant tread type moving in the direction of egress may be accepted as an approved egress element in all buildings except buildings of Use Groups A, E and I when constructed and approved in accordance with the requirements of this article and the provisions of Section 2117.0. When accepted as an element of a required means of egress, escalators shall be enclosed with fireresistance rated partitions as specified in Section 816.0.

820.2 Width: Escalator width shall be not less than 40 inches (1016 mm) between guards and the moving tread shall be not less than 36 inches (914 mm) in width and 15¾ inches (400 mm) in depth.

820.3 Capacity: The occupant capacity shall be computed as provided in Section 808.0 for exit stairways.

820.4 Landings and platforms: Landings and platforms shall be provided at the top and bottom of each unit as required for interior exit stairways.

820.5 Railings: Guards shall be equipped with moving handrails traveling at the same speed as the stairway.

820.6 Egress: Means of egress to the street shall be provided as specified for interior exit stairways.

820.7 Construction: Only noncombustible materials shall be used in the construction of escalators accepted as a required means of egress except for step wheels, handrails, electrical equipment and wood veneers not more than 1/28 inch (1 mm) thick directly attached to metal or other noncombustible backing with a nonvolatile and nonflammable cement.

820.7.1 Enclosure: The enclosure shall afford the fireresistance rating required for approved interior exit stairways as specified in Section 816.9.

820.8 Height of travel per unit: A single escalator unit shall not have a vertical travel of more than two stories nor more than 35 feet (10668 mm).

SECTION 821.0 FIRE ESCAPES

821.1 Where permitted: Fire escapes shall not be permitted as an element of a required means of egress except on existing buildings or structures when constructed in accordance with the approved rules and when more adequate exit facilities cannot be provided. Fire escapes shall not provide more than 50 percent of the required exit capacity.

821.2 Location: When located on the front of the building and projecting beyond the building line, the lowest landing shall be not less than 7 feet (2134 mm) or more than 12 feet (3658 mm) above grade, equipped with a counter-balanced stairway to the street. In alleyways and thoroughfares less than 30 feet (9144 mm) wide, the clearance under the lowest landing shall be not less than 12 feet (3658 mm).

821.3 Construction: The fire escape shall be designed to support a live load of 100 pounds per square foot (488.20 kg/ m^2) and shall be constructed of steel or other approved noncombustible materials. Fire escapes may be constructed of wood not less than 2 inches thick on buildings of Type 5 construction.

821.3.1 Dimensions: Stairs shall be at least 22 inches (559 mm) wide with risers not more and treads not less than 8 inches (203 mm) and landings at the foot of stairs not less than 40 inches (1016 mm) wide by 36 inches (914 mm) long, located not more than 8 inches (203 mm) below the access window or door.

821.3.2 Opening protectives: Doors and windows along the fire escape shall be protected with ¾ hour fireresistance rated opening protectives.

SECTION 822.0 SLIDESCAPES

822.1 Where permitted: Slidescapes and safety chutes shall be permitted in buildings of Use Group H, in existing school buildings of Use Group E and in existing buildings of Use Group I when approved by the building official and constructed in accordance with the approved rules.

822.2 Location: The arrangement and location of slidescapes shall conform to this article for means of egress and shall be designated by *Exit* signs and lights as provided in Section 823.0.

822.3 Construction: All chutes shall be constructed of approved noncombustible materials with a pitch in the line of travel of not less than 24 nor more than 42 degrees (0.42 rad to 0.73 rad), measured on the developed circumference of spiral chutes. Straight chutes shall be not less than 24 inches (610 mm) and spiral chutes not less than 28 inches (711 mm) in clear width; nor more than 44 inches (1118 mm) wide in any case. When erected on the interior of a building, they shall be enclosed as required in Section 816.9.2 for interior stairways with direct means of egress to a street or other public way.

822.4 Capacity: Slidescapes, where permitted as an element of a required exit, shall be rated at one unit of egress width per slide, with rated capacity of 60. Slidescapes, except as permitted for buildings of Use Group H, shall not constitute more than 25 percent of the required number of units of egress width from any building or structure or any individual story.

SECTION 823.0 EXIT SIGNS AND LIGHTS

823.1 Location: In all buildings, rooms or spaces required to have more than one exit or exit access, all required means of egress shall be indicated with approved internally illuminated signs reading *Exit*, visible from the exit access and, when necessary, supplemented by directional signs in the exit access corridors indicating the direction and way of egress. All *Exit* signs shall be located at exit doors or exit access areas, so as to be readily visible.

823.2 Size and color: *Exit* signs shall have red letters at least 6 inches (152 mm) high and the minimum width of each stroke shall be ¾ inch (19 mm) on a white background or in other approved distinguishable colors. If an arrow is provided as part of an *Exit* sign, the construction shall be such that the arrow direction cannot be readily changed. The word *Exit* shall be clearly discernible when the internally illuminated sign is not energized.

823.3 Illumination: Each sign shall be illuminated by a source providing not less than five foot candles (53.82 lux) at the illuminated surface.

Exception: Approved self-luminous signs which provide evenly illuminated letters shall have a minimum luminance of 0.06 foot lamberts (0.21 cd/m^2).

823.4 Power source: All *Exit* signs shall be illuminated at all times when the building is occupied. To assure continued illumination for a duration of not less than 1 hour in case of primary power loss, the *Exit* signs shall be connected to an emergency electrical system that complies with Section 2006.0.

Exception: Approved self-luminous signs which provide continuous illumination independent of external power sources need not comply with Section 2006.0.

SECTION 824.0 MEANS OF EGRESS LIGHTING

824.1 Artificial lighting: All means of egress in other than buildings of Use

Group R-3 shall be equipped with artificial lighting facilities to provide the intensity of illumination herein prescribed continuously during the time that conditions of occupancy of the building require that the exits be available. Lighting shall also be provided to illuminate the exit discharge. In buildings of Use Group R-2, means of egress lighting, except that lighting within a dwelling unit, shall be wired on a circuit independent of circuits within any dwelling unit. The disconnecting means and overcurrent protection device shall not be located within a dwelling unit or such that access must be obtained by going through a dwelling unit.

824.2 Intensity of illumination: The intensity of floor lighting shall be not less than one foot candle (10.76 lux).

824.3 Use Groups A and E: In buildings of Use Groups A and E for the exhibition of motion pictures or other projections by means of directed light, the illumination of aisles may be reduced during such period of projection to not less than 0.2 foot candle (2.15 lux).

824.3.1 Control: The lighting of exits, aisles and auditoriums shall be controlled from a location inaccessible to unauthorized persons. Supplementary control shall be provided as specified in Section 605.4 in the motion picture projection room.

824.4 Power source: Means of egress lighting shall be connected to an emergency electrical system that complies with Section 2006.0 to assure continued illumination for a duration of not less than 1 hour in case of emergency or primary power loss in buildings listed in Sections 824.4.1 through 824.4.6.

824.4.1 Use Groups A, E and I: In all buildings of Use Groups A, E and I.

824.4.2 Use Group B: In all buildings of Use Group B containing more than 1,000 occupants.

824.4.3 Use Group M: In all buildings of Use Group M when greater than 3,000 square feet (279 m^2) in area on any floor, or when having one or more floors above or below grade floor.

824.4.4 Use Group R-1: In buildings of Use Group R-1 containing more than 25 sleeping rooms.

824.4.5 Use Group R-2: In all buildings of Use Group R-2 containing more than 50 occupants.

824.4.6 Windowless buildings: In all windowless buildings or portions thereof containing more than 100 occupants except buildings of Use Group R-3.

SECTION 825.0 HAZARDS TO MEANS OF EGRESS

825.1 Floor openings: Manholes or floor access panels shall not be located in the line of egress which reduce the clearance to less than 32 inches (813 mm).

825.2 Protrusions: There shall not be low-hanging door closers that remain within the opening of a doorway when the door is open, or that protrude hazardously into the corridor or line of egress when the door is closed. There shall not be low-hanging signs, ceiling lights or similar fixtures which protrude into corridors or lines of egress.

825.3 Identification of hazardous exits: Doors leading to dangerous areas such as fire escapes, loading platforms, switch rooms and mechanical rooms shall be equipped with knobs, handles or push bars that have been knurled.

825.4 Floor surface: All floors of corridors and lines of egress shall have a slip-resistant surface.

825.5 Open-sided floor areas: Guards shall be located along open-sided walking surfaces, mezzanines and landings. The guards shall be constructed in accordance with Section 827.0.

825.6 Elevation change: Where changes in elevation exist in exit access corridors, exits or exit discharge, ramps shall be used when the difference in elevation is less than 12 inches (305 mm).

Exception: At exterior doors not required for the physically handicapped and aged by Section 512.0, a maximum of 8 inches (203 mm) step down shall be permitted.

SECTION 826.0 AISLES AND SEATS

826.1 General: Buildings of Use Groups A and E which contain seats, tables, displays, equipment, or other material shall be provided with aisles leading to the required exits.

826.2 Aisle width: In theater style seating, aisle width shall be sufficient to accommodate the capacity as indicated in Section 808.0 for corridors and shall be not less than 36 inches (914 mm) in width if serving only one side and not less than 42 inches (1067 mm) in width if serving both sides. Such minimum width shall be measured at the point farthest from an exit and shall be increased at the rate of 1½ inches (38 mm) for each 5 feet (1524 mm) in length towards an exit. With continental seating, as specified in Section 826.6, side aisles shall be not less than 44 inches (1118 mm).

826.3 Aisle spacing: There shall be a maximum of six intervening seats between any seat and the nearest aisle. With continental seating, as specified in Section 826.6, the number of intervening seats may be increased to 29 where egress doors are provided along each side aisle of the row of seats at the rate of one pair of egress doors for each five rows of seats. Such egress doors shall provide a minimum clear width of 66 inches (1676 mm).

826.4 Cross aisles: Aisles shall terminate at a cross aisle, foyer or exit without a dead end length over 20 feet (6096 mm).

826.5 Aisle gradient: The aisle slope shall not exceed one unit vertical in eight units horizontal (1:8). Steps shall not be used in aisles where differences in elevation can be accommodated by a slope of less than one unit vertical in

eight units horizontal (1:8). Where steps are used in aisles, such steps shall extend across the full aisle width with treads and risers complying with Section 816.4 and shall be illuminated. Isolated steps shall not be permitted.

826.6 Seat spacing: Seating other than continental spacing shall be spaced not less than 12 inches (305 mm) from the back of the row ahead and the nearest projection of the row behind.

With continental seating, the spacing of rows of unoccupied seats shall provide a clear width between rows measured horizontally as follows (automatic or self-rising seats shall be measured in the seat-up position, other seats shall be measured in the seat-down position); 18 inches (457 mm) clear width between rows of 18 seats or less, 20 inches (508 mm) clear width between rows of 35 seats or less, 21 inches (533 mm) clear width between rows of 45 seats or less and 22 inches (559 mm) clear width between rows of 46 seats or more.

826.7 Seats: The capacity of seats without dividing arms shall be equal to one person per 18 inches (457 mm). For seating booths, the capacity shall be equal to one person per 24 inches (610 mm).

826.8 Railings: Metal or other approved noncombustible railings shall be provided on balconies and galleries as prescribed in Sections 826.8.1 through 826.8.3.

826.8.1 At fascia: At the fascia of boxes, balconies and galleries not less than 26 inches (660 mm) in height; not less than 36 inches (914 mm) in height at the end of aisles extending to the fascia for the full width of the aisle; and not less than 42 inches (1067 mm) in height at the foot of steps for the full width of the steps.

826.8.2 At cross aisles: Along cross aisles, not less than 26 inches (660 mm) in height except where the backs of the seats along the front of the aisles project 24 inches (610 mm) or more above the floor of the aisle.

826.8.3 Successive tiers: Where seatings are arranged in successive tiers, and the height of rise between platforms exceeds 18 inches (457 mm) not less than 26 inches (660 mm) in height along the entire row of seats at the edge of the platform.

SECTION 827.0 GUARDS

827.1 General: Where required by the provisions of Sections 609.2.4, 617.7, 815.5, 816.5, 825.5 and 1310.5, guards shall be constructed in accordance with the requirements of this section.

827.2 Height: The guards shall be at least 42 inches (1067 mm) in height measured vertically above the leading edge of the tread or adjacent walking surface.

Exceptions

1. Guards shall be not less than 30 inches (762 mm) in height above the leading edge of the tread along stairs which are not more than 20 feet (6096 mm) in height or which reverse direction at an intermediate

landing with 12 inches (305 mm) or less measured horizontally between successive flights.

2. Guards in buildings of Use Group R-3 shall be not less than 36 inches (914 mm) in height.

827.3 Construction: Open guards shall have intermediate rails, balusters or other construction such that a sphere with a diameter of 6 inches (152 mm) cannot pass through any opening.

Exception: In buildings of Use Groups F, H or S, the construction shall not permit a sphere with a diameter of 14 inches (356 mm) to pass through any opening.

827.4 Design load: Guards shall be designed to resist a simultaneous vertical and horizontal thrust of 50 pounds per lineal foot (74.45 kg/m) applied at the top railing. Guards of reviewing stands, grandstands, bleachers and similar assembly structures shall be capable of resisting a lateral force of 50 pounds per lineal foot (74.45 kg/m) and sustaining a vertical load of 100 pounds per lineal foot (148.9 kg/m).

ARTICLE 9

STRUCTURAL LOADS AND STRESSES

SECTION 900.0 GENERAL

900.1 Scope: The provisions of this article shall control the structural design of all buildings and structures or portions thereof hereafter erected.

900.2 Certificate of compliance: The provisions of this article and Article 10 may be deemed to have been satisfied when certification of an architect or engineer registered in Kentucky to that effect is placed on drawings submitted to the building official.

SECTION 901.0 DESIGN SAFE LOAD

901.1 Safe support required: Buildings or other structures, and all parts thereof, shall be designed and constructed to support safely all loads, including dead loads, without exceeding the allowable stresses (or specified strengths when appropriate load factors are applied) for the materials of construction in the structural members and connections.

901.2 Progressive collapse: Buildings and structural systems shall provide such structural integrity that the hazards associated with progressive collapse are reduced to a level consistent with good engineering practice. Structures shall be able to sustain local damage or failure with the structure as a whole remaining stable. Compliance with the applicable provisions of ANSI A58.1 listed in Appendix A shall be deemed to meet the requirements of this section.

901.3 Load tests: The building official may require a load test, or shall accept certified reports of such tests conducted in accordance with the approved rules by approved testing agencies, of any construction whenever there is reason to question its safety for the intended occupancy or use.

SECTION 902.0 TEST SAFE LOAD

902.1 When required: When not capable of design by accepted engineering analysis, any system of construction or structural unit and its connections shall be subjected to the tests prescribed in Article 11 or in the test standards listed in Appendix A, or to such other tests approved by the building official that simulate the actual loads and conditions of application that occur in

normal use; or the building official shall accept certified reports of such tests conducted by an approved testing agency, providing such tests meet the requirements of this code and the approved rules.

902.2 Test load: When approved by test, every structural assembly shall sustain without failure minimum superimposed loads equal to two and one half times the required live load; and under the approved working load, the deflection shall not exceed the limits prescribed in Section 1103.0.

SECTION 903.0 DESIGN LIVE LOAD

903.1 Required live load: The live loads to be assumed in the design of buildings and structures shall be the greatest load produced by the intended use and occupancy, but not less than the minimum uniformly distributed unit loads required in Section 906.0 for specific uses.

903.2 Loads not specified: The building official shall approve the required live load for any use not specifically provided for in Table 906.

SECTION 904.0 DESIGN DEAD LOAD

904.1 Weights of materials and construction: In estimating dead load for the purposes of structural design, the actual weights of materials and constructions shall be used, but not less than the unit dead loads prescribed in Appendix B and ANSI A58.1 listed in Appendix A. In the absence of definite information, any values assumed by the designers shall be subject to the approval of the building official.

904.2 Weight of fixed service equipment: In estimating dead loads for purposes of design, the weight of fixed service equipment such as plumbing stacks and risers, electrical feeders, heating, ventilating, air conditioning and sprinkler systems shall be included.

904.3 Partition load: In offices and other buildings, in which subdividing partitions may be subsequently erected, rearranged or relocated, provision shall be made to support the actual weight of such partitions where they occur, or for an equivalent uniform load, which shall be assumed not less than 20 pounds per square foot (psf) (97.64 kg/m^2) of floor area in addition to the specified uniformly distributed live load. Provision for partition weight shall be made whether or not partitions are shown on the plans, unless the specified live load exceeds 80 psf (390.56 kg/m^2).

SECTION 905.0 EXISTING BUILDINGS

905.1 General: In the reconstruction, repair, extension or alteration of existing buildings, the allowable working stresses used in design shall be as indicated in the following Sections 905.2 through 905.5.

905.2 Building extended: When an existing building is altered by an extension in height or area, all existing structural parts affected by the addition shall be

strengthened where necessary, and all new structural parts shall be designed to meet the requirements for buildings hereafter erected.

905.3 Building repaired: When repairs are made to the structural portion of an existing building, and the uncovered structural portions are found unsound, such parts shall be made to conform to the requirements for buildings hereafter erected.

905.4 Existing live load: When an existing building heretofore approved is altered or repaired in accordance with Section 103.3, the structure may be designed for the loads and stresses applicable at the time of erection, provided the public safety is not endangered thereby.

905.5 Posted live load: Any existing building heretofore approved, in which there is not a change in use to a new use group requiring greater floor loads, may be posted for the originally approved live loads, provided the building is structurally safe in all its parts and adequate for its existing use, and the public safety is not endangered thereby.

SECTION 906.0 UNIFORMLY DISTRIBUTED LIVE LOADS

906.1 Uniform live load: The minimum uniformly distributed live load in pounds per square foot shall be as provided in Table 906, and for all concentrated loads wherever they occur as provided in Section 907.0. The live loads in Table 906 are the minimum loads to be used for the occupancies listed. Where the buildings will be subjected to greater live loads, such loads shall be used for design.

906.2 Posting of live loads: In every building or other structure or part thereof of Use Groups B, F, M or S, the design loads shall be marked on plates of approved design which shall be supplied and securely affixed by the owner of the building, or the owner's authorized agent, in a conspicuous place in each space to which they relate. Any plates lost, removed or defaced shall be replaced by the owner or the owner's agent.

Table 906
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS

Occupancy or use	Live load (psf)
Apartments (see Residential)	
Armories and drill rooms	150
Assembly areas:	
Fixed seats	50
Movable seats	100
Platforms (assembly)	100
Stage floors	150
Balcony (exterior)	100
One and two family dwellings only	60
Bowling alleys, poolrooms and billiard rooms	75
Cornices	60

Table 906 (cont'd.)
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS

Occupancy or use	Live load (psf)
Corridors, except as otherwise indicated	100
Dwellings (see Residential)	
Fire escapes	100
Single-family residential buildings only	40
Garages:	
Passenger cars	50
Trucks and buses	Note a
Grandstands (see Reviewing stands)	
Gymnasiums, main floors and balconies	100
Hospitals:	
Operating rooms, laboratories	60
Private rooms	40
Wards	40
Corridors, above first floor	80
Hotels (see Residential)	
Institutional-residential care (see Residential)	
Libraries:	
Reading rooms	60
Stack rooms	150
Manufacturing:	
Light	100
Heavy	150
Marquees	75
Office buildings:	
Offices	50
Lobbies	100
Corridors, above first floor	80
File and computer rooms require heavier loads based upon anticipated occupancy	
Penal institutions:	
Cell blocks	40
Residential:	
Attics	20[b]
Multi-family dwellings:	
Dwelling units	40
Public rooms	100
Corridors	80
One- and two-family dwellings	40
Sleeping rooms	30
Hotels:	
Guest rooms	40
Public rooms	100
Corridors serving public rooms	100
Corridors	80
Reviewing stands, grandstands and bleachers	100[c]
Schools:	
Classrooms	40
Corridors	80
Sidewalks, vehicular driveways, subject to trucking	250
Skating rinks	100
Stairs and exits	100

Table 906 (cont'd.)
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS

Occupancy or use	Live load (psf)
Storage areas:	
Light	125
Heavy	250
Stores:	
Retail	75
Wholesale	100
Yards and terraces, pedestrians	100

Note a. Minimum live loads shall be in accordance with lane loads of AASHTO HB-12 listed in Appendix A, but shall not be less than 50 psf.

Note b. Live load need be applied to joists or to bottom chords of trusses or trussed rafters only in those portions of attic space having a clear height of 42 inches or more between joist and rafter in conventional rafter construction; and between bottom chord and any other member in trusses or trussed rafter construction. However, joists or the bottom chords of trusses or trussed rafters shall be designed to sustain the imposed dead load or 10 psf, whichever is greater, uniformly distributed over the entire span.

A further ceiling dead load reduction to a minimum of 5 psf or the actual dead load, whichever is greater, may be applied to joists in conventional rafter construction or to the bottom chords of trusses or trussed rafters under either or both of the following conditions:

1. If the clear height is not over 30 inches between joist and rafter in conventional construction and between the bottom chord and any other member for trusses or trussed rafter construction.
2. If a clear height of greater than 30 inches, as defined in item 1 directly above, does not exist for a horizontal distance of more than 12 inches along the member.

Note c. Loads of 120 pounds per lineal foot on footboards and seatboards shall be used. Lateral sway bracing loads of 24 pounds per foot parallel to and 10 pounds per lineal foot perpendicular to seats and footboards shall be used.

Note d. 1 inch = 25.4 mm; 1 psf = 4.882 kg/m^2.

SECTION 907.0 CONCENTRATED LOADS

907.1 General: Floors of buildings in the locations specified in Table 907 shall be designed to support the uniformly distributed live loads prescribed in Section 906.0 or the following concentrated loads in pounds, whichever produces the greater stresses. Unless otherwise specified, the indicated concentration shall be assumed to occupy an area of 2½ feet (762 mm) square and shall be so located as to produce the maximum stress conditions in the structural members.

Table 907
MINIMUM CONCENTRATED LOADS

Location	Pounds[a]
Elevator machine room grating (on area of 4 sq. in.)	300
Finish light floor plate construction (on area of 1 sq. in.)	200
Garages	See Note b
Greenhouse roof bars, purlins and rafters	100
Hospitals and ward rooms	1,000
Libraries	1,000
Manufacturing and storage buildings	2,000
Mercantile areas	2,000
Office	2,000
Schools	1,000
Scuttles, skylight ribs and accessible ceilings	200
Sidewalks or vehicular driveways subject to trucking	8,000
Stair treads (on area of 4 sq. in. at center of tread)	300

Notes to Table 907

Note a. Applied to an area 2½ feet by 2½ feet (762 mm by 762 mm) unless otherwise indicated. These are the minimum concentrated loads; if anticipated loads are higher, the actual loads shall be used.

Note b. Minimum concentrated loads for garages or portions of buildings used for parking motor vehicles shall be:

1. For passenger cars accommodating not more than nine passengers, 2,000 pounds acting on an area of 20 square inches;
2. Mechanical parking structures without slab, passenger cars only, 1,500 pounds per wheel; and
3. For trucks or buses, on slabs, maximum axle load on an area of 20 square inches.

Note c. 1 pound = 4.448 N; 1 square inch = 645.16 square mm.

SECTION 908.0 IMPACT LOADS

908.1 General: The live loads specified in Section 906.0 shall be assumed to include adequate allowance for ordinary impact conditions. Provision shall be made in the structural design for special uses and loads which involve vibration and impact forces.

908.2 Elevators: All moving elevator loads shall be increased 100 percent for impact, and the structural supports shall be designed within the limits of deflection prescribed by ANSI A17.1 listed in Appendix A.

908.3 Machinery: For the purpose of design, the weight of machinery and moving loads shall be increased as follows to allow for impact:

Elevator machinery	100 percent
Light machinery, shaft or motor driven	20 percent
Reciprocating machinery or power driven units	50 percent
Hangers for floors or balconies	33 percent

These percentages shall be increased when so recommended by the manufacturer.

908.4 Craneways: All craneways, except those using only manually powered cranes, shall have their design loads increased for impact as follows:

1. A vertical force equal to 25 percent of the maximum wheel load for cab operated cranes or 10 percent for pendant operated cranes;
2. A lateral force equal to 20 percent of the weight of the trolley and lifted load only, applied at the top of each rail in proportion to the relative lateral stiffness of the rail support system; and
3. A longitudinal force of 10 percent of the maximum wheel loads of the crane applied at the top of the rail.

908.5 Assembly structures: Grandstands, stadiums and similar assembly structures shall be designed to resist a horizontal swaying load applied parallel to the rows of seats, in addition to any wind loads, of not less than 24 pounds per lineal foot (35.74 kg/m) of seats; and of not less than 10 pounds per lineal foot (14.89 kg/m) of seats applied transversely.

SECTION 909.0 SPECIAL LOADS

909.1 General: Provisions shall be made for all special loads herein prescribed

and all other special loads to which the building or structure may be subjected.

909.2 Retaining walls: Retaining walls shall be designed to resist the lateral pressure of retained material. Walls retaining drained earth may be designed for pressure equivalent to that exerted by fluid weighing not less than 30 pounds per cubic foot (20.47 kg/m^3) and having a depth equal to that of the retained earth. Any surcharge shall be in addition to the equivalent fluid pressure.

909.3 Hydrostatic uplift: All foundation slabs and other footings subjected to water pressure shall be designed to resist a uniformly distributed uplift equal to the full hydrostatic pressure. *

909.4 Construction loads and erection stresses: Provision shall be made for temporary construction and wind loads which may occur during the erection of the building; and all structural members and connections shall be designed and erected so as to prevent overstressing during construction.

909.5 Partial loading: The full intensity of the appropriately reduced live load applied only to a portion of the length of a structure or member shall be considered if it produces a more unfavorable effect than the same intensity applied over the full length of the structure or member.

909.6 Interior finish: Finish materials used on interior walls and partitions shall have adequate strength to resist a horizontal load of not less than 5 psf (24.41 kg/m^2).

SECTION 910.0 ROOF LOADS

910.1 General: The structural supports of roofs and marquees shall be designed to resist wind and, where applicable, snow and earthquake loads in addition to the dead load of construction and the appropriate live loads as prescribed in this section, or in Table 906 (snow load as provided in Section 911.0; wind load as provided in Section 912.0; and earthquake load as provided in Section 916.0).

910.2 Minimum roof loads: Ordinary roofs, either flat, pitched, or curved, shall be designed for the live loads as specified in Table 910 or the snow load, whichever is greater.

910.3 Overhanging eaves: In other than buildings of Use Group R-3, and except where the overhang framing is a continuation of the roof framing, overhanging eaves, cornices and other roof projections shall be designed for a minimum uniformly distributed live load of 60 psf (292.92 kg/m^2).

910.4 Ponding: Roofs shall be designed for the maximum possible depth of water that may be ponded thereon as determined by the relative levels of roof deck and overflow weirs, scuppers, edges or serviceable drains in combination with the deflected structural elements. In determining the maximum possible depth of water, all primary roof drainage means shall be assumed to be blocked.

910.5 Special purpose roofs: When used for incidental promenade purposes, roofs shall be designed for a minimum live load of 60 psf (292.92 kg/m²); and 100 psf (488.20 kg/m²) when designed for roof gardens or assembly or educational uses.

910.5.1 Landscaped roofs: Where roofs are to be landscaped, the uniform design live load in the landscaped area shall be 20 psf (97.64 kg/m²). The weight of the landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil.

910.5.2 Special purpose roofs: Roofs to be used for other special purposes shall be designed for appropriate loads, or as approved by the building official.

Table 910
MINIMUM ROOF LIVE LOADS[a]

Roof slope	Tributary loaded area in square feet for any structural member		
	0 to 200	201 to 600	Over 600
Flat or rise less than 4 inches per foot (1:3) Arch or dome with rise less than 1/8 of span	20	16	12
Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1) Arch or dome with rise 1/8 of span or less than 3/8 of span	16	14	12
Rise 12 inches per foot (1:1) and greater Arch or dome with rise 3/8 of span or greater	12	12	12

Note a. In pound-force per square foot of horizontal projection.
Note b. 1 square foot = 0.093 m²; 1 psf = 4.882 kg/m².

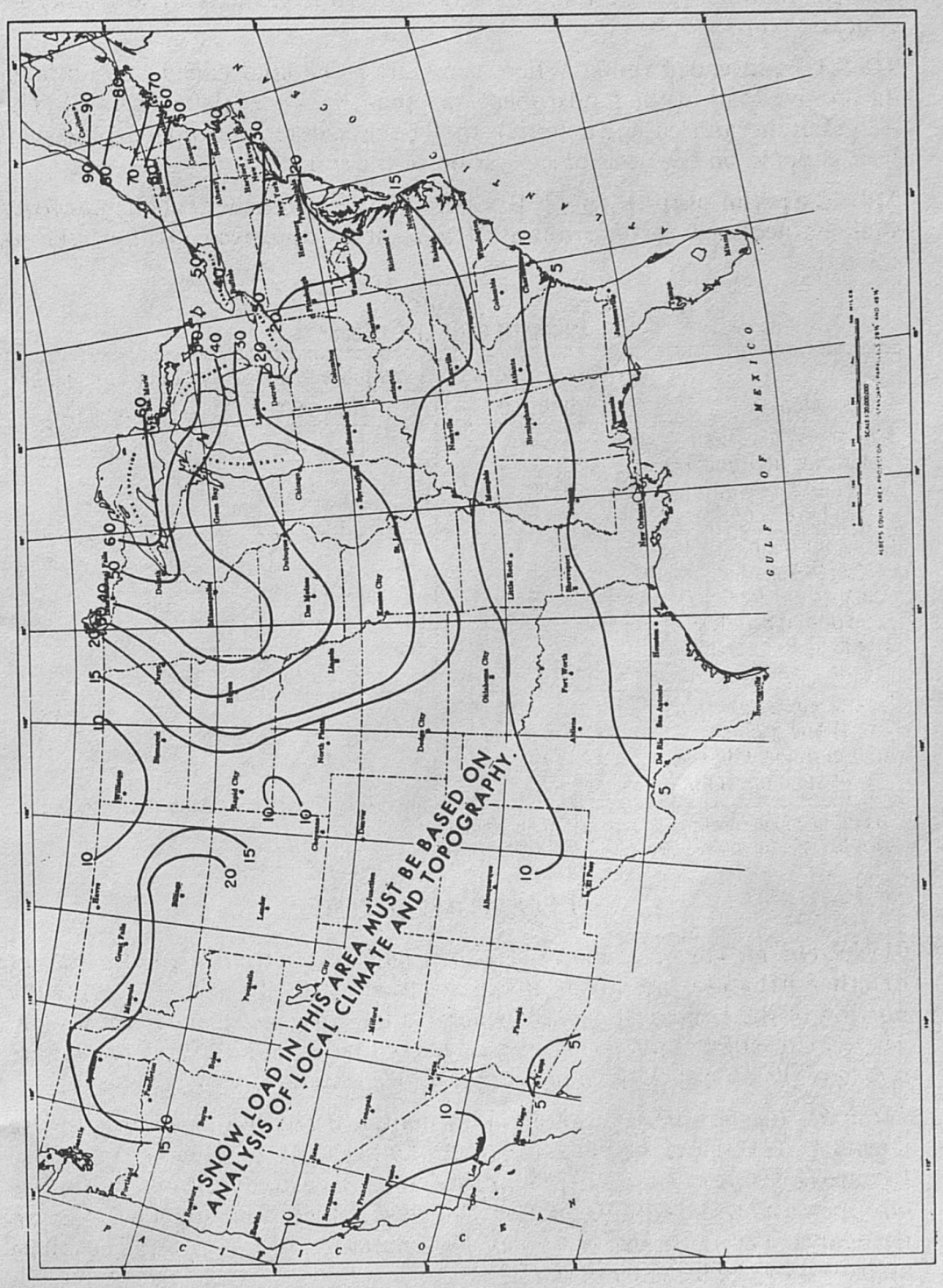
SECTION 911.0 SNOW LOAD

911.1 General: The basic snow loads to be assumed in the design of buildings or other structures are given in Figures 911.1a, 911.1b and 911.1c for the portion of the United States for which isolines of ground snow are shown. These loads correspond to the ground snow load in pound-force per square foot for 100, 50 and 25 year mean recurrence intervals, respectively.

911.2 Design snow load: Figure 911.1a shall be used for all buildings in Use Group A, E, H, I and R-1. Figure 911.1b shall be used for all buildings in Use Groups B, F, M, R-2 and R-3. Figure 911.1c shall be used for buildings in Use Group S and any building of Use Group U which does not have human occupants. The snow load design used for buildings of Use Group U shall be approved by the building official.

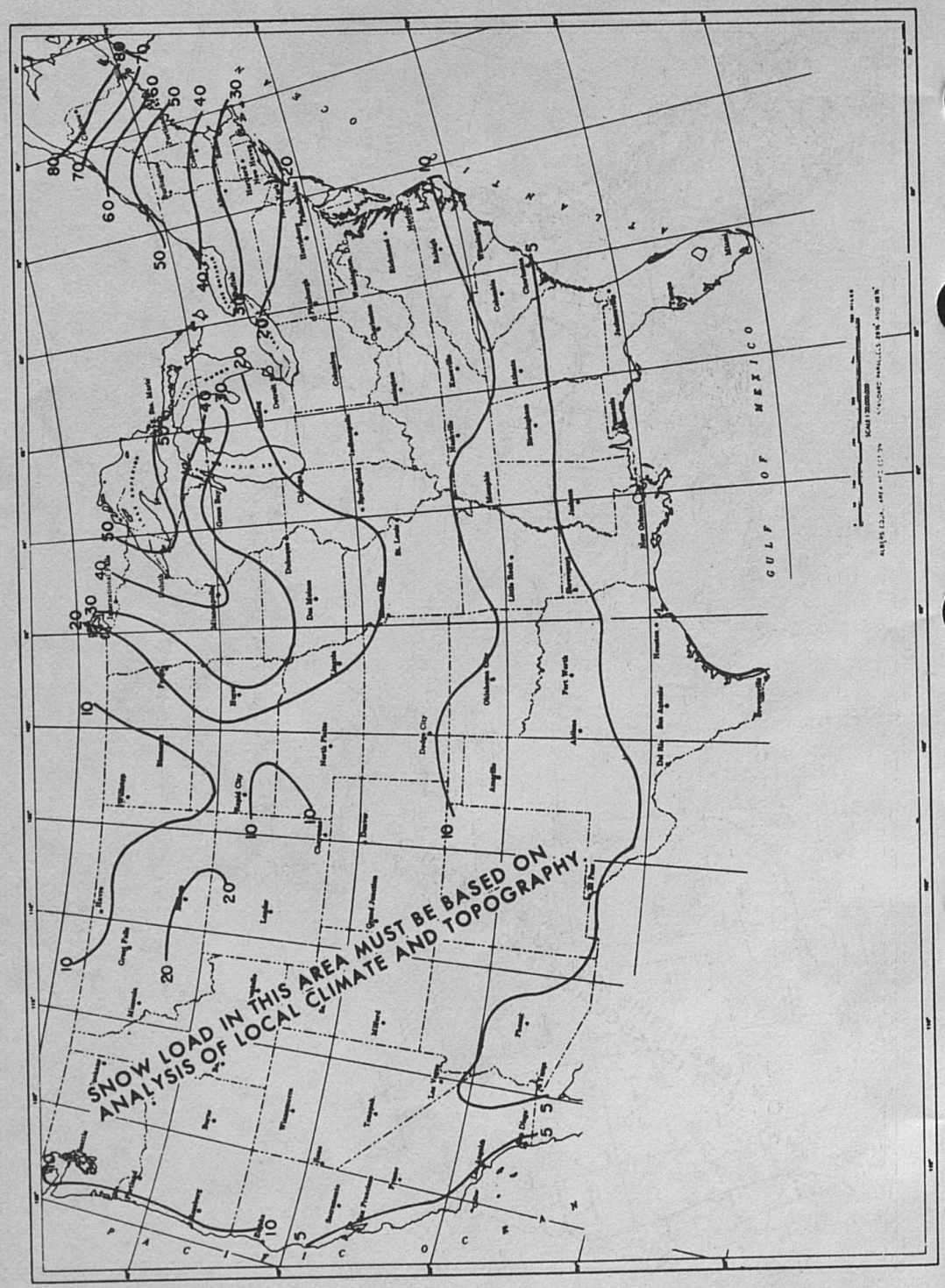
911.2.1 Special snow regions: Special consideration shall be given to regions where design loads are not shown in Figures 911.1a, 911.1b and 911.1c and

Figure 911.1a
SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
100-YEAR MEAN RECURRENCE INTERVAL



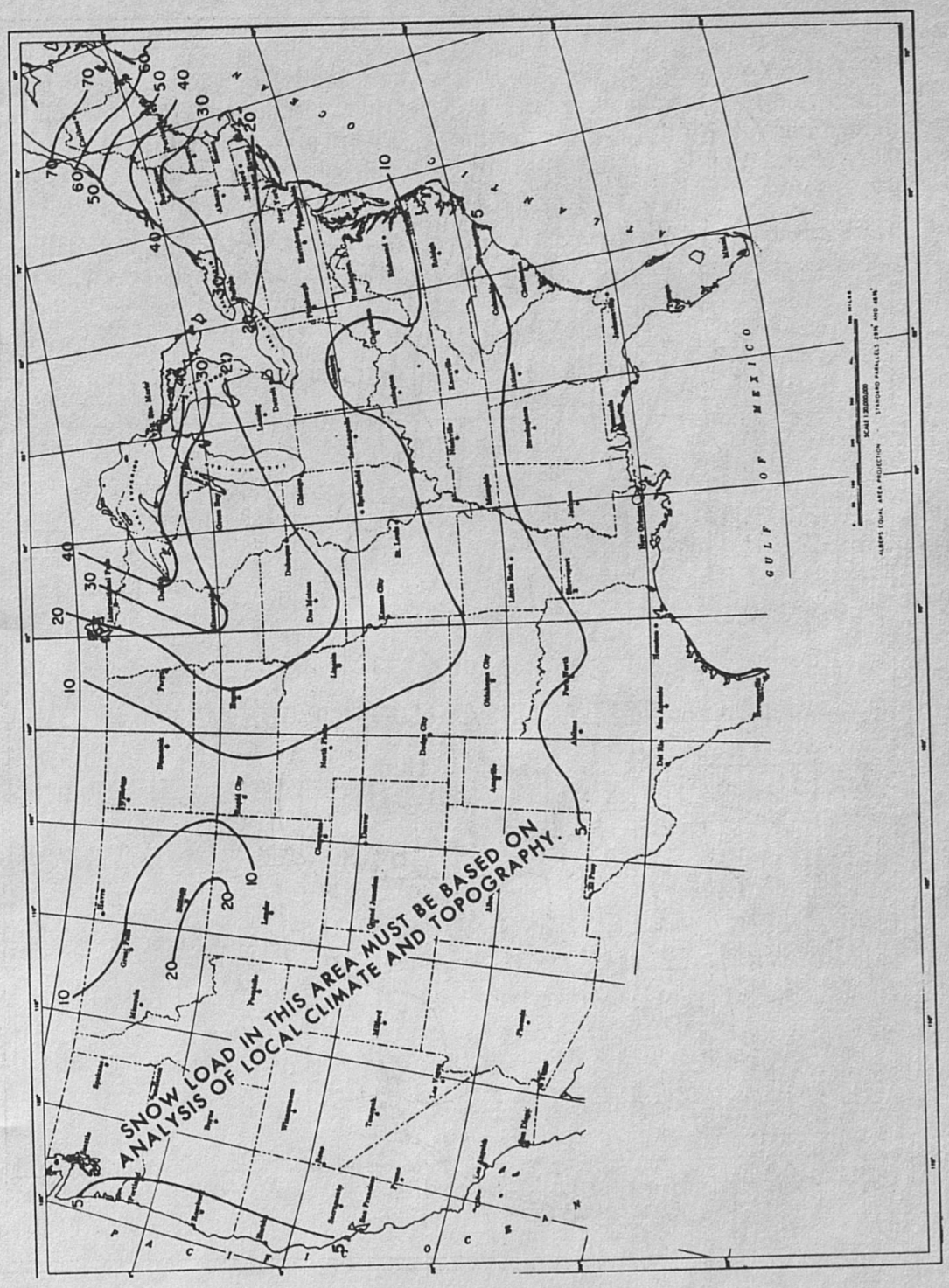
Note a. 1 psf = 4.882 kg/m².

Figure 911.1b
SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
50-YEAR MEAN RECURRENCE INTERVAL



Note a. 1 psf = 4.882 kg/m².

Figure 911.1c
SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
25-YEAR MEAN RECURRENCE INTERVAL



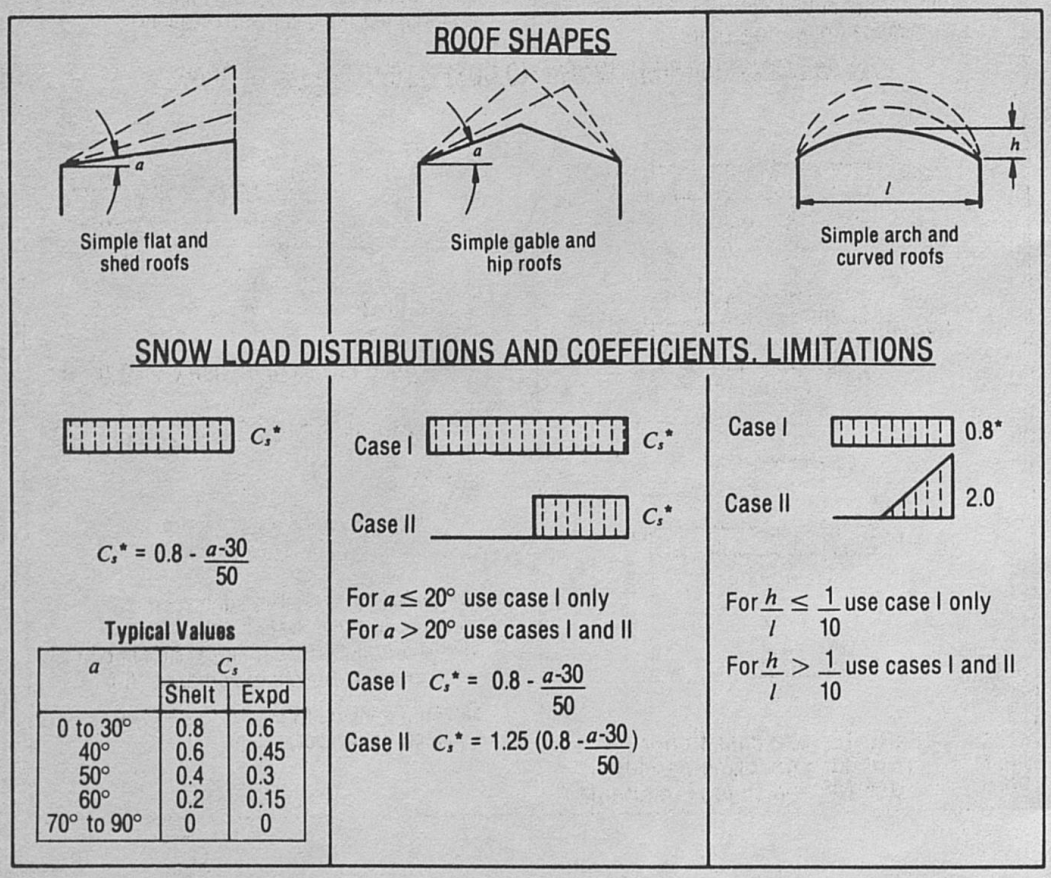
Note a. 1 psf = 4.882 kg/m².

where unusually high accumulations of snow may occur. For areas where records of snowfall or experience indicate that the ground snow loads given in the figures are inadequate, higher basic snow loads shall be used as approved by the building official.

911.3 Roof snow load: The minimum snow loads for the design of both ordinary and multiple series roofs, either flat, pitched or curved, shall be determined by multiplying the ground snow load given in the Figures 911.1a, 911.1b and 911.1c by the appropriate coefficients, C_s, given in Section 911.3.1.

911.3.1 Snow load coefficients: The basic snow load coefficient, C_s, shall be taken as 0.8, and shall be increased or decreased in accordance with the

Figure 911.3a
SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS



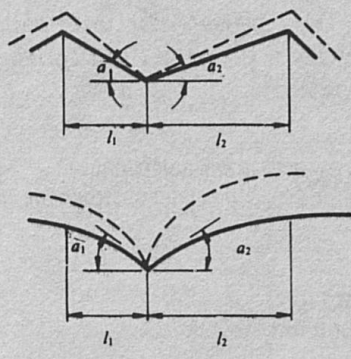
Note a. (Referenced in figure by asterisks.) For roofs conforming to wind exposure requirements of 911.3.1, values of C_s may be reduced 25 percent.

The term $\frac{a - 30}{50}$ is valid for greater than 30 degrees.

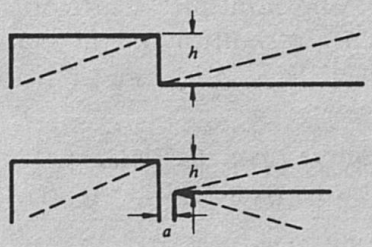
Note b. 1 degree = 0.01745 rad.

Figure 911.3b
SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS

ROOF SHAPES

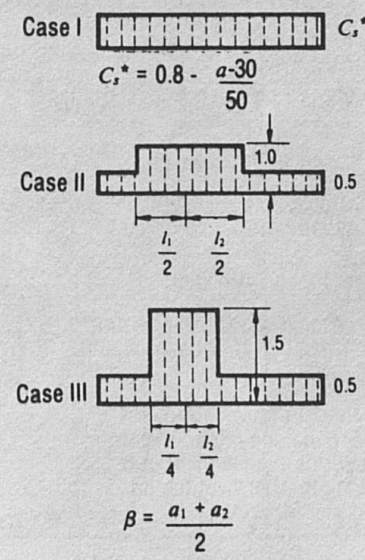


Valley areas of two-span and multiple series sloped or curved roofs



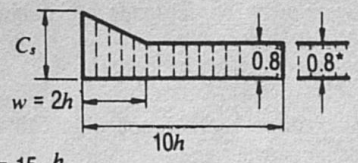
Lower level of multi-level roofs (when upper roof is part of the same building or on an adjacent building not more than 15 ft. away)

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS. LIMITATIONS



$\beta = \frac{a_1 + a_2}{2}$

For $\beta \leq 10°$ use case I only
For $10° < \beta < 20°$ use cases I and II
For $\beta \geq 20°$ use cases I, II and III



$C_s = 15 \frac{h}{g}$

When $15 \frac{h}{g} < 0.8^*$ use $C_s = 0.8^*$

When $15 \frac{h}{g} > 3.0$ use $C_s = 3.0$

$w = 2h$

When $h < 5$ ft use $w = 10$ ft
$h > 15$ ft use $w = 30$ ft

h = Difference of roof heights in ft
g = Ground snow load in psf
w = Width of drift from higher building in ft
a = Distance between buildings < 15 ft

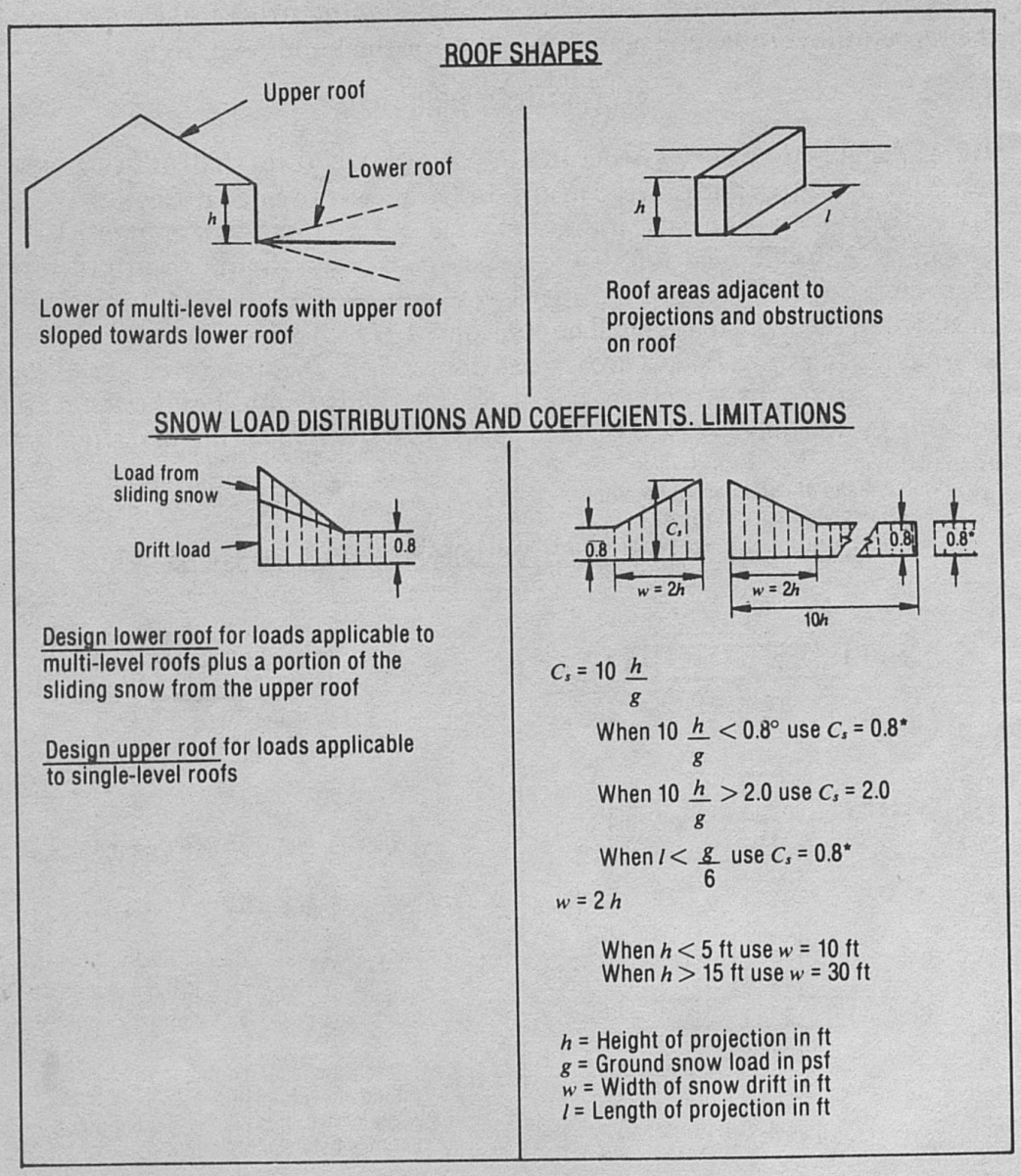
Design upper roof for loads applicable to single-level roofs

Note a. (Referenced in figure by asterisks.) For roofs conforming to wind exposure requirements of 911.3.1, all values of C_s may be reduced 25 percent.

The term $\frac{a - 30}{50}$ is valid for greater than 30 degrees.

Note b. 1 degree = 0.01745 rad; 1 foot = 304.8 mm; 1 psf = 4.882 kg/m².

Figure 911.3c
SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS



Note a. (Referenced in figure by asterisks.) For roofs conforming to wind exposure requirements of 911.3.1, values of C_s may be reduced 25 percent.

Note b. 1 foot = 304.8 mm; 1 psf = 4.882 kg/m².

Figures 911.3a, 911.3b and 911.3c. For roofs that have a clear exposure to winds of sufficient intensity to remove snow, and that do not have such projections as parapet walls, a basic snow load coefficient of 0.6 may be used. This coefficient may be applied only in those regions where the resulting reduced snow load is equal to, or greater than 12 psf (58.58 kg/m²). Roofs shielded on any side by obstructions within a distance of 10 *h* from the

building (*h* is the height of the obstruction above the roof level) shall not be considered to have a clear exposure. Where more than one case is specified, each case shall be considered separately in designing structural elements and the more unfavorable effect shall be used for the building design.

SECTION 912.0 WIND LOAD

912.1 Design: All exposed structures or parts of structures shall be designed to resist the pressures due to wind in any direction, as provided in Sections 912.0 to 915.0 inclusive. The basic minimum wind speeds are shown in Figure 912.1 for the geographic location of the structure. The minimum wind pressures corresponding to specific wind speeds and heights are shown in Table 912.1. In all cases, the wind loads shall be considered as acting normal to the surfaces to which they apply. These provisions do not apply to structures of unusual shape, exposure, or structural characteristics which would make them susceptible to unusual stresses. In such cases, special engineering investigations are required.

Table 912.1
EFFECTIVE VELOCITY PRESSURES[a]
FOR ORDINARY BUILDINGS AND STRUCTURES

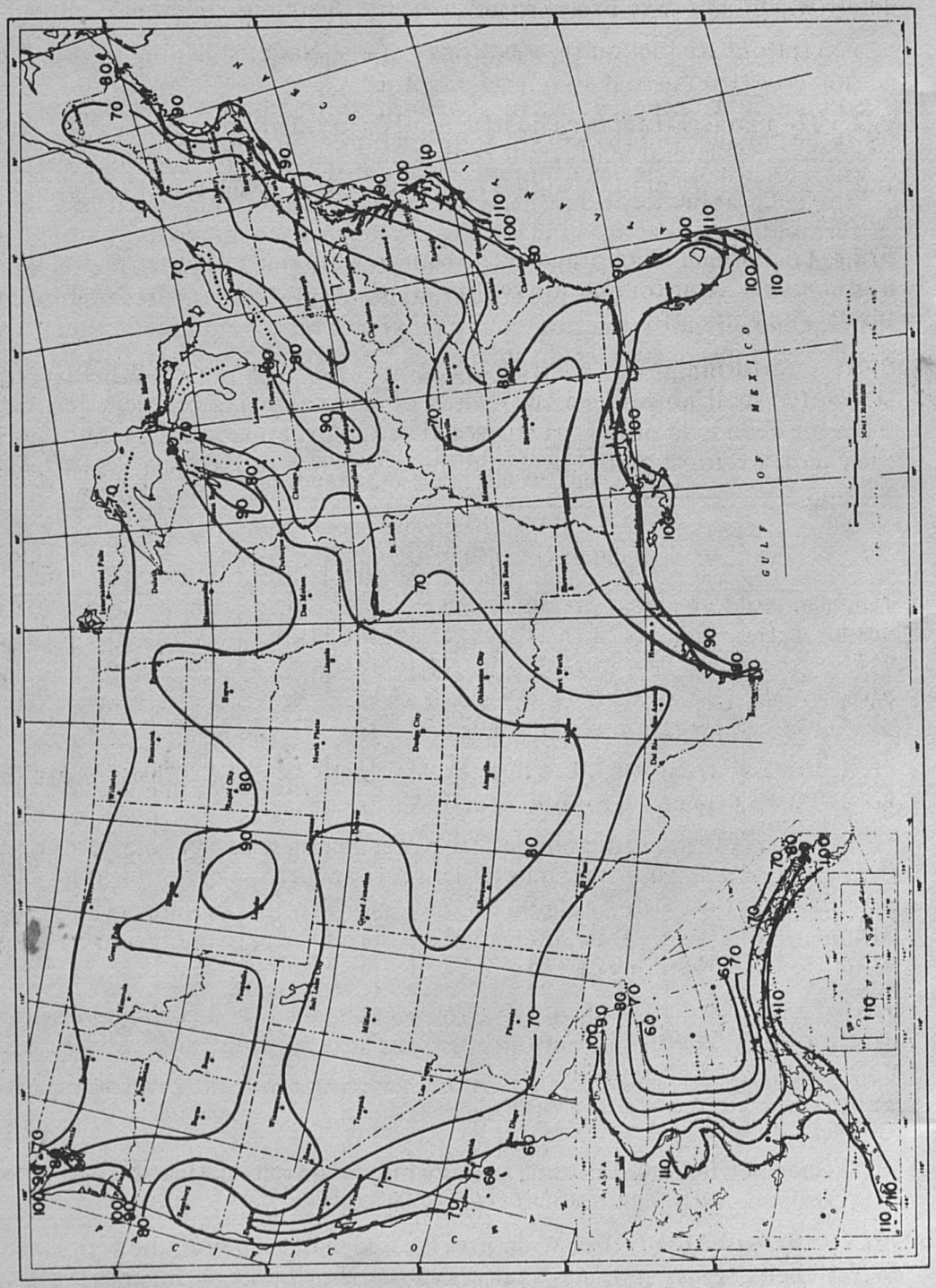
Height (ft)	Basic wind speed (mph)								
	50	60	70	80	90	100	110	120	130
Less than 30	10	10	10	10	13	16	20	23	27
30-40	10	10	11	14	17	21	27	31	36
40-75	10	10	12	15	19	24	29	34	40
75-125	10	11	15	19	24	30	36	43	51
125-175	10	12	17	22	28	34	41	49	58
175-225	10	14	18	24	31	38	46	54	64
225-275	10	15	20	26	33	41	49	59	69
275-325	11	16	21	28	35	43	52	62	73
325-375	11	16	22	29	37	45	55	65	77
375-425	12	17	23	31	39	48	58	69	81
425-475	12	18	24	32	40	50	60	72	84
475-525	13	18	25	33	42	51	62	74	87
525-575	13	19	26	34	43	53	64	76	90
575-625	14	20	27	35	44	55	66	79	92
625-675	14	20	28	36	46	57	69	82	96
675-725	14	21	28	37	47	58	70	83	98
725-775	15	21	29	38	48	59	72	86	100
775-825	15	22	30	39	49	61	73	87	102

Note a. Pressures, in pounds per square foot, are based on geographic locations such as suburban areas, towns, city outskirts, wooded areas and rolling terrain.
Note b. 1 foot = 304.8 mm; 1 mph = 0.447 m/s; 1 psf = 4.882 kg/m^2.

912.2 Special wind conditions: Special wind conditions shall be provided for in accordance with Sections 912.2.1 and 912.2.2.

912.2.1 Increased loads: For structures located in flat, open country, open flat coastal belts, grassland, unusually exposed positions or in geographical regions where local records indicate higher wind loads than established in Section 912.1 the higher wind load shall be used.

Figure 912.1
BASIC WIND SPEED IN MILES PER HOUR
Annual Extreme Fastest-Mile Speed 30 Feet Above Ground,
50-Year Mean Recurrence Interval[a]



Note a. This figure applies to all types of storms except tornadoes.
Note b. 1 foot = 304.8 mm; 1 mph = 0.447 m/s.

912.2.2 Decreased loads: For structures located in centers of large cities, very rough, hilly terrain and in geographical regions where substantiating data indicates lower wind loads than established in Section 912.1, designs based on lower wind loads may be approved.

Exception: Reduction in wind loads due to direct shielding afforded by adjacent structures shall not be permitted.

912.3 Torsional resistance: The structural frame of all structures subjected to wind or other lateral loads shall be designed to resist the torsional moment due to eccentricity of the resultant load with respect to the center of rigidity of the structure.

912.4 Anchorage: Anchorage of the roof to walls and columns, and of walls and columns to the foundation system shall be provided to resist overturning, uplift, and sliding forces.

912.5 Overturning: The overturning moment due to the wind load on all structures shall not exceed two-thirds of the stabilizing moment resulting from the dead load of the structure, unless the structure is anchored to resist the excess overturning moment and the excess horizontal shear over sliding friction.

SECTION 913.0 WIND ON VERTICAL SURFACES

913.1 General: The wind pressures on vertical surfaces to be considered in the design of the elements of the structure shall be those prescribed in Section 912.1, distributed and modified in accordance with this section. The wind pressure shall be applied to the gross area of the vertical surface of that portion of the structure above grade.

913.2 Bracing system: Forces due to wind loads shall be transferred to the ground by a properly designed structural system.

913.3 Primary framing members: Structural members and systems providing stability for the structure shall be designed and constructed for the basic wind pressures indicated in Table 912.1 and modified in Sections 913.3.1 and 913.3.2. Pressures shall be multiplied by the coefficients indicated in Table 913.3.1 and in Section 913.3.2.

913.3.1 External distribution: The wind pressure shall be distributed between exterior walls as a normal inward pressure on the windward wall and as a normal outward pressure on the leeward and sidewalls in accordance with Table 913.3.1.

Table 913.3.1
EXTERNAL DISTRIBUTION COEFFICIENTS FOR VERTICAL SURFACES PRIMARY FRAMES AND SYSTEMS

Windward wall	0.8
Leeward wall	0.5
If height/width and height/length ratios are greater than 2.5	0.6
Side walls	0.7

913.3.2 Internal pressures: An internal pressure equal to 1.0 times the basic wind pressure shall be applied to all primary members acting outward. This pressure is not to be combined with the pressures determined in Section 913.3.1.

913.4 Secondary components: Girts, windows and glazing, doors and door frames, spandrels and similar secondary components and their connections shall be designed and constructed to transfer the wind pressures to the primary framing members.

913.4.1 Distribution: Secondary components shall be designed to resist internal and external wind pressures equal to 1.5 times those determined by Section 912.1, but not less than 15 psf (3.23 kg/m^2).

SECTION 914.0 WIND ON INCLINED SURFACES

914.1 General: The wind pressures on inclined surfaces, including roofs, to be considered in the design of the elements of the structure shall be those prescribed in Section 912.1, distributed and modified in accordance with this section.

914.2 Primary framing members: Structural members and systems providing stability for the structure shall be designed and constructed for the basic wind pressures indicated in Table 912.1 as modified and distributed in accordance with Section 914.2.1.

914.2.1 External distribution: The external wind pressures on inclined surfaces shall be distributed as indicated in Table 914.2.1 and shall be based on the average height of the lower edge or roof eave above grade, the slope of the surface at the location under consideration and the ratio of sidewall height to building width.

Table 914.2.1
EXTERNAL DISTRIBUTION FACTORS[a] FOR INCLINED SURFACES PRIMARY FRAMES AND SYSTEMS

	Windward slopes angle with horizontal						All leeward slopes
Ratio of sidewall height to building width	Flat to 15°	15° to 25°	25° to 35°	35° to 45°	45° to 60°	More than 60°	
0.3 or less	—1.0	0.2	0.3	0.4	0.5	0.8	—0.7
0.5	—1.0	—0.8	—0.2	0.3	0.5	0.8	—0.7
1.0	—1.0	—1.0	—0.6	—0.1	0.5	0.8	—0.7
1.5 or more	—1.0	—1.0	—0.9	—0.4	0.2	0.8	—0.7

Note a. — indicates forces outward; all others indicate forces inward.
Note b. 1 degree = 0.01745 rad.

914.2.2 Arched surfaces: The external wind pressures assumed to be acting on the primary framing members of external arched surfaces shall not be less than those indicated in Table 912.1 as distributed in accordance with Table 914.2.2.

Table 914.2.2
EXTERNAL DISTRIBUTION FACTOR[a] FOR ARCHED SURFACES ON ELEVATED SUPPORTS PRIMARY FRAMES AND SYSTEMS

Rise to span ratio	Windward quarter	Center half	Leeward quarter
less than 0.2	—0.9	—0.8	—0.5
0.2 to 0.25	—0.6	—0.9	—0.5
0.25 to 0.3	—0.5	—1.0	—0.5
0.3 to 0.35	0.2	—1.0	—0.5
0.35 to 0.4	0.4	—1.1	—0.5
0.4 to 0.5	0.6	—1.2	—0.5
more than 0.5	0.9	—1.3	—0.5

Note a. —indicates forces outward; all others indicate forces inward.

914.3 Secondary members: Secondary roof framing, purlins, roof panels, glazing and sheathing and their connections shall be designed to resist wind pressures as specified in Section 913.4.1.

914.4 Overhang uplift: Overhanging eaves, cornices and other roof projections shall be designed and constructed to withstand an upward pressure of 2.0 times the wind pressures given in Table 912.1.

SECTION 915.0 WIND LOADS ON SIGNS, TANK TOWERS AND CHIMNEYS

915.1 Ground signs and towers: The wind pressure on ground signs and towers, other than radio and television towers, shall be those prescribed in Section 913.4 for secondary components.

915.2 Roof structures: The wind pressure on roof signs, tank towers, stacks, chimneys and other exposed roof structures with plane surfaces shall be those prescribed in Section 913.4 for secondary components except as provided in Sections 915.3 and 915.4.

Table 915.4
NET PRESSURE COEFFICIENTS FOR CHIMNEYS AND TANKS[a]

Shape	Type or surface	*h/d*		
		1	7	25
Square (wind normal to a face)	Smooth or rough	1.3	1.4	2.0
Square (wind along diagonal)	Smooth or rough	1.0	1.1	1.5
Hexagonal or octagonal ($d\sqrt{q} > 2.5$.)	Smooth or rough	1.0	1.2	1.4
Round ($d\sqrt{q} > 2.5$.)	Moderately smooth[b]	0.5	0.6	0.7
	Rough ($d'/d \cong 0.02$)	0.7	0.8	0.9
	Very rough ($d'/d \cong 0.08$)	0.8	1.0	1.2

Note a. h = height of structure in feet; d = diameter or least horizontal dimension in feet; d' = depth in feet of protruding elements such as ribs and spoilers; q = the effective velocity pressure in psf from Table 912.1.

Note b. Metal, timber, concrete.

Note c. 1 foot = 304.8 mm; 1 psf = 4.882 kg/m².

915.3 Shielding effect: The shielding effect of one element by another shall not be considered when the distance between them exceeds four times the projected smallest dimension of the windward element.

915.4 Effect of shape: Net pressure coefficients for chimneys, tanks and similar structures are prescribed in Table 915.4. These coefficients apply to the projected area of the structure on a vertical plane normal to the wind direction. For slender structures such as flagpoles, a minimum net pressure coefficient of 1.2 shall be used if $d\sqrt{q} < 2.5$.

SECTION 916.0 EARTHQUAKE LOAD

916.1 General: In regions where local experience or the records of the U.S. Geological Survey (USGS) show loss of life or damage of buildings resulting from earthquakes, buildings and structures hereafter erected shall be designed to withstand lateral forces as provided in Section 916.3, except as exempted in Section 916.2.

916.2 Exemptions: Earthquake loading shall not be required in calculating the structural frame of a building or structure when the building complies with one or more of the following conditions.

1. Is located in Zone 0 of Figure 916.
2. Is located where local experience or the records of the U.S. Geological Survey (USGS) do not show loss of life or damage to property, regardless of zone.
3. Is a building of Use Group R-3.
4. Is a minor accessory building.

916.3 Earthquake load design: The load design criteria provided in this section shall be used to calculate and effectively provide for the loads and stresses acting upon a structure.

916.3.1 General: When required to withstand lateral forces under Section 916.1, buildings and structures shall be designed in accordance with the following provisions of this section according to the zone in which they are located on the seismic probability map in Figure 916.

916.3.1.1 Application of provisions: These lateral force requirements are intended to make buildings earthquake-resistive. The provisions apply to the buildings as a unit and also to all parts thereof, including the structural frame or walls, floor and roof systems, and other structural features. In specific cases, they may be interpreted or added to as to detail by approval of the building official in order that the intent shall be fullfilled.

916.3.1.2 Additions: Where applicable, every addition to an existing building or structure shall be designed and constructed to resist and withstand the forces provided for herein, and in any case where an existing building or structure is increased in height all portions thereof affected by such increased height shall be reconstructed to resist and withstand the forces provided for herein.

916.3.1.3 Alterations: Where applicable, an existing building or structure shall not be altered or reconstructed in such a manner that the resistance to the forces provided for herein will be less than that before such alteration or reconstruction was made; provided, however, that this provision shall not apply to nonbearing partitions, and shall not apply to other minor alterations which are made in accordance with Section 106.3.

916.3.2 Plans and design data: Where earthquake loads are applicable, a brief statement of the items indicated in Sections 916.3.2.1 through 916.3.2.3 shall be included with each set of plans filed.

916.3.2.1 Dead and live loads: A summation of the dead and live loads of the building, floor by floor, which was used in figuring the shear for which the building is designed.

916.3.2.2 Bracing: A brief description of the bracing system used, the manner in which the designer expects such system to act and a clear statement of any assumption used. Assumptions as to location of all points of counter-flexure in members must be stated.

916.3.2.3 Sample calculation: Sample calculation of a typical bent or equivalent. For combined stresses due to the lateral forces and other loads, the allowable unit stresses and the allowable load in connections may be increased as provided in Section 917.0.

916.3.3 Lateral force requirements: Where earthquake loads are applicable, every building or structure and every portion thereof, except as exempted in Section 916.2, shall be designed and constructed to resist stresses produced by lateral forces as provided in this section. Stresses shall be calculated as the effect of a force applied horizontally at each floor or roof level above the foundation. The force shall be assumed to act from any horizontal direction. In those zones where wind, snow, or other loads impose a greater load than those provided herein, such other loads shall be provided for.

916.3.4 Definitions: The definitions listed below apply only to the provisions of this section.

Space frame: A three-dimensional structural system composed of interconnected members, other than shear or bearing walls, laterally supported so as to function as a complete self-contained unit with or without the aid of horizontal diaphragms or floor bracing systems.

Space frame, vertical load-carrying: A space frame designed to carry all vertical loads.

Space frame, moment-resisting: A vertical load-carrying space frame in which the members and joints are capable of resisting design lateral forces by bending moments and column shears.

Space frame, ductile moment-resisting: A space frame which complies with the requirements for a ductile moment-resisting space frame as set forth in Section 916.3.11.

Box system: A structural system without a complete vertical load-carrying space frame. In this system, the required lateral forces are resisted by shear walls as hereinafter defined.

Shear wall: A wall designed to resist lateral forces parallel to the wall. Braced frames subjected primarily to axial stresses shall be considered as shear walls for the purpose of this definition.

Lateral force-resisting system: That part of the structural system to which the lateral forces prescribed in Section 916.3.5.1 are assigned.

916.3.4.1 Symbols and notations: The following symbols and notations apply only to the provisions of this section.

C = Numerical coefficient for base shear as defined in Section 916.3.5.2.

C_p = Numerical coefficient as defined in Section 916.3.5.2 and set forth in Table 916.3.5.2.

D = The dimension of the building in feet in a direction parallel to the applied forces (see also Section 916.3.10).

D_s = The plan dimension in feet of the vertical lateral force-resisting system in the direction of the applied force.

F_i, F_n, F_x = Lateral force applied to level i, n, or x respectively.

F_p = Lateral forces on the part of the structure, and in the direction, under consideration.

F_t = That portion of V considered concentrated at the top of the structure, at the level n. The remaining portion of the total base shear (V) shall be distributed over the height of the structure including level n according to the equation for F_x in Section 916.3.5.1.

h_i, h_n, h_x = The height in feet above the base to level i, n, or x respectively.

J = Numerical coefficient for base overturning moment as defined in Section 916.3.9.

J_x = Numerical coefficient for overturning moment at level x.

K = Numerical coefficient as set forth in Table 916.3.5.1.

Level i = Level of the structure referred to by the subscript i.

Level n = That level which is uppermost in the main portion of the structure.

Level x = That level which is under design consideration.

M = That overturning moment at the base of the building or structure.

M_x = The overturning moment at level x.

N = The total number of stories above exterior grade to level n.

T = Fundamental period of vibration of the building or structure in seconds in the direction under consideration.

V = The total lateral force or shear at the base.

$$V = F_t + \sum_{i=1}^{n} F_i$$

where $i = 1$ designates first level above the base.

W = The dead load

$$W = \sum_{i=1}^{n} W_i$$

Exception: W shall be equal to the total dead load plus 25 percent of the floor live load in Use Group S.

W_i, W_x = That portion of W which is located at or is assigned to level i or x respectively.

W_p = The weight of a portion of a structure.

Z = Numerical coefficient dependent upon the zone as determined by the maps in Figure 916. For locations in Zone 1, Z shall be equal to 0.25. For locations in Zone 2, Z shall be equal to 0.50. For locations in Zone 3, Z shall be equal to 1.0.

916.3.5 Minimum earthquake forces for structures: Minimum earthquake forces shall be determined in accordance with Sections 916.3.5.1 through 916.3.5.3.

916.3.5.1 Total lateral force and distribution of lateral force: Every structure shall be designed and constructed to withstand minimum total lateral seismic forces assumed to act nonconcurrently in the direction of each of the main axes of the structure in accordance with the following formula:

$$V = ZKCW$$

The value of K shall be not less than that in Table 916.3.5.1. The value of C shall be determined in accordance with the following formula:

$$C = 0.05 \div \sqrt[3]{T}$$

Exception: C shall be 0.10 for all one- and two-story buildings.

T is the fundamental period of vibration of the structure in seconds in the direction under consideration. Properly substantiated technical data for establishing the period T for the contemplated structure may be submitted. In the absence of such data, the value T for buildings shall be determined by the following formula:

$$T = 0.05\, h_n \div \sqrt{D}$$

Exception: In all buildings in which the lateral force resisting system consists of a moment-resisting space frame which resists 100 percent of the required lateral forces, and which frame is not enclosed by or adjoined by more rigid elements which would tend to prevent the frame from resisting lateral forces:

$$T = 0.10\, N$$

The total lateral force V shall be distributed in the height of the structure in the following manner:

$$F_t = .004\, V\, (h_n \div D_s)^2$$

F_t need not exceed 0.15 V and may be considered as 0 for values ($h_n \div D_s$) of 3 or less, and

$$F_x = (V\text{-}F_t)\, w_x h_x \div \sum_{i=1}^{n} w_i h_i$$

Exception: One- and two-story buildings shall have uniform distribution. At each level designated as x, the force F_x shall be applied over the area of the building in accordance with the mass distribution on that level.

Table 916.3.5.1
HORIZONTAL FORCE FACTOR *K* FOR BUILDINGS OR OTHER STRUCTURES[a]

Type or arrangement of resisting elements	Value of K[b]
All building framing systems except as hereinafter classified	1.00
Buildings with a box system as defined in Section 916.3.4	1.33
Buildings with a dual bracing system consisting of a ductile moment-resisting space frame and shear walls designed in accordance with the following criteria. 1. The frames and shear walls shall resist the total lateral force in accordance with their relative rigidities considering the interaction of the shear walls and frames. 2. The shear walls acting independently of the ductile moment-resisting space frame shall resist the total required lateral force. 3. The ductile moment-resisting space frame shall have the capacity to resist not less than 25 percent of the required lateral force.	0.80
Buildings with a ductile moment-resisting space frame designed to resist the total required lateral force.	0.67
Elevated tanks plus full contents, on four or more crossbraced legs and not supported by a building[c, d, e]	3.00
Structures other than buildings and other than those set forth in Table 916.3.5.2	2.00

Note a. Where wind load would produce higher stresses, these loads shall be used in lieu of the loads resulting from earthquake forces.
Note b. See maps in Figure 916 for seismic probability zones and definitions of Z as specified in Section 916.3.4.1.
Note c. The minimum value of KC shall be 0.12 and the maximum value of KC need not exceed 0.25.
Note d. For overturning, the factor J as specified in Section 916.3.9 shall be 1.00.
Note e. The torsional requirements of Section 916.3.8 shall apply.

916.3.5.2 Lateral forces on parts or portions of buildings and other structures: Parts or portions of buildings or structures and their anchorage shall be designed for lateral forces in accordance with the following formula:

$$F_p = ZC_pW_p$$

The values of C_p are in Table 916.3.5.2. The distribution of these forces shall be according to the gravity loads pertaining thereto.

916.3.5.3 Pile foundations and caisson footings: Individual pile and caisson footings of every building or structure shall be interconnected by ties, each of which can carry by tension and compression a horizontal force equal to 10

percent of the larger pile cap loading, unless it can be demonstrated that equivalent restraint can be provided by other means.

916.3.6 Distribution of horizontal shear: Total shear in any horizontal plane shall be distributed to the various elements of the lateral force-resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements that are assumed not to be part of the lateral force-resisting system may be incorporated into buildings provided that their effect on the action of the system is considered and provided for in the design.

916.3.7 Drift: Lateral deflections or drift of a story relative to its adjacent stories shall be considered.

916.3.8 Horizontal torsional moments: Provisions shall be made for the increase in shear resulting from the horizontal torsion due to an eccentricity between the center of mass and the center of rigidity. Negative torsional shears shall be neglected. Where the vertical resisting elements depend on diaphragm action for shear distribution at any level, the shear-resisting elements shall be capable of resisting a torsional moment assumed to be equivalent to the story shear acting with an eccentricity of not less than 5 percent of the maximum building dimension at that level.

Table 916.3.5.2
HORIZONTAL FORCE FACTOR C_p FOR PARTS OR PORTIONS OF BUILDINGS OR OTHER STRUCTURES

Part or portion of building	Direction of force	Value of C_p
Exterior bearing and nonbearing walls, interior bearing walls and partitions, interior nonbearing walls and partitions over 10 feet in height, masonry fences over 6 feet in height.	Normal to flat surface	0.20
Cantilever parapet and other cantilever walls, except retaining walls.	Normal to flat surface	1.00
Exterior and interior ornamentations and appendages	Any direction	1.00
When connected to or part of a building: towers, tanks, towers and tanks plus contents, chimneys, smokestacks, and penthouses	Any direction	0.20[a]
When resting on the ground, tank plus effective mass of its contents	Any direction	0.10
Floors and roofs acting as diaphragms[b]	Any direction	0.10
Connections for exterior panels or for elements complying with Section 916.3.12.5	Any direction	2.00

Note a. When $\frac{h_n}{D}$ of any building is equal to or greater than five to one, increase value by 50 percent.

Note b. Floors and roofs acting as diaphragms shall be designed for a minimum value of C_p of 10 percent applied to loads tributary from that story unless a greater value of C_p is required by the basic seismic formula $V = ZKCW$.

Note c. 1 foot = 304.8 mm.

916.3.9 Overturning: Every building or structure shall be designed to resist the overturning effects caused by wind forces and the related requirements, or the earthquake forces specified in this section, whichever governs.

Exception: The axial loads from earthquake force on vertical elements and footings in every building or structure may be modified in accordance with the following provisions.

1. Overturning moment (M) at the base of the building or structure shall be determined in accordance with the following formula:

$$M = J\,(F_t h_n + \sum_{i=1}^{n} F_i h_x)]$$

where $J = 0.6 \div \sqrt[3]{T^2}$

The value of J need not be more than 1.00.

2. For structures other than buildings, the value of J shall not be less than 0.45, and the overturning moment (M_x) at any level designated as x shall be determined in accordance with the following formula:

$$M_x = J_x[F_t(h_n - h_x) + \sum_{i=1}^{n} F_i(h_i - h_x)]$$

where $J_x = J + (1\text{-}J)\,(h_x \div h_n)^3$

916.3.9.1 Overturning moment distribution: At any level, the incremental changes of the design overturning moment in the story under consideration shall be distributed to the various resisting elements in the same proportion as the distribution of the shears in the resisting system. Where other vertical members are provided which are capable of partially resisting the overturning moments, a redistribution may be made to these members if framing members of sufficient strength and stiffness to transmit the required loads are provided.

Where a vertical resisting element is discontinuous, the overturning moment carried by the lowest story of that element shall be carried down as a load to the foundation.

916.3.10 Setbacks: Buildings having setbacks wherein the plan dimension of the tower in each direction is at least 75 percent of the corresponding plan dimension of the lower part may be considered as a uniform building without setbacks for the purpose of determining seismic forces.

For other conditions of setbacks, the tower shall be designed as a separate building using the larger of the seismic coefficients at the base of the tower determined by considering the tower as either a separate building for its own height or as part of the overall structure. The resulting total shear from the tower shall be applied at the top of the lower part of the building which shall be otherwise considered separately for its own height.

916.3.11 Structural systems: Buildings more than 160 feet (48768 mm) in height shall have ductile moment-resisting space frames which (including connections) are capable of resisting not less than 25 percent of the required seismic force for the structure as a whole. All buildings designed with a horizontal force factor K of 0.67 or 0.80 shall be ductile moment-resisting space frames.

Exceptions

1. Buildings more than 160 feet (48768 mm) in height in Zone 1 may have shear walls or braced frames in lieu of a ductile moment-resisting space frame, provided a K value of 1.00 or 1.33 is utilized in the design.
2. Other structural systems may be approved by the building official when evidence is submitted showing that adequate energy absorption and ductility are provided to withstand the anticipated earthquakes based on a seismological evaluation for the location.

Moment-resisting space frames and ductile moment-resisting space frames may be enclosed or adjoined by more rigid elements which would tend to prevent the space frame from resisting lateral forces where it can be shown that the action or failure of the more rigid elements will not impair the vertical and lateral load resisting ability of the space frame.

The necessary ductility for a ductile moment-resisting space frame shall be provided by a frame which will incorporate approved criteria for achieving ductility in the elastic and inelastic range. Shear walls in buildings where $K = 0.80$ shall be constructed to achieve ductile systems in accordance with approved criteria.

916.3.12 Design requirements: The design requirements of Sections 916.3.12.1 through 916.3.12.5 shall apply to the earthquake design required by this section.

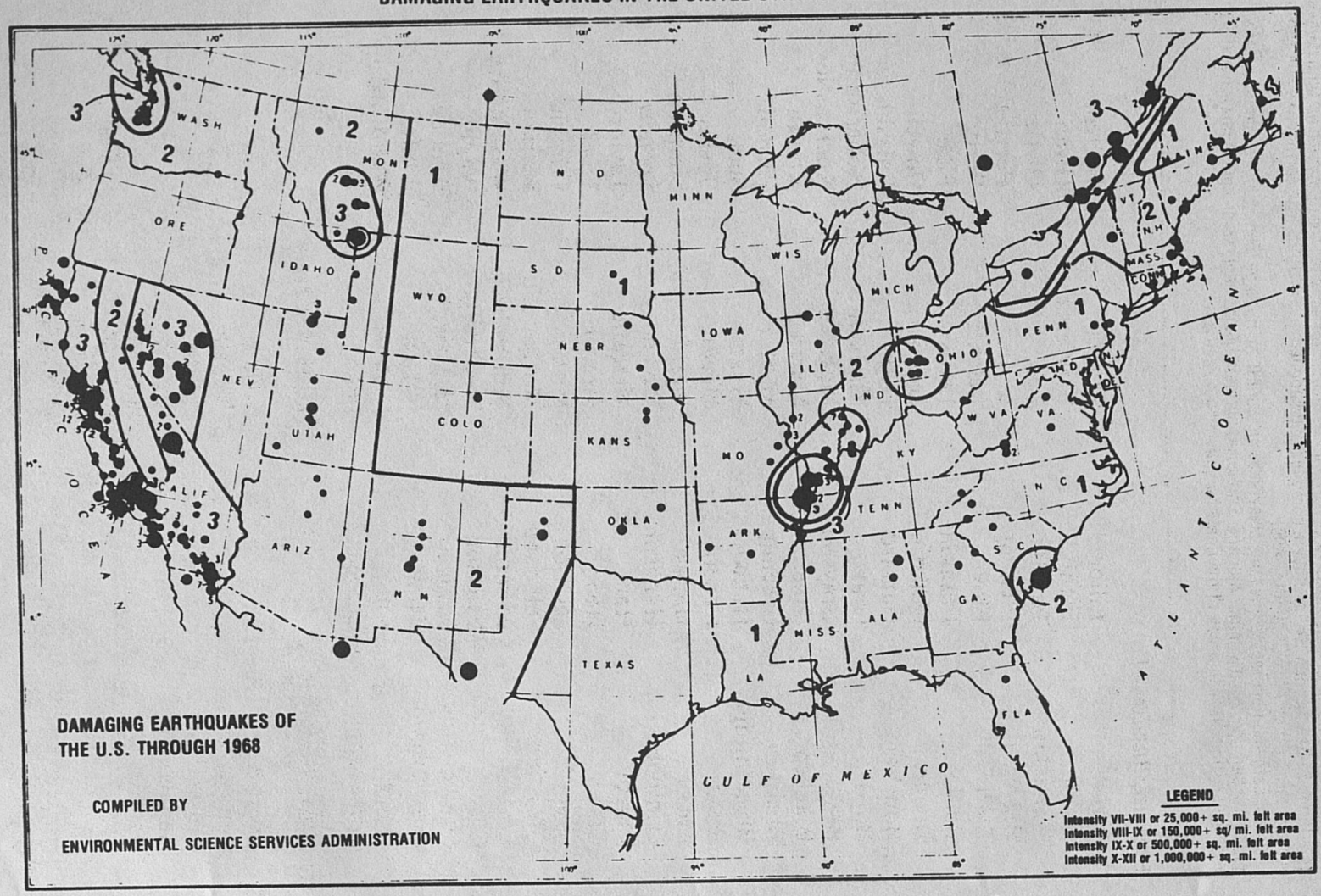
916.3.12.1 Building separations: All portions of structures shall be designed and constructed to act as an integral unit in resisting horizontal forces unless separated structurally by a distance sufficient to avoid contact under deflection from seismic action or wind forces.

916.3.12.2 Minor alterations: Minor structural alterations may be made in existing buildings and other structures; but the resistance to lateral forces shall be not less than that before such alterations were made, unless the building as altered meets the requirements of this section.

916.3.12.3 Structural elements: All elements within the structure which are considered to resist seismic forces or movement, or are connected so as to participate with the structural system, shall be designed in accordance with approved structural practice.

916.3.12.4 Combined vertical and horizontal forces: In computing the effect of seismic force in combination with vertical loads, gravity load stresses induced in members by dead load plus design live load, except roof live load and snow load, shall be considered.

Figure 916
DAMAGING EARTHQUAKES IN THE UNITED STATES THROUGH 1968



Notes to Figure 916

Note a. Maps of the three separate areas of the United States which indicated earthquake risk zones to supplement coefficient *Z*. This zoning was superimposed on maps showing the damaging earthquakes of the United States through 1968 that were compiled and supplied by the USGS. The earthquake risk zones were determined by ANSI Committee A58.

Note b. Large number represents zone classification: Zone 0, no damage; Zone 1, minor damage; Zone 2, moderate damage; Zone 3, major damage. Small number next to dots represents approximate number of recorded earthquakes in areas of the intensity shown by size of dot.

Earthquake Risk Zone #1

Adair
Allen
Anderson
Barren
Bath
Bell
Boone
Bourbon
Boyd
Boyle
Bracken
Breathitt
Breckinridge
Bullitt
Butler
Campbell
Carroll
Carter
Casey
Christian
Clark
Clay
Clinton
Cumberland
Daviess
Edmonson
Elliott
Estill
Fayette
Fleming
Floyd
Franklin
Gallatin
Garrard
Grant
Grayson
Green
Greenup
Hancock
Hardin
Harlan
Harrison
Hart
Henry
Jackson
Jefferson
Jessamine
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Lincoln
Logan
Madison
Magoffin
Marion
Martin
Mason
Meade
Menifee
Mercer
Metcalfe
Monroe
Montgomery
Morgan
Muhlenberg
McCreary
McLean
Nelson
Nicholas
Ohio
Oldham
Owen
Owsley
Pendleton
Perry
Pike
Powell
Pulaski
Robertson
Rockcastle
Rowan
Russell
Scott
Shelby
Simpson
Spencer
Taylor
Todd
Trimble
Warren
Washington
Wayne
Whitley
Wolfe
Woodford

Earthquake Risk Zone #2

Caldwell
Calloway
Crittenden
Henderson
Hopkins
Lyon
Trigg
Union
Webster

Earthquake Risk Zone #3

Ballard
Carlisle
Fulton
Graves
Hickman
Livingston
Marshall
McCracken

916.3.12.5 Exterior elements: Nonbearing nonshear wall panels, or other elements which are attached to or enclose the exterior, shall accommodate movements of the structure resulting from lateral forces or temperature changes. These panels or other elements shall be supported by approved means or by mechanical fasteners in accordance with the provisions of Sections 916.3.12.5.1 through 916.3.12.5.3.

916.3.12.5.1 Movement between stories: Connections and panel joints shall allow for a relative movement between stories of not less than two times story drift caused by wind or seismic forces, or ¼ inch (6 mm), whichever is greater.

916.3.12.5.2 Ductility and rotation capacity: Connections shall have sufficient ductility and rotation capacity so as to preclude fracture or brittle failures at or near connections.

916.3.12.5.3 Sliding or ductile connections: Connections to permit movement in the plane of the panel for story drift may be properly designed sliding connections using slotted or oversize holes, or may be connections which permit movement by bending of ductile material.

SECTION 917.0 COMBINATION OF LOADS

917.1 General: Loads listed herein shall be considered to act in the following combinations, whichever produce the most unfavorable effects in the building, foundation, or structural member concerned, reduced when appropriate according to Section 918.0. The most unfavorable effect may occur when one or more of the contributing loads are not acting:

1. Dead load,
2. Dead load plus live load,
3. Dead load plus (wind load or earthquake load),
4. Dead load plus internal load,
5. Dead load plus live load plus (wind load or earthquake load),
6. Dead load plus live load plus internal load,
7. Dead load plus (wind load or earthquake load) plus internal load, and
8. Dead load plus live load plus (wind load or earthquake load) plus internal load.

917.2 Probability factor: The total of the combined load effects may be multiplied by the following load combination probability factors. An increase in the allowable stresses will not be allowed in conjunction with a decrease due to the above load combinations.

1. 1.00 for combinations 1 through 4 listed in Section 917.1 above.
2. 0.75 for combinations 5 through 7 listed in Section 917.1 above.
3. 0.66 for combination 8 listed in Section 917.1 above.

917.3 Dead load counteracting live load: When loads other than dead loads counteract dead loads in a structural member or joint, special care shall be exercised by the designer to ensure adequate safety for possible stress reversals.

917.4 Stress increases: All allowable stresses and soil bearing values specified in this code for working stress design may be increased one-third when considering wind or earthquake forces either acting alone or when combined with vertical loads. An increase will be not allowed for vertical loads acting alone.

SECTION 918.0 LIVE LOAD REDUCTION

918.1 Permissible reduction: Except as otherwise indicated in Section 918.2, members having an influence area of 400 square feet (37.20 m^2) or more may be designed for a reduced live load determined by applying the following equations:

$$L = L_o \left(0.25 + \frac{15}{\sqrt{A_i}}\right) \text{ where;}$$

L = reduced design live load in pounds per square foot,

L_o = unreduced design live load in pounds per square foot from Table 906,

A_i = influence area in square feet taken as four times the tributary area for a column, two times the tributary area for a beam and one times the panel area for a two-way slab.

918.2 Limitations: The provisions of Sections 918.2.1 through 918.2.3 shall limit the applications of live load reductions permitted by this section.

918.2.1 Maximum reduction: The reduced design live load permitted by Section 918.1 shall not be less than 50 percent of the unreduced live load for members supporting one floor and not less than 40 percent of the unreduced live load for members supporting more than one floor.

918.2.2 Live loads 100 psf or less: For live loads of 100 psf (488.20 kg/m^2) or less, no reduction shall be made for buildings or portions thereof of Use Groups A and E, for public garages (except as indicated in Section 918.2.3), for one-way slabs or for roofs (except as indicated in Section 910.0).

918.2.3 Live loads greater than 100 psf: For live loads which exceed 100 psf (488.20 kg/m^2) and for Group 2 public garages, design live loads on members supporting more than one floor may be reduced by 20 percent.

SECTION 919.0 DESIGN STRENGTHS OF MATERIALS

919.1 Conformance to standards: The design strengths and permissible stresses of any structural material that is identified as to manufacture and grade by mill tests, or the strength and stress grade is otherwise confirmed to the satisfaction of the building official, shall conform to the specifications and methods of design of accepted engineering practice or to the approved rules in the absence of applicable standards. *

919.2 New materials: For materials which are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests as provided in Sections 902.0 and 1102.0.

ARTICLE 10

FOUNDATION SYSTEMS

SECTION 1000.0 GENERAL

1000.1 Scope: The provisions of this article shall control the foundation design and construction of all buildings and structures hereafter erected to insure adequate strength of all parts thereof for the safe support of all superimposed live and special loads, in addition to their own dead load, without exceeding the allowable stresses or design capabilities.

SECTION 1001.0 BEARING VALUE OF SOILS

1001.1 Soil analysis: All applications for permits for the construction of new buildings or structures, and for the alteration of permanent structures which require changes in foundation loads and distribution shall be accompanied by a statement describing the soil in the ultimate bearing strata, including sufficient records and data to establish its character, nature and loadbearing capacity. Such records shall be certified by a licensed professional engineer or a licensed architect.

1001.2 Satisfactory foundation materials: Satisfactory bearing materials for spread footings shall include ledge rock on its natural bed; natural deposits of sand, gravel or firm clay, or a combination of such materials, provided they do not overlie an appreciable amount of peat, organic silt, soft clay or other objectionable materials.

1001.3 Presumptive bearing values: Except when determined by field loading tests or as otherwise provided herein, the maximum allowable pressure on supporting soils under spread footings at or near the surface shall not exceed the values specified in Table 1001. Presumptive bearing values shall apply to all materials of similar physical characteristics and disposition. Surface values shall be adjusted for deep footings, and for the bearing strata under piles, as provided in this code. When foundation piles are driven to penetrate into sound rock, the allowable bearing values in Table 1001 may be increased as prescribed in Section 1021.0.

1001.4 Lightweight structures: Mud, organic silt, or unprepared fill shall be assumed not to have presumptive bearing capacity unless approved by test, except where the bearing capacity is deemed adequate by the building official for the support of lightweight and temporary structures.

Table 1001
PRESUMPTIVE SURFACE BEARING VALUES OF FOUNDATION MATERIALS

	Class of material	Tons per square foot
1.	Massive crystalline bedrock including granite, diorite, gneiss, trap rock, hard limestone and dolomite	100
2.	Foliated rock including bedded limestone, schist and slate in sound condition	40
3.	Sedimentary rock including hard shales, sandstones, and thoroughly-cemented conglomerates	25
4.	Soft or broken bedrock (excluding shale), and soft limestone	10
5.	Compacted, partially cemented gravels, and sand and hardpan overlying rock	10
6.	Gravel and sand gravel mixtures	6
7.	Loose gravel, hard dry clay, compact coarse sand, and soft shales	4
8.	Loose, coarse sand and sand-gravel mixtures and compact fine sand (confined)	3
9.	Loose medium sand (confined), stiff clay	2
10.	Soft broken shale, soft clay	1.5

Note a. 1 ton per square foot = 9765 kg/m^2.

SECTION 1002.0 FOUNDATION INVESTIGATIONS

1002.1 When required: In the absence of satisfactory data from immediately adjacent areas, the owner or applicant shall make borings, test pits, or other soil investigations at such locations and to sufficient depths of the bearing materials to the satisfaction of the building official. For all buildings which are more than three stories or 40 feet (12192 mm) in height, and whenever it is proposed to use float, mat or any type of deep foundation, there shall be at least one exploratory boring to rock or to an adequate depth below the loadbearing strata for every 2,500 square feet (232.5 m^2) of built-over area, and such additional tests that the building official may direct. When the safe sustaining power of the soil is in doubt, or superior bearing value than specified in this code is claimed, the building official shall direct that the necessary borings or tests be made.

1002.2 Soil samples: Samples of the strata penetrated in test borings or test pits, representing the natural disposition and conditions at the site, shall be available for examination by the building official. Wash or bucket samples shall not be approved.

1002.3 Varying soil values: When test borings indicate nonuniformity of bearing materials, a sufficient number of additional borings shall be made to establish strata levels of equal bearing capacity.

1002.4 Cost of tests: Costs of soil investigations shall be at the expense of the owner.

SECTION 1003.0 SOIL TEST PROCEDURE

1003.1 Soil test method: The test procedure and testing apparatus shall be approved by the building official before they are used; and a complete record of the tests, together with a record of the soil profile, shall be filed by the licensed engineer or architect who shall have a fully-qualified representative on the site during all boring and test operations.

1003.2 Loaded areas: For spread footings, the soil shall be loaded at one or more places and at the required level or levels. The loaded area shall be approximately 4 square feet (0.37 m^2) for all bearing materials; except that when the footing overlies wet clay or other soft materials, the test load shall be applied to an area of not less than 10 square feet (0.93 m^2).

1003.3 Recorded settlements: Loads shall be applied in continuous increments of not more than one-fourth of the proposed safe load. When the proposed load has been reached, it shall remain undisturbed and readings shall be recorded to determine the rate of settlement until the settlement in eight consecutive hours is less than 0.01 inches (0.25 mm). A 50 percent excess load shall then be applied and allowed to remain in place until the rate of settlement is less than 0.01 inches (0.25 mm) in 24 hours.

1003.4 Accuracy of loading: Test loads applied by mechanical devices shall be automatically controlled so as to insure not more than 5 percent variation in applied load. Such devices shall be calibrated prior to the test.

1003.5 Test acceptance: The load settlement shall be represented diagramatically, and a test shall not be deemed satisfactory if the net settlement after removal of the test load exceeds 0.01 inches per ton (0.00028 mm/ kg) of gross load applied.

SECTION 1004.0 ALLOWABLE FOUNDATION LOADS

1004.1 General: The maximum allowable loads under all types of foundations shall be limited as provided herein.

1004.2 Rock foundations: Where subsurface explorations at the project site indicate variations or doubtful characteristics in the structure of the rock upon which it is proposed to construct foundations, a sufficient number of borings shall be made to a depth of not less than 10 feet (3048 mm) below the level of the footings to provide assurance of the soundness of the foundation bed and its bearing capacity.

1004.3 Increased rock capacity: The presumptive bearing capacity of Class 1 or Class 2 rock may be increased when the surface is leveled or benched; provided such increased safe capacity is determined by load tests on an area of not less than 1 square foot (0.093 m^2) in accordance with the provisions of Section 1003.0; but such loads shall not be increased to exceed the unit compressive stress permitted on reinforced concrete footings under the provisions of this code.

SECTION 1005.0 DEPTH OF FOOTINGS

1005.1 Frost protection: Except when erected upon solid rock or otherwise protected from frost, foundation walls, piers and other permanent supports of all buildings and structures larger than 100 square feet (9.30 m^2) in area or 10 feet (3048 mm) in height shall extend below the frost line of the locality, and spread footings of adequate size shall be provided when necessary to properly distribute the load within the allowable bearing value of the soil. Or, such structures shall be supported on piles or ranging timbers when solid earth to rock is not available. Footings shall not be founded on frozen soils unless such frozen condition is of a permanent character.

1005.2 Isolated footings: Footings on granular soil of Classes 5 to 10 inclusive in Table 1001 shall be so located that the line drawn between the lower edges of adjoining footings shall not have a steeper slope than 30 degrees (0.52 rad.) with the horizontal, unless the material supporting the higher footing is braced or retained or otherwise laterally supported in an approved manner or a greater slope has been properly established by engineering analysis.

1005.3 Floating mat: Floating mat foundations shall be located on permanently undisturbed soil of adequate bearing capacity. The building official may approve a continuous foundation mat which is located directly on the ground when adequate subsoil drainage and a ratproof apron as specified in Section 1314.0 are provided when required. Where subject to freezing, the footings shall be designed to resist frost action.

SECTION 1006.0 FOOTING DESIGN

1006.1 Design loads: The full dead load including the weight of foundations, footings, and overlying fill, and the reduced live loads as specified in Section 918.0, shall be used in designing footings.

1006.2 Pressure due to lateral loads: If the increased pressure on any footing due to wind, earthquake or other lateral loads does not exceed one-third of the dead and live load pressures alone, such loads may be neglected. When such increased pressure is more than one-third, the lateral loads shall be considered in the design with a one-third increase in allowable soil pressure under the combined load.

1006.3 Earthquake loads: In localities subject to seismic disturbances, special provision shall be made in the foundation design to comply with the provisions of Section 916.0.

1006.4 Vibratory loads: Where machinery operation or other vibrations may be transmitted through the foundation, consideration shall be given in the footing design to prevent detrimental disturbances of the soil.

1006.5 Varying unit pressures: Footings shall be so designed that the unit soil pressure under the dead load shall be as uniform as possible under all parts of the building or structure. When necessary for stability in the structure due to

settlement or varying soil conditions, variations may be permitted in the unit pressure under different footings.

SECTION 1007.0 TIMBER FOOTINGS AND WOOD FOUNDATIONS

1007.1 Timber footings: Timber footings may be used for buildings of Type 5 construction and as otherwise approved by the building official. Such footings shall be treated in accordance with AWPA C2 or C3 listed in Appendix A or shall be placed entirely below permanent water level, except that untreated timbers may be used as capping of wood piles which project above the water level over submerged or marsh lands. The compressive stresses perpendicular to grain in untreated timber footings supported upon piles shall not exceed 70 percent of the allowable stresses for the species and grade of timber as specified in the NFoPA *National Design Specification for Wood Construction* listed in Appendix A.

1007.2 Pole buildings: Pole type buildings shall be designed and erected in accordance with AWPI *Pole Building Design* listed in Appendix A. The poles shall be treated in accordance with AWPA C2 or C4 listed in Appendix A.

1007.3 Wood foundations: Wood foundation systems shall be designed and installed in accordance with NFoPA TR7 listed in Appendix A. All lumber and plywood shall be treated in accordance with AWPB-FDN listed in Appendix A and shall be identified as to conformance with such standards by an approved agency.

SECTION 1008.0 STEEL GRILLAGES

1008.1 General: All steel grillage beams shall be separated with approved steel spacers and shall be entirely encased in at least 3 inches (76 mm) of concrete and the spaces between the beams shall be completely filled with concrete or cement grout. When used on yielding soils, steel grillages shall rest on approved concrete beds not less than 6 inches (152 mm) thick.

SECTION 1009.0 CONCRETE FOOTINGS

1009.1 Concrete strength: Concrete in footings shall have an ultimate compressive strength of not less than 2,500 psi (1.76 kg/mm^2) at 28 days.

1009.2 Design: Concrete footings shall comply with Sections 1215.0 and 1216.0 and ACI 318 listed in Appendix A.

1009.3 Thickness: The thickness of concrete footings shall comply with Sections 1009.3.1 and 1009.3.2.

1009.3.1 Plain concrete: In plain concrete footings, the edge thickness shall be not less than 8 inches (203 mm) for footings on soil; except that for buildings of Use Group R-3 and buildings less than two stories in height of Type 5 construction, the edge thickness may be reduced to 6 inches (152 mm) provided the footing does not extend beyond 4 inches (102 mm) on either side of the supported wall.

1009.3.2 Reinforced concrete: In reinforced concrete footings the thickness above the bottom reinforcement shall be not less than 6 inches (152 mm) for footings on soil, nor less than 12 inches (305 mm) for footings on piles. The clear cover on reinforcement where the concrete is cast against the earth shall not be less than 3 inches (76 mm). Where concrete is exposed to soil after it has been cast, the clear cover shall be not less than 1½ inches (38 mm) for reinforcement of No. 5 bars or ⅝ inch (16 mm) diameter wire or smaller, nor less than 2 inches (51 mm) for larger reinforcement.

* **1009.4 Deposition:** Concrete footings shall not be poured through water unless otherwise approved by the building official. When poured under or in the presence of water, the concrete shall be deposited by approved means which insure minimum segregation of the mix and negligible turbulence of the water.

1009.5 Protection of concrete: Concrete footings shall be protected from freezing during depositing and for a period of not less than 5 days thereafter. Water shall not be allowed to flow through the deposited concrete.

1009.6 Forming of concrete: Concrete footings may be cast against the earth except when, in the opinion of the building official, soil conditions warrant forming. When forming is required, it shall be in accordance with Chapter 6 of ACI 318 listed in Appendix A.

SECTION 1010.0 MASONRY UNIT FOOTINGS

1010.1 Dimensions: Masonry unit footings shall be laid in Type M or S mortar complying with Section 1114.0, and the depth shall be not less than twice the projection beyond the wall, pier or column. The width shall be not less than 8 inches (203 mm) wider than the wall supported thereon.

1010.2 Offsets: The maximum offset of each course in brick foundation walls stepped up from the footings shall be 1½ inches (38 mm) if laid in single courses, and 3 inches (76 mm) if laid in double courses.

SECTION 1011.0 MAT, RAFT AND FLOAT FOUNDATIONS

1011.1 General: Mat, raft and float foundations shall be used only when the applied loads of the building or structure are so arranged as to result in practically uniformly balanced loading, and the soil immediately below the mat is of uniform bearing capacity. The characteristics of the soil under the mat or raft shall be considered in the analysis of loading on mats and other continuous footings, and due allowance shall be made for possible concentrated soil pressures under heavily loaded columns.

SECTION 1012.0 PIER FOUNDATIONS

1012.1 Lateral dimensions and height: Except for buildings of Use Group R-3 and other light structures, the minimum dimension of isolated piers used as foundations shall be 2 feet (610 mm), and the height shall not exceed 12 times

the least horizontal dimension, unless constructed of reinforced concrete or structural steel, or when entirely encased in steel shell at least ¼ inch (6 mm) thick. Greater heights may be approved by the building official when surrounding foundation materials furnish adequate lateral support.

1012.2 Belled bottoms: When pier foundations are belled at the bottom, the edge thickness of the bell shall be not less than that required for the edge of footings. If the sides of the bell slope at an angle less than 60 degrees (1.05 rad) from the horizontal, the effects of vertical shear shall be considered.

1012.3 Plain concrete: When the unsupported height of foundation piers exceeds six times the least dimension, the allowable working stress on piers of unit masonry or plain concrete shall be reduced in accordance with ANSI/NBS 211 and ACI 318 listed in Appendix A.

1012.4 Reinforced concrete: When constructed of reinforced concrete, foundation piers may be reinforced with spiral or vertical reinforcement in accordance with ACI 318 listed in Appendix A. When adequate lateral support is furnished by the surrounding materials as defined in Section 1014.0, the requirements for long columns shall be waived.

1012.5 Steel shell: When concrete piers are entirely encased with a circular steel shell, the area of the shell steel may be considered as reinforcing steel, provided the steel is protected under the conditions specified in Section 1013.0. All horizontal joints in the shell shall be spliced to comply with Section 1013.0.

1012.6 Dewatering: When piers are carried to depths below water level, the piers shall be constructed by a method which will insure accurate preparation and inspection of the bottom, and the depositing or construction of sound concrete or other masonry in the dry.

SECTION 1013.0 PILE FOUNDATIONS

1013.1 Investigation: Pile foundations shall be designed and installed on the basis of a foundation investigation and report which shall include borings, test pits or other subsurface exploration at locations and depths sufficient to determine the position and adequacy of the bearing soils, except where sufficient data upon which to base the design and installation is available. The investigation and report shall include, but not be limited to, the following:

1. Recommended pile types and installed capacities.
2. Driving criteria.
3. Installation and field inspection procedures.
4. Pile load test requirements.
5. Durability of pile materials.
6. Designation of bearing stratum or strata.

1013.2 Special types of piles: The use of types of piles not specifically mentioned herein may be permitted, subject to the approval of the building official, upon the submission of acceptable test data, calculations and other

information relating to the structural properties and load capacity of such piles. The allowable stresses shall not in any case exceed the limitations specified herein.

1013.3 Protection of pile materials: Where boring records or site conditions indicate possible deleterious action on pile materials because of soil constituents, changing water levels or other factors, the pile materials shall be adequately protected by materials, methods or processes approved by the building official. Protective materials shall be applied to the piles so as not to be rendered ineffective by driving.

1013.4 Lateral support: Any soil other than fluid soil shall be deemed to afford sufficient lateral support to the pile to prevent buckling and to permit the design of the pile in accordance with the applicable provisions of this code. All piles standing unbraced in air, water or soils not capable of providing lateral support shall be designed as columns in accordance with the provisions of this code.

1013.5 Group action: In cohesive soils, the compressive load capacity of a group of friction piles shall be analyzed by a rational method approved by the building official and, where such analysis indicates, the individual allowable pile load shall be reduced accordingly.

1013.6 Stability: All piles shall be braced to provide lateral stability in all directions. Three or more piles connected by a rigid cap shall be considered as being braced, provided that the piles are located in a radial direction from the centroid of the group, not less than 60 degrees (1.05 rad) apart. A two-pile group in a rigid cap shall be considered to be braced along the axis connecting the two piles. Methods used to brace piles shall be subject to the approval of the building official.

Piles supporting walls shall be driven alternately in lines at least 1 foot (305 mm) apart and located symmetrically under the center of gravity of the wall load carried, unless effective measures are taken to provide for eccentricity and lateral forces, or the wall piles are adequately braced to provide for lateral stability. A single row of piles without lateral bracing may be used for buildings of Use Group R-3 and lightweight construction not exceeding two stories or 35 feet (10668 mm) in height, provided the centers of the piles are located within the width of the foundation wall.

1013.7 Structural integrity: Piles shall be installed in such a manner and sequence as to prevent distortion or damage to piles being installed or already in place, to the extent that such distortion or damage affects the structural integrity of the piles.

1013.8 Spacing: The minimum center-to-center spacing of piles shall be not less than twice the average diameter of a round pile, nor less than one and three-quarters times the diagonal dimension of a rectangular pile. When driven to or penetrating into rock, the spacing shall be not less than 24 inches (610 mm). When receiving principal support from end bearing on materials other than rock, or through friction resistance, the spacing shall be not less

than 30 inches (762 mm) except that for piles having enlarged bases formed either by compacting concrete or driving a precast base the minimum center-to-center spacing shall be 4½ feet (1372 mm). The spacing of piles shall be such that the average load on the supporting strata will not exceed the safe bearing value of those strata as determined by test borings or other approved methods.

1013.9 Splices: Splices shall be constructed so as to provide and maintain true alignment and position of the component parts of the pile during installation and subsequent thereto and shall be of adequate strength to transmit the vertical and lateral loads and moments occuring at the location of the splice during driving and under service loading. Splices shall develop not less than 50 percent of the least value of the pile in bending. In addition, all pile splices occurring in the upper 10 feet (3048 mm) of the embedded portion of the pile shall be capable of resisting at allowable working stresses the moment and shear that would result from an assumed eccentricity of the pile load of 3 inches (76 mm) or the pile shall be braced in accordance with Section 1013.6 to other piles that do not have splices in the upper 10 feet (3048 mm) of embedment.

1013.10 Pile caps: Pile caps shall be of reinforced concrete. The soil immediately below the pile cap shall not be considered as carrying any vertical load. The tops of all piles shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend at least 4 inches (102 mm) beyond the edges of all piles. The top of all piles shall be cut back to sound material before capping.

1013.11 Preexcavation: The use of jetting, augering or other methods of preexcavation shall be subject to the approval of the building official. When permitted, preexcavation shall be carried out in the same manner as used for piles subject to load tests and in such a manner that will not impair the carrying capacity of the piles already in place or damage adjacent structures. Pile tips shall be driven below the preexcavated depth until the required resistance or penetration is obtained.

1013.12 Inspection: A qualified inspector approved by the building official shall be present when pile foundations are being installed or during tests. The inspector shall make and submit to the building official detailed records of the installation of each pile and the results of load tests. Records shall include the cutoff and tip elevation of each pile relative to a permanent reference.

1013.13 Identification: All pile materials shall be identified for conformity to the specified grade with this identification maintained continuously from the point of manufacture to the point of installation or shall be tested by an approved agency to determine conformity to the specified grade and the approved agency shall furnish an affidavit of compliance to the building official.

1013.14 Pile location plan: A plan showing the location and designation of all piles by an identification system shall be filed with the building official prior

to installation of such piles. All detailed records for individual piles shall bear an identification corresponding to that shown on the plan.

1013.15 Use of existing piles: Piles left in place where a structure has been demolished shall not be used for the support of new construction unless satisfactory evidence is submitted to the building official indicating that the piles are sound and meet all the requirements of this code. Such piles shall be load tested or redriven to verify their capacities. The design load applied to such piles shall be the lowest allowable load as determined by tests or redriving data.

1013.16 Pile driveability: Pile cross sections shall be of sufficient size and strength to withstand driving stresses without damage to the pile, and to provide sufficient stiffness to transmit the required driving forces.

1013.17 Heaved piles: All piles that have heaved during the driving of adjacent piles shall be redriven as necessary to develop the required capacity and penetration, or the capacity of the pile shall be verified by load test in accordance with Section 1014.4.

1013.18 Settlement analysis: The settlement of individual piles or groups of piles shall be estimated based upon approved methods of analysis. The predicted settlement shall not cause harmful distortion of, or instability in, the structure; nor shall it lead to any stresses exceeding allowable values.

1013.19 Use of vibratory drivers: Vibratory drivers may be used to install piles only if the pile load capacity is verified by load tests in accordance with Section 1014.4. The installation of production piles shall be controlled according to power consumption and rate of penetration, or other means approved by the building official that assures pile capacities equal or exceeding that of test piles.

1013.20 Installation sequence: Piles shall be installed in such sequence to avoid compacting the surrounding soil to the extent that other piles cannot be installed properly, and to prevent ground movements that could damage adjacent structures.

SECTION 1014.0 ALLOWABLE PILE LOADS

1014.1 Determination of allowable loads: The allowable axial and lateral loads on piles shall be determined by an approved formula, load tests or method of analysis.

1014.2 Piles in subsiding areas: Where piles are driven through subsiding fills or other subsiding strata and derive support from underlying firmer materials, the downward friction forces which are imposed on the piles by the subsiding upper strata shall be included in the design.

1014.3 Driving formula: The allowable compressive load on any pile when determined by the application of an approved driving formula shall not exceed 40 tons (36287 kg). The formula load shall be determined for gravity

drop or power-actuated hammers, and the hammer energy used shall be the maximum consistent with the size, strength and weight of the driven piles. The use of a follower shall be permitted only with the approval of the building official. The introduction of fresh hammer cushion or pile cushion material just prior to final penetration shall not be permitted.

1014.4 Load tests: When greater compressive loads per pile than permitted by Section 1014.3 are desired or when the design load for any pile foundation is in doubt, control test piles shall be tested in accordance with ASTM D1143 listed in Appendix A. At least one pile shall be test loaded in each area of uniform subsoil conditions. When required by the building official, additional piles shall be load tested if necessary to establish the safe design capacity. The resulting allowable loads shall be not more than one-half of that test load which produces a permanent net settlement of not more than 0.01 inch per ton (0.000028 mm/kg) of test load, and not more than ¾ inch (19 mm). In subsequent driving of the balance of foundation piles, all piles shall be deemed to have a supporting capacity equal to the control pile when such piles are of the same type, size and relative length as the test pile, are installed using the same or comparable methods and equipment as the test pile, are installed in similar subsoil conditions as the test pile, and when the rate of penetration of such piles is equal to or less than that of the test pile through a comparable driving distance.

1014.5 Use of higher allowable stresses: Allowable stresses greater than those specified for each pile type in this article shall be permitted when supporting data justifying such higher stresses are filed with the building official. Such substantiating data shall include a foundation investigation in accordance with Section 1013.1 and pile load tests in accordance with Section 1014.4, regardless of the load supported by the pile. The design and installation of the pile foundation shall be under the direct supervision of a registered professional engineer knowledgeable in the field of soil mechanics and pile foundations, who shall certify to the building official that the piles as installed satisfy the design criteria.

1014.6 Allowable lateral load: When required by the design, the lateral load capacity of a single pile or a pile group shall be determined by an approved method of analysis or by lateral load tests to at least twice the proposed design working load. The resulting allowable load shall be not more than one-half of that test load which produces a gross lateral movement of 1 inch (25 mm) at the ground surface.

1014.7 Uplift capacity: When required by the design, the uplift capacity of a single pile shall be determined in accordance with ASTM D3689 listed in Appendix A or an approved method of analysis based upon a minimum safety factor of three. The maximum allowable uplift load shall be one-half that load which produces an upward movement of the pile but equal to the gross elastic extension of the pile plus 0.1 inch (3 mm). For pile groups subjected to uplift, the allowable working uplift load for the group shall be the lesser of the proposed individual pile uplift working load times the number of

piles in the group, or two-thirds of the effective weight of the pile group and the soil contained within a block defined by the perimeter of the group and the length of the pile.

1014.8 Bearing capacity: Individual piles and groups of piles shall develop ultimate load capacities of at least twice the design working loads in the designated bearing layers. Analysis shall show that no soil layer underlying the designated bearing layers causes the bearing capacity safety factor to be less than two.

1014.9 Bent piles: The load carrying capacity of piles discovered to have a sharp or sweeping bend may be determined by an approved method of analysis or by load testing a representative pile.

1014.10 Overloads on piles: The maximum compressive load on any pile due to mislocation shall not exceed 110 percent of the allowable design load.

SECTION 1015.0 STRUCTURAL STEEL PILES

1015.1 Materials: Structural steel piles, steel pipe and fully welded steel piles fabricated from plates shall conform to ASTM A36, A252, A283, A572 or A588 listed in Appendix A.

1015.2 Allowable stresses: The allowable design compressive stresses shall not exceed 0.35 of the minimum specified yield strength of the steel, except that allowable design stresses may be increased up to 0.50 of the minimum specified yield strength of steel where substantiated by Section 1014.5.

1015.3 Dimensions of H-piles: Sections of H-piles shall comply with the criteria of Sections 1015.3.1 through 1015.3.3.

1015.3.1 Flanges: The flange projections shall not exceed 14 times the minimum thickness of metal in either the flange or the web, and the flange widths shall be not less than 80 percent of the depth of the section.

1015.3.2 Depth: The nominal depth of the direction of the web shall be not less than 8 inches.

1015.3.3 Thickness: Flanges and web shall have a minimum nominal thickness of ⅜ inch.

1015.4 Dimensions of steel pipe piles: Steel pipe piles driven open ended shall have a nominal outside diameter of not less than 10 inches and a minimum wall thickness of not less than ¼ inch (6 mm) for diameters less than 14 inches (356 mm), and of not less than ⅜ inch (10 mm) for diameters 14 inches (356 mm) and over. Pipe of less wall thickness may be driven open ended if a suitable cutting shoe is provided.

SECTION 1016.0 CONCRETE-FILLED STEEL PIPE AND TUBE PILES

1016.1 Material: Steel pipe and tube piles shall conform to ASTM A252 or A283 listed in Appendix A. Concrete shall conform to Section 1017.1.1. The maximum size coarse aggregate shall be ¾ inch (19 mm).

1016.2 Allowable stresses: The allowable design compressive stresses in the concrete shall not exceed 0.33 of the 28-day ultimate strength (f'_c). The allowable design compressive stress in the steel shall not exceed 0.35 of the minimum specified yield strength of the steel, except that the allowable design compressive stress may be increased up to 0.50 of the minimum specified yield strength of the steel where substantiated by Section 1014.5.

1016.3 Minimum dimensions: Piles shall have a nominal outside diameter of not less than 8 inches and a minimum wall thickness in accordance with Section 1015.4. For mandrel-driven pipe piles, the minimum wall thickness may be $^1/_{10}$ inch (3 mm).

1016.4 Reinforcement: Reinforcement steel shall conform to Section 1017.1.2. Reinforcement shall not be placed within 1 inch (25 mm) of the steel casing.

1016.5 Placing concrete: Placing concrete shall conform to Section 1017.1.3.

SECTION 1017.0 CAST-IN-PLACE CONCRETE PILES

1017.1 General: The materials, reinforcement and installation of cast-in-place concrete piles shall conform to Sections 1017.1.1 through 1017.1.3.

1017.1.1 Material: All concrete shall have a 28-day ultimate compressive strength (f'_c) of not less than 2,500 psi (1.76 kg/mm^2). When concrete is placed through a funnel hopper at the top of the pile, the concrete mix shall be designed and proportioned so as to produce a cohesive workable mix having a slump of not less than 4 inches (102 mm) and not more than 6 inches (152 mm). If concrete is to be pumped, the mix design including slump shall be adjusted to produce a pumpable concrete.

1017.1.2 Reinforcement: Except for steel dowels embedded 5 feet (1524 mm) or less in the pile and as provided in Section 1017.2 reinforcement when required shall be assembled and tied together and shall be placed in the pile as a unit before the reinforced portion of the pile is filled with concrete.

1017.1.3 Installation: Concrete shall be placed in such a manner as to insure the exclusion of any foreign matter and to secure a full-sized shaft. Concrete shall not be placed through water except when tremie methods are approved by the building official. When depositing concrete from the top of the pile, the concrete shall not be chuted directly into the pile but shall be poured in a rapid and continuous operation through a funnel hopper centered at the top of the pile.

1017.2 Drilled or augered uncased piles: Drilled or augered uncased piles shall conform to Sections 1017.2.1 through 1017.2.4.

1017.2.1 Allowable stresses: The allowable design stress in the concrete of drilled uncased piles shall not exceed 33 percent of the 28-day ultimate compressive strength (f'_c). The allowable design stress in the concrete of augered cast in place piles shall not exceed 25 percent of the 28-day ultimate compressive strength (f'_c).

1017.2.2 Dimensions: The pile length shall not exceed 30 times the average diameter. The minimum diameter shall be 12 inches (305 mm).

1017.2.3 Installation: If pile shafts are formed through unstable soils and concrete is placed in an open drilled hole, a steel liner shall be inserted in the hole prior to placing concrete. If the steel liner is withdrawn during concreting, the level of concrete shall be maintained above the bottom of the liner a sufficient height to offset any hydrostatic or lateral soil pressure.

If concrete is placed by pumping through a hollow stem auger, the auger shall not be permitted to rotate during withdrawal and shall be withdrawn in a steady continuous motion. Concreting pumping pressures shall be measured and shall be maintained high enough at all times to offset hydrostatic and lateral earth pressures. Concrete volumes shall be measured to insure that the volume of concrete placed in each pile is equal to or greater than the theoretical volume of the hole created by the auger. If the installation process of any pile is interrupted or a loss of concreting pressure occurs, the pile shall be redrilled to original depth and reformed. Augered cast-in-place piles shall not be installed within six pile diameters center-to-center of a pile filled with concrete less than 24 hours old unless approved by the building official. If the concrete level in any completed pile drops, the pile shall be rejected and replaced.

1017.2.4 Reinforcement: For piles installed with a hollow stem auger, longitudinal steel reinforcement may be placed without lateral ties provided it is placed through ducts in the auger prior to filling the pile with concrete. All pile reinforcement shall have a concrete cover of not less than 2½ inches (64 mm).

1017.3 Driven uncased piles: Driven uncased piles shall conform to Sections 1017.3.1 through 1017.3.4.

1017.3.1 Allowable stress: The allowable design stress in the concrete shall not exceed 25 percent of the 28-day ultimate compressive strength (f'_c) applied to a cross-sectional area not greater than the inside area of the drive casing or mandrel.

1017.3.2 Dimensions: The pile length shall not exceed 30 times the average diameter. The minimum diameter shall be 12 inches (305 mm).

1017.3.3 Installation: Piles shall not be driven within six pile diameters center-to-center in granular soils or within one-half the pile length in cohesive soils of a pile filled with concrete less than 48 hours old, unless approved by the building official. If the concrete surface in any complete pile rises or drops, the pile shall be rejected and replaced. Piles shall not be installed in soils which could cause pile heave.

1017.3.4 Concrete cover: All pile reinforcement shall have a concrete cover of not less than 2½ inches (64 mm), measured from the inside face of the drive casing or mandrel.

1017.4 Enlarged base piles: Enlarged base piles shall conform to Sections 1017.4.1 through 1017.4.5.

1017.4.1 Materials: The maximum size for coarse aggregate for all concrete shall be ¾ inch (19 mm). Compacted concrete shall have a zero slump.

1017.4.2 Allowable stress: The allowable design compressive stress in the concrete shall not exceed 25 percent of the 28-day ultimate compressive strength (f'_c), except that where the concrete is placed in a permanent steel casing the allowable concrete stress may be increased to 33 percent of the 28-day ultimate compressive strength (f'_c).

1017.4.3 Installation: Enlarged bases formed either by compacting concrete or driving a precast base shall be formed in or driven into granular soils. All piles shall be constructed in the same manner as successful prototype test piles driven for the project. Pile shafts extending through peat or other organic soil shall be encased in a permanent steel casing. If a cased shaft is used, it shall be adequately reinforced to resist column action or the annular space around the pile shaft shall be filled sufficiently to reestablish the lateral support of the soil. If pile heave occurs, the pile shall be rejected unless it can be demonstrated that the pile is undamaged and capable of carrying twice its design load.

1017.4.4 Bearing capacity: Pile bearing capacity shall be verified by load tests in accordance with Section 1014.4.

1017.4.5 Concrete cover: The minimum concrete cover shall be 2½ inches (64 mm) for uncased shafts and 1 inch (25 mm) for cased shafts.

1017.5 Steel cased piles: Steel cased piles shall comply with Sections 1017.5.1 through 1017.5.4.

1017.5.1 Material: Pile shells or casings shall be of steel and shall be sufficiently strong to resist collapse and sufficiently water-tight to exclude any foreign materials during the placing of concrete. Steel shells shall have a sealed tip with a diameter of not less than 8 inches (203 mm).

1017.5.2 Allowable stress: The allowable design compressive stress in the concrete shall not exceed 33 percent of the 28-day ultimate compressive strength (f'_c), except that the allowable concrete stress may be increased to a maximum value of $0.40f'_c$ for that portion of the pile meeting the conditions specified in Sections 1017.5.2.1 through 1017.5.2.4.

1017.5.2.1 Thickness: The thickness of the steel shell is not less than No. 14 gage (0.0068 inch) minimum.

1017.5.2.2 Shell type: The shell is seamless or is provided with seams of strength equal to the basic material and is of a configuration which will provide confinement to the cast in place concrete.

1017.5.2.3 Strength: The ratio of steel yield strength (f_y) to design f'_c shall be not less than 6.

1017.5.2.4 Diameter: The nominal pile diameter is not greater than 16 inches.

1017.5.3 Installation: Piles shall have steel shells, mandrel-driven their full length in contact with the surrounding soil, left permanently in place and

filled with concrete. A pile shall not be driven within four and one-half average pile diameters of a pile filled with concrete less than 24 hours old unless approved by the building official. Concrete shall not be placed in steel shells within heave range of driving.

1017.5.4 Reinforcement: Reinforcement shall not be placed within 1 inch (25 mm) of the steel shell. Reinforcing shall be considered necessary only for unsupported pile lengths or when the pile is designed to resist uplift or unbalanced lateral loads.

SECTION 1018.0 PRECAST CONCRETE PILES

1018.1 Design and manufacture: All piles shall be designed and manufactured in accordance with accepted practice, and to resist all stresses induced by handling, driving and service loads. The minimum lateral dimension shall be 10 inches (254 mm). All corners of square piles shall be chamfered. Longitudinal steel shall be arranged in a symmetrical pattern and shall be laterally tied with steel ties or wire spiral spaced not more than 3 inches (76 mm) apart, center-to-center, for a distance of 2 feet (610 mm) from the ends of the pile; and not more than 6 inches (152 mm) elsewhere except that at the ends of each pile the first five ties or spirals shall be spaced 1 inch (25 mm) center-to-center.

1018.1.1 Installation: All piles shall be handled and driven so as not to cause injury or overstressing which will affect their durability or strength.

1018.2 Reinforced piles: Reinforced precast concrete piles shall conform to Sections 1018.2.1 through 1018.2.5.

1018.2.1 Design: The minimum amount of longitudinal reinforcement shall be 2 percent of the concrete section and shall consist of at least four bars.

1018.2.2 Material: All concrete shall have a 28-day ultimate compressive strength (f'_c) of not less than 4,000 psi (2.81 kg/mm^2).

1018.2.3 Allowable stress: The allowable compressive stress in the concrete shall not exceed 33 percent of the 28-day ultimate strength (f'_c) applied to the gross cross-sectional area of the pile.

1018.2.4 Concrete cover: All pile reinforcement shall have a concrete cover of not less than 2 inches (51 mm) except that for piles exposed to sea water, the minimum protective concrete cover shall be 3 inches (76 mm).

1018.2.5 Installation: A precast concrete pile shall not be driven before the concrete has attained a compressive strength of at least 3,000 psi (2.11 kg/mm^2), except that in all cases the concrete strength shall be sufficient to withstand handling and driving forces.

1018.3 Prestressed piles: Prestressed concrete piles shall conform to Sections 1018.3.1 through 1018.3.4.

1018.3.1 Design: The effective prestress in the pile shall be not less than 700 psi (0.49 kg/mm^2).

1018.3.2 Material: Prestressing steel shall conform to ASTM A416 listed in

Appendix A. All concrete shall have a 28-day ultimate compressive strength (f'_c) of not less than 5,000 psi (3.52 kg/mm²).

1018.3.3 Allowable stress: The maximum allowable design compressive stress (f'_c) in concrete shall be determined as follows:

$$f_c = 0.33 f'_c - 0.27 f_{pc}$$

where f_{pc} is the effective prestress stress on the gross section.

1018.3.4 Installation: A prestressed pile shall not be driven before the concrete has attained a compressive strength of at least 4,000 psi (2.81 kg/mm²), except that in all cases the concrete shall be of sufficient strength to withstand handling and driving forces.

SECTION 1019.0 TIMBER PILES

1019.1 Materials: Timber piles shall conform to ASTM D25 listed in Appendix A.

1019.2 Preservative treatment: Timber piles used to support permanent structures shall be treated in accordance with this section unless it is established that the tops of untreated timber piles will be below lowest ground water level assumed to exist during the life of the structure. Preservative and minimum final retention shall be in accordance with AWPA C3 listed in Appendix A. When timber piles are used in salt water, the treatment shall conform to AWPB MP1, MP2 or MP4 listed in Appendix A. Pile cutoffs shall be treated in accordance with AWPA M4 listed in Appendix A.

1019.3 Allowable stresses: The allowable stresses for treated round timber piles shall not exceed those set forth in Table 1019.3.

Table 1019.3
ALLOWABLE UNIT STRESSES FOR TREATED ROUND TIMBER PILES, NORMAL LOAD DURATION—VALUES AT TIP OF PILE

Species	Compression parallel to grain psi[d]	Bending psi[d]	Shear horiz. psi[d]	Comp. perp. to grain psi[d]	Modulus of elasticity
Pacific Coast Douglas fir[a]	1,250	2,450	115	230	1,500,000
Red oak[c]	1,100	2,450	135	350	1,250,000
Red pine[e]	900	1,900	85	155	1,280,000
Southern pine[a, b]	1,200	2,400	110	250	1,500,000

Note a. The allowable unit stresses in compression parallel to grain for Pacific Coast Douglas fir and Southern pine may be increased 0.2 percent for each foot (305 mm) of length from the tip of the pile to the critical section. The increase shall not exceed 10 percent for any pile. The stress increase is cumulative with increase in section properties due to pile taper.

Note b. Southern pine values apply to longleaf, slash, loblolly and shortleaf pines.

Note c. Red oak values apply to northern and southern red oak.

Note d. The working stresses in the above table have been adjusted to compensate for strength reductions due to conditioning prior to treatment. Where piles are air dried or kiln dried prior to pressure treatment, or where untreated piles are to be used, the above working stresses shall be increased by multiplying the tabulated values by the following factors:

Pacific Coast Douglas fir, red oak, red pine	1.11
Southern pine	1.18

Note e. Red pine values apply to red pine grown in the United States.

Note f. 1 psi = 0.000703 kg/mm².

1019.4 End bearing piles: Any sudden decrease in driving resistance of an end bearing timber pile shall be investigated with regard to the possibility of damage. If the sudden decrease in driving resistance cannot be correlated to bearing data, the pile shall be removed for inspection or rejected.

SECTION 1020.0 COMPOSITE PILES

1020.1 Design: Composite piles consisting of two or more approved pile types shall be designed to meet the conditions of installation.

1020.2 Limitation of load: The maximum allowable load shall be limited by the capacity of the weakest section incorporated in the pile.

1020.3 Splices: Splices between concrete and steel or wood sections shall be designed to prevent separation both before and after the concrete portion has set, and to insure the alignment and transmission of the total pile load. Splices shall be designed to resist uplift due to upheaval during driving of adjacent piles, and shall develop the full compressive strength and not less than 50 percent of the tension and bending strength of the weaker section.

SECTION 1021.0 CAISSON PILES

1021.1 Construction: Caisson piles shall consist of a shaft section of concrete filled pipe extending to bedrock with an uncased socket drilled into the bedrock and filled with concrete. The caisson pile shall have a full-length structural steel core or a stub core installed in the rock socket and extending into the pipe portion a distance equal to the socket depth.

1021.2 Design: The depth of the rock socket shall be sufficient to develop the full loadbearing capacity of the caisson pile with a minimum safety factor of two, but the depth shall be not less than the outside diameter of the pipe. The design of the rock socket may be predicated on the sum of the allowable bearing pressure on the bottom of the socket plus bond along the sides of the socket. The minimum outside diameter of the caisson pile shall be 18 inches (457 mm), and the diameter of the rock socket shall be approximately equal to the inside diameter of the pile.

1021.3 Material: Pipe and steel cores shall conform to the material requirements in Section 1015.0. Pipe shall have a minimum wall thickness of ⅜ inch (10 mm) and shall be fitted with a suitable steel driving shoe welded to the bottom of the pipe. All concrete shall have a 28-day compressive strength (f'_c) of not less than 4,000 psi (2.81 kg/mm^2). The concrete mix shall be designed and proportioned so as to produce a cohesive workable mix with a slump of from 4 inches (102 mm) to 6 inches (152 mm).

1021.4 Structural core: The gross cross-sectional area of the structural steel core shall not exceed 25 percent of the gross caisson section. The minimum clearance between the structural core and the pipe shall be 2 inches (51 mm). If cores are to be spliced, the ends shall be milled or ground to provide full contact and shall be full depth welded.

1021.5 Allowable stresses: The allowable design compressive stresses shall not exceed the following: concrete, $0.33f'_c$; steel pipe, $0.35f_y$; structural steel core, $0.50f_y$.

1021.6 Installation: The rock socket and pile shall be thoroughly cleaned of all foreign materials before filling with concrete. Steel cores shall be bedded in cement grout at the base of the rock socket. Concrete shall not be placed through water except when tremie methods are approved by the building official.

SECTION 1022.0 FOUNDATION WALLS

1022.1 Design: Foundation walls shall be designed to resist frost action and to support safely all vertical and lateral loads as provided in Article 9. The maximum stresses due to combined load shall be within the values specified for the materials used in the construction. Unless properly reinforced, tensile stresses shall not exceed those permitted in plain masonry.

1022.2 Minimum thickness: The thickness of foundation walls shall be not less than the thickness of the wall supported, and the minimum thickness shall be limited for the various materials of construction as herein specified. Eight-inch foundation walls shall be permitted under brick veneered frame and under 10-inch cavity walls when the total height of the wall supported, including gables, is not more than 20 feet (6096 mm).

1022.2.1 Reinforced concrete: When reinforced concrete is required to resist all stresses, foundation walls shall be not less than 8 inches thick.

1022.2.2 Hollow and solid unreinforced masonry and plain concrete: The thickness of unreinforced masonry foundation walls shall not be less than shown in Table 1022.2.2 for the type of foundation and superstructure construction used.

Table 1022.2.2
THICKNESS OF FOUNDATION WALLS

Foundation wall construction		Maximum depth below grade (feet)[a, b, c] Supported wall construction		
Type	Thickness (inches)	Frame	Masonry veneer	Masonry
Hollow masonry (unreinforced)	8	4 (6)	4.5 (6)	5 (7)
	10	5 (7)	5.5 (7)	6 (7)
	12	7	7	7
Solid masonry (unreinforced)	8	5 (7)	5.5 (7)	6 (7)
	10	6 (7)	6 (7)	6.5 (7)
	12	7	7	7
Plain concrete	8	7	7	7

Note a. Depth below grade may be increased up to that indicated in parentheses where such increase is warranted by soil conditions and local experience and is approved by the building official.

Note b. Where height of unbalanced fill (height of finish grade above basement floor or inside grade) exceeds 7 feet, foundation wall thickness shall be determined by structural analysis as required in Section 1310.2.

Note c. 1 foot = 304.8 mm.

1022.2.3 Hollow unit walls: Foundation walls of approved hollow masonry units shall be provided with not less than 4 inches (102 mm) of solid masonry at girder bearings, or shall be strengthened with buttresses.

1022.2.4 Rubble stone: Foundation walls of rough or random rubble stone shall not be less than 16 inches (406 mm) thick.

1022.2.5 Bonding: All foundation walls shall be bonded as required for superstructure walls in Section 1210.0.

1022.3 Increased thickness with depth: When any foundation wall, other than a wall that is designed as a retaining wall, extends more than 12 feet (3658 mm) below the top of the first floor beams, the thickness of the wall shall be increased 4 inches (102 mm) for each additional 12 feet (3658 mm) or fraction thereof in depth.

1022.4 Corbels on 8-inch walls: Where an 8-inch wall is corbeled, the top corbel shall be a full course of headers at least 6 inches in length, extending not higher than the bottom of the floor framing. The maximum projection of one unit shall exceed neither one-half the depth of the unit nor one-third its width at right angles to the face which is offset.

1022.5 Lateral stability: Foundation walls of buildings and structures which serve as retaining walls shall conform to the applicable requirements of Section 1310.0, and shall be strengthened with buttresses or additional wall thickness to resist lateral soil and hydrostatic pressure when subjected thereto.

ARTICLE 11

MATERIALS AND TESTS

SECTION 1100.0 GENERAL

1100.1 Scope: The provisions of this article shall govern the quality, workmanship and requirements for all materials hereafter used in the construction of buildings and structures. All materials of construction and tests shall conform to the applicable standards listed in this code.

1100.2 New materials: All new building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this article and in the approved rules to determine character, quality and limitations of use.

1100.3 Used materials: The use of all second-hand materials which meet the minimum requirements of this code for new materials shall be permitted.

SECTION 1101.0 ALTERNATE TEST PROCEDURE

1101.1 General: In the absence of approved rules or other approved standards, the building official shall make or cause to be made the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided in Section 110.0. The cost of all tests and other investigations required under the provisions of this code shall be borne by the applicant. *

SECTION 1102.0 TESTS

1102.1 Test standards: All structural units and assemblies shall be tested in accordance with the standards listed in Appendix A. In the absence of test procedures governing any specific material or method of construction, the building official shall accept authenticated reports from approved agencies which meet the requirements of this code.

1102.2 Strength tests: To determine the safe uniformly distributed working load when not capable of design by approved engineering analysis, or to

check the adequacy of the structural design of an assembly when there is reasonable doubt as to its strength or stability, every system of construction, subassembly or assembled unit and its connections shall be subjected to strength tests prescribed in this code, or to such other tests approved by the building official that simulate the loads and conditions of application that the completed structure will be subjected to in normal use.

1102.2.1 Strength test for glass: The working strength of glass for any location in which it is required to withstand wind or impact loads shall be determined according to Section 1301.5.4 for wind loads and Section 1301.5.6 for impact loads.

1102.3 Durability and endurance tests: Whenever required by the building official or specified herein or in the approved rules, the material or construction shall be subjected to sustained and repetitive loading to determine its resistance to fatigue, and to test for durability and weather resistance.

1102.4 Maintenance test: In addition to durability and endurance tests, tests of all materials shall be made to assure the maintenance of the standards of approved materials when reasonable doubt exists as to quality and when required by the building official.

1102.5 Performance test: All work shall be conducted and completed in an approved manner, so as to secure the results intended in all sections of this code. Whenever there is reasonable doubt as to the stability or structural safety of a completed building or structure or part thereof for the intended use, the building official may require a load test of the building unit or portion of the structure in question. The load test shall be conducted in accordance with Section 1102.5.1 or 1102.5.2.

1102.5.1 Load test procedure specified: When a standard listed in Appendix A governing a specific material or method of construction has load test procedures and acceptance criteria, the test procedure and acceptance criteria of the standard shall apply.

1102.5.2 No load test procedure specified: In the absence of load test procedures and acceptance criteria for a specific material or method of construction, such existing structure shall be subjected to a superimposed load equal to two times the design live load. The test load shall be left in place for a period of 24 hours. If during the test, or upon removal of the test load, the structure shows evidence of failure, the building official shall order such reinforcement or modifications deemed necessary to insure adequacy of the structure for the rated capacity; or in lieu thereof, the building official may specify a reduced working load to which the structure shall be limited. the structure shall be considered to have successfully met the test requirements if the total deflection does not exceed the theoretical deflection computed by approved engineering formulae. When the total deflection is greater than such theoretical value, the structure shall be considered safe for the design load if it recovers 75 percent of the maximum deflection within 24 hours after the removal of the test load.

1102.6 Tests of service equipment and devices: Tests of service equipment and accessories shall include proscenium curtain and stage ventilation in accordance with Sections 610.2.6 and 610.2.8; structural load tests in accordance with Section 902.0; flues, chimneys and boilers in accordance with the mechanical code listed in Appendix A; electric installations in accordance with Section 2002.0; escalators, elevator interlocks and safety devices in accordance with Section 2102.0; refrigerating equipment and other mechanical and plumbing systems and devices as required by the mechanical and plumbing codes listed in Appendix A, and all other service tests required by the approved rules.

1102.7 Fire tests: In the determination of flash points, combustibility, flame-resistance and fireresistance rating of construction materials and methods, all tests shall be conducted in conformity to Sections 1402.0, 1403.0 and 1404.0.

1102.8 Prefabricated construction tests: Prefabricated assemblies or subassemblies not capable of design by approved engineering analysis shall meet all the requirements and tests for at-site construction. The floor panels and other prefabricated units shall be assembled to form an integrated test specimen constructed as in practice, of not less than three units in width with two longitudinal joints; and when designed on the assumption of a simple span, such units shall be tested with flat end supports.

1102.9 Test specimens: The selection and construction of all test specimens and the details of test procedures herein required shall conform to the requirements of the specific test standard being followed. All test specimens and constructions shall be truly representative of the materials, workmanship and details to be normally applied in practice. When structural or fireresistance rated properties of the material are dependent upon adequate curing, the age of the specimen shall be not less than that required to reach the specified design strength or other condition regulated by the applicable test standard.

Note: Test procedures. Test requirements constitute fundamental performance standards and therefore come within the scope of this code. The detail test specifications and procedures are formulated and defined in the approved rules or by reference to test standards of approved testing agencies and organizations. Details of test procedures have been omitted from this code, except for essential basic requirements when deemed necessary.

SECTION 1103.0 CONDITIONS OF ACCEPTANCE

1103.1 General: In evaluating the physical properties of materials and methods of construction when not subject to design by approved engineering analysis, the structural requirements shall be based on the criteria established by the following Sections 1103.2 through 1103.7.

1103.2 Test load factor: The test assembly shall sustain without failure superimposed loads equal to two and one-half times the design live load.

1103.3 Working load deflection: Under the approved working load, the deflection of floor and roof assemblies shall not be greater than $^{1}/_{360}$ of the span for plastered construction; $^{1}/_{240}$ of the span for unplastered floor construction; and $^{1}/_{180}$ of the span for unplastered roof construction.

1103.4 Wall and partition assemblies: Bearing wall and partition assemblies shall sustain the load test both with and without window framing.

1103.5 Comparative tests: When not available from existing approved test data, the building official may require comparative tests of assemblies of standard traditional forms of construction used for similar purposes to assist in determining the adequacy of the new construction.

1103.6 Concentrated load tests: When not capable of design, all floor assemblies in the use classification groups specified in Table 907 shall be subjected to the concentrated loads therein prescribed when such loading exceeds in stress effect the uniformly distributed load specified for such uses in Table 906.

1103.7 Puncture penetration tests: All finish floor assemblies in which light gage metal or other thin materials are used as the structural floor shall withstand the application of a 200 pound (90.8 kg) concentrated load applied to the top surface on an area of 1 square inch (645 mm^2) at any point or points of the assembly designated by the building official.

SECTION 1104.0 APPROVALS

1104.1 Written approval: Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be approved by the building official in writing within a reasonable time after satisfactory completion of all required tests and submission of required test reports.

1104.2 Approved record: Whenever any material, appliance, equipment, system or method of construction shall have been approved by the building official, a record of such approval, including all the conditions and limitations of its permitted use, shall be kept on file in the building official's office and shall be open to public inspection during business hours.

1104.3 Labeling: Products and materials in which the performance characteristics are required to be identified shall be labeled in accordance with the procedures set forth in Sections 1104.3.1 through 1104.3.3.

1104.3.1 Testing: An approved agency shall test a representative sample of the product or material being labeled to the relevant standard or standards. The approved agency shall maintain a record of all the tests performed. The records shall provide sufficient detail to verify compliance with the test standard.

1104.3.2 Inspection and identification: The approved agency shall periodically perform an inspection, which may be in-plant, of the product or material

that is to be labeled. The inspection shall verify that the labeled product or material is representative of the product or material tested.

1104.3.2.1 Independent: The agency to be approved shall be objective and competent. The agency shall also disclose all possible conflicts of interest so that its objectivity can be confirmed.

1104.3.2.2 Equipment: An approved agency shall have adequate equipment to perform all required tests. The equipment shall be periodically calibrated.

1104.3.2.3 Personnel: An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests.

1104.3.3 Label information: The label shall contain the manufacturer's and/or distributor's identification, model number, serial number, or definitive information describing the product or material's performance characteristics and approved agency's identification.

1104.4 Heretofore approved materials: The use of any material already fabricated or of any construction already erected, which conformed to requirements or approvals heretofore in effect, shall be permitted to continue, if not detrimental to life, health or safety of the public.

SECTION 1105.0 MASONRY CONSTRUCTION UNITS

1105.1 Nominal dimensions: Dimensions and thicknesses of masonry construction units specified in this code are nominal dimensions. Actual dimensions may vary from the prescribed minimum in accordance with approved tolerances in the building industry.

1105.2 Second-hand units: Brick and other second-hand masonry units may be reused, subject to the approval of the building official as to quality, condition and compliance with the requirements for new masonry units. The unit shall be of whole, sound material, free from cracks and other defects that would interfere with its proper laying or use, and shall be cleaned free from old mortar before reuse.

SECTION 1106.0 BRICK UNITS

1106.1 General: Brick of clay, shale and calcium silicate (sand/lime) shall conform to ASTM standards listed in Appendix A as follows: C216 for solid units of face brick; C62 for solid units of building brick; C652 for hollow brick; and C73 for calcium silicate brick. Grade requirements for clay and shale brick units in contact with the ground or subject to water, frost and freezing action shall be governed by the applicable provisions of the ASTM standards listed above.

SECTION 1107.0 STRUCTURAL CLAY TILE UNITS

1107.1 General: Structural clay wall tile shall conform to ASTM standards for structural clay tile units listed in Appendix A as follows: C34 for loadbear-

ing wall tile; C212 for structural clay facing tile; C56 for structural clay nonloadbearing wall tile. Grade requirements for units subjected to the weather or contact with the ground shall be governed by the applicable provisions of the ASTM standards listed above.

1107.2 Fireproofing tile: Structural clay tile for nonstructural use in fireproofing of structural members and in wall furring shall not be required to meet compressive strength specifications. The fireresistance rating shall be determined by standard test procedure to comply with the requirements of Table 401.

SECTION 1108.0 GLAZED MASONRY UNITS

1108.1 General: Glazed masonry building units shall be of a quality equal to that required by ASTM C126 listed in Appendix A.

SECTION 1109.0 CONCRETE UNITS

1109.1 Quality: Cast concrete units shall be of sound, compact structure, uniform in shape and free from cracks, warpage or other defects that would impair their serviceability or strength when laid in the wall.

1109.2 Hollow loadbearing units: Approved hollow loadbearing concrete units for use below grade or unprotected against the weather by stucco, brick or other approved facings or veneers shall have a minimum compressive strength on the gross area of 1,000 pounds per square inch (psi) (0.70 kg/mm^2); and for protected exterior use and general interior construction not less than 700 psi (0.49 kg/mm^2).

1109.3 Hollow nonloadbearing units: Approved hollow nonloadbearing concrete units shall have a minimum compressive strength on the average gross area of 350 psi (0.25 kg/mm^2).

1109.4 Solid loadbearing units: Approved solid loadbearing concrete masonry units, when unprotected against the weather or subject to frost and water action, shall have a minimum compressive strength of 1,800 psi (1.27 kg/mm^2), and for protected exterior or general interior use not less than 1,200 psi (0.84 kg/mm^2).

1109.5 Concrete brick: Approved concrete brick for use when exposed to freezing in the presence of moisture shall have a minimum compressive strength of 2,500 psi (1.76 kg/mm^2); and when used as a backup in exterior walls or for general interior construction, a compressive strength of not less than 1,250 psi (0.88 kg/mm^2).

1109.6 Concrete fireproofing and furring units: Approved concrete block or tile used in fireproofing or furring when not exposed to the weather shall have a minimum compressive strength of 300 psi (0.21 kg/mm^2) of net area tested as laid in practice. When exposed to the weather, the compressive strength shall be not less than 700 psi (0.49 kg/mm^2) of gross area. All nonbearing units shall be clearly marked to distinguish them from loadbearing units.

1109.6.1 Fireresistance ratings: Fireresistance ratings for concrete masonry walls of various equivalent thicknesses shall be in accordance with Table 1109.6.1.

Table 1109.6.1
MINIMUM EQUIVALENT THICKNESS, INCHES[b], FOR RATINGS OF[a]

	4 hrs.	3 hrs.	2 hrs.	1½ hrs.	1 hr.	¾ hr.	½ hr.
Calcareous and siliceous gravel	6.2	5.3	4.2	3.6	2.8	2.4	2.0
Expanded clay, shale or slate	5.1	4.4	3.6	3.3	2.6	2.2	1.8
Expanded slag or pumice	4.7	4.0	3.2	2.7	2.1	1.9	1.5
Limestone cinders or slag	5.9	5.0	4.0	3.4	2.7	2.3	1.9

Note a. Thicknesses shown are equivalent thicknesses and include plaster, lath and gypsum wallboard where mentioned and grout when cells are solidly grouted. The equivalent thicknesses may include the thickness of portland cement plaster or 1.5 times the thickness of gypsum plaster. Where combustible members are framed into the wall, the wall must be of such thickness or be so constructed that the thickness of solid material between the end of each member and the opposite face of the wall, or between members set in from opposite sides, will be not less than 93 percent of the thickness shown in Table 1109.6.1.

Note b. 1 inch = 25.4 mm.

1109.6.2 Increasing ratings: Walls composed of hollow concrete masonry units having a nominal thickness of 8 inches or greater and having a fireresistance rating of at least 2 hours shall be classified as 4 hours when the hollow spaces are completely filled with insulation, grout or a dry granular material, such as expanded slag, clay, shale or sand. *

SECTION 1110.0 STRUCTURAL GLASS BLOCK UNITS

1110.1 General: Solid or hollow approved structural glass blocks shall not be used in fire walls, party walls or fire separation walls, or for loadbearing construction. All mortar bearing surfaces of the block shall be precoated or prepared to insure adhesion between mortar and glass.

SECTION 1111.0 ARCHITECTURAL TERRA COTTA

1111.1 General: All approved architectural terra cotta units shall be formed with a strong, homogeneous body of hardburned, weather-resisting clay which gives off a sharp, metallic ring when struck and shall meet the strength and durability requirements of this code. All units shall be formed to engage securely with, and anchor to, the structural frame or masonry wall.

SECTION 1112.0 NATURAL STONE

1112.1 General: Natural stone for masonry shall be sound and free from loose or friable inclusions. It shall meet the strength, fireresistance, durability and impact-resistance required for the intended use.

SECTION 1113.0 CAST STONE

1113.1 General: All approved cast stone shall be fabricated of concrete or other approved materials of required strength, durability and fireresistance for the intended use and shall be reinforced where necessary to comply with Section 1216.0.

SECTION 1114.0 MORTAR AND GROUT FOR MASONRY

1114.1 General: Mortar and grout for use in reinforced and nonreinforced masonry construction shall meet the requirements of this section and ASTM C270 or C476 listed in Appendix A.

1114.2 Mortar and grout types: Mortar and grout for masonry construction shall conform to the requirements of this section.

1114.2.1 Mortar types: Mortar shall conform to the proportion specification of Table 1114.2.1 or the property specification of ASTM C270 listed in Appendix A. Aggregate for use in mortar shall comply with ASTM C144 listed in Appendix A. Mortar conforming to the proportion specification mixed to an initial flow of 100 to 115 percent, shall have a flow after suction of not less than 70 percent.

1114.2.2 Grout types: Grout for reinforced and nonreinforced masonry shall conform to Table 1114.2.2. Aggregate for use in grout shall comply with ASTM C404 listed in Appendix A.

1114.3 Types of mortar permitted: Unit masonry shall be laid in mortar of the types listed in Table 1114.3.

1114.4 Special mortars: The building official may approve other special masonry mortars in place of the mortar types listed in Table 1114.3, provided they develop the minimum compressive strengths specified for the respective

Table 1114.2.1
MORTAR PROPORTION SPECIFICATION REQUIREMENT
(PARTS BY VOLUME)

Mortar type	Portland cement	Masonry cement	Hydrated lime or lime putty Min.	Hydrated lime or lime putty Max.	Damp loose aggregate
M	1 1	— 1	— —	1/4	Not less than 2 1/4 and not more than 3 times the sum of the volumes of the cements and lime used.
S	1 1/2	— 1	1/4 —	1/2	
N	1 —	— 1	1/2 —	1 1/4 —	
O	— 1	1 —	— 1 1/4	— 2 1/2	

Table 1114.2.2
GROUT PROPORTIONS FOR REINFORCED AND NONREINFORCED MASONRY (PARTS BY VOLUME)

Type	Portland cement or portland blast-furnace slag cement	Hydrated lime or lime putty	Aggregates, measured in a damp loose condition	
			Fine	Coarse
Fine grout	1	0 to 1/10	2¼ to 3 times the sum of the volumes of the cementitious materials	—
Coarse grout	1	0 to 1/10	2¼ to 3 times the sum of the volumes of the cementitious materials	1 to 2 times the sum of of the volumes of the cementitious materials

Table 1114.3
MASONRY AND MORTAR TYPES

Types of masonry	Types of mortar permitted
Fire brick	R fractory air setting mortar
Glass block masonry	S or N
Grouted and filled cell masonry	M or S
Linings of existing masonry, above or below grade	M or S
Masonry above grade or interior masonry	
Cavity walls and masonry bonded hollow walls	
Design wind pressure exceeds 20 psf	M or S
Design wind pressure 20 psf or less	M, S or N
Piers of hollow units	M or S
Piers of solid units	M, S or N
Walls of hollow units	M, S or N
Walls of solid units	M, S, N or O
Masonry in contact with earth	M or S
Masonry other than above	M, S or N
Nonloadbearing partitions and fireproofing	M, S, N, O or Gypsum

Note a. 1 psf = 4.882 kg/m².

Table 1114.5
CERAMIC TILE MORTAR COMPOSITIONS

Walls:	Scratchcoat	1 cement; 1/5 hydrated lime; 4 dry or 5 damp sand
	Setting bed and leveling coat	1 cement; ½ hydrated lime; 5 damp sand to 1 cement; 1 hydrated lime; 7 damp sand
Floors:	Setting bed	1 cement; 1/10 hydrated lime; 5 dry or 6 damp sand; or 1 cement; 5 dry or 6 damp sand
Ceilings:	Scratchcoat and setting bed	1 cement; ½ hydrated lime; 2½ dry sand or 3 damp sand

mortars they replace. The strength classification of a special mortar or special mix may be determined by compressive strength tests with the materials and in the proportions representative of those to be used in actual practice. The allowable unit working stresses in the masonry shall not be more than one-fourth the average ultimate compressive strength of the assembled test samples.

* **1114.5 Mortars for ceramic wall and floor tile:** Portland cement mortars for installing ceramic wall and floor tile shall be of the compositions indicated in Table 1114.5.

1114.5.1 Dry-set portland cement mortars: Premixed prepared portland cement mortars requiring only the addition of water may be used in the installation of ceramic tile if complying with ANSI A118.1 and ANSI A118.2 listed in Appendix A. Dry-set mortars which are labeled for use with a particular type of tile, such as glazed wall tile, ceramic mosaics, pavers, and quarry tile, shall not be used to set other types of tile for which they are not intended. The shear bond strength for tile set in such mortar shall be as required for the kind of mortar used when tested in accordance with that standard. Mortars which are not restricted by their labeling to particular types of the tile shall pass all of the shear tests listed in the standard. Tile set in dry-set portland cement mortar shall be installed in accordance with ANSI A108.5 and ANSI A108.7 listed in Appendix A.

1114.5.2 Latex portland cement mortars: Latex modified portland cement thin-set mortar to which latex is added as a replacement for all or part of the gauging water may be used in the installation of ceramic tile if complying with ANSI A118.4 listed in Appendix A. Tile set in latex portland cement mortar shall be installed in accordance with ANSI A108.5 and A108.7 listed in Appendix A.

1114.6 Organic adhesives: Water-resistant organic adhesives complying with ANSI A136.1 listed in Appendix A may be used in the installation of ceramic tile. The shear bond strength shall be not less than 40 psi (0.028 kg/ mm^2) for Type I adhesive, and not less than 20 psi (0.014 kg/ mm^2) for Type II adhesive, when tested in accordance with ANSI A136.1 listed in Appendix A. Tile set in organic adhesives shall be installed in accordance with ANSI A108.4 listed in Appendix A.

1114.7 Epoxy mortar: Ceramic tile may be set and grouted with epoxy complying with ANSI A118.3 listed in Appendix A. Tile set in epoxy shall be installed in accordance with ANSI A108.6 listed in Appendix A.

SECTION 1115.0 CONCRETE AGGREGATES

* **1115.1 Aggregate quality:** All concrete aggregates, except lightweight aggregates for insulating concrete, shall meet the requirements of ACI 318 listed in Appendix A. Lightweight aggregates for insulating concrete shall meet the requirements of ASTM C332 listed in Appendix A.

1115.2 Special aggregates: Special aggregates, including among others, perlite, vermiculite and other processed mica, pumice, lava, tufa, volcanic glass, slag, coke, expanded clay and shale used in concrete and plaster construction shall meet all the requirements of the approved rules and shall be classified in their respective fireresistance rating grades as determined by ASTM E119 listed in Appendix A. When used for fire protection purposes only, the mortar strength requirements for such aggregates may be waived by the building official providing the concrete is shown by test to have adequate strength for the intended use.

SECTION 1116.0 CONCRETE

1116.1 General: Concrete for use as plain or reinforced concrete shall be proportioned and produced to comply with the requirements of ACI 318 listed in Appendix A.

1116.2 Strength tests: Strength tests of concrete shall be made in accordance with ACI 318 listed in Appendix A.

Exception: The building official may waive the requirement for strength tests when the total quantity of a given class of concrete is less than 50 cubic yards (38.25 m^3). In such cases, the building official shall require satisfactory evidence that concrete of the required strength is being provided. Satisfactory evidence shall include, but not necessarily be limited to, certification from the concrete supplier that the concrete to be provided will be proportioned based on "field experience" and/or "trial batches" in accordance with Sections 4.3 and 4.4 of ACI 318 listed in Appendix A. In the absence of satisfactory evidence, concrete shall be proportioned in accordance with Table 1116, if strength tests are to be waived.

Table 1116
MAXIMUM WATER/CEMENT RATIOS AND MINIMUM CEMENT CONTENTS

Specified compressive strength[a] (psi)	Minimum sacks of cement per cubic yard of concrete	Maximum permissible water/cement ratios			
		Non-air-entrained concrete		Air-entrained concrete	
		Absolute ratio by weight	U.S. gal. per 94 lb. bag of cement	Absolute ratio by weight	U.S. gal. per 94 lb. bag of cement
2,500	5	0.67	7.6	0.54	6.1
3,000	5½	0.58	6.6	0.46	5.2
3,500	6	0.51	5.8	0.40	4.5

Note a. Twenty-eight-day strengths for cements meeting strength limits of ASTM C150 listed in Appendix A, Types I, IA, II or IIA and seven-day strengths for Types III and IIIA.
Note b. 1 psi = 0.000703 kg/mm^2; 1 $yd.^3$ = 0.7646 m^3; 1 lb. = 0.454 kg; 1 gal. = 0.00379 m^3.

SECTION 1117.0 INTERIOR LATHING AND GYPSUM PLASTERING

1117.1 General: All lathing and gypsum plaster materials and accessories shall be marked with appropriate standards referenced in this section and stored in such manner as to protect them from the weather.

1117.2 Standards: All interior lathing and gypsum plastering materials shall conform to the standards listed in Table 1117 and Appendix A and, when required for fire protection, shall also conform to the provisions of Article 14.

1117.3 Installation: Installation of these materials shall conform to Section 1219.0.

Table 1117
PLASTER MATERIALS AND ACCESSORIES

Material	Standard
Exterior plaster bonding compounds	ASTM C932
Gypsum base for veneer plasters	ASTM C588
Gypsum casting and molding plaster	ASTM C59
Gypsum Keene's cement	ASTM C61
Gypsum lath	ASTM C37
Gypsum plaster	ASTM C28
Gypsum veneer plaster	ASTM C587
Interior bonding compounds, gypsum	ASTM C631
Lime plasters	ASTM C5; C206
Metal lath	ASTM C847
Plaster aggregates	
Sand	ASTM C35; C897
Perlite	ASTM C35
Vermiculite	ASTM C35
Portland cement	ASTM C150
Steel studs and track	ASTM C645; C955
Steel screws	ASTM C894; C954
Welded wire lath	ASTM C933

SECTION 1118.0 PORTLAND CEMENT STUCCO LATH AND PLASTER

1118.1 General: All exterior and interior portland cement stucco lathing and plastering shall be done with appropriate materials listed in Table 1117 and Appendix A.

1118.2 Weather protection: All materials shall be stored in such a manner as to protect them from the weather.

1118.3 Installation: Installation of these materials shall be in conformance with ASTM C926 and Section 1228.0.

SECTION 1119.0 GYPSUM BOARD MATERIALS

1119.1 General: All gypsum board materials and accessories shall be marked with appropriate standards referenced in this section and stored so as to protect them from the weather.

1119.2 Standards: All gypsum board materials shall conform to the appropriate standards listed in Table 1119 and Appendix A.

1119.3 Installation: Installation of these materials shall conform to Section 1219.0 and, when required for fireresistance, to Article 14.

Table 1119
GYPSUM BOARD MATERIALS AND ACCESSORIES

Material	Standard
Gypsum sheathing	ASTM C79
Gypsum wallboard	ASTM C36
Joint reinforcing tape and compound	ASTM C474; C475
Nails for gypsum boards	ASTM C514
Steel screws	ASTM C894; C954
Steel studs, nonloadbearing	ASTM C645
Water-resistant gypsum backing board	ASTM C630

SECTION 1120.0 FIBER BOARDS

1120.1 General: Insulating boards manufactured with wood or other vegetable fibers used as building boards for sheathing, roof decks, interior wall and ceiling finish, roof insulation or sound deadening, shall be vermin proof, resistant to rot-producing fungi, water-repellent and shall meet the strength and durability tests specified in ASTM C208 and C532 listed in Appendix A. Sheathing, when used structurally, shall be so identified by an approved agency. When required under the provisions of Article 14, the boards shall be protected or treated to develop the required fireresistance rating or flameresistance as determined by test.

1120.2 Jointing: To insure tight-fitting assemblies, edges shall be manufactured square or shiplapped, beveled, tongue-and-groove or U-jointed.

1120.3 Roof insulation: When used as roof insulation in all types of construction, fiber boards shall be protected with an approved roof covering.

1120.4 Wall insulation: When installed and firestopped to comply with Article 14, fiber boards may be used for wall insulation in all types of construction. In fire wall and fire separation wall construction, unless treated to be fireretardant as provided in Section 1404.0 for Class I materials, the boards shall be cemented directly to the masonry or other noncombustible base and shall be protected with an approved noncombustible veneer anchored to the base without intervening air spaces.

1120.5 Drywall construction: Where fireresistance ratings are required, provision shall be made for interlocking, lapping or otherwise protecting the joints between adjacent boards to insure smoke and flame tightness.

1120.6 Insulating roof deck: When used as roof decking in open beam construction, fiber board insulating roof deck shall have a nominal thickness not less than 1 inch.

1120.7 Siding: Hardboard siding shall comply with AHA A135.6 listed in Appendix A.

SECTION 1121.0 PLYWOOD

1121.1 Quality: All plywood when used structurally shall meet the performance standards and all other requirements of DOC PS 1 and HPMA PS 51

listed in Appendix A for the type, grade and identification index or species group of plywood involved and shall be so identified by an approved agency. Working stresses shall conform to APA E30, APA Y510 and HPMA HP-SG listed in Appendix A.

1121.2 Types: Plywood for interior use may be either of the moisture-resistant or exterior type. Plywood for exterior use shall be of the exterior waterproof type, except that plywood roof sheathing exposed to the outdoors on the underside may be interior type bonded with exterior glue. Exterior plywood may be applied directly to the framing as a siding, provided it has a nominal thickness of ⅜ inch. Joints shall occur over framing members, unless wood or plywood sheathing is used or joints are lapped horizontally a minimum of 1½ inches (38 mm) or otherwise made waterproof to the satisfaction of the building official. If plywood is used as lapped siding without sheathing, the wall framing to which it is attached shall be diagonally braced.

1121.3 Spans: The maximum spans for plywood sheathing shall be limited by the allowable stresses and deflections for the design live load, but shall not be greater than the spans specified in Tables 1121.3.1, 1121.3.1a, 1121.3.2 and 1121.3.3.

1121.3.1 Floor and roof sheathing: Allowable spans for floor and roof sheathing shall be as specified in Tables 1121.3.1 and 1121.3.1a. The values in Table 1121.3.1 apply to Structural I and II, C-D and C-C grades only.

1121.3.1.1 Floor sheathing: Edges of plywood floor sheathing shall have approved tongue-and-groove joints or shall be supported with blocking, unless ¼-inch minimum thickness underlayment is installed, or finish floor is $^{25}/_{32}$-inch wood strip. Allowable uniform load based on deflection of $^{1}/_{360}$ of the span is 165 pounds per square foot (psf) (806 kg/m^2).

1121.3.2 Plywood combination subfloor underlayment: Allowable spans for combination subfloor underlayment shall be as specified in Table 1121.3.2.

1121.3.2.1 Limitations: Table 1121.3.2 is applicable to underlayment grade, C-C (plugged) and all grades of sanded exterior type plywood. Allowable uniform load based on deflection of $^{1}/_{360}$ of span is 125 psf (610 kg/m^2). Plywood edges shall have approved tongue-and-groove joints or shall be supported with blocking, unless ¼-inch minimum thickness underlayment is installed, or finish floor is $^{25}/_{32}$-inch wood strip. If wood strips are perpendicular to supports, thicknesses shown for 16-inch (406 mm) and 20-inch (508 mm) spans may be used on 24-inch (610 mm) span. Except for ½-inch, underlayment grade and C-C (plugged) panels may be of nominal thickness $^{1}/_{32}$-inch less than the nominal thicknesses shown when marked with the reduced thicknesses.

1121.3.3 Vertical maximum stud spacing: Stud spacing for vertical sheathing shall be as specified in Table 1121.3.3.

1121.4 Stress skin panel: For use in stress skin or other prefabricated construction, plywood design shall be determined by approved engineering analysis or by the tests prescribed for prefabricated assemblies in Section 1102.0.

Table 1121.3.1
ALLOWABLE SPANS FOR PLYWOOD FLOOR AND ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PERPENDICULAR TO SUPPORTS[a] (SPAN IN INCHES)

Panel index[b] roof span, roof/floor span	Roof					Floor
	Maximum span (inches)			Load (psf)		
	Thickness (inches)	Edges blocked[c]	Edges unblocked	Total load	Live load	Maximum span[e] (inches)
12/0	5/16	12	12	155	150	0
16/0	5/16, 3/8	16	16	95	75	0
20/0	5/16, 3/8	19.2	19.2	75	65	0
24/0	3/8	24	20	65	50	0
24/0	1/2	24	24	65	50	0
30/12	5/8	30	26	70	50	12[f]
32/16	1/2, 5/8	32	28	55	40	16[g]
36/16	3/4	36	30	55	50	16[g]
42/20	5/8, 3/4, 7/8	42	32	40[d]	35[d]	20[g,h]
48/24	3/4, 7/8	48	36	40[d]	35[d]	24

Note a. These values apply to Structural I and II, C-D and C-C grades only. Spans shall be limited to values shown because of possible effect of concentrated loads (see Section 1121.3.1).
Note b. Identification index appears on all panels in the construction grades listed in Note a.
Note c. Edges may be blocked with lumber or other approved type of edge support.
Note d. For roof live load of 40 psf or total load of 55 psf, decrease spans by 13 percent or use panel with next greater identification index.
Note e. Plywood edges shall have approved tongue-and-groove joints or shall be supported with blocking, unless 1/4-inch minimum thickness underlayment is installed, or finish floor is 25/32-inch wood strip. Allowable uniform load based on deflection of 1/360 of the span is 165 psf (see Section 1121.3.1.1).
Note f. May be 16 inches if 25/32-inch wood strip flooring is installed at right angles to joists.
Note g. May be 24 inches if 25/32-inch wood strip flooring is installed at right angles to joists.
Note h. For joists spaced 24 inches on center, plywood sheathing with Identification Index Numbers 42/20 or greater can be used for subfloors when supporting 1½ inches of lightweight concrete.
Note i. 1 inch = 25.4 mm; 1 psf = 4.882 kg/m².

Table 1121.3.1a
ALLOWABLE LOADS FOR PLYWOOD ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PARALLEL TO SUPPORTS[a] (SPAN IN INCHES)

	Thickness (inches)	No. of plies	Span (inches)	Total load (psf)	Live load (psf)
Structural I	1/2	4	24	35	25
	1/2	5	24	55	40
Other grades covered in PS 1	1/2	5	24	30	25
	5/8	4	24	40	30
	5/8	5	24	55	45

Note a. Uniform load deflection limitations: 1/180 of span under live load plus dead load, 1/120 under live load only. Edges shall be blocked with lumber or other approved type of edge supports.
Note b. 1 inch = 25.4 mm; 1 psf = 4.882 kg/m².

Table 1121.3.2
ALLOWABLE SPANS FOR PLYWOOD COMBINATION SUBFLOOR—UNDERLAYMENT,[a] PLYWOOD CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PERPENDICULAR TO SUPPORT (THICKNESS IN INCHES)

Species groups	Maximum spacing of joists (inches)		
	16	20	24
1	1/2	5/8	3/4
2, 3	5/8	3/4	7/8
4	3/4	7/8	1

Note a. Applicable to underlayment grade, C-C (plugged) and all grades of sanded exterior type plywood. Spans limited to values shown because of possible effect of concentrated loads. Allowable uniform load based on deflection of 1/360 of span is 125 psf. Plywood edges shall have approved tongue-and-groove joints or shall be supported with blocking, unless 1/4-inch minimum thickness underlayment is installed, or finish floor is 25/32-inch wood strip. If wood strips are perpendicular to supports, thicknesses shown for 16-inch and 20-inch spans may be used on 24-inch spans. Except for 1/2-inch, underlayment grade and C-C (plugged) panels may be of nominal thickness 1/32 inch less than the nominal thicknesses shown when marked with the reduced thickness (see Section 1121.3.2.1).
Note b. 1 inch = 25.4 mm; 1 psf = 4.882 kg/m^2.

Table 1121.3.3
ALLOWABLE STUD SPACING FOR PLYWOOD WALL SHEATHING

Panel identification index	Panel thickness (inch) and construction	Maximum stud spacing (inches) Exterior coverings nailed to:[a]	
		Stud	Sheathing
12/0, 16/0, 20/0	5/16	16	16[b]
16/0, 20/0, 24/0, 32/16	3/8 and 1/2 3-ply	24	16 24[b]
24/0, 32/16	1/2 (4 & 5-ply)	24	24

Note a. Blocking of horizontal joints not required.
Note b. Apply plywood sheathing with face grain perpendicular to studs.
Note c. 1 inch = 25.4 mm.

SECTION 1122.0 WALLBOARDS AND SHEATHING

1122.1 General: Wallboards of particle board, gypsum, processed fiber or other approved materials shall conform to AHA A135.4, ANSI A208.1, AHA 194.1, ASTM C208 and ASTM D2277 listed in Appendix A. All wallboards shall be identified as to compliance with appropriate standards.

1122.2 Water-resistant gypsum backer board: In all areas subjected to repeated damp conditions and moisture accumulation such as bathtub and shower compartments, water-resistant gypsum backer board complying with ASTM C630 listed in Appendix A shall be used as a substratum unless protected with a moisture-proof and vapor-proof covering.

SECTION 1123.0 HARDBOARD

1123.1 Basic hardboard: Basic hardboard shall meet the requirements of AHA A135.4 listed in Appendix A.

1123.2 Siding: Hardboard siding shall meet the requirements of AHA 135.6 listed in Appendix A, and when used structurally shall be so identified by an approved agency.

SECTION 1124.0 PARTICLE BOARD

1124.1 Quality: Particle board shall conform to ANSI A208.1 listed in Appendix A. Particle board shall be identified by the grade mark or certificate of inspection issued by an approved agency.

1124.2 Floor underlayment: Underlayment shall conform to Type 1-M-1 of ANSI A208.1 listed in Appendix A. Underlayment shall not be less than ¼ inch in thickness and shall be installed as recommended by the manufacturer.

1124.3 Combination subfloor underlayment: Allowable spans and grades for combination subfloor underlayment shall be as specified in Table 1124.3.

1124.4 Roof sheathing: Allowable loads for roof sheathing shall be in accordance with the spans and grades specified in Table 1124.4.

Table 1124.3
ALLOWABLE SPANS FOR PARTICLE BOARD COMBINATION SUBFLOOR UNDERLAYMENT[a]

Grade	Thickness (inches)	Maximum spacing[b,c,d] of supports (inches)
2-M-W	5/8 21/32 3/4	16 19.2 24
2-M-F	3/4	19.2
2-M-3	3/4	19.2

Note a. All panels are continuous over two or more spans and the tongue-and-groove panels are installed with the long dimension perpendicular to supports.
Note b. Uniform deflection limitation shall be 1/360th of the span under 100 psf minimum load.
Note c. Edges shall have tongue-and-groove joints or shall be supported with blocking unless ¼-inch minimum thickness underlayment is installed, or finish floor is 25/32-inch wood strip.
Note d. 1 inch = 25.4 mm.

Table 1124.4
ALLOWABLE LIVE LOADS FOR PARTICLE BOARD ROOF SHEATHING[a,b]

Grade	Thickness (inches)	Maximum on-center spacing of supports (inches)[d]	Live load (pounds per square foot)[d]	Total load (pounds per square foot)[d]
2-M-W and 2-M-F	3/8[c]	16	45	65
	7/16	16	105	105
	7/16[c]	24	30	40
	1/2	16	110	150
	1/2	24	40	55

Note a. Panels are continuous over two or more spans.
Note b. Uniform load deflection limitations shall be 1/180th of the span under live load plus dead load and 1/240th of the span under live load only.
Note c. Edges shall be supported with blocking or edge clips.
Note d. 1 inch = 25.4 mm; 1 pound per square foot = 4.882 kg/m².

1124.5 Siding and sheathing: Allowable spans and grades of particle board siding and sheathing shall be as specified in Table 1124.5a and 1124.5b.

Table 1124.5a
ALLOWABLE SPANS FOR EXPOSED PARTICLE BOARD PANEL SIDING

Grade	Stud spacing (inches)[a]	Minimum thickness (inches)		
		Siding		Exterior ceilings and soffits
		Direct to studs	Continuous support	Direct to supports
2-M-W and 2-M-F	16	3/8	5/16	5/16
	24	1/2	5/16	3/8
2-M-1 and 2-M-2	16	5/8	3/8	—
	24	3/4	3/8	—

Note a. 1 inch = 25.4 mm.

Table 1124.5b
ALLOWABLE SPANS FOR PARTICLE BOARD WALL SHEATHING[a]

Grade	Thickness (Inches)	Stud spacing (inches)[b]	
		Siding nailed to studs	Sheathing under coverings parallel or perpendicular to studs
2-M-W and 2-M-F	5/16	16	—
	3/8	24	16
	7/16	24	24
2-M-1 and 2-M-2	3/8	16	—
	1/2	16	16

Note a. Not exposed to the weather, long dimension of the panel parallel or perpendicular to studs.
Note b. 1 inch = 25.4 mm.

ARTICLE 12

STEEL, MASONRY, CONCRETE, GYPSUM AND LUMBER CONSTRUCTION

SECTION 1200.0 GENERAL

1200.1 Scope: The provisions of this article shall govern the quality, workmanship and requirements for all methods of construction hereafter used in the construction of buildings and structures. All methods of construction shall conform to the applicable standards listed in this code.

SECTION 1201.0 STRUCTURAL STEEL CONSTRUCTION

1201.1 General: Structural steel construction used in all buildings and structures shall be fabricated from materials of uniform quality, free from defects that would vitiate the strength or stability of the structure. Workmanship, design, fabrication, transportation and erection shall conform to AISC S326 listed in Appendix A.

1201.2 Plans: Design plans drawn to appropriate scale shall show the size, section and relative locations of all structural members with floor levels, column centers and all offsets fully dimensioned. The design loads shall be clearly indicated for all parts of the building or structure.

1201.3 Temporary and special stresses: Due provision shall be made in the design for temporary stresses occurring during erection, and for the influence of special loads producing impact or vibrations as provided in Section 909.4. Stresses caused by eccentric loading shall be fully provided for and eccentric details shall be shown on the design and shop drawings.

1201.4 Shop drawings: Complete shop drawings shall be prepared in conformance with the best modern practice in advance of the actual fabrication. Such drawings shall clearly distinguish between shop and field rivets, bolts and welds in all connections and details. *

1201.5 Painting and special protection: All painting shall comply with AISC S326 listed in Appendix A. When exposed to highly corrosive fumes or vapors, or subject to destruction from other highly hazardous industrial processes, all structural steelwork shall be protected in accordance with AISC S326 listed in Appendix A.

SECTION 1202.0 FORMED STEEL CONSTRUCTION

1202.1 Design: The design of all cold-formed steel members and assembled wall, floor and roof panels, used alone or in combination with other structural members, or with component materials, shall be based on allowable unit stresses and maximum deflections in accordance with the AISI *Specification for Design of Cold-Formed Steel Structural Members* and AISI *Specification for Design of Cold-Formed Stainless Steel Structural Members* listed in Appendix A. Metal building systems shall conform to the provisions of this code and the MBMA *Metal Building Systems Manual* listed in Appendix A.

1202.2 Secondary structural systems: Formed steel floor, wall and roof systems may be designed and constructed to resist all vertical and horizontal moments and shears resulting from lateral forces. Such members, when designed to transmit horizontal shears due to wind or other lateral forces, shall be connected to the supporting structure so as to adequately resist all primary and secondary stresses. When concrete topping or other approved decking is installed in a manner to insure composite action of the assembly, the strength of the composite member may be included in the calculations.

1202.3 Protection: Formed steel shall be protected in accordance with Sections 1202.3.1 through 1202.3.4.

1202.3.1 Shop coat: All individual structural members and assembled panels of light gage and formed steel construction, except where fabricated of approved corrosion-resistive metallic steel or of steel having a corrosion-resistive or other approved coating, shall be protected against corrosion with an approved shop coat of paint, enamel, or other approved protection.

1202.3.2 Field coat: After erection where directly exposed to the weather, except when encased in concrete made of noncorrosive aggregates, or where fabricated of approved corrosion-resistive steel, or of galvanized or otherwise adequately-protected steel, individual structural members and assembled panels of light gage and formed steel construction shall be given an additional coat of approved protection.

1202.3.3 Siding: Exposed siding or sheathing shall be fabricated of approved corrosion-resistive steel or otherwise protected at the ground level for sufficient height above grade as determined by the depth of average snowfall in the locality, but not less than 8 inches (203 mm).

1202.3.4 Protection at exterior walls: Floor or roof construction which extends into an exterior wall shall be adequately waterproofed and protected from the weather to prevent corrosion.

1202.4 Tests: When not capable of design by approved engineering analysis, the building official shall require tests of the individual or assembled structural units and their connections as prescribed in Sections 1102.0 and 1103.0. At least three specimens truly representative of the construction to be used in practice shall be subjected to the prescribed test and the mean of the results shall determine the safe working value; provided that any individual test

varying more than 10 percent from the mean value shall cause rejection of the series.

SECTION 1203.0 STEEL JOIST CONSTRUCTION

1203.1 General: Steel joists and joist girders may be used as structural members in floor and roof construction in accordance with SJI *Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders* listed in Appendix A.

1203.2 Loads and stresses: Connections of all members shall be designed with the minimum possible eccentricity and all secondary stresses shall be included with primary stresses in the design. In buildings subject to heavy concentrations or moving loads, the construction shall be designed to resist the vertical and lateral components of such loads in addition to the live and dead loads specified in Article 9.

1203.3 Partitions: The joists shall be designed to support the dead load of partitions, wherever they occur, in addition to all other imposed dead and live loads.

1203.4 Protection: Painting of steel joists shall be in accordance with the requirements of Section 1202.0 for formed steel construction; or the joist shall be dipped in an approved hot asphalt, or shall be protected by painting, dipping or spraying with approved cold asphalt at the place of manufacture.

1203.5 Height and area limitations: When the main structural frame is designed to resist all horizontal and vertical moments and shears due to lateral forces, and the secondary system consists of steel joists which are attached to the supporting beams and girders of the frame as specified in the standards listed in Section 1203.1, steel joist construction of the required fireresistance rating may be used in all buildings within the height limits of Table 501.

1203.6 Tests: When not subject to approved engineering analysis as regulated by Section 1203.1, the assembly shall meet the load test requirements specified in Sections 1102.0 and 1103.0.

SECTION 1204.0 REINFORCING STEEL

1204.1 General: Metal reinforcement for reinforced concrete, reinforced gypsum concrete, and reinforced masonry shall comply with ACI 318, ACI 531, ANSI/NBS H74, NCMA TR75-B or BIA *Requirements for Engineered Brick Masonry* listed in Appendix A.

1204.2 Tests: When unidentified reinforcement is approved for use, not less than three tension and three bending tests shall be made on representative specimens of the reinforcement from each shipment and grade of reinforcing steel proposed for use in the work.

SECTION 1205.0 CAST STEEL CONSTRUCTION

1205.1 Materials: Carbon steel casting for building construction shall be cast from steel conforming to AISC S326 listed in Appendix A. All castings shall be free from injurious blow holes or other defects which would impair the structural strength.

1205.2 Higher strength cast steel: Higher strength cast steel may be used when approved by the building official.

1205.3 Welding cast steel: Cast steel designed for use in welding shall be of weldable grade.

SECTION 1206.0 CAST IRON CONSTRUCTION

1206.1 Materials: Cast iron for building construction shall be a good foundry mixture providing clean, tough, gray iron, free from serious blow holes, cinder spots and cold shuts, and conforming to ASTM A48 and ASTM A256 listed in Appendix A for medium gray iron castings.

1206.2 Limitations of use: Cast iron columns shall not be used where subject to eccentric loads which produce a net tension in the section, nor in any part of a structural frame which is required to resist stress due to wind. The maximum stresses for cast iron shall be as indicated in Table 1206.

Table 1206
CAST IRON STRESSES

Type of stress	Maximum stress in pounds per square inch
Extreme compression (fiber stress in bending)	16,000
Extreme tension (fiber stress in bending)	3,000
Column compression	9,000 minus 40 *l*/*r*
Shear	3,000
Tension	3,000
Ratio *l*/*r* not to exceed 70	

Note a. 1 psi = 0.00703 kg/mm².

1206.3 Multi-story columns: Cores of superimposed columns shall be of the same dimensions above and below a splice. When a column of smaller diameter is superimposed over one of larger diameter, the larger column shall be tapered down to the smaller diameter over a length of not less than 6 inches (152 mm).

1206.4 Thickness of metal: The minimum thickness of cast iron shall be not less than specified in Sections 1206.4.1 through 1206.4.3.

1206.4.1 Columns: In columns, the metal shall be not less than $^{1}/_{12}$ the smallest dimension of the cross-section and not less than ¾ inch (19 mm).

1206.4.2 Bases and brackets: In bases and flanges, the metal shall be not less than 1 inch (25 mm) thick reinforced with fillets and brackets.

1206.4.3 Lintels: In lintels, the metal shall be not less than ¾ inch (19 mm) thick and shall be limited to use on spans of not more than 6 feet (1829 mm).

1206.5 Inspection: A cast iron column shall not be erected in place before it has been inspected and approved by the building official. The use of any cast iron column in which blow holes or imperfections reduce the effective area of the cross-section more than 10 percent shall be prohibited. Where required by the building official, ⅜-inch (10 mm) round inspection holes shall be drilled in the section to expose the thickness of metal for inspection purposes.

SECTION 1207.0 SPECIAL STEEL AND STRUCTURAL STEEL CABLE SYSTEMS

1207.1 Special steels: Alloy, high-carbon or other special high-strength steels not covered in this article may be used in the design and construction of buildings and structures as prescribed in Section 919.0.

1207.2 Structural steel cable systems: The design, fabrication and erection of steel cables used as load-carrying members in buildings and structures shall be in accordance with the AISI *Criteria for Structural Applications of Steel Cables for Buildings* listed in Appendix A.

SECTION 1208.0 LIGHTWEIGHT METAL ALLOYS

1208.1 General: Aluminum and other approved lightweight metals and alloys used for structural purposes in buildings and structures shall comply with AA-SAS 30 and AA-ASM 35 listed in Appendix A.

SECTION 1209.0 MASONRY WALL CONSTRUCTION

1209.1 Design: All masonry construction shall comply with the provisions of this article governing quality of materials and manner of construction; and shall be of adequate strength and proportions to support all superimposed loads within working stresses prescribed in Table 1209, ANSI/NBS H74, BIA *Building Code Requirements for Engineered Brick Masonry*, NCMA TR75-B or ACI 531 with the exception of Section 12.2.2 on fired clay masonry listed in Appendix A.

1209.2 Wetting of brick: Brick (clay or shale) at the time of laying, shall require wetting if the unit's initial rate of water absorption exceeds 30 grams per 30 square inches per minute (30 g per 323 mm^2/s) or 0.035 ounces per square inch (0.0015 g/mm^2), as determined by ASTM C67 listed in Appendix A.

1209.3 Cold weather construction: Masonry laid in temperatures of the outside air below 40 degrees F. (4 degrees C.) shall be protected in accordance with the provisions of the IMIAWC *Recommended Practices and Guide Specifications for Cold Weather Masonry* listed in Appendix A. Frozen materials shall not be used, nor shall frozen masonry be built upon.

1209.4 Incorporation of combustibles: Lumber or other combustible materials, except nailing blocks and ornamental timber to an extent permitted by

the chasing restrictions of Section 1212.0 and the provisions of Section 1400.3, shall not be incorporated in masonry walls, except as approved for combustible aggregates or component materials after fire test.

Table 1209
ALLOWABLE COMPRESSIVE STRESSES; GROSS CROSS-SECTIONAL AREA, IN PSI
(Except as noted)

Type of masonry and grade of masonry unit (psi gross area)	Type of mortar			
	M	S	N	O
Grouted masonry of solid masonry units:				
from 4,500 to 8,000 psi	350	275	200	—
from 2,500 to 4,500 psi	275	215	155	—
from 1,500 to 2,500 psi	225	175	125	—
Hollow walls (cavity or masonry bonded)[a]				
Solid masonry units				
2,500 plus psi	140	130	110	—
from 1,500 to 2,500 psi	100	90	80	—
Hollow masonry units	70	60	55	—
Masonry of hollow units	85	75	70	—
Piers of hollow units, cellular spaces filled	105	95	90	—
Solid masonry of brick and other solid units of clay or shale; sand lime or concrete:				
8,000 plus psi	400	350	300	200
from 4,500 to 8,000 psi	250	225	200	150
from 2,500 to 4,500 psi	175	160	140	110
from 1,500 to 2,500 psi	125	115	100	75
Solid masonry of solid concrete masonry units:				
1,800 plus psi	175	160	140	100
from 1,200 to 1,800 psi	125	115	100	75
Stone ashlar masonry				
Granite	800	720	640	500
Limestone or marble	500	450	400	325
Rubble stone, coursed, rough or random	140	120	100	80
Sandstone or cast stone	400	360	320	250

Note a. On gross cross-sectional area of wall minus area of cavity between wythes. The allowable compressive stresses for cavity walls are based upon the assumption that the floor loads bear upon but one of the two wythes. Where hollow walls are loaded concentrically, the allowable stresses may be increased by 25 percent.

Note b. 1 psi = 0.000703 kg/mm².

SECTION 1210.0 BONDING OF WALLS

1210.1 General: Walls of solid, composite and hollow masonry and cavity and other hollow walls shall be bonded in accordance with this section, ACI 531, NCMA TR75-B or ANSI/NBS H74 listed in Appendix A.

1210.2 Rubble stone walls: All stones in rubble masonry shall be laid on their natural bed and the walls shall be bonded with not less than one through bond stone for each 9 superficial square feet (0.84 m²) of area.

1210.3 Buttresses and piers: All buttresses shall be bonded into the wall by a masonry bond. The piers and buttresses shall have sufficient strength and

stability with sufficient bonding or anchorage between the walls and the supports to resist wind pressure and suction.

1210.4 Intersecting walls and partitions: Where required by design or Section 1211.0, masonry walls and partitions shall be securely anchored or bonded at points where they intersect by one of the following methods indicated in Sections 1210.4.1 through 1210.4.3.

1210.4.1 True masonry bond or metal ties: Walls may be bonded by laying at least 50 percent of the units at the intersection in true masonry bond with alternate units having a bearing of not less than 3 inches (76 mm) upon the unit below, or they may be anchored with not less than $^{3}/_{16}$ inch (5 mm) corrosion-resistant metal wire ties or joint reinforcement at vertical intervals not to exceed 2 feet (610 mm), or by other equivalent approved anchorage.

1210.4.2 Offsets and anchors: Where walls are carried up separately, the intersection shall be toothed or blocked with 8 inch (203 mm) maximum offsets and shall be provided with approved metal anchors at vertical intervals of not more than 4 feet (1219 mm) or, when approved, blocking may be eliminated and rigid steel anchors shall be provided, spaced not more than 2 feet (610 mm) apart vertically.

1210.4.3 Interior nonloadbearing walls: Interior nonloadbearing walls may be bonded or anchored as required by Sections 1210.4.1 or 1210.4.2 or they may be anchored at their intersection at vertical intervals of not more than 2 feet (610 mm) with at least No. 22 Galvanized Sheet Gage (0.034 in.) corrosion-resistant corrugated metal ties $^{7}/_{8}$ inch (22 mm) in width, or other equivalent approved method of anchorage.

1210.5 Erecting precautions: Where hollow walls decrease in thickness, a course of solid masonry or concrete filled units, or a continuous bearing plate shall be interposed between the thicker and thinner sections. A wall shall not be built up more than 25 feet (7620 mm) in advance of other walls of the same building or structure unless supported independently at each floor, and all walls shall be temporarily braced during erection.

SECTION 1211.0 LATERAL BRACING OF WALLS

1211.1 General: All masonry walls shall be laterally supported by horizontal bracing of floor and roof framing, or vertical bracing of columns, buttresses or cross walls at vertical or horizontal intervals as specified in ANSI/NBS 211, ANSI/NBS H74, ACI 531, NCMA TR75-B or BIA *Building Code Requirements for Engineered Brick Masonry* listed in Appendix A. Provision shall be made in the structure to transfer wind pressures and other lateral forces to the foundation.

SECTION 1212.0 CHASES AND RECESSES IN BEARING WALLS

1212.1 Where permitted: Chases and recesses shall be prohibited in any wall less than 12 inches thick or in the required area of piers and buttresses; except

that 8-inch walls where permitted in residential buildings and the apron under window openings may have chases not more than 4 inches (102 mm) in depth.

1212.2 Maximum size: The maximum permitted depth of a chase in any wall shall be not more than one-third the wall thickness, and the maximum length of a horizontal chase or the maximum horizontal projection of a diagonal chase shall not exceed 4 feet (1219 mm) except as provided in Section 1212.5; and except further that the length of the apron below window sills in all walls may equal the width of the window opening. Such aprons in 8 inch-walls may have chases not more than 4 inches (102 mm) in depth when waterproofed. The aggregate area of recesses and chases in any wall shall be not more than one-fourth of the area of the face of the wall in any one story.

1212.3 Fireresistive limitations: It shall be unlawful to have chases or recesses which reduce the thickness of material below the minimum specified in Article 14 for fire walls, fire separation walls or required fireresistive covering of structural members.

1212.4 Hollow walls: When chases and recesses are permitted in hollow walls and walls constructed of hollow blocks or tile, they shall be built in with the wall. It shall be unlawful to cut chases in such walls after erection.

1212.5 Continuous chases: Horizontal chases for the bearing of reinforced concrete floor and roof slabs may be continuous, provided anchors are installed above and below the floor construction to resist the bending and uplifts in the wall due to flexure of the slab.

SECTION 1213.0 CORBELED AND PROJECTED MASONRY

1213.1 Limitations: In nonreinforced masonry, the maximum horizontal projection of corbeling from the plane of the wall shall not exceed one-half of the wall thickness of solid walls or one-half of the wythe thickness for cavity walls. The maximum projection of one unit shall not exceed one-half the height of the unit, nor one-third of its bed depth.

1213.2 Hollow walls: Corbeling of hollow masonry or masonry built of hollow units shall be supported on at least one full course of solid masonry.

1213.3 Molded cornices: Unless structural support and anchorage is provided to resist the overturning moment, the center of gravity of all projecting masonry or molded cornices shall lie within the middle third of the supporting wall. Terra cotta and metal cornices shall be provided with a structural frame of approved noncombustible material anchored in an approved manner.

SECTION 1214.0 BEARING ON HOLLOW UNIT WALLS

1214.1 Bearing area: Beam, girder and other concentrated loads shall be provided with a bearing of solid masonry or filled cores of hollow unit masonry at least 4 inches (102 mm) in height, or with a bearing plate of adequate design and dimensions to distribute the load safely on the wall or pier.

1214.2 Closure tile: All open cells in tile or blocks at wall ends and at openings shall be filled solidly with grout for a length of not less than 12 inches (305 mm), or reversed closure tile shall be used.

SECTION 1215.0 PLAIN CONCRETE

1215.1 General: For design, plain concrete is defined as either unreinforced or containing less reinforcement than the minimum amount specified for reinforced concrete in accordance with Section 1216.0.

1215.2 Limitations: Plain concrete shall not be used for structural members where special design considerations are required for earthquake or blast forces, unless specifically approved by the building official.

1215.3 Minimum strength: Specified compressive strength of plain concrete to be used for structural purposes shall not be less than 2,500 psi (1.76 kg/mm^2).

1215.4 Design: Plain concrete members shall be designed for adequate strength in accordance with ACI 318.1 listed in Appendix A.

1215.5 Minimum slab thickness: The minimum thickness of concrete floor slabs supported directly on the ground shall be not less than 3½ inches (89 mm).

SECTION 1216.0 REINFORCED CONCRETE

1216.1 Design: All structures of reinforced concrete, including prestressed concrete, shall be designed and constructed in accordance with ACI 318 listed in Appendix A.

1216.2 Special systems of design or construction: Any system of design or construction not covered by, or conflicting with, the requirements of this code may be approved by the building official on the basis of satisfactory experience records and tests as prescribed by Sections 1102.0, 1103.0, 1402.0 and 1403.0.

1216.3 Conduits and pipe embedded in concrete: Plumbing and heating piping and electrical conduits may be embedded in reinforced concrete floor and wall construction and in column fireproofing as provided in Section 1411.0. Piping for radiant heating purposes may be embedded in the structural floor or wall slabs, or may be installed in a separate concrete layer placed in addition to the required fireproof covering, as approved by the building official. In any case, the required area of reinforcement shall be provided in addition to such piping; and the conduits, pipes and other embedded mechanical facilities shall be so placed as to leave the strength and fireresistance rating of the construction undiminished.

1216.4 Minimum concrete dimensions: Protection of reinforced concrete structural elements in buildings and structures shall be adequate to meet the fire and strength tests of this code, but not less than the minimum dimensions

established by ACI 318 listed in Appendix A. Unless specifically designed for structural load-carrying capability, any floor finish not placed monolithically with floor slabs shall not be included in the calculations for structural strength.

SECTION 1217.0 CONCRETE-FILLED PIPE COLUMNS

1217.1 General: Concrete-filled pipe columns shall be manufactured from standard, extra-strong, or double-extra-strong steel pipe and tubing, filled with concrete so placed and manipulated as to secure maximum density and to insure complete filling of the pipe without voids.

1217.2 Design: The safe supporting capacity of concrete-filled pipe columns shall be computed in accordance with the approved rules or as determined by test.

1217.3 Connections: All caps, base plates and connections shall be of approved types and shall be positively attached to the shell and anchored to the concrete core. Welding of brackets without mechanical anchorage shall be prohibited. When the pipe is slotted to accommodate webs of brackets or other connections, the integrity of the shell shall be restored by welding to insure hooping action of the composite section.

1217.4 Reinforcement: To increase the safe load-supporting capacity of concrete-filled pipe columns, the steel reinforcement shall be in the form of rods, structural shapes or pipe embedded in the concrete core with sufficient clearance to insure the composite action of the section, but not nearer than 1 inch (25 mm) to the exterior steel shell. All structural shapes used as reinforcement shall be milled to insure bearing on cap and base plates.

1217.5 Fireresistance rating protection: Pipe columns shall be of such size or so protected as to develop the required fireresistance ratings specified in Table 401. When an outer steel shell is used to enclose the fireproof covering, it shall not be included in the calculations for strength of the column section. The minimum diameter of pipe columns shall be 4 inches (102 mm) except that in Type 5 structures not exceeding 3 stories or 40 feet (12192 mm) in height, 3-inch (76 mm) columns may be used in the basement and as secondary steel members.

1217.6 Approvals: All details of column connections and their splices shall be shop-fabricated by approved methods and shall be approved only after tests in accordance with the approved rules. Shop-fabricated concrete-filled pipe columns shall be inspected by the building official or by an approved representative of the manufacturer at the plant.

SECTION 1218.0 SHOTCRETE

1218.1 General: Except as specified in the following sections, shotcrete shall conform to the requirements of this code for plain concrete or reinforced concrete.

1218.2 Proportioning: Shotcrete proportions shall be selected that allow suitable placement procedures using the delivery equipment selected, and that results in in-place hardened shotcrete meeting the strength requirements of this code.

1218.3 Aggregate: Coarse aggregate, if used, shall not exceed ¾ inch (19 mm) in size.

1218.4 Reinforcement: Reinforcement shall comply with Sections 1218.4.1 through 1218.4.3.

1218.4.1 Size: The maximum size of reinforcement shall be No. 5 bars. The building official may permit the use of larger bars if it can be demonstrated that adequate encasement of the larger bars can be achieved.

1218.4.2 Spacing: The minimum clearance between parallel reinforcing bars shall be 2½ inches (64 mm). Welded wire fabric shall have a minimum wire spacing of 2 inches (51 mm) by 2 inches (51 mm).

1218.4.3 Splices: Lap splices in reinforcing bars shall be by the noncontact lap splice method with at least 2 inches (51 mm) clearance between bars. The building official may permit the use of contact lap splices where necessary for the support of the reinforcing and where it can be demonstrated that adequate encasement of the bars at the splice can be achieved.

1218.5 Rebound: Any rebound or accumulated loose aggregate shall be removed from the surfaces to be covered prior to placing the initial or any succeeding layers of shotcrete. Rebound shall not be reused as aggregate.

1218.6 Joints: Except where permitted herein, unfinished work shall not be allowed to stand for more than 30 minutes unless all edges are sloped to a thin edge. For structural elements which will be under compression and for construction joints shown on the approved plans, square joints may be used. Before placing additional material adjacent to previously applied work, sloping and square edges shall be cleaned and wetted.

1218.7 Damage: Any in-place shotcrete which exhibits sags or sloughs, segregation, honeycombing, sand pockets or other obvious defects shall be removed and replaced.

1218.8 Curing: During the curing periods specified herein, shotcrete shall be maintained above 40 degrees F. (4 degrees C.) and in a moist condition.

1218.8.1 Initial curing: Shotcrete shall be kept continuously moist for 24 hours after shotcreting is completed or shall be sealed with an approved curing compound.

1218.8.2 Final curing: Final curing shall continue seven days after shotcreting, or for three days if high-early-strength cement is used, or until the specified strength is obtained. Final curing shall consist of either the initial curing process or the shotcrete shall be covered with an approved moisture-retaining cover.

1218.8.3 Natural curing: Natural curing may be used in lieu of that specified above when the relative humidity remains at or above 85 percent, and is authorized by the design architect/engineer, and approved by the building official.

1218.9 Strength test: Strength test of shotcrete shall be made in accordance with the quality assurance provisions of ACI 506.2 listed in Appendix A.

SECTION 1219.0 GYPSUM CONSTRUCTION

1219.1 General: Gypsum board and plaster construction shall be of the materials listed in Table 1119. These materials shall be assembled and installed in conformance with appropriate standards listed in Table 1219 and Appendix A.

1219.2 Limitations: Gypsum construction shall not be used in any exterior location where it would be directly exposed to the weather.

1219.3 Inspection: The building official shall be notified not less than 24 hours in advance of all plastering work or installation of any gypsum board except gypsum lath. Plaster shall not be applied until after the lathing or other plaster base has been inspected and approved by the building official.

1219.4 Weather protection: When plastering work is in progress, the building or structure shall be enclosed and conditioned to provide proper ventilation and temperatures not less than 40 degrees F. (4 degrees C.) nor more than 80 degrees F. (27 degrees C.) from one week prior to the plastering operation and until one week following or until the plaster is dry.

Table 1219
INSTALLATION OF GYPSUM CONSTRUCTION

Material	Standard
Gypsum plaster	ASTM C842
Gypsum veneer base	ASTM C844
Gypsum veneer plaster	ASTM C843
Gypsum wallboard	GA-216
Interior lathing and furring	ASTM C841
Steel framing for gypsum boards	ASTM C754

SECTION 1220.0 ENGINEERED UNREINFORCED MASONRY

1220.1 General: This section shall govern wall thicknesses and lateral support requirements for unreinforced masonry determined by a structural analysis based upon standards referenced in this section.

1220.2 Brick masonry: Walls designed and constructed of brick masonry using solid clay shale units shall conform to the provisions of the BIA *Building Code Requirements for Engineered Brick Masonry* listed in Appendix A.

1220.3 Concrete block masonry: Walls designed and constructed of concrete block masonry units shall conform to the provisions of ACI 531 listed in Appendix A.

SECTION 1221.0 REINFORCED MASONRY

1221.1 General: All reinforced masonry, except for reinforced solid clay brick masonry and reinforced concrete block masonry, shall conform to the provisions of ANSI/NBS H74 or NCMA TR75-B listed in Appendix A. Reinforced solid clay brick masonry shall conform to the BIA *Building Code Requirements for Engineered Brick Masonry* listed in Appendix A. Reinforced concrete block masonry shall conform to the provisions of NCMA TR75-B or ACI 531 listed in Appendix A.

1221.2 Tests: When required, testing of masonry assemblies designed and constructed under this section for strength, material compatibility, and quality control shall be in accordance with ASTM E72, ASTM E447, ASTM E518 or ASTM E519 listed in Appendix A.

SECTION 1222.0 UNREINFORCED MASONRY

1222.1 General: All unreinforced masonry except for engineered unreinforced masonry shall conform to ANSI/NBS 211 listed in Appendix A. Engineered unreinforced masonry shall conform to Section 1220.0 of this code.

1222.2 Tests: When required, testing of masonry assemblies designed and constructed under this section for strength, material compatibility, and quality control shall be in accordance with ASTM E72, ASTM E447, ASTM E518, and ASTM E519 listed in Appendix A.

SECTION 1223.0 LUMBER AND TIMBER CONSTRUCTION

1223.1 Design: All structural wood members and connections shall be of sufficient size or capacity to carry all design loads without exceeding the allowable design values specified in the NFoPA *National Design Specification for Wood Construction* listed in Appendix A.

1223.1.1 Identification: All lumber used for load-supporting purposes, including end-jointed or edge-glued lumber, shall be identified by the grade mark of a lumber grading or inspection agency approved by the building official. Grading practices and identification shall be in accordance with rules published by an approved agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency approved by the building official may be accepted for precut, remanufactured, or rough-sawn lumber, and for sizes larger than 3 inches nominal thickness.

1223.2 Minimum dimensions: Dimensions of lumber and timber construction shall comply with Sections 1223.2.1 and 1223.2.2.

1223.2.1 Sizes of structural members: All lumber sizes specified in this code are nominal sizes. Nominal sizes may be shown on the plans. Computations to determine the required size of members shall be based on the net dimensions (actual sizes).

1223.2.2 Structural posts: All isolated structural posts shall have a minimum dimension of 4 inches (102 mm).

1223.3 Fabrication: Fabrication of lumber and timber construction shall comply with Sections 1223.3.1 through 1223.3.3.

1223.3.1 Connections: All connections shall be fabricated with approved timber connectors, bolts, lag screws, spikes, nails or gluing or other approved connecting devices. Bolted connections shall be snugged up tightly without crushing wood fibers under the washers. All nailed connections shall meet the minimum requirements of Appendix C.

1223.3.2 Cambering: Trusses and long-span girders shall be designed with sufficient camber, or other provision shall be made to counteract any deflection other than that permitted in Section 1103.3.

1223.3.3 Cutting and notching: It shall be unlawful to notch, cut or pierce wood beams, joists, rafters or studs in excess of the limitations herein specified, unless proven safe by structural analysis or suitably reinforced to transmit all calculated loads.

1223.3.3.1 Notches: Notch depth in the top or bottom of the joist, rafters and beams shall not exceed one-sixth the depth of the members and shall not be located in the middle one-third of the span. Notch depth at the ends of the member shall not exceed one-fourth the depth of the member. The tension side of beams, joists and rafters of 4-inch or greater nominal thickness shall not be notched, except at ends of members.

1223.3.3.2 Holes: Holes bored or cut into joists for piping or electrical cables shall not be closer than 2 inches (51 mm) to the top or bottom of the joist and the diameter of the hole shall not exceed one-third the depth of the joist. In studs of bearing walls or partitions, notches or bored holes made to receive piping, electrical conduit, air conditioning or heating ductwork or for other fabricating purposes shall not be cut or bored more than one-third the depth of the stud.

1223.3.3.3 Reinforcement: When the stud is cut or bored in excess of one-third its depth it shall be reinforced to be equal in load carrying capacity to a stud notched not more than one-third its depth.

1223.4 Trimmer and header beams: When determined necessary by stress analysis, trimmer and header beams shall be hung in approved stirrups or hangers, unless supported on a wall, girder or column. All multiple-member beams shall be spiked or bolted together.

1223.5 Bearing and anchorage on girders: All members framing into girders shall be anchored or tied to secure continuity. The ends of all wood beams or joists resting on girders shall bear not less than 4 inches (102 mm) or shall be supported in approved metal stirrups, hangers or on wood clips or ribbon strips. Beams framing from opposite sides shall lap at least 6 inches (152 mm) and be bolted or spiked together; and when framing end to end, they shall be secured together by approved ties, straps, dogs, plates or sheathing.

1223.6 Maintenance: All connections in the joints of timber trusses and structural frames shall be inspected periodically. Bolts and other connectors shall be maintained tight.

SECTION 1224.0 HEAVY TIMBER CONSTRUCTION

1224.1 Wood: All structural wood members, sawn or glued-laminated, used in Type 4 construction shall be stress-grade timbers identified as to grade and strength by approved manufacturing, testing or inspection agencies or bureaus. All structural timber members shall have the minimum dimensions specified in Section 405.0 for Type 4 construction and shall be designed, fabricated and installed in accordance with the NFoPA *National Design Specification for Wood Construction*, AITC 102, AITC 108, AITC 112, AITC 117, AITC 119 and AITC A190.1 listed in Appendix A.

1224.2 Other structural materials: Structural steel or reinforced concrete members may be substituted for timber in any part of the structural frame, if protected to develop the required fireresistance rating specified in Table 401 but not less than 1 hour fireresistance rating. Structural members supporting walls shall be protected to afford the same fireresistance rating as the wall supported.

1224.3 Columns: Columns shall be continuous or superimposed throughout all stories by means of reinforced concrete or metal caps with brackets, or shall be connected by properly designed steel or iron caps, with pintles and base plates, or by timber splice plates affixed to the columns by means of metal connectors housed within the contact faces, or by other approved methods. Girders or trusses supporting columns shall have at least 1 hour fireresistance rating.

1224.4 Floors: The planks shall be laid so that a continuous line of joints will not occur except at points of support and so that they are not spiked to supporting girders which are parallel to the lamination of the floor. Flooring shall not extend closer than ½ inch (13 mm) to walls to provide an expansion joint, but the joint shall be covered at top or bottom to avoid flue action.

1224.5 Beams and girders: Beam and girder supports and connections shall comply with Sections 1224.5.1 and 1224.5.2.

1224.5.1 Wall and girder supports: Wall plate boxes of self-releasing type or approved hangers shall be provided where beams and girders enter masonry. An air space of ½ inch (13 mm) shall be provided at the top, end and sides of the member unless approved durable or treated wood is used. Where intermediate beams are used to support a floor, they shall rest on top of the girders, or shall be supported by ledgers or blocks securely fastened to the sides of the girders, or they may be supported by approved metal hangers into which the ends of the beams shall be closely fitted. Wood beams and girders supported by walls required to have a fireresistance rating of 2 hours or more shall have not less than 4 inches (102 mm) of solid masonry between their ends and the outside face of the wall and between adjacent beams. Adequate roof anchorage shall be provided.

1224.5.2 Column connections: Girders and beams shall be closely fitted around columns and adjoining ends shall be cross-tied to each other, or inter-tied by caps or ties, to transfer horizontal loads across the joint. Wood bolsters may be placed on tops of columns which support roof loads only.

SECTION 1225.0 WOOD CONSTRUCTION

1225.1 General: The exterior walls, interior partitions, floors and roofs of wood construction shall be designed and constructed to develop adequate strength to resist all vertical and lateral forces due to both dead and live loads. Standard balloon, braced, platform, and post-and-beam types of construction shall be acceptable framing methods.

1225.2 Wood stud frame: Wood stud framing shall comply with Sections 1225.2.1 through 1225.2.8.

1225.2.1 Bearing walls: Posts and studs in bearing walls and partitions shall be designed as columns, with due allowance for lateral support furnished by sheathing, intermediate bracing, horizontal bridging, wall coverings and the floor and roof assemblies. The walls shall be fabricated in such a manner as to provide adequate support for the material used to enclose the building and to provide for transfer of all lateral loads to the foundation in accordance with Section 1103.4.

A single top plate may be used provided the plate is adequately tied at joints, corners, and intersecting walls by at least the equivalent of 3 inch by 6 inch by 0.036 inch (76 mm by 152 mm by 1 mm) thick galvanized steel that is nailed to each wall or segment of wall by three 8d nails or equivalent, provided the rafters, joists, or trusses are centered over the studs with a tolerance of not more than 1 inch (25 mm).

1225.2.2 Nonbearing walls: Studs in nonbearing walls and partitions shall not be spaced more than 48 inches (1219 mm) on centers, and may be erected with the long dimension parallel to the wall, unless otherwise approved after test as an integrated assembly. A single top plate may be installed in accordance with Section 1225.2.1.

1225.2.3 Bracing: In buildings more than one story in height and where necessary for strength in one-story buildings, the corner posts shall be the equivalent of not less than two pieces of 2-inch by 4-inch studs, braced by not less than one piece of 1-inch by 4-inch continuous diagonal brace let into the studs. Bracing may be omitted when diagonal wood sheathing, plywood or particle board panels are used, or other sheathing specified in Section 1225.3 is applied vertically in panels of not less than 4 feet by 8 feet with approved fasteners complying with Appendix C. Other sheathing materials may be used when tested in accordance with ASTM E72 listed in Appendix A and meeting the following criteria.

Dry tests with load increments of 400 pounds (182 kg). Maximum load 5,200 pounds (2362 kg) or 650 pounds per foot (968 kg/m).

1. At load of 1,200 pounds (545 kg), average total deflection of 0.2 inch (5 mm) and residual deflection of 0.1 inch (2 mm).

2. At load of 2,400 pounds (1090 kg), average total deflection of 0.6 inch (15 mm) and residual deflection of 0.3 inch (8 mm).

Wet tests with load increments of 400 pounds (182 kg). Maximum load 4,000 pounds (1816 kg).

1. At load of 1,200 pounds (545 kg), average total deflection of 0.28 inch (7 mm) and residual deflection of 0.14 inch (4 mm).
2. At load of 2,400 pounds (1090 kg), average total deflection of 0.8 inch (20 mm) and residual deflection of 0.4 inch (10 mm).

1225.2.4 Mortise-and-tenon framing: Where mortise-and-tenon framing is used, the vertical members of the frame shall be not less than 4 inches by 6 inches in size and shall be designed as a column.

1225.2.5 Multiple stories: When the frame is more than one story in height and studs and posts are not continuous from sill to roof, the members shall be secured together with approved clips, splices or other connections to insure a continuous, well-integrated structure. Sheet metal clamps, ties or clips shall be formed of galvanized steel or other approved corrosion-resistive materials equivalent to No. 20 Galvanized Sheet Gage (0.040 in.) steel sheets for 2-inch framing members and not less than No. 18 Galvanized Sheet Gage (0.052 in.) for 3-inch structural members. For 4-inch and larger members, column splices and beam and girder supports shall comply with Section 1224.0.

1225.2.6 Framing over openings: Headers, double joists, trusses or other approved assemblies of adequate size to transfer all superimposed loads to the vertical members shall be provided over all window and door openings in bearing walls and partitions.

1225.2.7 Beam separation in Types 3A and 3B construction: All wood and other combustible floor, roof and other structural members framing into masonry walls shall be cut to a bevel of 3 inches (76 mm) in the depth and shall project not more than 4 inches (102 mm) into the wall. The distance between embedded ends of adjacent beams or joists entering into the wall from opposite sides shall be not less than 4 inches (102 mm).

1225.2.8 Framing around flues and chimneys: Combustible framing shall be trimmed not less than 2 inches (51 mm) from all flues, chimneys and fireplaces, and 6 inches (152 mm) away from flue openings.

1225.3 Wall sheathing: Except as provided in Section 1225.4 for weather boarding or when stucco construction complying with Section 1118.0 is used, all enclosed buildings shall be sheathed with one of the materials of the nominal thickness specified in Table 1225.3 or any other material of equal strength and durability approved by the building official.

1225.3.1 Paper-backed lath sheathing: In buildings of Use Group R-3 and one story commercial buildings with brick or similar veneers, the sheathing may consist of a layer of paper-backed lath complying with Section 1117.0 and a 1-inch (25 mm) intermediate space which shall be mortar-filled as each course of veneering is applied.

Table 1225.3
MINIMUM THICKNESS OF WALL SHEATHING

Sheathing type	Minimum thickness
Fiber board	½ inch
Gypsum sheathing	½ inch
Particle board	see Section 1124.5
Plywood	5/16 inch
Reinforced cement mortar	1 inch (see Section 1225.3.1)
Wood sheathing	⅝ inch

1225.4 Exterior weather boarding, veneers and condensation: To secure weather-tightness in framed walls and other unoccupied spaces, the exterior walls shall be faced with an approved weather-resisting covering properly attached to resist wind and rain. The cellular spaces shall be so ventilated as not to vitiate the firestopping at floor, attic and roof levels, or shall be provided with interior noncorrodible vapor-type barriers complying with the approved rules, or other means shall be used to avoid condensation and leakage of moisture. The materials indicated in Table 1225.4 shall be acceptable as approved weather coverings of the minimum nominal thickness specified.

Table 1225.4
MINIMUM THICKNESS OF WEATHER COVERINGS

Covering type	Minimum thickness
Aluminum siding[b]	0.019 inch
Asbestos cement boards	⅛ inch
Asbestos shingles	5/32 inch
Brick and concrete masonry veneers	2 inches
Clay tile veneers	¼ to 1 inch
Exterior plywood (with sheathing)	5/16 inch
Exterior plywood (without sheathing)	see Section 1121.2
Formed steel siding	29 gage (0.017 in.)
Glass fiber reinforced concrete panels	⅜ inch
Hardboard siding	¼ inch
Particle board (with sheathing)	see Section 1124.5
Particle board (without sheathing)	see Section 1124.5
Precast stone facing	⅝ inch
Protected fiber board siding	½ inch
Stone veneers	2 inches
Stucco or exterior plaster	¾ inch
Wood shingles	⅜ inch
Wood siding (without sheathing)[a]	½ inch

Note a. Wood siding of less thickness may be used providing such wall covering is placed over sheathing which conforms to Section 1225.3.
Note b. See AAMA 1402.3 listed in Appendix A.

1225.4.1 Masonry veneers: Veneers of unit masonry shall be attached to the wood frame with at least No. 22 Galvanized Sheet Gage (0.034 in.) corrosion-resistive, corrugated metal ties not less than ⅞ inch (22 mm) in width at vertical intervals of not more than 16 inches (406 mm) and horizontal intervals of not more than 32 inches (813 mm).

1225.4.2 Metal veneers: Veneers of metal shall be fabricated from approved corrosion-resistive materials or shall be protected front and back with porcelain enamel or shall be otherwise treated to render the metal resistant to corrosion. Such veneers shall be not less than No. 29 Galvanized Sheet Gage (0.017 in.) in thickness mounted on wood or metal furring strips or approved sheathing on the wood construction.

1225.4.3 Height of veneers: The average height of 4-inch masonry veneer shall be not more than 25 feet (7620 mm) above its supports on a foundation wall or on corbels of masonry or steel; and not more than 18 feet (5486 mm) in height for 2-inch veneers.

1225.4.4 Nailing: All weather boarding and wall and roof coverings shall be securely nailed with aluminum, copper, zinc, zinc-coated or other approved corrosion-resistive nails in accordance with the nailing schedule in Appendix C or the approved manufacturer's recommendations. Shingles and other weather coverings shall be attached with appropriate standard shingle nails to furring strips securely nailed to studs, or with approved mechancially bonding nails, except when sheathing is wood not less than 1-inch nominal thickness or plywood not less than $^{5}/_{16}$ inch thick. Wood shingles or shakes attached with approved corrosion-resistive annular grooved nails may be applied over fiber board shingle backer and fiber board sheathing when the installation is in accordance with the approved manufacturer's recommendations. Wood shingles or shakes and asbestos shingles or siding may be nailed directly to nail base fiber board sheathing not less than ½-inch nominal thickness with approved corrosion-resistive annular grooved nails when the installation is in accordance with the approved manufacturer's recommendations.

1225.5 Foundation anchorage: Wall sill plates, minimum of 2-inch by 4-inch members, shall be sized and anchored to foundation walls or piers and at intermediate intervals as required to resist wind uplift. Anchor bolts shall be a minimum of ½-inch diameter. The bolts shall be embedded in foundations to a depth of not less than 8 inches (203 mm) of poured in place concrete, and not less than 15 inches (381 mm) in grouted unit masonry. There shall be a minimum of two anchor bolts per section of plate and anchor bolts shall be placed 12 inches (305 mm) from the end of each section of plate with intermediate bolts spaced a maximum of 8 feet (2438 mm) on center.

1225.6 At-grade protection: Wood framing and metal siding shall be protected at grade in accordance with Sections 1225.6.1 and 1225.6.2.

1225.6.1 Wood framing: All exterior wood framework of buildings, whether structural or nonloadbearing, shall be supported on approved foundation walls at least 8 inches (203 mm) above the finished grade, and higher when necessitated by greater average snowfall. Where climatic conditions or the geographical location require additional control measures to protect buildings and structures against decay and termite attack, the provisions of Section 1315.0 shall be complied with.

1225.6.2 Metal siding: Exposed metal siding or sheathing shall be protected

from corrosion at the ground level by supporting the foundation channel at sufficient height above grade on the concrete apron or other approved water-resisting foundation.

1225.7 Floors: Wood floor construction shall comply with Sections 1225.7.1 through 1225.7.3.

1225.7.1 Bridging: Except as hereinafter noted, in all floor, attic and roof framing, there shall be not less than one line of bridging for each 8 feet (2438 mm) of span. The bridging shall consist of not less than 1-inch by 3-inch lumber, double-nailed at each end, or of equivalent metal bracing of equal rigidity. A line of bridging shall also be required at supports where adequate lateral support is not otherwise provided. Midspan bridging is not required for floor, attic or roof framing in buildings of Use Groups R-2 and R-3, except when the joist depth exceeds 12 inches nominal or when the minimum uniformly distributed live load exceeds 40 psf (195.28 kg/m^2).

1225.7.2 Flooring: The flooring of wood frame construction shall be of adequate strength and stiffness to support required loads and, where necessary for strength and for lateral support of the building, subflooring shall be provided.

1225.7.3 Joist spans: Except when otherwise substantiated by approved structural design methods, floor joist spans shall comply with the NFoPA *Span Tables for Joists and Rafters* listed in Appendix A. Design stresses shall be those indicated in the NFoPA *Design Values for Joists and Rafters* listed in Appendix A.

1225.8 Roofs: Wood roof construction shall comply with Sections 1225.8.1 through 1225.8.4.

1225.8.1 Types of decking and sheathing: Roof deck sheathing shall consist of not less than ⅝-inch boards, plywood of the thickness specified in Section 1121.3, particle board of the grade and thickness specified in Section 1124.4, or other approved materials of equivalent strength and rigidity. When open deck sheathing is used on pitched roofs, it shall consist of not less than 1-inch by 4-inch roofers spaced not more than 6 inches (152 mm) on center or material of equivalent strength and rigidity.

1225.8.2 Wood shingles: Wood shingles and handsplit shakes complying with the RCSHSB *Grading Rules for CertiGrade Red Cedar Shingles* listed in Appendix A may be used for roof covering where permitted in Section 1427.0, and may be installed on tight decking or on spaced roof boards.

1225.8.3 Asphalt shingles: Asphalt shingle roofs with a slope of four units vertical in 12 units horizontal (4:12) or more shall have an underlay consisting of one layer of Type 15 asphalt-saturated felt, adequately attached. Where January daily average temperature is 25 degrees F. (-4 degrees C.) or less, or where there is possibility of ice forming along the eaves and causing a backup of water, an eaves flashing strip of mineral surfaced roll roofing shall be applied to extend to a point 12 inches (305 mm) minimum inside the interior

wall line of the building. Asphalt shingles laid with double coverage may be installed on slopes below 4:12 to as low as 2:12, provided the shingles are approved self-sealing shingles or are hand-sealed and are installed with an underlayment consisting of two layers of Type 15 felt, applied shingle fashion. In areas where the January daily average temperature is 25 degrees F. (-4 degrees C.) or less, or where there is a possibility of ice forming along the eaves and causing a backup of water, the two layers of felt shall be cemented together from the eaves up the roof to overlie a point 24 inches (610 mm) inside the interior wall line of the building.

1225.8.4 Rafter spans: Except when otherwise substantiated by approved structural design methods, rafter spans shall comply with the NFoPA *Span Tables for Joists and Rafters* listed in Appendix A. Design stresses shall be those indicated in the NFoPA *Design Values for Joists and Rafters* listed in Appendix A. Trusses shall be designed in accordance with the TPI *Design Specifications for Light Metal Plate Connected Wood Trusses* and the NFoPA *National Design Specifications for Wood Construction* listed in Appendix A.

1225.9 Reroofing: Reroofing of wood roof construction shall comply with Sections 1225.9.1 through 1225.9.3.

1225.9.1 Asphalt shingle application: Not more than two overlays of asphalt shingles shall be applied over an existing asphalt shingle roof. Not more than two overlays of asphalt shingles shall be applied over wood shingles. Asphalt shingles applied over wood shingles shall have an underlay of not less than Type 30 nonperforated felt.

1225.9.2 Wood shingle application: Not more than one overlay of wood shakes shall be applied over an existing asphalt shingle or wood shingle roof. One layer of 18-inch (457 mm) Type 30 felt shall be interlaced between each layer of shakes.

1225.9.3 Application over shakes: New roof covering shall not be applied over an existing shake roof.

1225.10 Flashings: Approved corrosion-resistive flashing shall be provided at top and sides of all exterior window and door openings in such manner as to be leakproof. Similar flashings shall be installed at the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings; under and at the ends of masonry, wood or metal copings and sills; continuously above all projecting wood trim; at wall and roof intersections; built-in gutters; at junctions of chimneys and roofs; and in all roof valleys and around all roof openings.

> **Exception:** When approved by the building official, flashing is not required when an approved water-resistant sheathing is used and an approved water-resistant caulking is used at the top and sides of all window and door openings in such a manner to be leakproof.

1225.11 Building paper: When veneers of brick, clay tile, concrete, or natural or artificial stone are used, 14-pound felt or paper shall be attached to the

sheathing with flashing wherever necessary to prevent moisture penetration behind the veneer.

SECTION 1226.0 STRESS SKIN PANELS

1226.1 Integrated assemblies: Approved panels or other integrated assemblies fabricated of dimension lumber with wood stress coverings glued thereto, or consisting of structural units of metal-covered or molded plywood or other approved plastics formed and molded into prefabricated loadbearing members, shall be permitted for use in floors, roofs, walls, partitions and ceilings when designed in accordance with APA S811, S812, U310, U813 and U814 listed in Appendix A or meeting the test requirements of Sections 1102.0, 1103.0 and 1104.0.

1226.2 Splices: Splices and connections between panels shall be weather-tight and of sufficient strength to resist two and one-half times the design live load to which they will be subjected in normal use. The fastenings of covering assemblies to structural studs, ribs or joists shall provide rigidity equivalent to approved gluing. Nailing shall not be acceptable for that purpose.

1226.3 Molded plywood units: Structural units of plywood or other approved plastics of similar combustible characteristics formed and molded into prefabricated loadbearing members shall conform to the approved rules and shall be identified by the approved label. The design shall be based on approved engineering analysis, confirmed by the tests prescribed in Sections 1102.0 and 1103.0.

SECTION 1227.0 STRUCTURAL GLUED-LAMINATED TIMBER AND BUILT-UP WOOD CONSTRUCTION

1227.1 General: Buildings and structures may be designed and erected of glued-laminated structural members or of composite members of plywood and dimension lumber.

1227.2 Exposed structural glued-laminated timber: Those portions of glued-laminated timbers which form the structural supports of a building or other structure and are exposed to weather and not properly protected by a roof, eave overhangs, or similar coverings shall be treated in accordance with AITC 109 listed in Appendix A or be manufactured from approved durable woods.

1227.3 Glued-laminated members and plywood components: Built-up beam and column sections consisting of one or more webs with glued lumber flanges and stiffeners shall be designed in accordance with APA S811, S812, U310, U813 and U814 listed in Appendix A. Plywood beams consisting of plywood alone bonded together with adhesives shall be designed and fabricated in accordance with APA H815 listed in Appendix A. Other plywood components consisting of plywood alone or plywood in combination with sawn or glued-laminated lumber and bonded together with adhesives shall be designed, fabricated and identified in accordance with APA S811, S812, U310, U813 and U814 listed in Appendix A.

1227.3.1 Gluing surfaces: In glued-lumber constructions, the surfaces to be glued shall be worked to a smooth, flat surface without sanding and free from wax, grease or oil to insure a complete glue bond over the entire contact. Factory-sanded plywood shall be permitted.

SECTION 1228.0 PORTLAND CEMENT STUCCO CONSTRUCTION

1228.1 General: All exterior and interior portland cement stucco construction shall be done with the appropriate materials listed in Table 1117 and shall be applied to conform with ASTM C926 listed in Appendix A.

1228.2 Weather protection: At all times during application and for a period of not less than 48 hours after application of each coat, provisions shall be made to keep stucco work above 40 degrees F. (4 degrees C.).

ARTICLE 13

BUILDING ENCLOSURES, WALLS AND WALL THICKNESS

SECTION 1300.0 GENERAL

1300.1 Scope: The provisions of this article shall govern the minimum specifications for enclosure walls and wall thickness hereafter used in the construction of buildings and structures. All materials and methods of construction shall conform to the applicable standards listed in this code.

SECTION 1301.0 ENCLOSURE WALLS

1301.1 General: All buildings, except as may be provided for buildings of Use Group U designed for special uses, shall be enclosed on all sides with independent or party walls of approved construction. Such walls shall be constructed to afford the fireresistance rating specified in Table 401 and as required in this code for location, use and type of construction.

1301.2 Projections: Exterior enclosure walls shall be constructed entirely within property lines or building lines when established by law, except for authorized projections beyond the street lot line in accordance with Section 506.0.

1301.3 Exterior wall pockets: In exterior walls of all buildings or structures, wall pockets or crevices in which moisture may accumulate shall be avoided or protected with adequate caps or drips, or other approved means shall be provided to prevent water damage.

1301.4 Exceptions: The provisions of this article shall not be deemed to prohibit the omission of exterior walls for all or part of a story of a building in accordance with Section 1406.1.1.

1301.5 Glass in walls: Glass used in enclosure walls shall comply with Sections 1301.5.1 through 1301.5.6.

1301.5.1 Labeling: Each light shall bear the manufacturer's label designating the type and thickness of glass. When approved by the building official, labels may be omitted from other than tempered glass provided an affidavit is furnished by the glazing contractor certifying that each light is glazed in accordance with approved plans and specifications.

Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic-fired on the glass and be visible when the unit is glazed. Tempered spandrel glass is exempted from permanent labeling. This type of glass shall be labeled with a removable paper label by the manufacturer.

1301.5.2 Glass supports: Where one or more sides of any light of glass is not firmly supported, or is subjected to unusual load conditions, detailed shop drawings, specifications and analysis or test data assuring safe performance for the specific installation shall be prepared by engineers experienced in this work and approved by the building official. Analysis shall be based on the wind loads specified in Section 913.4 for secondary framing members. The elevation of the glazed openings shall be computed by adding the distances from grade to the head and sill, respectively, and dividing the sum by two.

1301.5.3 Glass dimensional tolerance: Glass thickness tolerances shall comply with those established in the Table 1301.5.3. Where thickness is to be controlled, nominal values are stated subject to the tolerances shown in Table 1301.5.3.

Table 1301.5.3
MINIMUM GLASS THICKNESS

Nominal thickness (inches)	Plate glass minimum thickness (inches)[a]	Sheet glass minimum thickness (inches)[a]
SS	—	0.085
DS	—	0.115
1/8	0.094	—
3/16	0.156	0.182
13/64	0.172	—
7/32	—	0.205
1/4	0.218	0.236
5/16	0.281	—
3/8	0.343	0.357
1/2	0.468	0.478
5/8	0.562	—
3/4	0.689	—
7/8	0.750	—
1	0.875	—
1 1/4	1.125	—

Note a. 1 inch = 25.4 mm.

1301.5.4 Wind loads: Glass exposed to wind pressure shall be capable of meeting the design criteria of Section 913.4 for secondary framing members, but shall not be less than the thickness prescribed in Table 1301.5.4b. The wind load used to enter Table 1301.5.4b shall be modified by dividing the load prescribed in Section 913.4 by the value shown in Table 1301.5.4a.

1301.5.5 Louvered windows or jalousies: Regular plate, sheet or patterned glass in jalousies and louvered windows shall not be thinner than nominal 7/32 inch and not longer than 48 inches (1219 mm). When other glass types are

used, design shall be submitted to the building official for approval. Exposed glass edges shall be smooth.

Wired glass with wire exposed on longitudinal edges shall not be used in jalousies or louvered windows.

Table 1301.5.4a
RELATIVE RESISTANCE TO WIND LOAD
(Assuming equal thickness)

Glass type	Approximate relationship[a]
Factory-fabricated double glazing[b]	1.5
Fully-tempered	4.0
Heat-strengthened	2.0
Laminated	0.6
Regular plate or sheet	1.0
Rough-rolled plate	1.0
Sandblasted	0.4
Wired glass	0.5

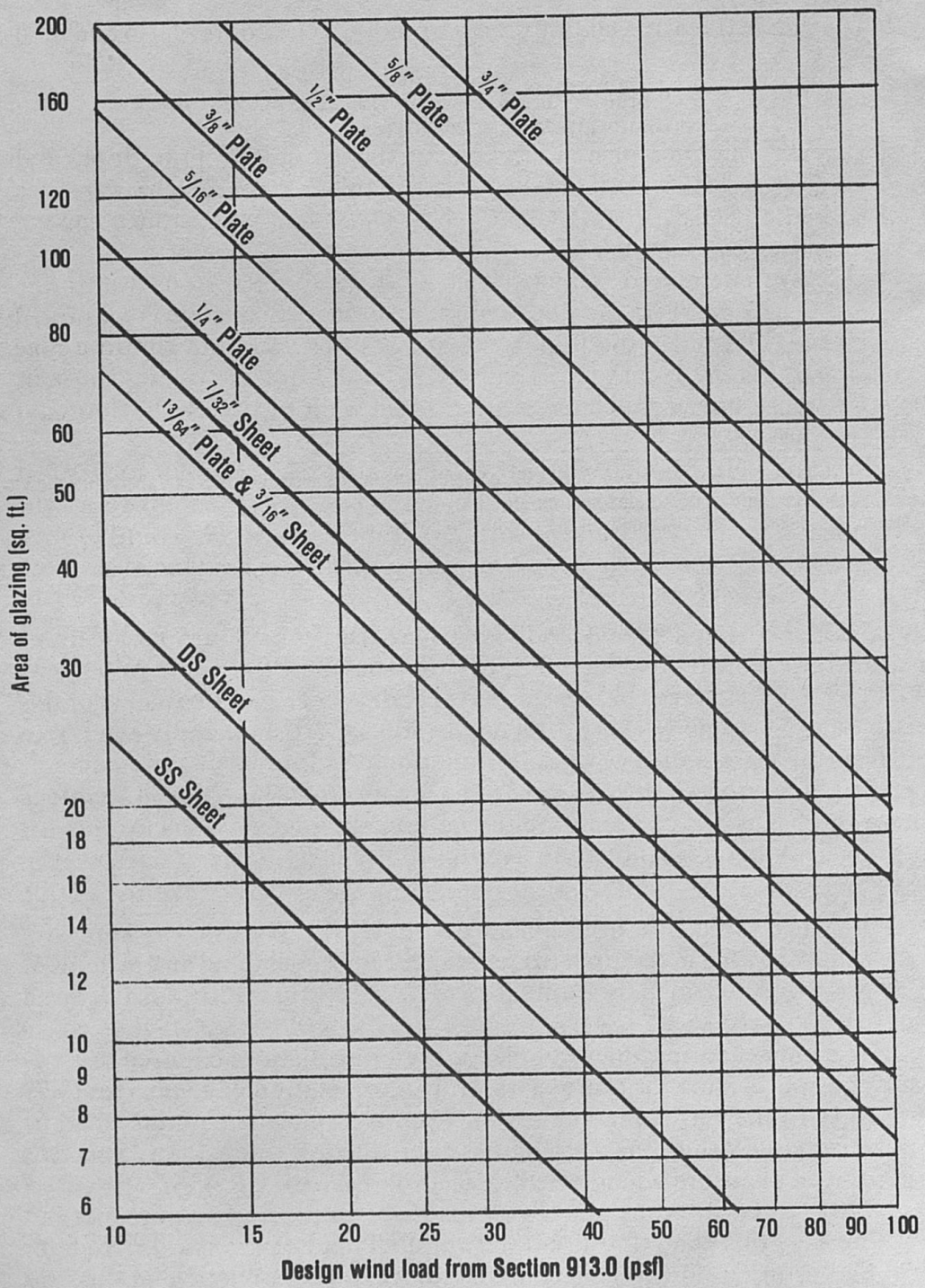
Note a. Before using Table 1301.5.4b, divide the design wind load from Section 913.0 by the value shown here for the glass type involved (see Section 1301.5.4).
Note b. Use thickness of the thinner of the two lights, not thickness of unit.

1301.5.6 Human impact loads: Individual glazed areas in hazardous locations such as those indicated in Section 1301.5.6.1 shall pass the test requirements of CPSC 16 CFR, Part 1201, listed in Appendix A. The requirements of this section and Sections 1301.5.6.1 through 1301.5.6.2.1 shall apply equally to replacement glass and new glass installation. Additional requirements as specified in Section 1301.5.6.2.1 are to be satisfied for glass used in locations where the hazard is of a continuous nature, such as glass enclosures for sporting activities as identified in Section 1301.5.6.2.

Exceptions

1. Polished wired glass in compliance with ANSI Z97.1 listed in Appendix A may be used in required fireresistance rated assemblies and in items of glazing listed in paragraphs 6 and 7 of Section 1301.5.6.1 (glazed panels).
2. The unbacked specimens of plastic materials shall be exposed in Arizona and Florida for three years with an orientation of 45 degrees (0.79 rad.) to the vertical facing south. Approved plastic materials shall be acceptable if the impact strength is not reduced by more than 25 percent during exposure when tested in accordance with CPSC 16CFR, Part 1201, listed in Appendix A. Some discoloration is permissible, but defects other than this discoloration shall not be permissible. No bubbles or other noticable decomposition shall be permissible in the irradiated portion.

Table 1301.5.4b
REQUIRED NOMINAL THICKNESS OF REGULAR PLATE OR SHEET GLASS
(Based on minimum thicknesses allowed in Federal Specifications DD-G-451b)
Design Factor = 2.5



Note a. 1 square foot = 0.093 m²; 1 pound per square foot = 4.882 kg/m².

1301.5.6.1 Specific hazardous locations: The following shall be considered specific hazardous locations for purposes of glazing.

1. Glazing in ingress and egress doors except jalousies (see Section 1301.5.5).
2. Glazing in fixed and sliding panels of sliding type doors (patio and mall type).
3. Glazing in storm doors.
4. Glazing in all unframed swinging doors.
5. Glazing, operable or nonoperable, in shower and bathtub doors and enclosures with a horizontal edge less than 6 feet (1829 mm) above the room floor level or less than 70 inches (1778 mm) above the compartment floor.
6. Glazing, operable or nonoperable, adjacent to a door and within the same wall plane as the door whose nearest vertical edge is within 12 inches (305 mm) of the door in a closed position and whose bottom edge is less than 60 inches (1524 mm) above the floor or walking surface, unless an intervening interior permanent wall is between the door and the glazing.
7. Glazing in fixed panels having a glazed area in excess of 9 square feet (0.84 m^2) with the lowest edge less than 18 inches (457 mm) above the finish floor level or walking surface within 36 inches (914 mm) of such glazing and the finish floor or walking surface are extended on both sides of said glazing. In lieu of safety glazing, such glazed panels may be protected with a horizontal member not less than 1½ inches (38 mm) in width when located between 24 inches (610 mm) and 36 inches (914 mm) above the walking surface.

Exceptions: The following products, materials and uses are exempt from the above hazardous locations.

1. Openings in doors through which a 3 inch (76 mm) sphere is unable to pass.
2. Assemblies of leaded glass or faceted glass and items of carved glass when used for decorative purposes in locations described in Section 1301.5.6.1, items 1, 6 or 7.
3. Glazing materials used as curved glazed panels in revolving doors.
4. Commercial refrigerated cabinet glazed doors.

1301.5.6.2 Continuously hazardous locations: The following shall be considered continuously hazardous locations for purposes of glazing.

1. Glazing in squash and racquetball courts forming whole or partial wall sections.
2. Glazing in squash and racquetball courts used as a door or part of a door.

1301.5.6.2.1 Testing: Test methods and loads for individually glazed areas such as those described in Section 1301.5.6.2 shall conform to those of CPSC 16 CFR Part 1201 listed in Appendix A, with impacts being applied at a height from ground level of 59 inches (1499 mm) to an actual or simulated

glass wall installation with fixtures, fittings and methods of assembly identical to those used in practice. In order to be deemed acceptable, the following conditions shall be achieved:

Glass walls:

1. Any glass wall in a squash or racquetball court shall remain intact following a test impact.
2. The deflection of such walls shall be not greater than 1½ inches (38 mm) at the point of impact.

Glass Doors:

1. Glass doors shall remain intact following a test impact at the prescribed height in the center of the door.
2. The relative deflection between the edge of a glass door and the adjacent wall shall not exceed the following values for the impact test bag drop heights specified below.
   a. The thickness of the wall plus ⅛ inch (3 mm) for a drop height of 24 inches (610 mm).
   b. The thickness of the wall plus ¼ inch (6 mm) for a drop height of 36 inches (914 mm).
   c. The thickness of the wall plus ½ inch (13 mm) for a drop height of 48 inches (1219 mm).

1301.5.6.3 Labeling requirements: Each light of safety glazing material manufactured, distributed, imported, or sold for use in hazardous locations or installed in such a location within the Commonwealth of Kentucky shall be permanently labeled by such means as etching, sandblasting or firing ceramic material on the safety glazing material. The label shall identify the labeler, whether manufacturer, fabricator or installer, and the nominal thickness and the type of safety glazing material and the fact that said material meets the test requirements of ANSI Standard Z97.1 and Z97.1a listed in Appendix A and such further requirements as may be adopted by the Department of Housing, Buildings and Construction. The label must be legible and visible after installation. Such safety glazing labeling shall not be used on other than safety glazing materials.

SECTION 1302.0 PROTECTION OF WALL OPENINGS

1302.1 Fireresistance rated openings: Openings in exterior walls, when required to be fireresistance rated, shall comply with the provisions of Article 14.

* **1302.2 Structural strength against wind forces:** In all buildings required to resist wind pressure under the provisions of Article 9, exterior window openings shall be designed to resist the specified wind load when such protectives are more than 100 square feet (9.30 m^2) in area in the first story or more than 50 square feet (4.65 m^2) in the upper stories.

1302.3 Structural strength of sash or frames: The glass or other approved glazing material shall be of adequate thickness or shall be provided with steel frames or otherwise reinforced to resist the wind loads specified in Article 9, acting both inwardly and outwardly.

SECTION 1303.0 STRUCTURAL GLASS BLOCK WALLS

1303.1 Exterior wall panels: The maximum dimensions of glass block wall panels in exterior walls, when used singly or in multiples forming continuous bands of structural glass blocks between structural supports, shall be 25 feet (7260 mm) in length and 20 feet (6096 mm) in height between structural supports and expansion joints; and the area of each individual panel shall be not more than 250 square feet (23.25 m^2). Intermediate structural supports shall be provided to support the dead load of the wall and all other superimposed loads. When individual panels are more than 144 square feet (13.39 m^2) in area, a supplementary stiffener shall be provided behind the panels, anchored thereto and to the structural supports.

1303.2 Joint materials: Glass blocks shall be laid up in Type S or N mortar with approved galvanized or other noncorrosive metal wall ties in the horizontal mortar joints of exterior panels. The sills of glass block panels shall be coated with approved asphaltic emulsion, or other elastic waterproofing material, previous to laying the first mortar course, and the perimeter of the panels shall be caulked to a depth of not less than ½ inch (13 mm) with nonhardening caulking compound on both faces, or other approved expansion joints shall be provided. When laid up in joint materials other than mortars herein defined, a single panel shall not be more than 100 square feet (9.30 m^2) in area, nor more than 10 feet (3048 mm) in either length or height.

1303.3 Wind and earthquake loads: Exterior wall panels shall be held in place in the wall opening to resist both the internal and external pressures due to wind and earthquake loads specified in Sections 912.0, 913.0 and 916.0.

1303.4 Interior wall panels: Structural glass blocks shall not be used in fire walls, party walls or fire separation walls, or for loadbearing construction. Such blocks shall be erected with mortar in metal frames or reinforcement as provided in this section for exterior walls, or other approved joint materials. Wood strip framing may be used in partitions not required to be fireresistance rated. *

SECTION 1304.0 WALL FACINGS AND VENEERS

1304.1 Backing surfaces for veneers: Veneers for other than buildings of Type 5 construction shall be attached only to substantial, rigid and noncombustible surfaces which are plumb, straight and of true plane. Wood backing surfaces shall not be used, except in buildings of Type 5 construction. The backing shall provide sufficient rigidity, stability and weather resistance, and the veneer shall be installed and anchored as required in this code for the specific material.

1304.2 Veneer thickness: Materials used for nonbearing veneers on masonry walls shall not have less than the thickness indicated in Table 1304.

1304.2.1 Nonstructural: Masonry or other approved noncombustible materials used as facing on bearing walls or partitions shall not be considered to

have structural value, and shall be excluded in the determination of required wall thickness.

Table 1304
MINIMUM NOMINAL THICKNESS OF NONBEARING VENEERS ON MASONRY WALLS

Aluminum siding[a]	0.019 inch
Brick and concrete masonry	2 inches
Ceramic veneer (architectural terra cotta, anchored type)	1 inch
Clay tile (flat slab)	¼ to 1 inch
Clay tile (structural)	1¾ inches
Glass fiber reinforced concrete panels	⅜ inch
Marble slabs	1 inch
Precast stone facing	⅝ inch
Steel (approved corrosion-resistive)	No. 29 Galvanized Sheet Gage (0.017 in.)
Stone (cast artificial)	1½ inches
Stone (natural)	2 inches
Structural glass	11/32 inch

Note a. See AAMA 1402.3 listed in Appendix A.

SECTION 1305.0 STRUCTURAL GLASS VENEERS

1305.1 Dimensions: The minimum thickness of glass veneer shall be 11/32 inch and the area of individual panels shall not exceed 10 square feet (0.93 m^2), with a maximum length of 4 feet (1219 mm). The edge of each unit shall be ground square with a slight arris. All exposed external corners and angles shall be rounded to a radius of not more than 3/16 inch (5 mm).

1305.2 Construction: Structural glass veneer construction shall comply with Sections 1305.2.1 and 1305.2.2.

1305.2.1 Backing surface: The glass veneer shall be set in mastic cement on a float coat of 1 inch (25 mm) thick cement mortar reinforced with wire lath attached to noncombustible furring spaced not more than 12 inches (305 mm) on center.

1305.2.2 Support of veneer: The base course of glass units shall be supported on a corrosion-resistive metal frame anchored to the backing and caulked with a waterproof compound at grade.

1305.3 Reinforcement: Metal reinforcing of cold-formed corrosion-resistive angles of not less than No. 16 Galvanized Sheet Gage (0.064 in.) or other approved reinforcement shall be provided in all horizontal joints anchored into the masonry wall with expansion or toggle bolts.

1305.4 Expansion joints: Expansion joints shall be provided at ends and intermediate sections caulked with an approved waterproofing compound as required by the approved rules. Where necessary for water-tightness, exposed edges shall be protected with corrosion-resistive metal or other approved noncombustible flashing.

1305.5 Other loads: Signs, awning brackets or other loads shall not be hung directly from glass veneers, but shall be supported on framing anchored to or otherwise supported by the masonry wall, free from contact with the glass.

SECTION 1306.0 THIN STONE AND TILE VENEERS

1306.1 Size of units: In localities subject to frost and freezing temperatures, tile and terra cotta units shall be frostproof and shall not be more than 288 square inches (0.19 m^2) in area. Where not subject to frost action, the size of the tile may be increased not more than 50 percent in area.

1306.2 Construction: One inch thick marble, granite, terra cotta and similar materials, or ceramic tile facing ¼ to 1 inch in thickness shall be installed in an approved manner.

SECTION 1307.0 METAL VENEERS

1307.1 Materials: Veneers of metal shall be fabricated from approved corrosion-resistive alloys, or shall be covered front and back with approved porcelain enamel, or otherwise treated to render the metal resistant to corrosion.

1307.2 Construction: The metal veneer shall be securely attached to the masonry; or supported on approved metal framing protected by painting, galvanizing or other approved protection; or supported on wood studs and furring strips, treated with an approved preservative process complying with Section 1315.2.

1307.3 Waterproofing: All joints and edges exposed to the weather shall be caulked with approved durable waterproofing material or by other approved means to prevent penetration of moisture.

1307.4 Grounding metal veneers: Grounding of metal veneers on all buildings shall comply with the requirements of Article 20 and NFiPA 70 listed in Appendix A.

SECTION 1308.0 PLASTIC VENEERS

1308.1 General: Veneers of weather-resisting plastics shall comply with the definition of approved plastics in Section 2300.2.1 and shall be erected and anchored on a foundation coat, waterproofed or otherwise protected from moisture absorption and sealed with a coat of mastic or other approved waterproof coating in accordance with the approved rules. *

1308.2 Area limitation: Sections of plastic veneer shall not exceed 300 square feet (27.9 m^2) in area.

1308.3 Separation: Sections of plastic veneer shall be separated vertically by a minimum of 4 feet (1219 mm). *

SECTION 1309.0 THICKNESS OF PANEL WALLS

1309.1 Solid panel walls: Panel, apron or spandrel walls as defined in this code shall not be limited in thickness, provided they meet the fireresistance rating requirements of Article 14 and Table 401, and are constructed of approved noncombustible weather-resisting materials of adequate strength to resist the wind loads specified in Sections 912.0 and 913.0.

1309.2 Hollow panel walls: Unless constructed of the materials and thickness specified by ANSI/NBS H74, BIA *Building Code Requirements for Engineered Brick Masonry*, NCMA TR75-B or ACI 531 listed in Appendix A, hollow panel walls shall be tested and approved in the assembled unit as constructed in normal practice to develop the required fireresistance ratings specified in Table 401 for exposure on both faces.

1309.3 Weather resistance: When the construction as tested and approved for a fireresistance rating does not possess the required weather resistance, it shall be covered on the exterior with approved corrosion-resistive metal facings or other approved noncombustible weather-resisting veneers.

1309.4 Anchorage: All panel walls shall be anchored to the structural frame to insure adequate lateral support and resistance to wind, and to earthquake forces where subject to seismic loads.

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SECTION 1310.0 RETAINING WALLS

1310.1 General: Walls built to retain or support the lateral pressure of earth or water or other superimposed loads shall be designed and constructed of approved masonry, reinforced concrete, steel sheet piling or other approved materials within the allowable stresses specified in this code (see Section 1315.3.3).

1310.2 Design: Retaining walls shall be designed to resist the pressure of the retained material, including both dead and live load surcharges to which they may be subjected, and to insure stability against overturning, sliding, excessive foundation pressure and water uplift.

1310.3 Hydrostatic pressure: Unless drainage is provided, the hydrostatic head of water pressure shall be assumed equal to the height of the wall.

1310.4 Coping: All masonry retaining walls other than reinforced concrete walls shall be protected with an approved coping.

1310.5 Guardrails: When retaining walls with a difference in grade level on either side of the wall in excess of 4 feet (1219 mm) are located closer than 2 feet (610 mm) to a walk, path, parking lot or driveway on the high side, such retaining walls shall be provided with a guard constructed in accordance with Section 827.0 or other approved protective measure.

SECTION 1311.0 ISOLATED PIERS

1311.1 General: Isolated masonry piers shall be bonded as required for solid

walls of the same thickness and shall be provided with adequate means for distributing the load at the top of the pier.

SECTION 1312.0 WATERPROOFING

1312.1 General: The exterior structural elements of all buildings herein specified shall be waterproofed in accordance with the approved rules.

1312.2 Steel frame: Exterior steel columns and girders, before embedment in masonry of the required fireresistance rating specified in Table 401, shall be protected from moisture by approved waterproofing material, a parging coat of cement mortar or by a minimum of 8 inches of weather-tight masonry.

1312.3 Chases: The backs and sides of all chases in exterior walls with less than 8 inches of approved masonry to the exterior surface shall be insulated and waterproofed.

1312.4 Foundations: Foundation walls below grade, and basement floors of all buildings of Use Groups I and R enclosing habitable or occupiable rooms or spaces below grade, shall be made watertight and when necessary shall be reinforced to withstand water pressure as prescribed in Sections 909.0 and 1310.0. All other foundation walls below grade in all use groups enclosing occupiable rooms or spaces shall be dampproofed with not less than one coat application of approved dampproofing paint, or a ½ inch (13 mm) parging coat of portland cement mortar or other approved method.

1312.4.1 Subsoil drains: Subsoil drains shall be provided around foundations enclosing habitable or usable spaces located below grade and which are subjected to ground water conditions. Drains shall be installed at or below the area to be protected and shall discharge by gravity or by mechanical means into an approved drainage system complying with the plumbing code listed in Appendix A.

1312.5 Types of waterproofing: The processes and methods used to render buildings, structures or parts thereof watertight as herein required shall be of approved types. *

SECTION 1313.0 FLOODPROOFING

1313.1 General: All buildings or structures located in areas prone to flooding as determined by the governmental body having jurisdiction shall be floodproofed in accordance with provisions of this section. Areas subject to a 1 percent or greater chance of flooding in any given year (100-year flood) shall be the minimum criteria for determining an area prone to flooding.

1313.2 Base flood level: The base flood level is an elevation or depth of potential flooding as determined by the governmental body having jurisdiction. This level shall be equal to or greater than the 100-year flood elevation or depth.

1313.2.1 Elevation: All buildings and structures located within a flood-prone area shall have the lowest structural member, except pilings or columns, at or

above the base flood level.

Exception: All buildings and structures of all use groups except Use Group R, as an alternative may comply to the watertight provisions of Section 1313.2.4.

1313.2.2 Anchorage: The structural systems of all buildings or structures shall be designed, connected and anchored to prevent flotation, collapse and permanent lateral movement due to flooding to an elevation equal to the base flood level.

1313.2.3 Fastening: All sheathing and exterior weather boarding shall be securely fastened to structural members.

1313.2.4 Water-tight construction: All buildings or structures of all use groups except Use Group R, shall be floodproofed with walls below base flood level substantially impermeable to the passage of water and with structural components capable of resisting hydrostatic and hydrodynamic loads and the effects of bouyancy.

1313.3 Anchorage in coastal areas: All buildings or structures within an area identified by the governmental body having jurisdiction as a coastal high hazard area shall be constructed on adequately-anchored pilings or columns, and securely anchored to such piles or columns. The lowest portions of structural members of the lowest floor, except pilings or columns, shall be elevated to or above the base flood level.

1313.3.1 Fastening in coastal areas: All buildings or structures shall have all components including floor frames, walls, roofs, sheathing and weather boarding securely fastened and adequately interconnected to resist the loads anticipated during flooding to an elevation equal to the base flood level.

1313.3.2 Obstructions in coastal areas: The space below the lowest floor shall be free of obstructions, except pilings and columns, or be constructed with walls intended to collapse under stress due to flooding, wind-driven water or abnormally high tides without jeopardizing the structural support of the building. Such enclosed space shall not be used for human occupancy.

1313.4 Floodproof certification: A registered professional architect or engineer shall certify that all applicable floodproofing requirements of this section have been satisfied.

SECTION 1314.0 RATPROOFING

1314.1 General: All buildings or structures and the walls enclosing habitable or occupiable rooms and spaces in which persons live, sleep or work, or in which feed, food or foodstuffs are stored, prepared, processed, served or sold, shall be constructed in accordance with the provisions of this section.

1314.2 Grade protection: Buildings not provided with a continuous foundation shall be provided with protection against rodents at grade in accordance with either Section 1314.2.1 or 1314.2.2.

1314.2.1 Apron: When an apron is provided, it shall be not less than 8 inches (203 mm) above, nor less than 24 inches (610 mm) below grade. In all cases it shall not terminate below the lower edge of the siding material. The apron shall be constructed of an approved nondecayable, water-resisting and ratproofing material of required strength and shall be installed around the entire perimeter of the building. When constructed of masonry or concrete materials, it shall be not less than 4 inches (102 mm) in thickness.

1314.2.2 Grade floors: Where continuous concrete grade floor slabs are provided, open spaces shall not be left between slab and walls, and all openings in the slab shall be protected.

1314.3 Opening protection: Openings shall be protected in accordance with Sections 1314.3.1 through 1314.3.3.

1314.3.1 Wall openings: Openings in the wall or apron required for ventilation or other purposes shall be guarded with corrosion-resistive ratproof shields of not less than No. 22 Galvanized Sheet Gage (0.034 in.) perforated steel sheets, or No. 20 B&S Gage aluminum (0.032 in.) or No. 16 Galvanized Sheet Gage (0.064 in.) expanded metal or wire mesh screens, with not more than ½ inch (13 mm) mesh openings.

1314.3.2 Slab openings: Access openings in grade floor slabs shall be protected with concrete, masonry, metal or other corrosion-resistive noncombustible covers of adequate strength to support the floor loads.

1314.3.3 Pipe and conduit openings: All openings for pipe, conduit, cable and similar purposes at or near grade shall have snugly-fitted collars to eliminate all open spaces.

SECTION 1315.0 PROTECTION AGAINST DECAY AND TERMITES

1315.1 General: Wood construction shall conform to provisions of this section in order to prevent decay and termite attack.

1315.2 Protection: Where protection of wood members is required by this section, protection shall be provided by using naturally durable or pressure-treated wood.

1315.2.1 Naturally durable wood: The term "naturally durable wood" refers to the heartwood of the following species with the exception that an occasional piece with corner sapwood may be included if 90 percent or more of the width of each side on which it occurs is heartwood.

Decay-resistant:	Redwood, cedars, black locust, bald cypress (tidewater red), and black walnut.
Termite-resistant:	Redwood, bald cypress, (tidewater red), and Eastern red cedar.

1315.2.2 Pressure-treated wood: The term "pressure-treated wood" refers to wood, including plywood, meeting the retention, penetration and other requirements applicable to the species, product, treatment and conditions of use in AWPA C1, C2, C9, and AWPB LP2, LP22, LP33, LP44, LP55 and

LP77 listed in Appendix A. Preservatives shall conform to the AWPA P1, P2, P5, P8, and P9 listed in Appendix A.

1315.2.3 Identification: All lumber and plywood required to be pressure-treated shall bear the AWPB quality mark, or that of an approved agency which maintains continuing supervision, testing and inspection over the quality of the product.

1315.2.4 Moisture content: When wood pressure treated-with a water-borne preservative is used in enclosed locations where drying in service cannot readily occur, such wood shall be at a moisture content of 19 percent or less before being covered with insulation, interior wall finish, floor coverings or other material.

1315.3 Conditions favorable to decay: Where conditions are favorable to decay, wood shall comply with Sections 1315.3.1 through 1315.3.3.

1315.3.1 Wood used above ground: Wood used above ground in the locations specified in Sections 1315.3.1.1 through 1315.3.1.5 shall be naturally durable or pressure treated-wood using water borne preservatives and treated in accordance with AWPB LP 2 listed in Appendix A.

1315.3.1.1 Joists and girders: When wood joists or the bottom of a wood structural floor without joists are closer than 18 inches (457 mm), or wood girders are closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated areas located within the perimeter of the building foundation, the floor assembly, including posts, girders, joists and subfloor shall be of approved naturally durable or pressure-treated wood.

1315.3.1.2 Sills: All sills which rest on concrete or masonry exterior walls and are less than 8 inches (203 mm) from exposed earth shall be of approved naturally durable or pressure-treated wood.

1315.3.1.3 Sleepers and sills: Sleepers and sills on a concrete or masonry slab which is in direct contact with earth shall be of approved naturally durable or pressure-treated wood.

1315.3.1.4 Girder ends: The ends of wood girders entering exterior masonry or concrete walls shall be provided with a ½ inch (13 mm) air space on top, sides and end, unless approved naturally durable or pressure-treated wood is used.

1315.3.1.5 Clearance: Clearance between wood siding and earth on the exterior of a building shall be not less than 6 inches (152 mm) except where siding, sheathing and wall framing are of approved pressure-treated wood.

1315.3.2 Wood in contact with the ground: All wood in contact with the ground (exposed earth) and which supports permanent structures intended for human occupancy shall be approved pressure-treated wood using water-borne preservatives and treated in accordance with AWPB LP22 listed in Appendix A when used in the locations specified in Sections 1315.3.2.1 through 1315.3.2.4.

Exception: Untreated wood may be used where entirely below ground water level or continuously submerged in fresh water.

1315.3.2.1 Columns embedded in concrete: Sawn posts and columns supporting permanent structures intended for human occupancy which are embedded in concrete in direct contact with earth or embedded in concrete exposed to the weather shall be of approved pressure-treated wood having a retention of 0.60 lbs. per cubic foot (9.61 kg/m^3).

1315.3.2.2 Other columns: Posts or columns exposed to the weather or in basements and cellars, and which support permanent structures, shall be supported by concrete piers or metal pedestals projecting at least 1 inch (25 mm) above concrete or masonry floors or decks and 6 inches (152 mm) above exposed earth and separated therefrom by an impervious moisture barrier, except when approved naturally durable or pressure-treated wood is used.

1315.3.2.3 Columns in crawl spaces: Posts or columns supporting permanent structures which are closer than 8 inches (203 mm) to exposed ground in enclosed crawl spaces or unexcavated areas located within the perimeter of the building shall be of approved naturally durable or pressure-treated wood.

1315.3.2.4 Wood structural members: Wood structural members supporting moisture-permeable floors or roofs which are exposed to the weather, such as concrete or masonry slabs, shall be of approved naturally durable or pressure-treated wood unless separated from such floors or roofs by an impervious moisture barrier.

1315.3.3 Wood used in retaining walls: Wood used in retaining or crib walls shall be of approved pressure-treated wood, treated in accordance with AWPB LP22, LP33, LP44, LP55 or LP77 listed in Appendix A, except as indicated in Sections 1315.3.3.1 through 1315.3.3.3.

1315.3.3.1 Untreated wood: When the wall is not more than 2 feet (610 mm) in height and is separated from the lot line or a permanent building by a minimum distance equal to the height of the wall, it may be of untreated wood.

1315.3.3.2 Naturally durable wood on the lot line: When the wall is not more than 2 feet (610 mm) in height and is located on the lot line, it may be of naturally durable wood.

1315.3.3.3 Naturally durable wood separated: When the wall is not more than 4 feet (1219 mm) in height and is separated from the lot line or a permanent building by a minimum distance equal to the height of the wall, it may be of approved naturally durable wood.

1315.4 Geographical areas: In geographical areas where experience has demonstrated a specific need, approved naturally durable or pressure-treated wood shall be used for those portions of wood members which form the structural supports of buildings, balconies, porches or similar permanent building appurtenances when such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering to

prevent moisture or water accumulation on the surface or at joints between members. Depending on local experience, such members may include the following:

1. Horizontal members such as girders, joists and decking;
2. Vertical members such as posts, poles and columns; or
3. Both horizontal and vertical members.

SECTION 1316.0 THERMAL AND SOUND INSULATING MATERIALS

1316.1 General: Insulating batts, blankets, fills or similar types of materials, including vapor barriers and breather papers or other coverings, incorporated in construction elements shall be installed as required by this section.

Exception: Fiber board insulation shall be installed as required by Section 1120.0.

1316.2 Exposed installations: Such materials when exposed as installed in rooms or spaces, including attics, plenums and crawl spaces of buildings of any type construction shall comply with the requirements of Section 1404.2 for Class I materials.

1316.3 Concealed installations: Insulating materials when concealed as installed in buildings of any type construction shall comply with the requirements of Section 1404.2 for Class II materials.

1316.3.1 Facings: When such materials are installed in concealed spaces such as wall, floor or ceiling cavities, attics or crawl spaces in buildings of Types 3, 4 and 5 construction, the flame spread and smoke developed rating limitations do not apply to facings, provided that the facing is installed behind and in substantial contact with the unexposed surface of the ceiling, floor or wall finish.

1316.4 Cellulosic insulation: Cellulosic insulation shall meet the requirements of CPSC Standard 16 CFR, Parts 1209 and 1404, listed in Appendix A.

SECTION 1317.0 FOAM PLASTICS

1317.1 General: The provisions of this section shall govern the requirements and uses of foam plastic in buildings or structures.

1317.1.1 Surface burning characteristics: Unless otherwise indicated in this section, all foam plastics and foam plastic cores of manufactured assemblies shall have a flame spread rating of not more than 75 and shall have a smoke developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E84 listed in Appendix A.

1317.2 Thermal barrier: Unless otherwise indicated in this section, all foam plastic shall be separated from the interior of a building by an approved thermal barrier of ½ inch gypsum wallboard or equivalent thermal barrier material which will limit the average temperature rise of the unexposed surface to not more than 250 degrees F. (121 degrees C.) after 15 minutes of fire exposure complying with the standard time-temperature curve of ASTM

E119 listed in Appendix A. The thermal barrier shall be installed in a manner that assures it will stay in place for a minimum of 15 minutes under the same test conditions.

1317.3 Prescriptive installations: The requirements of Sections 1317.3.1 through 1317.3.9.2.6 shall apply to all uses or foam plastics unless specifically approved according to Section 1317.4.

1317.3.1 Masonry or concrete construction: Foam plastics may be used without the thermal barrier described above when the foam plastic is protected by a minimum 1 inch (25 mm) thickness of masonry or concrete.

1317.3.2 Cold storage construction: Foam plastic when tested in a thickness of 4 inches (102 mm) may be used in a thickness up to 10 inches (254 mm) when the building is equipped throughout with an approved automatic fire suppression system.

1317.3.3 Walk-in coolers: Foam plastics may be used in a thickness up to 4 inches (102 mm) in freestanding walk-in coolers or freezer units less than 400 square feet (37.2 m^2) in floor area without a thermal barrier and without an automatic fire suppression system when the foam plastic is covered by a metal facing not less than 0.032 inch thick aluminum or corrosion-resistant steel having a minimum base metal thickness of 0.016 inches. When protected by a thermal barrier, the foam plastic may be used in a thickness up to 10 inches (254 mm).

1317.3.4 Roofing: Foam plastic may be used in a roof covering assembly without the thermal barrier when the foam is separated from the interior of the building by plywood sheathing not less than ½ inch in thickness bonded with exterior glue, with edges supported by blocking, tongue-and-groove joints or other approved type of edge support, or an equivalent material. Foam plastic roof insulation which complies with FM 4450 or UL Subject 1256 listed in Appendix A need not meet the requirements of Section 1317.1.1.

For all roof applications, the smoke developed rating shall not be limited.

1317.3.5 Attics and crawl spaces: Within an attic or crawl space where entry is made only for service of utilities, foam plastics shall be protected against ignition by 1½ inch (38 mm) thick mineral fiber insulation, ¼ inch thick plywood, particle board or hardboard or ⅜-inch gypsum wallboard, corrosion-resistant steel having a base metal thickness of 0.016 inch, or other approved material installed in such a manner that the foam plastic is not exposed. The protective covering shall be consistent with the requirements for the type of construction.

1317.3.6 Doors: Where doors are permitted without a fireresistance rating, foam plastic may be used as a core material when the door facing is metal having a minimum thickness of 0.032-inch aluminum or 0.016-inch steel. The thermal barrier requirement of Section 1317.2 shall not apply.

Exception: In buildings of Use Group R-3, foam-filled exterior entrance doors not requiring a fireresistance rating may be faced with wood.

1317.3.7 Siding backer board: Foam plastic to be used as siding backer board shall have a maximum thickness of ½ inch (13 mm) and be separated from the interior of the building by not less than 2 inches (51 mm) of mineral fiber insulation or equivalent in lieu of the thermal barrier or when applied as insulation with residing over existing exterior wall construction.

1317.3.8 Interior trim: Foam plastic may be used as interior trim provided it complies with all of Sections 1317.3.8.1 through 1317.3.8.4.

1317.3.8.1 Density: The minimum density is 20 pounds per cubic foot (320 kg/m^3).

1317.3.8.2 Thickness: The maximum thickness of the trim is ½ inch (13 mm) and the maximum width is 4 inches (102 mm).

1317.3.8.3 Area limitation: The trim constitutes no more than 10 percent of the aggregate wall and ceiling area of any room or space.

1317.3.8.4 Flame spread: The flame spread rating does not exceed 75 when tested according to ASTM E84 listed in Appendix A. The smoke developed rating is not limited.

1317.3.9 Exterior walls: Exterior walls in buildings of fireresistance rated or noncombustible construction shall comply with Sections 1317.3.9.1 through 1317.3.9.2.6.

1317.3.9.1 One-story buildings: Foam plastic insulation having a flame spread rating of not more than 25 may be used without a thermal barrier in or on walls of a one-story building, providing the thickness is not more than 4 inches (102 mm) and the foam plastic is covered by a thickness of not less than 0.032-inch aluminum or corrosion-resistant steel having a base metal thickness of 0.016 inch and the building area is equipped throughout with an automatic fire suppression system.

1317.3.9.2 Exterior side: Foam plastics used in or on the exterior side of exterior walls in Types 1, 2, 3 or 4 construction shall comply with the requirements of Sections 1317.3.9.2.1 through 1317.3.9.2.6.

1317.3.9.2.1 Thickness: The foam plastic shall be limited to a maximum thickness of 4 inches (102 mm).

1317.3.9.2.2 Flame spread: The foam plastic core, coatings and facings, each when tested individually, shall have a flame spread rating of 25 or less when tested in accordance with ASTM E84 listed in Appendix A.

1317.3.9.2.3 Fastening: Facing, coating and core materials shall be fastened to each other and the overall assembly shall be fastened to the building frame to prohibit failure in bond as a result of temperatures which may be experienced in a building fire, from wind load or other conditions.

1317.3.9.2.4 Full scale tests: Results of diversified or full scale fire tests reflecting an end use configuration shall be submitted to the building official demonstrating that the assembly in its final form does not show any tendency to propagate flame over the surface or through the core when exposed on the exterior face to a fire source.

1317.3.9.2.5 Thermal barrier: Any foam plastic insulation shall be separated from the building interior by a thermal barrier unless specific approval is obtained on the basis of Section 1317.4.

1317.3.9.2.6 Use: Where walls face a street or permanent open space of 30 feet (9144 mm) or more, foam plastic insulation may be used in or on a nonfireresistance rated wall assembly. Foam plastic may be used within exterior walls providing the wall assembly affords the required fireresistance rating.

Note: The limitations on height and area in Sections 1308.0 and 1425.0 and Article 23 dealing with light-transmitting plastic veneer materials and exterior trim do not apply to materials conforming to Section 1317.3.9.

1317.4 Diversified tests: Foam plastic not meeting the requirements of Sections 1317.2 and 1317.3 may be used when specifically approved based on diversified tests such as FM Procedure 4880, UL Subject 1040 or SPI Bulletin PICC 401 listed in Appendix A. Such approvals shall also be based on tests conducted in accordance with ASTM E84 and ASTM D1929 listed in Appendix A. Such testing shall be performed on the finished manufactured foam plastic assemblies and on the maximum thickness intended for use. Foam plastics which are used as interior finish on the basis of diversified tests shall also meet the flame spread requirements of Section 1421.0.

ARTICLE 14

FIRERESISTIVE CONSTRUCTION REQUIREMENTS

SECTION 1400.0 GENERAL

1400.1 Scope: The provisions of this article shall govern the use and design of all materials and methods of construction in respect to required fireresistance rating and flameresistance, as determined by the potential fire hazard of the use and occupancy of the building or structure and the location and function of all integral structural and other fireresistive elements of the building; and the installation of safeguards against the spread of fire to and from adjoining structures.

1400.2 Performance standards: The requirements of this article shall constitute the minimum functional performance standards for fire protection purposes; and shall not be deemed to decrease or waive any strength provisions or in any other manner decrease the requirements of this code in respect to structural safety.

1400.3 Use of combustibles: All materials and forms of construction that develop the fireresistance ratings required by this code shall be acceptable for fireproofing and structural purposes; except that the use of combustible component materials in structural units or structural assemblies shall be limited in types of construction specified in Sections 402.0, 403.0, 404.0 and 405.0 and in the following Section 1400.3.1.

1400.3.1 Combustible components: Combustible aggregates may be incorporated in concrete mixtures approved for fireresistance rated construction as provided in Section 1219.0 for gypsum concrete, in Section 1216.0 for cinder concrete, and any other approved component material or admixture may be used in assemblies that meet the fireresistive test requirements of this code; and wood nailing strips or any other materials of similar combustible characteristics may be embedded in concrete and masonry construction for securing trim and finish.

SECTION 1401.0 PLANS AND SPECIFICATIONS

1401.1 General: Plans for all buildings shall designate the type of construction and the fireresistance rating of all structural elements as required by this code.

The plans and specifications shall include documentation or supporting data substantiating all required fireresistance ratings.

SECTION 1402.0 FIRE HAZARD CLASSIFICATION

1402.1 General: The degree of fire hazard of buildings and structures for each specific use group as defined by the fire grading in Table 1402 shall determine the requirements for fire walls, fire separation walls and the segregation of mixed uses as prescribed in Section 313.0 and all structural members supporting such elements unless otherwise provided for in this code.

1402.2 Unclassified uses: The building official shall determine the fire hazard classification of a building or structure designed for a use not specifically provided in Table 1402 in accordance with the fire characteristics and potential fire hazard of the use group which it most clearly resembles; or its designation shall be fixed by the approved rules.

Table 1402
FIRE GRADING OF USE GROUPS

Use Group		Fire grading in hours
A-1	Assembly, theaters	3
A-2	Assembly, night clubs	3
A-3	Assembly, recreation centers, lecture halls, terminals, restaurants	2
A-4	Assembly, churches	1½
B	Business	2
E	Educational	1½
F	Factory and industrial	3
H	High hazard	4
I-1	Institutional, residential care	1
I-2	Institutional, incapacitated	2
I-3	Institutional, restrained	3
M	Mercantile	3
R-1	Residential, hotels	2
R-2	Residential, multi-family dwellings	1½
R-3	Residential, 1 and 2 family dwellings	1
S-1	Storage, moderate hazard	3
S-2	Storage, low hazard	2

SECTION 1403.0 FIRE TESTS

1403.1 Structural building assemblies: Built-up masonry units and composite assemblies of structural materials including walls, partitions, columns, girders, beams, slabs and assemblies of slabs and beams or other combinations of structural units for use in floor and roof construction shall be regulated by the fireresistance ratings of Table 401. Floor assemblies which are required to be fireresistance rated shall extend to and be tight against exterior walls or other provisions shall be made for maintaining the fireresistance rating of the assembly at such locations.

1403.1.1 Fireresistance ratings: The fireresistance ratings of building assemblies and structural elements shall be determined in accordance with the test procedures set forth in ASTM E119 listed in Appendix A. The fireresistance rating of concrete assemblies and structural elements shall be established as heretofore required, or may be determined in accordance with the procedures of the CRSI book *Reinforced Concrete Fire Resistance* or PCI MNL 124-77 listed in Appendix A. The fireresistance rating of protected steel columns may be calculated in accordance with AISI *Designing Fire Protection for Steel Columns* listed in Appendix A. The calculations shall be based upon the fire exposure and acceptance criteria specified in ASTM E119 listed in Appendix A.

1403.1.2 Tested assemblies: Assemblies of building construction detailed in GA-600 listed in Appendix A may be accepted as having the fireresistance ratings specified therein for determining compliance with the requirements of this code.

1403.2 Alternate protection: When it can be shown to the building official that the structural integrity of structural framing elements will not be reduced below a safe level by a fire within the building or in an adjacent building having a severity corresponding to the fireresistance rating required for the elements through the use of heat shields, separations or other approved means of protection, fireresistive coverings or insulating enclosing materials need not be provided for such elements.

1403.3 Opening protectives: Opening protectives shall comply with Sections 1403.3.1 through 1403.3.4.

1403.3.1 Fire assembly: A fire assembly shall include the fire door, fire shutter, fire window, or fire damper and all required hardware, anchorage, frames and sills necessary for the assembly.

1403.3.2 Fire doors and shutters: Opening protective assemblies including the frames, hardware and operation which comply with ASTM E152 and UL 63 listed in Appendix A shall be deemed to meet the requirements of this code for their recommended and approved locations and use as listed in Sections 1415.0, 1416.0 and 2117.3.

1403.3.3 Door openings more than 120 square feet: Fire doors for openings which are more than 120 square feet (11.16 m^2) in area shall be deemed to meet the requirements of this code for their recommended locations and use as listed in Section 1415.0 if the building official is supplied with a certificate from an approved inspection agency stating that the door conforms to all the standard construction requirements of tested and labeled fire door assemblies except as to size (see Section 1408.2.1).

1403.3.4 Fire windows: Fire window assemblies which comply with Section 1416.0 and ASTM E163 listed in Appendix A shall be deemed to meet the requirements of their recommended and required locations under this code.

1403.4 Combustibility tests: Where the behavior of materials under exposure to fire is specified in this code, the characteristics of materials shall be

determined by the tests and criteria set forth in Sections 1403.4.1 and 1403.4.1.1.

1403.4.1 Tests: The tests indicated in Sections 1403.4.1.1 and 1403.4.1.2 shall serve as criteria for acceptance of building materials as set forth in Sections 402.0, 403.0, 404.0 and 405.0 governing the combustibility of building materials for use in Types 1, 2, 3 and 4 construction. The term noncombustible does not apply to the flame spread characteristics of interior finish or trim materials. A material shall not be classed as a noncombustible building construction material which is subject to increase in combustible or flame spread rating beyond the limits herein established through the effects of age, moisture or other atmospheric conditions.

1403.4.1.1 Elementary materials: Materials which are intended to be classified as noncombustible shall be tested in accordance with ASTM E136 listed in Appendix A. Such materials shall be acceptable as noncombustible materials when at least three of the four specimens tested meet all of the following criteria.

1. The recorded temperature of the surface and interior thermocouples shall not at any time during the test rise more than 54 degrees F. (30 degrees C.) above the furnace temperature at the beginning of the test.
2. There shall be no flaming from the specimen after the first 30 seconds.
3. If the weight loss of the specimen during testing exceeds 50 percent, the recorded temperature of the surface and interior thermocouples shall not at any time during the test rise above the furnace air temperature at the beginning of the test, and there shall be no flaming of the specimen.

1403.4.1.2 Composite materials: Materials having a structural base of noncombustible material as defined in Section 1403.4.1.1. with a surfacing not more than 1/8 inch thick which has a flame spread rating not greater than 50 when tested in accordance with ASTM E84 listed in Appendix A shall be acceptable as noncombustible materials.

1403.5 Fire-retardant treated wood: Fire-retardant treated wood shall comply with Sections 1403.5.1 and 1403.5.2.

1403.5.1 General: Where permitted for use as a structural element, fire-retardant treated wood shall be defined as any wood product which when impregnated with chemicals by a pressure process, or other means during manufacture, shall have, when tested in accordance with ASTM E84 listed in Appendix A, a flame spread rating not greater than 25 when the test is continued for a period of 30 minutes, without evidence of significant progressive combustion. The material shall bear the identification of an approved agency having a re-examination service showing the performance rating thereof. Fire-retardant treated wood shall be dried to a moisture content of 19 percent or less for lumber and 15 percent or less for plywood before use.

1403.5.2 Use limitations: Wood that has been pressure treated with fire-retardant chemicals in accordance with AWPA C20 and AWPA C27 listed in Appendix A, or treated by other approved means during manufacture, may

be used in Types 1 and 2 construction for partitions, structural elements and roof framing and sheathing as indicated by Note e in Table 401, provided that the assembly in which such material is used shall produce the required fireresistance rating when tested in accordance with ASTM E119 listed in Appendix A. When the material is to be subjected to sustained high humidity or exposed to the weather, it shall be further identified to indicate that there is not an increase in the listed flame spread classification after being weathered in accordance with ASTM D2898 listed in Appendix A.

SECTION 1404.0 FLAME SPREAD AND FLAMERESISTANCE TESTS

1404.1 General: All materials which are required to restrict the spread of flame or to be flameresistant under the provisions of this code, including but not limited to interior finish materials, fire-retardant treated wood, tents and tarpaulins, and interior hangings and decorations, shall meet the requirements for their respective use and classifications as determined by the applicable test procedures listed in this section.

1404.2 Interior finish and trim materials: All materials used for interior finish and trim shall be classified in accordance with ASTM E84 listed in Appendix A.

1404.3 Interior floor finish materials: Interior floor finish materials which are judged by the building official to represent an unusual hazard and are to be installed in exits, passageways and corridors shall be classified in accordance with ASTM E648 listed in Appendix A.

1404.3.1 Class I interior floor finish: Class I interior floor finish shall be materials having a minimum critical radiant flux of 0.45 Watts per square centimeter.

1404.3.2 Class II interior floor finish: Class II interior floor finish shall be materials having a minimum critical radiant flux of 0.22 Watts per square centimeter.

1404.4 Interior hangings and decorations: Interior hangings and decorations shall comply with Sections 1404.4.1 through 1401.4.4.

1404.4.1 Acceptance criteria: Where required to be flameresistant under the provisions of this code, all materials used for artistic enhancement, decorations, draperies, curtains, scenery and hangings shall comply with this section. If treated to be flameresistant, these materials shall not generate smoke more dense than that given off by untreated wood or paper burning under comparable conditions when tested in the vertical flame test in accordance with NFiPA 701 listed in Appendix A.

1404.4.2, 1404.4.3 and 1404.4.4 Deleted by the Kentucky Department of Housing, Buildings and Construction.

SECTION 1405.0 SPECIAL FIRERESISTIVE REQUIREMENTS

1405.1 General: In buildings or parts thereof of the uses and types of construction herein specified, the general fireresistive requirements of Table 401 and the height and area limitations of Table 501 shall be subject to the exceptions and modifications described in Sections 1405.2 through 1405.7.

1405.2 Public garages: All existing buildings and structures altered or converted for use as a garage, motor vehicle repair shop or gasoline service station and more than one story in height, unless of Type 1 or Type 4 construction, shall have the partitions, columns and girders and all floor and roof construction protected and insulated with noncombustible materials or assemblies of component materials having a fireresistance rating of not less than 1 hour. Existing roof trusses shall be exempt from all fireresistive requirements.

* **1405.3 Packing and shipping rooms:** Every packing or shipping room located on or below a floor occupied for Use Group M shall be separated therefrom by fire separation walls or floor/ceiling assemblies of not less than the fireresistance rating of the type of construction as set forth in Table 401 but not less than 1 hour.

1405.4 Truck loading and shipping areas: Truck loading and shipping areas shall be permitted within any building of Use Group B, provided such areas are enclosed in construction of not less than the fireresistance rating of the type of construction as set forth in Table 401, but not less than 1 hour, and direct access is provided therefrom to the street.

1405.5 Use Groups B, M and R: Buildings of Use Groups B, M and R shall comply with the special fireresistive requirements of Sections 1405.5.1 through 1405.5.3.

1405.5.1 Type 3A construction: Buildings of Use Group R-2 of Type 3A construction may be increased to six stories or 75 feet (22860 mm) in height when the first floor construction above the basement has a fireresistance rating of not less than 3 hours and the floor area is subdivided by 2 hour fire walls into fire areas of not more than 3,000 square feet (279 m^2).

1405.5.2 Type 2B construction: When of Type 2B construction, buildings of Use Group R-2 may be increased to nine stories or 100 feet (30480 mm) in height when separated by not less than 50 feet (15240 mm) from any other building on the lot and from interior lot lines, the exits are segregated in a fire area enclosed in a fire wall of 2 hour fireresistance rating and the first floor construction has a fireresistance rating of not less than 1½ hours.

1405.5.3 Use Groups B and M: The first floor of buildings of Type 2C, 3B or 5B construction may be occupied for Use Groups B and M, provided the floor/ceiling assembly and enclosure walls are protected to afford 1 hour fireresistance rating and the exits from the residential floors are separately enclosed in accordance with the requirements of Article 8.

1405.6 Grade floor protection: In all buildings other than buildings of Use Group R-3 and in all types of construction other than Type 1, with habitable or occupiable stories or basements below grade, the floor/ceiling assemblies and supports below the grade floor shall be protected by providing a fireresistance rating of not less than 1 hour, Type 4 construction, or an automatic fire suppression system. The fireresistance rating provided shall not be less

* than the rating required by Table 401 for the type of construction.

1405.7 Interior partitions: In buildings or structures of other than Use Groups I and R of Types 1, 2A and 2B construction, partitions of a single thickness of wood or approved composite panels, and glass or other approved materials of similar combustible characteristics, may be used to subdivide rooms or spaces into offices, entries, or other similar compartments, provided they do not establish a corridor serving an occupant load of more than 30 in areas occupied by a single tenant and do not exceed 5,000 square feet (465 m^2) between fire separation assemblies or fire walls. An area not exceeding 7,500 square feet (697.5 m^2) may be subdivided with fire-retardant treated wood complying with Section 1403.5.

1405.8 Plenums: Air plenums shall comply with Sections 1405.8.1 and 1405.8.2.

1405.8.1 General: The use of uninhabited basements, cavity walls, areas above ceilings or attic spaces as supply, makeup, exhaust or return air plenums or ducts is prohibited.

Exception: Air-ceiling plenums may be installed as supply or return air plenums in all occupancies except buildings of Use Group R-3, provided such air plenums meet the requirements of other applicable articles of this code and of the mechanical code listed in Appendix A, and provided fuel-fired equipment or exposed combustible materials are not located therein. The use of air-ceiling plenums shall be confined to one fire area. The floor or roof assembly above an unlisted air-ceiling plenum shall not depend upon the air-ceiling for a portion of its fireresistance rating. Insulated cold water, hot water, steam, fire protection piping, building sanitary and storm drains, and vent systems may be installed in air-ceiling plenums. Electrical wiring and equipment in air-ceiling plenums shall conform to the requirements of NFiPA 70 listed in Appendix A. The use of air-ceiling plenums in evaporative cooling systems is prohibited. Panning of the joist or stud space for return air is permitted in buildings of Use Group R-3 only.

1405.8.1.1 Wiring: Single and multi-condutor low voltage and power-limited electrical wire and cables tested in accordance with UL 910 listed in Appendix A and having a peak optical density not greater than 0.50, an average optical density not greater than 0.15 and a flame spread of 5.0 feet or less and classified as having adequate fireresistance and low smoke-producing characteristics shall be permitted in concealed spaces such as spaces over suspended ceilings, plenums, ducts and other spaces used for environmental air-handling purposes.

1405.8.2 Crawl spaces: An underfloor space may be used as a supply plenum when the provisions of Sections 1405.8.2.1 through 1405.8.2.13 are met.

1405.8.2.1 General: The use of such space shall be limited to buildings of Use Group R-3 not more than two stories in height, or fire areas not exceeding 25,000 cubic feet (700 m^3) in volume in any other use group. Except for the floor immediately above the underfloor plenum, supply ducts shall be provided extending from the plenum to registers on other floor levels.

1405.8.2.2 Storage: Such spaces shall not be used for storage, shall be cleaned of all loose scrap material and shall be tightly and substantially enclosed.

1405.8.2.3 Enclosure: The enclosing material of the underfloor space, including the side wall insulation, shall not be more flammable than 1 inch (nominal) wood boards (flame spread classification of 200).

1405.8.2.4 Access: Access shall be through an opening in the floor which shall be 18 inches by 24 inches (457 mm by 610 mm).

1405.8.2.5 Bonnet temperature control: The furnace supplying warm air to such space shall be equipped with an automatic control which will start the air circulating fan when the air in the furnace bonnet reaches a temperature not higher than 150 degrees F. (66 degrees C.). Such control shall be one that cannot be set higher than 150 degrees F. (66 degrees C.).

1405.8.2.6 Outlet temperature control: The furnace supplying warm air to such space shall be equipped with an approved temperature limit control that will limit outlet air temperature to 200 degrees F. (93 degrees C.).

1405.8.2.7 Receptacle: A noncombustible receptacle shall be placed below each floor opening into the air chamber. Such receptacle shall be securely suspended from the floor members and shall be not more than 18 inches (457 mm) below the floor opening. The area of the receptacle shall extend 3 inches (76 mm) beyond the opening on all sides. The perimeter of the receptacle shall have a vertical lip at least 1 inch (25 mm) high at the open sides if it is at the level of the bottom of the joist, or 3 inches (76 mm) high if the receptacle is suspended.

1405.8.2.8 Registers: Floor registers shall be designed for easy removal in order to give access for cleaning the receptacles.

1405.8.2.9 Firestopping: Exterior walls and interior stud partitions shall be firestopped at the floor.

1405.8.2.10 Register box: Each wall register shall be connected to the air chamber by a register box or boot.

1405.8.2.11 Duct extension: A duct conforming with the mechanical code listed in Appendix A shall extend from the furnace supply outlet at least 6 inches (152 mm) below combustible framing.

1405.8.2.12 Ground cover: The entire ground surface of the underfloor space shall be covered with a vapor barrier having a vapor permeability rating of 1 perm or less and a flame spread rating of 200 or less.

1405.8.2.13 Piping: Fuel gas lines and plumbing waste cleanouts shall not be located within the space.

SECTION 1406.0 EXTERIOR WALLS

1406.1 General: All exterior walls shall comply with the provisions of Articles 9, 10, 11, 12 and 13, and with the fireresistance rating requirements of this section and Section 401.0. Exterior walls shall be rated for exposure to fire from inside the building.

1406.1.1 Omission of exterior walls: The provisions of this code shall not be deemed to prohibit the omission of exterior walls for all or part of a story when required for special uses and occupancies. When so omitted, the open areas shall be separated from the rest of the area and from the upper and lower stories of the building by wall and floor construction of the fireresistance rating required in Table 401; and except as otherwise specifically permitted in Section 1411.5, the piers, columns and other structural supports within the open portion shall be constructed with the fireresistance rating required for exterior bearing walls in Table 401.

1406.1.2 Special industrial uses: The exterior walls of buildings or structures of special industrial uses according to Section 305.3.1 shall be constructed of approved noncombustible and weather-resisting materials, and when located with a fire separation of less than 30 feet (9144 mm) shall be protected or constructed to provide a fireresistance rating of not less than 2 hours.

1406.2 Fire separation: The exterior walls of buildings or structures of Type 5B construction with a fire separation of less than 15 feet shall have a fireresistance rating of not less than 1 hour except buildings of Use Group R-2, R-3 or U. Exterior walls with a fire separation of less than 6 feet (1829 mm) shall be of at least 1 hour fireresistance rated construction. Exterior walls with a fire separation of 3 feet (914 mm) or less shall not have openings of any type.

1406.2.1 Noncombustible construction exemptions: One-story buildings of Type 2C construction which do not exceed 3,000 square feet (279 m^2) in area in all use groups except Use Groups A, E, H and I shall be exempt from all protected exterior wall requirements.

1406.3 Where required: In all buildings and structures of Use Groups B, F, H, M or S, exceeding three stories or 40 feet (12192 mm) in height, openings located vertically above one another in exterior walls which are required to have a fireresistance rating of more than 1 hour shall be separated by apron or spandrel walls not less than 3 feet (914 mm) in height, extending between the top of any opening and the bottom of the opening next above.

1406.3.1 Fireresistance rating: The apron or spandrel walls shall be constructed with the same fireresistance rating required for the exterior wall in which it is located as specified in Table 401; except when such required rating exceeds 1 hour, approved wired glass construction in fixed noncombustible sash and frames not exceeding one third of the area of such apron or spandrel may be located therein. In exterior nonbearing enclosure walls which are not required to be of more than 1 hour fireresistance rating, the provisions of this section in respect to apron or spandrel walls shall not apply.

1406.4 Parapets: Exterior walls required to have a fireresistance rating of 1 hour or more shall be constructed with parapet walls having the same fireresistance rating as the wall upon which they are erected. The height of the parapet shall not be less than 30 inches (762 mm) above the point where the roof surface and the wall intersect.

Exception: Parapets are not required on:

1. Exterior walls and fire walls connecting with roofs of Type 1 construction.
2. An exterior wall of a building, the roof of which is at least 3 feet (914 mm) lower than the roof of, or any opening in, an adjacent building.
3. Exterior walls facing an unoccupied open space having a width of 30 feet (9144 mm) or more.
4. Exterior walls in buildings of Use Group R-3 or buildings not exceeding 1,000 square feet (93 m^2) in area.
5. Exterior walls of a building where the roof has an angle of more than 20 degrees (0.35 rad.) with the horizontal.
6. Exterior walls connecting with roofs of noncombustible construction when the exterior wall is carried up tightly against the underside of the roof deck.

1406.4.1 Construction: Parapets shall be properly coped and flashed with noncombustible, weatherproof material. All corners of masonry parapet walls shall be reinforced with at least one ¼ inch bar in every third joint, continuous around the corner and extending into the masonry at least 3 feet (914 mm) from the corner.

SECTION 1407.0 FIRE WALLS AND PARTY WALLS

1407.1 General: Walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall, and shall be constructed of any approved noncombustible materials providing the required strength and fireresistance rating specified in Table 401 for the type of construction, but not less than the fire grading of the use group specified in Table 1402. Strength and stability shall comply with the provisions of Articles 9, 10, 11, 12 and 13.

1407.2 Cutting walls: A wall 8 inches or less in thickness shall not be cut for chases or socketed for insertion of structural members subsequent to erection (see Section 1212.0).

1407.3 Hollow walls: When combustible members frame into hollow walls or walls of hollow units, all hollow spaces shall be solidly filled for the full thickness of the wall and for a distance not less than 4 inches (102 mm) above, below and between the structural members with noncombustible materials approved for firestopping in Section 1420.0. The wall shall be not less than the minimum thickness specified in ANSI/NBS 211 for nonreinforced masonry, ANSI/NBS H74 for reinforced masonry, BIA *Building Code Requirements for Engineered Brick Masonry*, NCMA TR75-B or ACI 531 listed in Appendix A.

1407.4 Combustible insulation: The building official may permit the application of cork, fiber board or other combustible insulation if laid up without intervening air spaces and attached directly to the face of the wall, and protected on the exposed surface as provided in Sections 1120.0 and 1316.0.

1407.5 Continuity of walls: In all buildings or structures, walls shall be continuous from foundation to 2 feet 8 inches (813 mm) above the roof surface, except as provided in Sections 1407.5.1 through 1407.5.3. Fire walls shall be made smoke-tight at their junction with exterior walls. In exterior wall construction employing studs, the wall shall extend through the stud space to the exterior sheathing.

1407.5.1 Noncombustible roofs: The wall may terminate at the underside of the roof deck where the roof is of noncombustible construction and is properly firestopped at the wall.

1407.5.2 Combustible roofs: The wall may terminate at the underside of the roof deck in Types 3, 4 and 5 construction if properly firestopped, and if the roof sheathing or deck is constructed of approved noncombustible materials or fire-retardant treated wood for a distance of 4 feet (1219 mm) on either side of the wall, and combustible material does not extend through the wall and the roof covering has a minimum of a Class C rating.

1407.5.3 Noncombustible frame: The wall may be supported on the structural frame in buildings of noncombustible construction, provided such supporting frame has a fireresistance rating at least equal to that required for the wall.

1407.6 Offset fire walls: If fire walls are offset at intermediate floor levels in protected skeleton-frame construction, the offset floor construction and the intermediate wall supports shall be constructed of noncombustible materials with a fireresistance rating not less than that required for the fire wall.

SECTION 1408.0 FIRE WALL OPENINGS

1408.1 General: Openings in fire walls shall not exceed the limits in size and area herein prescribed, and the opening protectives shall conform to the provisions of Sections 1403.0 and 1414.0.

1408.2 Size of opening: Except in sprinklered buildings, an opening through a fire wall shall not exceed 120 square feet (11.16 m^2) in area, and the aggregate width of all openings at any floor level shall not exceed 25 percent of the length of the wall.

1408.2.1 First story exception: When the entire areas on both sides of a fire wall are provided with an approved automatic fire suppression system complying with the requirements of Article 17, openings designed for the passage of trucks may be constructed not more than 240 square feet (22.32 m^2) in area with a minimum distance of 3 feet (914 mm) between adjoining openings. Such openings shall be protected with approved automatic opening protectives of 3 hour fireresistance rating, and provided with an approved water curtain in addition to all other requirements.

1408.3 Opening protectives: Every opening in a fire wall shall be protected with an approved automatic opening protective assembly as herein required or the approved labeled equivalent in accordance with Section 1415.2, except horizontal exit openings.

1408.3.1 Hold-open devices: Heat actuated hold-open devices shall be installed on both sides of the wall, interconnected so that the operation of any single device will permit the door to close. Heat detectors or fusible links shall be installed at the door opening and at the ceiling in conformance with NFiPA 80 listed in Appendix A for the particular type of door to be installed. Swinging fire doors, where the ceiling is less than 3 feet (914 mm) above each side of the opening, may be actuated by a single fusible link incorporated in the hold-open arm of an approved automatic door closer. Doors opening in a means of egress shall be closed by an approved door closer, or may be closed by actuation of a smoke detector located in conformance with NFiPA 80 listed in Appendix A.

SECTION 1409.0 FIRE SEPARATION WALLS

1409.1 Uses: Fire separation walls shall comply with Sections 1409.1.1 through 1409.1.4 for the indicated uses.

1409.1.1 Mixed uses: When a building contains more than one occupancy, and each part of the building is separately classified as to use, the mixed uses shall be completely separated with fire separation walls as specified in Section 313.0.

1409.1.2 Multiple single-family dwellings: Single-family dwelling units (Use Group R-3) may be located above or adjacent to other single-family dwelling units (Use Group R-3) provided each dwelling unit is completely separated from the adjacent dwelling unit(s) by fire separation wall(s) and floor/ceiling assemblies of not less than 1 hour fireresistance rated construction. Single-family dwelling units having independent means of egress, when attached in this manner, shall be considered as one building classified as Use Group R-3 for the purpose of determining the applicable provisions of this code.

1409.1.3 Exits: Fire separation walls required for the enclosure of exits and areas of refuge shall be constructed of masonry, reinforced concrete or any other approved noncombustible materials having the minimum fireresistance rating prescribed by Table 401. Such walls may be constructed of combustible materials as regulated by Sections 816.9 and 1409.3.

1409.1.4 Other uses: Fire separation walls used for subdividing purposes, other than exits and areas of refuge, shall be constructed of the types of materials and shall have the minimum fireresistance rating as prescribed by Table 401 for the type of construction.

1409.2 Openings: Openings in fire separation walls shall comply with Sections 1409.2.1 and 1409.2.2.

1409.2.1 Size: Exit doors located in fire separation walls shall be limited to a maximum aggregate width of 25 percent of the length of the wall and the maximum area of any single opening shall not exceed 48 square feet (4.46 m^2).

1409.2.2 Protectives: All opening protectives in fire separation walls shall comply with the provisions of Section 1403.0 and shall have the minimum fireresistance rating as set forth in Section 1415.0.

1409.3 Combustible stair enclosures: Where permitted by Section 816.9, combustible stair enclosures shall be constructed in accordance with Sections 1409.3.1 and 1409.3.2.

1409.3.1 Construction: Stair enclosures constructed of approved combustible assemblies protected with component materials to afford the required fireresistance ratings shall be continuous through combustible floor construction and shall provide an unbroken fire barrier in combination with protected floors, ceilings and fire doors, separating the exits from the unprotected areas of the building. Such enclosures shall be firestopped to comply with Section 1420.0.

1409.3.2 Openings for lighting: Openings for the purpose of providing light in such enclosures may be protected with wired glass with single panes not more than 360 square inches (0.23 m^2) in area and a total area in one story of not more than 720 square inches (0.46 m^2). Such light panels shall comply with the provisions of Section 1418.0, and shall be contained in stationary sash and frames of steel or other approved noncombustible material.

1409.4 Continuity: All fire separation walls shall extend from the top of the fireresistance rated floor/ceiling assembly below to the fireresistance rated floor/ceiling or roof/ceiling assembly above, unless otherwise provided for in this code, and shall be securely attached thereto. Where these walls enclose required exits, areas of refuge and shafts, or where these walls separate mixed uses, they shall be continuous through all concealed spaces such as the space above a suspended ceiling, and they shall be constructed tight to the underside of the floor slab or roof deck above. The supporting construction shall be protected to afford the required fireresistance rating of the wall supported, except for exit access corridor walls in buildings of Types 2C, 3B and 5B construction. All hollow vertical spaces shall be firestopped at every floor level as required in Section 1420.0.

1409.5 Exterior walls: Where exterior walls serve as a part of a required fireresistance rated enclosure, such walls shall comply with the requirements of Table 401 for exterior walls and the fireresistance rated enclosure requirements shall not apply.

SECTION 1410.0 VERTICAL SHAFTS

1410.1 General: The provisions of this section shall apply to all vertical shaft enclosures, except as provided for stairway enclosures in Sections 816.9 and 1409.0, refuse chutes in Section 1606.0, and elevator and dumbwaiter hoistways in Section 2108.0.

1410.2 Open shaft enclosures: The enclosing walls of shafts that are open to the outer air at the top shall be constructed of materials specified in Article 13 for exterior walls of buildings and structures of the required fireresistance rating specified in Table 401.

1410.3 Covered shaft enclosures: The enclosing walls of interior covered

shafts shall be constructed of approved materials with the fireresistance rating specified in Table 401. The tops of covered shafts shall comply with Section 1410.5.

Exception: Shafts in buildings of Use Group R-3 and serving a single dwelling unit are not required to be enclosed.

1410.4 Duct and pipe shafts: In all buildings other than buildings of Use Group R-3, vertical pipes arranged in groups of two or more which penetrate two or more floors and occupy an area of more than 1 square foot (0.093 m^2), and vertical ducts which penetrate two or more floors, shall be enclosed by construction having the fireresistance rating to comply with this section. All combustible pipes and ducts connecting two or more stories shall be enclosed as indicated herein.

Exceptions

1. In all buildings of Use Group R-2, vertical noncombustible ducts shall not be required to have a 1 hour enclosure provided:
   a. the cross sectional area does not exceed 35 square inches;
   b. the duct does not penetrate more than three floors;
   c. the duct serves no more than one dwelling unit and shall not join other ducts except above the top level for the purpose of utilizing a single roof penetration; and
   d. these ducts are restricted for use as a bathroom or kitchen exhaust, combustion air supply and relief, and flues for gas equipment.
2. Combustible pipe shall be permitted where approved by Article 22 of this code. Noncombustible fittings shall be required where branch lines enter into or exit from rated walls, with no requirement for 1 hour enclosure.

1410.5 Top enclosure: A shaft that does not extend to the underside of the roof deck of the building shall be enclosed with top construction of the same strength and fireresistance rating as the floors of the building or structure in which it occurs, but not less than that of the fireresistance rating of the shaft enclosure.

1410.6 Bottom enclosure: All shafts that do not extend to the bottom of the building or structure shall be enclosed at the lowest level with construction of the same strength and fireresistance rating as the lowest floor through which it passes, but not with a fireresistance rating less than that of the shaft enclosure.

1410.7 Shaft openings: Openings other than those necessary for the purpose of the shaftway shall not be constructed in shaft enclosures. All openings shall be protected with approved fire doors, fire windows or fire dampers complying with the provisions of Sections 1414.0, 1415.0, 1416.0, and 1417.0.

SECTION 1411.0 FIRERESISTANCE RATING OF STRUCTURAL MEMBERS

1411.1 Requirements: The fireresistance rating of construction assemblies and structural members shall comply with the requirements of Table 401 and Section 1403.0.

1411.2 Protection of structural members: Columns, girders, trusses, beams, lintels, or other structural members that are required to have a fireresistance rating and that support more than two floors or one floor and roof, or support a bearing wall or a nonbearing wall more than two stories high, shall be individually protected on all sides for their length or height with materials having the required fireresistance rating. All other structural members required to have a fireresistance rating may be protected by individual encasement, by a membrane or ceiling protection as specified in Section 1412.0, or by a combination of both.

1411.3 Embedments and enclosures: Pipes, wires, conduits, ducts or other service facilities shall not be embedded in the required fire protective covering of a structural member that is required to be individually encased.

1411.4 Impact protection: Where the fire protective covering of a structural member is subject to impact damage from moving vehicles, the handling of merchandise, or other activity, the fire protective covering shall be protected by corner guards or by a substantial jacket of metal or other noncombustible material to a height adequate to provide full protection, but not less than 5 feet (1524 mm) from the finished floor.

1411.5 Exterior structural members: Structural members located in exterior walls or along the outer lines of a building or structure shall be protected as required by Table 401 for exterior bearing walls for the type of construction involved and shall be protected against corrosion by an approved method complying with Section 1312.0. The interior faces of exterior structural members shall be protected with coverings of the required fireresistance rating specified for interior structural members in Table 401.

Exception: When a fireresistance rating is required for exterior bearing walls in buildings of Type 2C, 3B and 5B construction in Table 401, the interior faces of any exterior structural member of such buildings shall be protected to provide a fireresistance rating equal to that required for exterior bearing walls.

1411.6 Wall structural supports: Structural elements which support walls required to have a fireresistance rating shall be protected to afford not less than the fireresistance rating of the wall supported, and the fireresistance rating shall not be less than 1 hour for members supporting masonry walls.

1411.6.1 Bottom flange protection: Fire protection may be omitted from the bottom flange of lintels, shelf angles and plates not a part of the structural frame or with a span of 6 feet (1829 mm) or less.

1411.6.2 Stone lintels: The use of stone lintels on spans exceeding 4 feet (1219 mm) shall not be permitted, unless supplemented by fireresistance rated structural members or masonry arches of the required strength to support the superimposed loads.

SECTION 1412.0 FIRERESISTANCE RATED FLOOR/ROOF/CEILING ASSEMBLIES

1412.1 Installation of ceiling fixtures: Fireresistive ceilings which constitute an integral part of a floor or roof assembly to meet a required fireresistance rating may have openings to accommodate noncombustible piping, ducts or electric outlets. The aggregate area of such openings in the ceiling shall be not greater than 100 square inches (0.065 m^2) in any 100 square feet (9.30 m^2) of ceiling area. The fixtures and attachments shall be installed so as not to decrease the fireresistance rating of the assembly. All duct openings shall be protected with approved noncombustible fire dampers in compliance with Section 1417.0.

1412.2 Ceiling panels: Where the weight of lay-in ceiling panels, used as part of fireresistance rated floor/ceiling or roof/ceiling assemblies, is not adequate to resist an upward force of 1 psf (4.88 kg/m^2), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

1412.3 Unusable space: In an assembly required to have a 1 hour fireresistance rating, the ceiling membrane of a tested assembly may be omitted over unusable space, or the flooring may be omitted where unusable space occurs above.

1412.4 Openings in fireresistance rated floors: The required fireresistance rating of floor or floor/ceiling assemblies shall be maintained where a penetration is made for electrical, mechanical, plumbing and communication conduits, pipes and systems.

SECTION 1413.0 ROOF CONSTRUCTION

1413.1 General: Roofs shall be constructed of materials or assemblies of materials designed to afford the fireresistance rating required by Table 401 as herein modified.

1413.2 Stadiums: The roof construction, including beams, trusses, framing, arches and roof decks, enclosing stadiums of Type 1 or Type 2 construction shall be of noncombustible materials without a specified fireresistance rating or of Type 4 construction.

1413.3 Roofs 20 feet or higher: When every part of the structural framework of roofs in buildings of Type 1 or Type 2 construction is 20 feet (6096 mm) or more above the floor immediately below, omission of all fire protection of the structural members is permitted, including the protection of trusses, roof framing and decking.

1413.4 Roof slabs, arches and decking: Where the omission of fire protection from roof trusses, roof framing and decking is permitted, roofs in buildings of Type 1 and Type 2 construction shall be constructed of noncombustible materials without a specified fireresistance rating, or of Type 4 construction in buildings not over five stories or 65 feet (19812 mm) in height.

1413.5 Firestopping: Firestopping of ceiling and attic spaces shall be provided as required by Section 1420.0.

SECTION 1414.0 EXTERIOR OPENING PROTECTIVES

1414.1 Where required: Where required in this section, Section 1406.0 or Article 6 for special uses, the exterior openings of all buildings or structures except storefronts and window and door openings in buildings of Use Group R-3 shall have approved opening protectives meeting the requirements of this section and Sections 1403.0, 1415.0, 1416.0, 1417.0 and 1418.0.

1414.2 Horizontal exposure: Approved protectives shall be provided in every opening where the fire separation measured perpendicular to the plane of the wall is less than 15 feet (4572 mm), except that in buildings of Types 2C and 5B construction approved opening protectives shall be provided in every opening where the fire separation is less than 6 feet (1829 mm).

1414.3 Vertical exposure: Approved protectives shall be provided in every opening which is less than 50 feet (15240 mm) vertically above the roof of an adjoining building or adjacent structure that is within a horizontal distance of 30 feet (9144 mm) of the wall in which the opening is located, unless such roof construction affords a fireresistance rating of not less than 1½ hours.

1414.4 Protected openings: Required protective assemblies in exterior openings shall be fixed, or they may be self-closing, or provided with approved automatic closing devices.

1414.4.1 Outside sprinklers: Approved outside automatic sprinklers installed in accordance with NFiPA 13 listed in Appendix A may be used for the protection of exterior openings, and shall have an automatic source of water and shall be provided with a fire department connection.

1414.5 Unprotected openings: Where a fireresistance rating is not required by this section for openings in exterior walls, windows and doors may be of unprotected wood. Glazing shall conform to the requirements of Articles 13 and 23.

SECTION 1415.0 FIRE DOORS

1415.1 Fire door assemblies: Approved fire door assemblies as defined in this code shall be constructed of any material or an assembly of component materials which meets the test requirements of Section 1403.0 and the fireresistance rating herein required, unless otherwise specifically provided for in this code.

1415.2 Labeled protective assemblies: All fire door assemblies shall be labeled by an approved agency. Labeled protective assemblies meeting the requirements of Sections 1403.3.2 or UL 10A, 14B and 14C for tin-clad fire door assemblies and NFiPA 80 listed in Appendix A, shall be approved for use as provided for in this code.

1415.3 Multiple doors: The use of multiple fire doors shall comply with Sections 1415.3.1 and 1415.3.2.

1415.3.1 Fire walls: Two doors, each with a fireresistance rating of 1½ hours, installed on opposite sides of the same opening, shall be deemed equivalent in fireresistance rating to one 3 hour fire door.

1415.3.2 Fire separation walls: Two doors, each with a fireresistance rating of ¾ hour installed on opposite sides of the same opening shall be deemed equivalent in fireresistance rating to a 1½ hour fire door, except when used in a required exit.

1415.4 Glass panels: Wired glass panels shall be permitted in fire doors within the limitations of Section 1418.0 and as herein specifically prescribed.

1415.5 Closing devices: Except as may be otherwise provided for openings in fire walls and fire separation walls, all fire doors shall be self-closing and shall be closed during occupancy of the building or part thereof. The building official may approve the use of rate-of-rise heat-actuated devices, or smoke detection devices, meeting the requirements of the approved rules on doors that are normally required to be open for ventilation or other specified purposes when the safety of the occupants is not endangered thereby.

Table 1415
FIRE DOOR FIRERESISTANCE RATINGS

Location	Fireresistance rating in hours
Exit access corridor enclosures of 1 hour construction	1/3
Fire walls and fire separation walls of 3 or more hour construction	3
Fire walls, fire separation walls and exit enclosures of 1½ or 2 hour construction	1½
Shaft and exit enclosures of 1 hour construction	1
Shaft enclosures and elevator hoistways of 2 hour construction	1½
Other fire separation walls of 1 hour construction	¾

SECTION 1416.0 FIRE WINDOWS AND SHUTTERS

1416.1 Fireresistance rating: Approved assemblies of fire windows and fire shutters shall meet the test requirements of Section 1403.0, or shall be approved labeled assemblies meeting the requirements of Section 1403.3.4.

1416.1.1 Exception: Steel window frame assemblies of ⅛ inch (3 mm) minimum solid section or of not less than No. 18 Manufacturers Standard Gage (0.048 in.) formed sheet steel members fabricated by pressing, mitering, riveting, interlocking or welding and having provision for glazing with ¼ inch wired glass as required in Section 1418.0 when securely installed in the building construction and glazed with ¼ inch labeled wired glass, shall be deemed to meet the requirements for a ¾ hour fire window assembly.

1416.2 Window mullions: All metal mullions which exceed a nominal height of 12 feet shall be protected with materials to afford the same fireresistance rating as required for the wall construction in which the protective is located.

1416.3 Swinging fire shutters: When fire shutters of the swinging type are used in exterior openings, not less than one row in every three vertical rows shall be arranged to be readily opened from the outside, and shall be identified by distinguishing marks or letters not less than 6 inches (152 mm) high.

1416.4 Rolling fire shutters: When fire shutters of the rolling type are used, they shall be of approved counterbalanced construction that can be readily opened from the outside.

SECTION 1417.0 FIRE DAMPERS

1417.1 Approval: Fire dampers shall comply with UL 555 listed in Appendix A and shall bear the label of an approved agency. Fire dampers shall be installed in accordance with the manufacturer's installation instructions. Fire dampers shall be capable of maintaining the integrity of the required fireresistance rating.

1417.2 Where required: Fire dampers shall be provided at locations where air distribution systems penetrate assemblies required to have a fireresistance rating.

Exceptions

1. When proper fire tests have shown that fire dampers are not necessary to maintain the integrity of the fireresistance rated assembly.
2. Subducts extending 22 inches (559 mm) vertically upward may be used in lieu of fire dampers for exhaust ducts penetrating a fireresistance rated shaft wall.
3. Penetrations of tenant separation and corridor walls in buildings equipped throughout with an approved automatic fire suppression system.
4. When the ducts are constructed of steel and are part of an engineered smoke removal system.
5. Penetrations of corridor walls when the ducts are constructed of steel and do not have openings which communicate the corridor with adjacent spaces or rooms.
6. Penetrations of a roof assembly when ducts are open to the atmosphere.
7. Hazardous exhaust systems as defined in the mechanical code listed in Appendix A.
8. When a fire wall having a fireresistance rating of 3 hours or more is penetrated, a fire door is required.

1417.3 Accessibility: Fire dampers shall be accessible.

SECTION 1418.0 WIRED GLASS

1418.1 Maximum size: One-quarter inch wired glass, which has been labeled for use in approved labeled opening protectives, may be used within the size limitations set forth in Table 1418.

Table 1418
LIMITING SIZE OF WIRED GLASS PANELS

Rating, opening	Max. area sq. in.	Max. height inches	Max. width inches
3 hour, Class A door	0	0	0
1 and 1½ hour, Class B doors	100	33	10
¾ hour, Class C door	1,296	54	54
1½ hour, Class D door	0	0	0
¾ hour, Class E door	1,296	54	54
Fire windows	1,296	54	54

Note a. 1 inch = 25.4 mm; 1 square inch = 0.0006452 m^2.

1418.1.1 Fire walls: Wired glass in fire doors located in fire walls shall be prohibited except that when serving as a horizontal exit, a self-closing swinging door may be provided with a vision panel of not more than 100 square inches (0.065 m^2) without a dimension exceeding 10 inches (254 mm).

1418.1.2 Fire separation walls: Wired glass vision panels may be used in fire doors of 1½ hour fireresistance rating intended for use in fire separation walls, but the glass panels shall not be more than 100 square inches (0.065 m^2).

1418.2 Exit and elevator protectives: Unless specifically required by Article 6 to be solid in such locations where unusually hazardous conditions prevail, fire doors in elevator and stairway shaft enclosures may be equipped with approved wired glass vision panels which shall be so located as to furnish clear vision of the passageway or approach to the elevator or stairway. Such vision panels shall not exceed the size limitations specified for Class B doors.

1418.3 Fire separation walls: One-quarter inch wired glass panels may be used in fire separation walls used for subdividing purposes as set forth in Section 1409.1.4, provided the required fireresistance rating of the wall does not exceed 1 hour. The maximum size of such panels shall not exceed the limitations for a ¾ hour Class C door.

SECTION 1419.0 FIRERESISTIVE REQUIREMENTS FOR PLASTER

1419.1 Thickness of plaster: The required thickness of fireresistance rated plaster protection shall be determined by the prescribed fire tests for the specified use and type of construction and in accordance with the provisions of Section 1117.0 for interior plastering and Section 1118.0 for exterior plastering. The thickness in all cases shall be measured from the face of the lath when applied to gypsum lath or metal lath.

1419.2 Plaster equivalents: For fireresistive purposes, ½ inch (13 mm) of unsanded gypsum plaster shall be deemed equivalent to ¾ inches (19 mm) of one to three sanded gypsum or 1 inch (25 mm) portland cement sand plaster.

1419.3 Noncombustible furring: In Types 1 and 2 construction, plaster shall be applied directly on masonry or on approved noncombustible plastering base and furring.

1419.4 Double reinforcement: Except in solid plaster partitions, or when otherwise determined by the prescribed fire tests, plaster protection more than 1 inch (25 mm) in thickness shall be reinforced with an additional layer of approved lath embedded at least ¾ inch (19 mm) from the outer surface and fixed securely in place.

1419.5 Plaster alternates for concrete: In reinforced concrete construction, gypsum or portland cement plaster may be substituted for ½ inch (13 mm) of the required poured concrete protection, except that a minimum thickness of ⅜ inch (10 mm) of poured concrete shall be provided in all reinforced concrete floors and 1 inch (25 mm) in reinforced concrete columns in addition to the plaster finish. The concrete base shall be prepared in accordance with Section 1118.0.

SECTION 1420.0 FIRESTOPPING AND DRAFTSTOPPING

1420.1 General: To prevent the free passage of flame and products of combustion through concealed spaces or openings in the event of fire, provisions shall be made to provide effective firestops or draftstops as herein specified.

1420.2 Firestopping materials: All firestopping shall consist of approved noncombustible materials securely fastened in place. Firestops of two thicknesses of 1-inch lumber with broken lap-joint, or one thickness of ¾-inch plywood with joints backed by ¾-inch plywood, or of 2-inch lumber installed with tight joints, shall be permitted in open spaces of wood framing.

1420.3 Draftstopping materials: Draftstopping materials shall be not less than ½-inch gypsum board, ⅜-inch plywood or other approved materials adequately supported.

1420.4 Integrity: The integrity of all firestopping and draftstopping shall be continuously maintained.

1420.5 Required inspection: Firestopping and draftstopping shall not be concealed from view until inspected and approved by the building official.

1420.6 Firestopping required: Firestopping shall be provided in the locations specified in Sections 1420.6.1 through 1420.6.7.

1420.6.1 Concealed wall spaces: In concealed spaces of stud walls and partitions, including furred or studded-off spaces of masonry or concrete walls, at the ceiling and floor or roof levels.

1420.6.2 Connections between horizontal and vertical spaces: At all interconnections between vertical and horizontal spaces such as occur at soffits over cabinets, drop ceilings, cove ceilings and similar locations.

1420.6.3 Stairs: In concealed spaces between stair stringers at the top and bottom of the run.

1420.6.4 Ceiling and floor openings: At openings around vents, pipes, ducts, chimneys and fireplaces at ceiling and floor levels, with noncombustible materials.

1420.6.5 Architectural trim: In exterior cornices and other exterior architectural elements where permitted of combustible construction in Section 1425.0, or when erected with combustible frames, at maximum intervals of 20 feet (6096 mm). If noncontinuous, they shall have closed ends, with at least 4 inches (102 mm) separation between sections.

1420.6.6 Combustible finish and trim: In the space behind combustible trim and finish where permitted under this code and all other hollow spaces where permitted in fireresistance rated construction at 10 foot (3048 mm) intervals; or the space shall be solidly filled with noncombustible materials.

1420.6.7 Concealed sleeper spaces: In concealed spaces formed by floor sleepers in areas of not more than 100 square feet (9.30 m^2); or the space shall be solidly filled with noncombustible materials.

1420.7 Draftstopping required: Draftstopping shall be provided in Types 3, 4 and 5 construction in the locations specified by Sections 1420.7.1 and 1420.7.2.

1420.7.1 Floors: Where ceilings are suspended below solid wood joists or suspended or attached directly to the bottom of open web wood floor trusses, the space between the ceiling and the floor above shall be divided by providing draftstopping as specified in Sections 1420.7.1.1 through 1420.7.1.3.

1420.7.1.1 Use Groups R-1 and R-2: In buildings of Use Groups R-1 and R-2, draftstopping shall be in line with the tenant separation walls when the walls do not extend to the floor sheathing above.

1420.7.1.2 Use Group R-3: In buildings of Use Group R-3, the space shall be divided into approximately equal areas not greater than 500 square feet (46.5 m^2). The draftstopping shall be provided parallel to the main framing members.

1420.7.1.3 Other use groups: In all other use groups, draftstopping shall be provided so that horizontal areas do not exceed 1,000 square feet (93 m^2).

Exception: Where the space above a ceiling is of combustible construction and the building is sprinklered above and below the ceiling, the draftstopping may be omitted.

1420.7.2 Attics and concealed spaces: Attics and concealed roof spaces shall be provided with draftstopping as specified in Sections 1420.7.2.1 and 1420.7.2.2.

1420.7.2.1 Use Group R: In buildings of Use Group R, in the attic, mansard, overhang or other concealed roof space, above and in line with the tenant separation walls which do not extend to the roof sheathing above.

Exceptions

1. Where corridor walls provide a tenant separation, draftstopping shall only be required above one of the corridor walls.
2. Where flat roofs with solid joist construction are used, draftstopping over tenant separation walls is not required.

3. Where the space above a ceiling is of combustible construction and the building is sprinklered above and below the ceiling, the draftstopping may be omitted.
4. Detached one- and two-family dwellings.

1420.7.2.2 Other use groups: In attics and concealed roof spaces, so that any horizontal area does not exceed 3,000 square feet (279 m^2).

Exceptions

1. Where flat roofs with solid joist construction are used, draftstopping over tenant separation walls is not required.
2. Where the space above a ceiling is of combustible construction and the building is sprinklered above and below the ceiling, the draftstopping may be omitted.

1420.8 Ventilation: Ventilation of concealed roof spaces shall be maintained in accordance with Section 709.0.

1420.9 Access to attics: A readily-accessible access opening not less than 22 inches by 30 inches (559 mm by 762 mm) shall be provided to any attic area having a clear height of over 30 inches (762 mm). When doors or other openings are provided in the draftstopping, they shall be self-closing and of approved materials specified in this section, and the construction shall be tightly fitted around all pipes, ducts or other assemblies piercing the draftstopping.

SECTION 1421.0 INTERIOR FINISH AND TRIM

1421.1 General: Interior finish and trim of buildings shall conform to the requirements of this section. Interior finish shall include all wainscoting and paneling or other finish applied structurally or for acoustical treatment, insulation, decoration or similar purposes. The use of a surface finish of paper or of material of not greater fire hazard than paper shall not be prohibited provided such finish does not exceed $^1/_{28}$ inch (1 mm) in thickness and is applied directly to a noncombustible base or substrate meeting the requirements of Section 1403.5.2. Show windows in the first story of buildings may be of wood or unprotected metal framing.

1421.2 Exposed construction: These requirements shall not be considered as requiring the installation of interior finish, but where construction or fire protection materials are exposed in rooms or spaces used for the occupancies specified in Section 1421.5, the hazard from rate of flame spread of such exposed materials shall be not greater than that of the interior finish permitted for such occupancy or use. Exposed portions of structural members complying with the requirements for Type 4 construction in Sections 405.0 and 1224.0 shall not be subject to interior finish regulations.

1421.3 Smoke or gases: Interior finish materials shall not be permitted that have a smoke developed rating greater than 450 when tested in accordance with ASTM E84 listed in Appendix A. When restrictions are not otherwise

established in this code, interior finish is not controlled, except that pyroxylin or similar finishes shall not be applied which, as dry films, produce excessive smoke or toxic fumes when exposed to fire.

1421.4 Materials: Materials may be used for interior finish and trim only as specifically provided in this code for the occupancy or use of the space in which it is installed. Use of any material for floor finish, interior finish, and trim in a building of Type 1 or 2 construction within the scope permitted in this section or Section 1423.0 shall not declassify the building with respect to its type of construction.

1421.4.1 Foam plastics: Foam plastics shall not be used as interior trim or finish except in compliance with this section and Section 1317.0.

1421.5 Interior finish: Interior finish of walls and ceilings shall have a flame spread rating not greater than that designated by the class prescribed for the various use groups listed in Table 1421.5, when tested in accordance with the requirements of Section 1404.2.

1421.5.1 Basements: In buildings or structures other than Use Group R-3, Class I or II interior finish shall be used in all basements or other underground spaces from which there is not direct exit to the outside of the building, if subject to occupancy for any purpose other than storage or service facilities.

1421.5.2 Maximum flame spread: Interior finish materials with flame spread classifications greater than 200 shall not be used in any room or space subject to human occupancy, except to such extent as may be specifically permitted by the building official on the basis of a finding that such use does not significantly increase the life hazard.

1421.5.3 Flame spread classifications: The classifications of interior finishes referred to herein correspond to flame spread ratings determined by ASTM E84 listed in Appendix A as follows. Class I flame spread, 0 - 25; Class II flame spread, 26 - 75; Class III flame spread, 76 - 200.

1421.6 Interior trim: Baseboards, chairrails, mouldings, trim around openings and other interior trim, not in excess of 10 percent of the aggregate wall and ceiling areas of any room or space, may be of Class I, II or III materials, except that trim around fire windows and fire doors shall comply with the requirements of Sections 1415.0 and 1416.0.

1421.7 Interior floor finish: Finished floors or floor covering materials of a traditional type, such as wood, vinyl, linoleum, terrazzo and other resilient floor covering materials are exempt from the requirements of this section. Floor coverings judged by the building official to represent an unusual hazard shall meet the classification prescribed for the various use groups listed in Table 1421.7 when tested in accordance with the requirements of Section 1404.3.

1421.7.1 Suppression system exception: When an approved automatic fire suppression system is provided, Class II materials may be used in any area

where Class I materials are required and materials complying with the DOC FF-1 "pill test" listed in Appendix A may be used in any area where Class II materials are required.

Table 1421.5
INTERIOR FINISH REQUIREMENTS[h]

Use groups	Required vertical exits and passageways[d]	Corridors providing exit access	Rooms or enclosed spaces[a]
A-1 Assembly, theaters	I	I[f]	II[b]
A-2 Assembly, night clubs	I	I[f]	II[b]
A-3 Assembly halls, terminals, restaurants	I	I[f]	II[b]
A-4 Assembly, churches	I	II	III
B Business	I	II	III
E Educational	I	II	III
F Factory and industrial	I	II	III
H High hazard	I	II	III[g]
I-1 Institutional, residential care	I	II	III
I-2 Institutional, incapacitated	I	I	I[c]
I-3 Institutional, restrained	I	I	I[c]
M Mercantile walls,	I	II	III
ceilings	I	II	II[e]
R-1 Residential, hotels	I	II	III
R-2 Residential, multi-family dwellings	I	II	III
R-3 Residential, 1 and 2 family dwellings	III	III	III
S-1 Storage, moderate hazard	II	II	III
S-2 Storage, low hazard	II	II	III

Note a. Requirements for rooms or enclosed spaces are based upon spaces enclosed in partitions of the building or structure, and where fireresistance rating is required for the structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions which do not comply with this shall be considered as enclosing spaces and the rooms or spaces on both sides thereof shall be counted as one. In determining the applicable requirements for rooms or enclosed spaces, the specific use or occupancy thereof shall be the governing factor, regardless of the use group classification of the building or structure. When an approved automatic fire suppression system is provided, the interior finish of Class II or III materials may be used in place of Class I or II materials respectively, where required in the table.

Note b. Class III interior finish materials may be used in places of assembly with a capacity of 300 persons or less.

Note c. Class III interior finish material may be used in administrative areas. Class II interior finish materials may be used in individual rooms of not over 4 persons capacity. Provisions in Note a allowing a change in interior finish classes when fire suppression protection is provided shall not apply.

Note d. Class III interior finish materials may be used for wainscoting or paneling for not more than 1,000 square feet of applied surface area in the grade lobby when applied directly to a noncombustible base or over furring strips applied to a noncombustible base and firestopped as required by Section 1422.0.

Note e. Class III interior finish materials may be used in mercantile occupancies of 3,000 square feet or less gross area used for sales purposes on the street floor only (balcony permitted).

Note f. Lobby areas may be Class II.

Note g. Where building height is over two stories, Class II shall be required.

Note h. The classifications of interior finishes referred to herein correspond to flame spread ratings determined by ASTM E84 listed in Appendix A as follows. Class I flame spread, 0 - 25; Class II flame spread, 26 - 75; Class III flame spread, 76 - 200 (see Section 1421.5.3).

Note i. 1 square foot = 0.093 m^2.

Table 1421.7
INTERIOR FLOOR FINISH REQUIREMENTS[c]

Use groups	Required vertical exits and passageways	Corridors providing exit access	Rooms or enclosed spaces[a]
A-1 Assembly, theaters	II	II	DOC FF-1[b]
A-2 Assembly, night clubs	II	II	DOC FF-1[b]
A-3 Assembly halls, terminals restaurants	II	II	DOC FF-1[b]
A-4 Assembly, churches	II	II	DOC FF-1[b]
B Business	II	II	DOC FF-1[b]
E Educational	II	II	DOC FF-1[b]
F Factory and Industrial	DOC FF-1[b]	DOC FF-1[b]	DOC FF-1[b]
H High hazard	DOC FF-1[b]	DOC FF-1[b]	DOC FF-1[b]
I-1 Institutional, residential care	II	II	DOC FF-1[b]
I-2 Institutional, incapacitated	I	I	DOC FF-1[b]
I-3 Institutional, restrained	II	II	DOC FF-1[b]
M Mercantile	II	II	DOC FF-1[b]
R-1 Residential, hotels	II	II	DOC FF-1[b]
R-2 Residential, multi-family dwellings	II	II	DOC FF-1[b]
R-3 Residential, 1 and 2 family dwellings	DOC FF-1[b]	DOC FF-1[b]	DOC FF-1[b]
S-1 Storage, moderate hazard	DOC FF-1[b]	DOC FF-1[b]	DOC FF-1[b]
S-2 Storage, low hazard	DOC FF-1[b]	DOC FF-1[b]	DOC FF-1[b]

Note a. Requirements for rooms or enclosed spaces are based upon the spaces being enclosed with partitions extending from the floor to the ceiling. Where partitions do not satisfy this criteria, the room or space is considered part of the corridor.

Note b. All carpet manufactured for sale in the United States is required by Federal regulations to pass the DOC FF-1 "pill test" (16 CFR, Part 1630) listed in Appendix A. If a material other than carpet is used, the material should be shown to be at least as resistant to flame propagation as a material which passes DOC FF-1 (minimum critical radiant flux of 0.04 Watts/cm^2).

Note c. The classifications correspond to that determined by ASTM E648 listed in Appendix A as follows: Class I, 0.45 Watts/cm^2; Class II, 0.22 Watts/cm^2 (see Section 1404.3).

1421.7.2 Test report: All carpet required by this section to meet critical radiant flux limits in accordance with Section 1404.3 shall be tested by an approved agency. A copy of the test report identifying and representing the style to be installed shall be provided to the building official upon request. The test report shall identify the carpet by manufacturer (or supplier) and style name, and shall be representative of the current construction of the carpet.

The carpet shall be identified as to manufacturer (or supplier) and style by a hang tag or other suitable method, which shall indicate the classification of the material based upon the limits specified in Section 1404.3.

SECTION 1422.0 APPLICATION OF INTERIOR FINISH

1422.1 Attachment: Where interior finish is regulated by the requirements of this code, interior finish materials shall be applied or otherwise fastened in such a manner that they will not readily become detached when subjected to

room temperatures of 200 degrees F. (93 degrees C.) or less for 30 minutes, or otherwise become loose through changes in the setting medium from the effects of time or conditions of occupancy.

1422.2 Application to structural elements: Interior finish materials applied to walls, ceilings or structural elements of a building or structure which are required to be fireresistance rated or to be constructed of noncombustible component materials shall be applied directly against the exposed surface of such structural elements or to furring strips attached to such surfaces with all concealed spaces created thereby firestopped where in excess of 10 feet (3048 mm) in any dimension (see Section 1420.6.6).

1422.3 Furred construction: Where walls, ceilings or other structural elements are required to be fireresistance rated or to be constructed of noncombustible component materials and interior finish is set out or dropped distances greater than 1¾ inches (44 mm) from the surface of such elements, only material of which both faces qualify as Class I shall be used.

Exceptions

1. Class II finish materials shall be permitted when protected on both sides by an approved automatic fire suppression system in which case Class I or II materials shall be used.
2. Class II or III materials shall be permitted when attached to a noncombustible backing complying with Section 1422.6 or to furring strips applied directly to such backing as provided in Section 1422.2.

1422.4 Type 4 construction: Interior finish materials may be applied directly to the wood members and decking of Type 4 construction, or to furring strips applied to such members or wood decking as provided in Section 1422.2.

1422.5 Class II and III materials: Interior finish materials, other than Class I materials, which are less than ¼ inch in thickness shall be applied directly against a noncombustible backing or a backing complying with the requirements of Section 1403.5.2 unless the tests under which such material has been classified were made with the materials suspended from the noncombustible backing.

1422.6 Backing material: Backing for interior finish materials shall be a continuous surface with permanently tight joints, equal in area to the area of the finish, and extending completely behind such finish in all directions; and may be of fire-retardant treated wood or any materials meeting the requirements of this code for noncombustible classification of material under Section 1403.4.1. When the backing does not constitute an integral part of the structural elements or system, it shall be attached directly to the structural elements or to furring strips as required for the application of finish according to Section 1422.2, or may be suspended from the structural members at any distance provided concealed spaces created thereby shall be firestopped in accordance with Section 1420.0.

SECTION 1423.0 COMBUSTIBLE MATERIALS PERMITTED IN FLOORS OF TYPES 1 AND 2 CONSTRUCTION

1423.1 General: Except as provided in Section 816.0 for stairs and Section 610.0, the use of combustible materials in or on floors of buildings of Types 1 and 2 construction shall be as herein specified.

1423.2 Sleepers, bucks, and grounds: Floor sleepers, bucks, nailing blocks and grounds may be constructed of combustible materials, provided the space between the fireresistance rated floor construction and the flooring is either solidly filled with noncombustible materials or firestopped in accordance with Section 1420.6.7, and provided such open spaces shall not extend under or through permanent partitions or walls.

1423.3 Flooring: Wood finish flooring may be attached directly to the embedded or firestopped wood sleepers, and shall be permitted when cemented directly to the top surface of approved fireresistance rated construction or directly to a wood subfloor attached to sleepers as provided in Section 1423.2. Combustible insulating boards not more than ½ inch thick and covered with approved finished flooring may be used for sound deadening or heat insulating when attached directly to a noncombustible floor assembly or to wood subflooring attached to sleepers as provided in Section 1423.2.

SECTION 1424.0 DECORATIVE MATERIAL RESTRICTIONS

1424.1 General: In buildings of Use Groups A, E, I-2 and I-3, all draperies, hangings and other decorative materials suspended from walls or ceilings shall be noncombustible or flameresistant meeting the requirements of Section 1404.0 as herein specified.

1424.2 Noncombustible: The permissible amount of noncombustible decorative hangings shall not be limited.

1424.3 Flameresistant: The permissible amount of flameresistant decorative hangings shall not exceed 10 percent of the total wall and ceiling area.

SECTION 1425.0 EXTERIOR TRIM RESTRICTIONS

1425.1 Gutters and leaders: All gutters and leaders hereafter placed on buildings or structures other than Type 5 construction, buildings of Use Group R-3 and private garages and similar accessory buildings shall be constructed of noncombustible materials.

1425.2 Architectural trim: Architectural trim shall be constructed and installed in accordance with Sections 1425.2.1 through 1425.2.3.

1425.2.1 Construction requirements: All architectural trim, such as cornices, veneers and other exterior architectural elements, which exceeds 40 feet (12192 mm) in height above grade shall be constructed of approved noncombustible materials and shall be secured to the wall with metal or other approved noncombustible brackets. Combustible architectural trim shall not

be located with a fire separation of less than 3 feet (914 mm) except fire-retardant treated wood conforming to Section 1403.5 for exterior use.

1425.2.2 Location: When combustible architectural trim is located along the top of exterior walls, it shall be completely backed up by the exterior wall and shall not extend over or above the top of exterior walls.

1425.2.3 Firestopping: Continuous exterior architectural trim constructed of combustible materials shall be firestopped as required in Section 1420.0.

1425.3 Combustible half-timbering: In buildings of Types 3 and 4 construction that do not exceed three stories or 40 feet (12192 mm) in height above grade, exterior half-timbering and similar architectural decorations may be constructed of wood or other equivalent combustible materials, provided such trim is backed up solidly with approved noncombustible materials.

1425.4 Balconies: All balconies attached to or supported by buildings of Types 1 and 2 construction shall be constructed of noncombustible materials. Balconies attached to or supported by buildings of Types 3, 4 and 5 construction may be of unprotected noncombustible materials or combustible construction. Balconies of combustible construction, other than fire-retardant treated wood, shall afford the fireresistance rating required by Table 401 for floor construction or shall be of Type 4 construction as described in Section 405.0. The aggregate length shall not exceed 50 percent of the building perimeter on each floor.

1425.5 Bay and oriel windows: All bay and oriel windows attached to or supported by walls other than Type 5 construction shall be of noncombustible construction, framed with brackets of steel, concrete or other approved noncombustible materials.

SECTION 1426.0 ROOF STRUCTURES

1426.1 General: All construction, other than aerial supports, clothes dryers and similar structures less than 12 feet (3658 mm) high, water tanks and cooling towers as hereinafter provided and flag poles erected above the roof of any part of any building or structure more than 40 feet (12192 mm) in height shall be constructed of noncombustible materials.

1426.2 Scuttles: Trap doors and scuttles as required by Section 817.0 shall be not less than 2 feet by 3 feet (610 mm by 914 mm) in size. In Types 1 and 2 construction, trap doors and scuttles shall be of approved noncombustible materials. *

1426.3 Penthouses: Penthouses shall be considered a part of the next lower story, and the enclosure shall conform to the requirements for exterior walls of the building type as regulated by Table 401 and Article 13 except as modified herein.

1426.3.1 Recessed walls: When the exterior wall of a penthouse is recessed 5 feet (1524 mm) or more from the exterior wall of the next lower story and the exterior wall of the next lower story is required to have a fireresistance rating

of greater than 1½ hours, the penthouse exterior wall shall be constructed with a fireresistance rating of not less than 1½ hours, covered on the outside with noncombustible, weatherproof material and supported on protected steel or reinforced concrete construction.

1426.3.2 Doors, frames, and sash: Doors, frames and window sash, except where otherwise specifically required to be fireresistance rated under this code, shall be constructed the same as other similar elements in the building or structure.

1426.4 Other enclosed roof structures: Enclosed roof structures, other than penthouses as defined in Article 2, shall be considered a story of the building and the enclosure shall conform to the requirements for exterior walls of the building type as regulated by Table 401 and Article 13, and to the provisions described in Sections 1426.4.1 and 1426.4.2.

1426.4.1 Noncombustible materials: Unless constructed of masonry or reinforced concrete in accordance with Article 12, roof structures erected on buildings or structures of Types 1 or 2 construction shall be enclosed in walls of noncombustible materials having a fireresistance rating of not less than 1 hour and protected with approved roof coverings or with material permitted for covering the exterior walls of the building.

1426.4.2 Combustible materials: Roof structures erected on buildings of Types 3, 4 and 5A construction may be constructed of combustible materials protected to afford 1 hour fireresistance rating and covered with approved roof coverings or with material permitted for covering the exterior walls of the building.

1426.5 Mansards and other sloping roofs: Mansards and other sloping roofs shall comply with Sections 1426.5.1 and 1426.5.2.

1426.5.1 High slope roofs: Every mansard roof or other sloping roof having a pitch of more than 60 degrees (1.05 rad) to the horizontal hereafter erected on any building or structure of other than Type 5 construction more than three stories or 40 feet (12192 mm) in height shall be constructed of noncombustible materials with a fireresistance rating of not less than 1 hour. When the building is more than seven stories or 85 feet (25908 mm) in height, such roofs shall afford the same fireresistance rating required for the exterior walls of the building, but need not exceed 1½ hour fireresistance rating.

1426.5.2 Low slope roofs: When the pitch is 60 degrees (1.05 rad) or less to the horizontal, the mansard or other sloping roof located on any building may be constructed of the same materials as required for the roof of the building.

1426.6 Dormers: The sides and roofs of dormers shall be of the same type of construction as the main roof, except that where a side of the dormer is a vertical extension of an exterior wall it shall be subject to the same fireresistance rating requirements as apply to the wall of the building. The roofs of dormers shall be protected with approved roof coverings complying with Section 1427.0. The sides of dormers shall be protected with approved roof

coverings or with material permitted for covering the exterior walls of the building.

1426.7 Water tanks: Water tanks shall be constructed and installed in accordance with Sections 1426.7.1 through 1426.7.5.

1426.7.1 Supports: Water tanks having a capacity of more than 500 gallons (1.90 m^3) placed in or on a building shall be supported on masonry, reinforced concrete, steel or other approved noncombustible framing or on timber conforming to Type 4 construction; provided that, when such supports are located in the building above the lowest story, they shall be fireresistance rated as required for Type 1A construction.

1426.7.2 Emergency discharge: A pipe or outlet shall be located in the bottom or in the side close to the bottom, or the tank shall be fitted with a quick opening valve, to enable the contents to be discharged in an emergency to a suitable drain complying with the plumbing code listed in Appendix A.

1426.7.3 Location: A tank shall not be located over or near a stairway or elevator shaft unless a solid roof or floor deck is constructed underneath the tank.

1426.7.4 Tank cover: All roof tanks exposed to the weather shall have approved covers sloping towards the outer edges.

1426.7.5 Hoop and strap protection: When metal hoops are used in the construction of wood tanks, they shall be protected with approved corrosion-resistive coatings or manufactured from approved corrosion-resistive alloys.

1426.8 Cooling towers: Cooling towers erected on the roofs of buildings when the base of the tower is more than 55 feet (16764 mm) above grade shall be constructed of noncombustible materials or of fire-retardant treated wood except that drip bars may be of wood. *

1426.9 Miscellaneous roof structures: Except as herein specifically provided, all towers, spires, dormers or cupolas shall be erected of the type of construction and fireresistance rating required for the building to which they are accessory as regulated by Table 401 and 501. When the height of such appurtenant structures exceeds 85 feet (25908 mm) above grade or when the area at any horizontal section of the tower, spire, dormer or cupola exceeds 200 square feet (18.6 m^2), or when it is used for any purpose other than as a belfry or architectural embellishment, the structure and its supports shall be of Type 1 or 2 construction, or of fire-retardant treated wood complying with Section 1403.5. Radio and television towers and antennae shall be constructed to comply with Sections 614.0 and 615.0.

SECTION 1427.0 ROOF COVERINGS

1427.1 Classification: Roof covering materials shall be classified in accordance with Section 1427.3 when tested in accordance with ASTM E108 listed in Appendix A.

1427.2 Existing roofs: The repair of existing roofs shall comply with the provisions of Section 103.0, but more than 25 percent of the roof covering of any building shall not be replaced in a period of 12 months unless the entire roof covering is made to conform to the requirements for new roofing.

1427.3 Classification of use: Roof coverings shall be classified according to Sections 1427.3.1 through 1427.3.4.

1427.3.1 Class A roof coverings: Class A roof coverings are those which are effective against severe fire test exposure. Class A roof coverings shall include the following: masonry, concrete, slate, tile, cement-asbestos or assemblies listed and identified as Class A by an approved testing agency. Class A roof coverings shall be permitted for use in buildings or structures of all types of construction.

1427.3.2 Class B roof coverings: Class B roof coverings are those which are effective against moderate fire test exposure. Class B roof coverings shall include metal sheets and shingles or assemblies listed and identified as Class B by an approved testing agency. Class B roof coverings shall be permitted as the minimum for use in buildings or structures of Type 1 construction.

1427.3.3 Class C roof coverings: Class C roof coverings are those which are effective against light fire test exposure. Class C roof coverings shall include assemblies listed and identified as Class C by an approved testing agency. Class C roof coverings shall be permitted as the minimum for use in buildings or structures of Types 2, 3, 4 and 5A construction.

1427.3.4 Nonclassified roof coverings: Nonclassified roof coverings shall not be permitted on buildings and structures except as indicated in Sections 1427.3.4.1 through 1427.3.4.3.

1427.3.4.1 Type 5B construction: Buildings and structures of Type 5B construction with a fire separation of not less than 6 feet (1829 mm) from the leading edge of the roof.

1427.3.4.2 Accessory structures: Structures not exceeding one story or 20 feet (6096 mm) in height and 2,500 square feet (232.5 m^2) in area and accessory to a dwelling shall have a fire separation of not less than 6 feet (1829 mm) from the leading edge of the roof except that the fire separation between the structure and the dwelling to which it is accessory shall not be limited provided both are located on the same lot.

1427.3.4.3 Use Groups S-1 and S-2: Buildings of Use Groups S-1 and S-2 not exceeding one story or 20 feet (6096 mm) in height and 6,000 square feet (558 m^2) in area with a fire separation of not less than 12 feet (3658 mm).

1427.4 Roof insulation: The use of cork, fiber board and other combustible roof insulation shall be permitted, provided it is covered with approved roof coverings directly applied thereto (see Section 1317.3.4).

1427.5 Grounding of metal roofs: Whenever, because of hazard resulting from electrical equipment or apparatus located thereon, or because of proximity to power lines, or for any other reason, it is deemed necessary by the

building official, metal roofs shall be grounded by bonding together each course or strip. The bonding conductor or conductors shall be extended to and attached in an approved manner to the grounding electrode used to ground the electrical system within the building on which such metal roofing is applied. The conductors used to bond courses or strips of metal roofing together, or any conductor extended for grounding to the grounding electrode, shall not have greater resistance than the conductor used to ground the electrical system within the building.

1427.5.1 Alternative methods of grounding metal roofing: Alternative methods of grounding metal roofing may be used, provided they are at least equal in performance to the methods described herein, and provided further that such desired method is first submitted to and approved by the building official.

SECTION 1428.0 SKYLIGHTS

1428.1 Structural requirements: When part of the roof system, skylights shall be designed to meet all structural requirements for roofs specified in Article 9. Design of glazing shall be in accordance with glazing industry design methods.

1428.2 Sash and frames: Sash and frames of all skylights on buildings of Types 1 and 2 construction shall be constructed of steel or other approved noncombustible materials. In foundries or buildings where acid fumes deleterious to metal are incidental to the use of the building, treated wood or other approved noncorrosive materials shall be permitted.

1428.3 Mounting: All skylights having their glazing set at an angle of less than 45 degrees (0.79 rad), measured from the horizontal, shall be mounted at least 4 inches (102 mm) above the plane of the roof on a curb constructed as required for the frame. Skylights may be installed in the plane of the roof where the roof pitch is greater than 45 degrees (0.79 rad) to the horizontal.

1428.4 Glazing materials: Skylights may be glazed with any of the following materials, subject to the noted limitations: laminated glass, wired glass, annealed glass, heat strengthened glass, tempered glass, glass block and light transmitting plastic. Annealed, heat-strengthened and tempered glass shall be protected by screens as specified in Section 1428.5. Light-transmitting plastic skylights shall meet the requirements of Section 2305.0. Glass block construction shall conform to the requirements of Sections 1110.0 and 1303.0.

1428.5 Screens: Annealed glass skylights shall be protected from falling objects by screens above the skylight. Annealed, heat-strengthened and tempered glass skylights shall be equipped with screens below the skylight to protect building occupants from falling glazing should breakage occur. Screens shall be of noncombustible materials and shall have a mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). The screen shall be constructed of not lighter than No. 12 B&S Gage (0.0808 inches) material. When utilized in a corrosive atmosphere, structurally equivalent noncorrosive materials shall be

used. Screens above the skylight shall be at least 4 inches (102 mm) above the skylight and shall project on all sides for a distance of not less than the height of the screen above the glass. When multiple layer glazing systems are used and the layer facing the interior is laminated glass, the protective screen below the skylight is not required.

* **1428.6 Greenhouses:** Any approved glazing may be used in the roof and the skylights for greenhouses provided that the height of the greenhouse at the ridge does not exceed 20 feet (6096 mm) above grade. Skylight frames shall be noncombustible if the height of the skylight exceeds 20 feet (6096 mm) above grade.

ARTICLE 15

MASONRY FIREPLACES

SECTION 1500.0 GENERAL

1500.1 Scope: The provisions of this article shall govern the design, installation, maintenance, repair, and approval of all masonry fireplaces.

1500.2 Mechanical code: All masonry fireplaces shall conform to the pertinent requirements of the mechanical code listed in Appendix A.

SECTION 1501.0 PLANS AND SPECIFICATIONS

1501.1 General: The plans and specifications shall describe in sufficient detail the location, size, and construction of all masonry fireplaces. The thickness and character of all material and the clearances from walls, partitions and ceiling shall be clearly shown and described.

SECTION 1502.0 CONSTRUCTION REQUIREMENTS

1502.1 Dimensions: The firebox of a masonry fireplace shall have a minimum depth of 20 inches (508 mm). The size of the chimney connection shall be a minimum cross-sectional area of 50 square inches (32258 mm^2). The minimum cross-sectional area of the fireplace shall equal the cross-sectional area of the chimney connection.

1502.2 Wall construction: Fireplace walls lined with a minimum of 2 inches low-duty refractory brick conforming to ASTM C64 listed in Appendix A shall be a minimum total thickness of 8 inches (203 mm) solid masonry. Medium-duty fire clay mortar conforming to ASTM C105 listed in Appendix A or equivalent shall be used with the low-duty refractory brick. Unlined fireplace walls shall be solid masonry having a minimum total thickness of 12 inches (305 mm).

1502.2.1 Extension of liners: The liner of the fireplace walls shall extend a minimum of 4 inches (102 mm) into the throat of the fireplace.

1502.2.2 Throat and smoke chamber: The walls of the throat and smoke chamber shall be solid masonry having a minimum thickness of 8 inches (203 mm).

1502.2.3 Heat exchanger: Gravity-fed heat exchangers installed in the walls of masonry fireplaces shall not reduce the total thickness of solid masonry.

1502.3 Foundation and hearth: The foundation of a fireplace shall be constructed with noncombustible material and shall conform to the requirements of Article 10. The hearth and hearth extension shall be a minimum of 4 inches (102 mm) solid masonry.

1502.3.1 Hearth extension: The hearth shall extend a minimum of 16 inches (406 mm) beyond the face of the fireplace opening and a minimum of 8 inches (203 mm) on each side of the fireplace opening for fireplaces having an opening of less than 6 square feet (0.56 m^2). The hearth of larger size fireplaces shall extend a minimum of 20 inches (508 mm) beyond the face of the fireplace opening and a minimum of 12 inches (305 mm) on each side of the fireplace opening.

1502.4 Clearance to combustibles: The exterior surface of fireplace walls shall have a minimum 4 inches (102 mm) clearance to combustibles. The opening of fireplaces shall have a minimum 6 inches (152 mm) clearance to combustibles.

1502.5 Opening to the chimney: Means shall be provided to shut off the opening to the chimney when the fireplace is not in operation.

1502.5.1 Dampers: Dampers shall be constructed of metal having a minimum thickness of No. 12 Manufacturer's Standard Gage (0.105 in.).

1502.6 Chimneys with metal hoods: Metal hoods shall extend a minimum of 6 inches (152 mm) beyond the firebox. The hoods shall comply with the requirements for metal chimneys.

ARTICLE 16

MECHANICAL EQUIPMENT AND SYSTEMS

SECTION 1600.0 GENERAL

1600.1 Scope: The provisions of this article shall control the construction, inspection and maintenance of all mechanical equipment and systems in respect to structural strength, fire safety and operation.

1600.2 Boilers: All boilers and associated pressure piping shall meet the standards for construction, installation and inspection as set forth in Chapter 15 of Title 815 of the Kentucky Administrative Regulations.

1600.3 Unfired pressure vessels: All unfired pressure vessels shall meet the standards set forth in Section VIII of the 1983 Edition of the ASME Boiler and Pressure Vessel Code, ANSI/ASME PBV-VIII-I.

1600.4 Mechanical code: All mechanical equipment and systems not covered by Section 1600.2 or 1600.3 but which are required by other provisions of this code to be installed in accordance with the mechanical code listed in Appendix A, shall be constructed, installed and maintained in conformity with the *BOCA Basic/National Mechanical Code/1984* including all applicable standards listed in Appendix A.

SECTION 1601.0 PLANS AND SPECIFICATIONS

1601.1 General: Plans and specifications for the installation, repair, extension or removal of any mechanical equipment or system shall be submitted in accordance with the mechanical code listed in Appendix A, and a permit shall be secured prior to the commencement of any work.

1601.2 Matter covered: The plans and specifications shall show in sufficient detail all pertinent features and clearances of the appliances and systems, including: size and type of apparatus; construction of flue, stack or chimney; stack connections; type of fuel; method of operation; and the method of compliance with all regulations for the class and type of equipment installed.

1601.3 Details: An application for permit shall be accompanied by specifications and diagrammatic mechanical drawings in sufficient detail, complying with the provisions of the mechanical code listed in Appendix A, before a permit shall be issued for the mechanical equipment or system. The plans

shall be drawn to a scale of not less than ⅛ inch to the foot (10 mm/m), and shall show the location and arrangement of all equipment and distribution elements including safeties and pressure controlling devices.

SECTION 1602.0 INSPECTIONS AND TESTS

1602.1 Inspection: All mechanical equipment and systems requiring a permit shall be inspected in accordance with the mechanical code listed in Appendix A and shall not be placed in operation until having been tested and approved.

1602.2 Concealment: It shall be unlawful for owners, contractors or workers to lath over or in any way to conceal any piping, outlet boxes or other parts of the mechanical equipment or system requiring a permit until an inspection has been made thereof and due notice given that the work has been approved.

1602.3 Defects and repairs: Upon inspection or reinspection of a mechanical system, any defects or deficiencies which require repair to insure safe operation shall be rectified before the system is placed in use.

1602.4 Power to deem unsafe: When a system or any part thereof is found unsafe to life or property, it shall be deemed unsafe and such system shall not be restored to use until it has been made safe and approved.

SECTION 1603.0 EXISTING BUILDINGS

1603.1 Unsafe orders: All existing mechanical equipment and systems shall be maintained and operated in accordance with the requirements of this code and the mechanical code listed in Appendix A. Any such equipment which does not comply with the requirements, and the operation of which is deemed unsafe to the building occupants, shall be altered as ordered by the building official to secure adequate safety.

SECTION 1604.0 FEES

1604.1 General: A permit to begin work for new construction or alteration shall not be issued until the prescribed application and permit fees have been paid, nor shall an amendment to a permit necessitating an additional fee because of the additional work involved be issued until the additional fee has been paid.

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SECTION 1605.0 DRYING ROOMS

1605.1 General: A drying room or dry kiln installed within a building shall be constructed entirely of approved noncombustible materials or assemblies of such materials with the required fireresistance rating based on the fire hazard of the contents and the process, as regulated by the approved rules or as required in Article 6 for special uses.

1605.2 Piping clearance: All overhead heating pipes shall have a clearance of not less than 2 inches (51 mm) from combustible contents of the dryer.

1605.3 Insulation: When the operating temperature of the dryer is 175 degrees F. (79 degrees C.) or more, metal enclosures shall be insulated from adjacent combustible materials by not less than 12 inches (305 mm) of air space, or the metal walls shall be lined with ¼ inch asbestos mill board or other approved equal insulation.

1605.4 Fire protection: Drying rooms designed for high hazard materials and processes, including special uses provided for in Article 6, shall be protected by an approved automatic fire suppression system conforming to the provisions of Article 17.

SECTION 1606.0 WASTE AND LINEN HANDLING SYSTEMS

1606.1 General: Waste and linen handling systems shall be installed in accordance with the provisions of Chapters 3 and 4 respectively of NFiPA 82 listed in Appendix A. *

SECTION 1607.0 REFUSE VAULTS

1607.1 Refuse vault enclosures: A vault for receiving combustible refuse from an exhaust system shall be constructed of not less than 3 hour fireresistance rated assemblies.

1607.2 Openings to boiler rooms: The opening between a vault and a boiler room shall not exceed 9 square feet (0.84 m^2) in area and shall be located at least 8 feet (2438 mm) from the firing door of the boiler, and the bottom of the opening shall be not less than 6 inches (152 mm) above the boiler room floor. All openings shall be equipped with approved automatic fire doors of not less than 1½ fireresistance rating or the approved labeled equivalent complying with Article 14.

1607.3 Location: When located within a building, a refuse vault shall extend above the roof or shall be directly vented to the outer air with ducts complying with the mechanical code listed in Appendix A.

1607.4 Fire protection: A vault for combustible refuse which exceeds 360 cubic feet (10.1 m^3) in volume shall be protected by an approved automatic fire suppression system conforming to Article 17.

SECTION 1608.0 DUST, STOCK AND REFUSE CONVEYOR SYSTEMS

1608.1 Power transmission: Power for fans located in rooms from which flammable dust is being removed shall be transmitted by means of a shaft passing through a bushed hole, or by a belt, chain or similar driving mechanism which is encased in a metal or other noncombustible dust-tight enclosure, both within and without the room.

1608.2 Collectors and separators: Cyclone collectors and separators and their supports shall be constructed of noncombustible materials and shall be located whenever possible on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to

combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe which extends above the highest part of any roof within a distance of 30 feet (9144 mm).

1608.3 Discharge pipes: Discharge pipes shall conform to all the requirements for ducts, including clearances required for high heat appliances, as contained in the mechanical code listed in Appendix A. A delivery pipe from a cyclone collector shall not convey refuse directly into the firebox of a boiler, furnace, dutch oven, refuse burner, incinerator or other appliance.

1608.4 Vents for exhaust conveyor systems: An exhaust system shall be vented to the outside of the building either directly by flue, or indirectly through the separator, bin, or vault into which it discharges.

1608.5 Spark protection: The outlet of an open air vent shall be protected with an approved metal or other noncombustible screen or by other equally efficient means to prevent the entry of sparks.

1608.6 Explosion relief vents: A safety or explosion relief vent shall be provided on all systems which convey combustible refuse or stock of an explosive nature, in accordance with the requirements of Article 6.

1608.6.1 Screens: When a screen is used in a safety relief vent, it shall be so attached as to permit ready release under emergency pressure.

1608.6.2 Hoods: The relief vent shall be provided with an approved noncombustible cowl or hood, or with a counterbalanced relief valve or cover arranged to prevent the escape of hazardous materials, gases or liquids.

ARTICLE 17

FIRE PROTECTION SYSTEMS

SECTION 1700.0 GENERAL

1700.1 Scope: The provisions of this article shall specify where fire protection systems are required in all buildings or structures or portions thereof.

1700.2 Installation requirements: The installation methods, repair, operation and maintenance of fire protection systems shall be in accordance with this code and the fire prevention code listed in Appendix A.

1700.3 Maintenance: The owner, tenant or lessee of every building or structure shall be responsible for the care and maintenance of all fire protection systems, including equipment and devices, to insure the safety and welfare of the occupants. Fire protection systems shall not be disconnected or otherwise rendered unserviceable without first notifying the fire department. When installations of required fire protection systems are interrupted for repairs or other necessary reasons, the owner, tenant or lessee shall immediately advise the fire department and shall diligently prosecute the restoration of the protection.

1700.4 Threads: All threads provided for fire department connections to sprinkler systems, standpipe systems, yard hydrants or any other fire hose connections shall be uniform to those used by the local fire department.

1700.5 Signs: If fire suppression control valves are located in a separate room or building, a sign shall be provided on the entrance door. The lettering for such sign shall be of a conspicuous color and shall be at least 4 inches (102 mm) in height, and shall read *Sprinkler Control Valves* or *Standpipe Control Valves* or indicate other types of systems (see Sections 1711.4.1 and 1713.8 for additional signs).

1700.6 Tests: Where required by this article and the standards referenced herein, all flow test connections and points of fluid discharge shall be reasonably accessible and acceptable to the administrative authority.

SECTION 1701.0 PLANS AND SPECIFICATIONS

1701.1 Required: Plans shall be submitted to indicate conformance with this code and shall be reviewed by the department prior to issuance of the permit.

Note: Since the fire department is responsible for inspection for the proper maintenance of fire protection systems in buildings, the administrative authority shall cooperate with the fire department in the discharging of responsiblity to enforce this article.

1701.2 Plans: The plans and specifications submitted to the department shall contain sufficient detail to evaluate the hazard and the effectiveness of the system. The details on the hazards shall include materials involved, the location and arrangement, and the exposure to the hazard.

1701.3 Calculations: The details on the fire protection system shall include the design considerations, calculations and other information as required by this code.

SECTION 1702.0 FIRE SUPPRESSION SYSTEMS

1702.1 Where required: Fire suppression systems shall be installed and maintained in full operating condition, as specified in this code, in the locations indicated in Sections 1702.2 through 1702.21.

Exception: Buildings of Use Group R-3.

1702.2 Use Group A-1: In all buildings or structures or portions thereof of Use Group A-1.

Exception: Auditoriums, foyers, lobbies, and toilet rooms.

1702.3 Use Group A-2: In all buildings or structures or portions thereof of Use Group A-2:

1. When more than 5,000 square feet (465 m^2) in area; or
2. When more than one story in height.

1702.4 Use Group A-3: In all buildings or structures or portions thereof of Use Group A-3 when more than 12,000 square feet (1116 m^2) in area.

1702.5 Stages and enclosed platforms: Stages under the roof and gridiron, in the tie and fly galleries, and in all places behind the proscenium wall of the stage; over and within enclosed platforms in excess of 500 square feet (46.5 m^2) in area; and in dressing rooms, lounges, workshops and storerooms accessory to such stages or enclosed platforms.

Exceptions

1. Stages or enclosed platforms open to the auditorium room on three or more sides.
2. Altars, pulpits or similar platforms and their accessory rooms.
3. Stage gridirons when sidewall sprinklers with 135 degrees F. (57 degrees C.) rated heads with heat-baffle plates are installed around the perimeter of the stage except for the proscenium opening at points not more than 30 inches (762 mm) below the gridiron nor more than 6 inches (152 mm) below the baffle plate.
4. Under stage or under enclosed platform areas less than 4 feet (1219 mm) in clear height used exclusively for chair or table storage and lined on the inside with materials approved for 1 hour fireresistance rated construction.

1702.6 Use Groups B, R-1 and R-2: In all buildings or structures of Use Groups B, R-1 and R-2 when more than 12 stories or 150 feet (45720 mm) in height.

Exception: In buildings of Use Group R, sprinklers may be omitted from bathrooms not greater than 55 square feet (5.12 m^2) in area.

1702.7 Use Group H: In all buildings or structures or portions thereof of Use Group H.

1702.8 Use Group I: In all buildings or structures or portions thereof of Use Group I.

Exceptions

1. One-story hospitals with patient rooms having direct egress to grade level at the exterior of the building.
2. In hospitals of Types 1, 2A or 2B construction, the automatic fire suppression system may be omitted from operating rooms, X-ray rooms, delivery rooms, cardiac and intensive care rooms and patient sleeping rooms not exceeding 450 square feet (41.85 m^2) in area when each such room is protected by an automatic fire alarm system connected to a continuously attended station within the building at a location approved by the fire department.
3. One-story day nurseries housing 100 children or less with each room having an exit directly to the outside.
4. Buildings of Use Group I-1 two stories or less in height and having an occupant load of less than 20.
5. Buildings of Use Group I-3 having an occupant load of less than six.

1702.9 Use Groups M, S-1 and F: In all buildings or structures or portions thereof of Use Groups M, S-1 and F:

1. When more than 12,000 square feet (1116 m^2) in area; or
2. When more than 24,000 square feet (2232 m^2) in total area on all floors; or
3. When more than three stories in height.

1702.10 Public garages (Group 1): In all Group 1 public garages:

1. When more than 10,000 square feet (930 m^2) in area.
2. When more than 7,500 square feet (697.5 m^2) in area and more than one story in height.
3. When more than 5,000 square feet (465 m^2) in area and more than two stories in height.
4. When more than three stories in height.
5. When located in buildings where the upper stories are designed for other uses.
6. When located in any story that is more than 50 percent below grade.

1702.11 Public garages (Group 2): In all Group 2 public garages:

1. When more than 10,000 square feet (930 m^2) in area and more than one story in height.
2. When more than two stories in height.

3. When located in buildings where the upper stories are designed for other uses.

Exception: Open parking structures or portions of buildings classified as open parking structures according to the definition in Section 201.0.

1702.12 Bus garages: In all bus garages:
1. When required by Section 1702.10.
2. When used as passenger terminals for four or more buses.
3. When used for storage or loading of four or more buses.

1702.13 Unlimited area buildings: In unlimited area buildings as required by Section 504.0.

Exception: Special industrial uses as indicated in Section 305.3.1.

1702.14 Storage and workshop areas: In all portions of Use Groups A, B, E, I, R-1 and R-2 occupied for storage, workshop or similar purposes.

Exceptions
1. Individual storage or workshop area located entirely within unsprinklered dwelling units.
2. Storage and workshop rooms less than 24 square feet (2.23 m^2) in area.

1702.15 Windowless story: In every story or basement of all buildings where there is not provided at least 20 square feet (1.86 m^2) of opening entirely above the adjoining ground level in each 50 lineal feet (15240 mm) or fraction thereof of exterior wall in the story or basement, on at least one side of the building. Openings shall have minimum dimensions of not less than 22 inches (559 mm). Such openings shall be accessible to the fire department from the exterior and shall be unobstructed to allow firefighting and rescue operations from the exterior.

When openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet (22860 mm) from such openings, the story shall be provided with an approved automatic fire suppression system, or openings as specified above shall be provided on at least two sides of the exterior walls of the story. If any portion of a basement is located more than 75 feet (22860 mm) from openings required in this section, the basement shall be provided with an approved automatic fire suppression system.

1702.16 Painting rooms: In spray painting rooms or shops where painting, brushing, dipping or mixing is regularly conducted using flammable materials.

1702.17 Trash rooms and chutes: In rooms or areas used for incineration, trash and laundry collection or similar uses; and at alternate floor levels and at the top of all chutes used in conjunction with these rooms or areas.

1702.18 Furnace rooms: In furnace rooms, boiler rooms and rooms for similar uses.

Exception: Such a room located entirely within and serving a single dwelling unit.

1702.19 Unenclosed vertical openings: In unenclosed vertical openings between floors as required by Sections 620.3 and 816.10.

1702.20 Kitchen exhaust systems: In commercial kitchen exhaust systems when such systems are required by the mechanical code listed in Appendix A.

1702.21 Hazardous exhaust systems: In duct systems exhausting hazardous material in accordance with the mechanical code listed in Appendix A.

1702.22 Alternate protection: In special use areas of buildings or structures, an automatic fire alarm system may be installed in lieu of a fire suppression system when approved by the building official and fire department, and when such fire suppression system installation would be detrimental or dangerous to the specific use or occupancy.

1702.22.1 Telephone central office equipment buildings: Within telephone central office equipment buildings, the automatic fire suppression system may be omitted in the following rooms or areas when such rooms or areas are protected with an approved automatic fire alarm system.

1. Generator and transformer rooms.
2. Communication equipment areas when such areas are separated from the remainder of the building by 1 hour fireresistance rated wall and 2 hour fireresistance rated floor/ceiling assemblies, and are used exclusively for such equipment.

SECTION 1703.0 SUPPRESSION SYSTEM SELECTION

1703.1 General: To guide the administrative authority with the selection of the proper type of fixed fire suppression system, the extinguishing agent for each type of hazard or fire may be classified as follows.

Class A: Fires involving ordinary combustible materials (such as wood, cloth, paper, rubber and many plastics) requiring the heat-absorbing (cooling) effects of water, water solutions, or the coating effects of certain dry chemicals which retard combustion.

Class B: Fires involving flammable or combustible liquids, flammable gases, greases and similar materials where extinguishment is most readily secured by excluding air (oxygen), inhibiting the release of combustible vapors, or interrupting the combustion chain reaction.

Class C: Fires involving energized electrical equipment where safety to the operator requires the use of electrically nonconductive extinguishing agents.

Note: Electrical fires should not be fought with portable Class A or B extinguishers, or with hand held solid stream nozzle. However, fixed water spray systems may be used to fight fires in energized electrical systems.

1703.2 Special hazards: In rooms or buildings containing combustibles such as aluminum powder, calcium carbide, calcium phosphide, metallic sodium and potassium, quick-lime, magnesium powder or sodium peroxide, which are incompatible with the use of water as an extinguishing agent, other extinguishing agents shall be used.

1703.3 Types: Where a fire suppression system is required in this code, Table 1703 may be used by the administrative authority to determine the type of suppression system suitable for the hazard involved, if not otherwise specified in this code.

Table 1703
GUIDE FOR SUPPRESSION SYSTEM SELECTION

Hazard	Water sprinklers or spray 1704.0 to 1706.0	Foam 1707.0	Carbon dioxide or halogenated 1708.0 to 1709.0	Dry chemical 1710.0
Class A fire potential	X	X	X	X
Class B fire potential	X	X	X	X
Class C fire potential	X		X	
SPECIAL FIRE HAZARD AREAS*				
Aircraft hangars	X	X	X	X
Alcohol storage	X	X	X	X
Ammunition loading	X			
Ammunition magazines	X			
Asphalt impregnating	X	X		
Battery rooms			X	
Carburetor overhaul shops	X	X	X	X
Cleaning plant equipment	X	X	X	X
Computer rooms	X		X	
Dowtherm	X			
Drying ovens	X		X	X
Engine test cells	X	X	X	
Escalator, stair wells	X			
Explosives: manufacturing, storage	X			
Flammable liquids storage	X	X	X	
Flammable solids storage	X			
Fuel oil storage	X	X		
Hangar decks	X	X		
High piled storage in excess of 15 feet (4572 mm) in height	X	X		
Hydraulic oil, lubricating oil	X		X	
Hydroturbine generators	X		X	
Jet engine test cells	X	X	X	
Library stacks	X		X	
Lignite storage and handling	X			
Liquefied petroleum gas storage	X			
Oil quenching bath	X	X	X	X
Paints: manufacturing, storage	X	X	X	X
Paint spray booths	X		X	X
Petrochemical storage	X	X	X	
Petroleum testing laboratories	X	X	X	
Printing presses	X		X	

* Within buildings or areas, so classified, as to require a supression system.

Table 1703 (cont'd.)
GUIDE FOR SUPPRESSION SYSTEM SELECTION

Hazard	Water sprinklers or spray 1704.0 to 1706.0	Foam 1707.0	Carbon dioxide or halogenated 1708.0 to 1709.0	Dry chemical 1710.0
Rack and palletized storage in excess of 12 feet (3658 mm) in height	X	X		
Range hoods	X		X	X
Reactor and fractionating towers	X			
Record vaults			X	
Rubber mixing and heat treating	X			
Service stations (inside buildings)	X		X	
Shipboard storage	X		X	
Solvent cleaning tanks		X	X	X
Solvent thinned coatings		X	X	X
Switchgear rooms			X	
Transformers, circuit breakers (outdoors)	X			
Transformers, circuit breakers (indoors)	X		X	
Turbine lubricating oil	X	X	X	X
Vegetable oil, solvent extraction	X	X		

1703.4 Installation: Fixed fire suppression systems shall be of an approved type designed and installed in accordance with the requirements of this code.

1703.5 Tests: All tests required by this code and the standards listed in this code shall be conducted at the expense of the owner or the owner's representative.

SECTION 1704.0 WATER SPRINKLER SYSTEMS

1704.1 General: Water sprinkler extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 13 listed in Appendix A.

1704.2 Occupancy sprinkler system: Within a building of mixed occupancies and where an occupancy is required by this code to be sprinklered with more than 20 sprinklers, the use group requiring sprinklers shall be separated from other uses by fire separation walls and floor/ceiling assemblies having a fireresistance rating corresponding to the highest fire grading prescribed in Table 1402 for the separate uses and equipped throughout with a complete automatic sprinkler system.

1704.3 Design: The details of the system supplied with the plans and specifications shall include information and the calculations of the sprinkler spacing

and arrangement with water supply and discharge requirements, size and equivalent lengths of pipe and fittings and water supply source. Sufficient information shall be included to identify the apparatus and devices used.

1704.4 Actuation: Water sprinkler extinguishing systems shall be automatically actuated unless otherwise specifically provided in this code.

1704.5 Sprinkler alarms: Approved audible or visual alarm devices shall be connected to every water sprinkler system and such alarm device shall be located in an approved location.

Exception: Alarms and alarm attachments shall not be required for limited area sprinkler systems (see Section 1705.5).

1704.5.1 Additional alarms: At least one additional audible or visual alarm device shall be installed within the building.

1704.6 Water control valve tags: Identification tags shall be provided in accordance with NFiPA 26 listed in Appendix A.

1704.7 Sprinkler riser: The sprinkler system riser(s) may also serve as the wet standpipe riser(s) in buildings required to have or having both systems (see Section 1711.4.1).

1704.8 Tests: A completed system shall be tested hydrostatically for 2 hours without visible leakage at not less than 200 psi (1379 kPa) or at 50 psi (345 kPa) in excess of the maximum static pressure when the maximum static pressure is greater than 150 psi (1034 kPa).

SECTION 1705.0 LIMITED AREA SPRINKLER SYSTEMS

1705.1 General: A limited area sprinkler system shall be of an approved type and installed in accordance with the provisions of this section.

1705.2 Installation: Where the provisions of this code require a limited number of sprinklers, a limited area sprinkler system may be installed to comply with these requirements.

1705.3 Design: The details of the system supplied with the plans and specifications shall include information and the calculations of the sprinkler spacing and arrangement with water supply and discharge requirements, size and equivalent lengths of pipe and fittings and water supply source. Sufficient information shall be included to identify the apparatus and devices used.

1705.4 Actuation: A limited area sprinkler system shall be automatically actuated.

1705.5 Sprinkler alarms: Alarms and alarm attachments shall not be required.

1705.6 Standpipe connection: The water supply for the limited area sprinkler system shall be from the building standpipe system when the building is equipped with a standpipe system that is sized for 500 gallons per minute (0.032 m^3/s) minimum flow and has an automatic water supply (see Section 1711.4.1).

1705.6.1 Domestic supply: Limited area sprinklers may be supplied from the domestic water system provided the domestic water system is designed to adequately support the design flow of the largest number of sprinklers in any one of the enclosed areas. When supplied by the domestic water system, the maximum number of sprinklers in any one enclosed room or area shall not exceed 20, which number shall be capable of totally protecting the room or area.

1705.6.2 Fire department connections: A fire department connection is not required for limited area sprinkler systems supplied from the domestic water system.

1705.6.3 Cross connection: There shall not be a cross connection between the domestic water system and the standpipe system.

1705.6.4 Domestic connection: A check valve shall be provided at the point where the suppression system piping is connected to the domestic water piping to prevent contamination of the domestic water supply. Shutoff valves shall not be permitted in the suppression system piping. Water supply shall be controlled by the riser control valve to the domestic water piping.

1705.7 Use: Limited area sprinklers shall be used only in rooms or areas enclosed with construction assemblies as required by this code.

SECTION 1706.0 WATER SPRAY FIXED SYSTEMS

1706.1 General: Water spray extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 15 listed in Appendix A.

1706.2 Design: The details of the system supplied with the plans and specifications shall include information and the calculations of the sprinkler spacing and arrangement with water supply and discharge requirements, size and equivalent lengths of pipe and fittings and water supply source. Sufficient information shall be included to identify the apparatus and devices used.

1706.3 Actuation: Water spray extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

1706.4 Tests: All new system piping shall be hydrostatically tested in accordance with the provisions of NFiPA 15 listed in Appendix A.

SECTION 1707.0 FOAM EXTINGUISHING SYSTEMS

1707.1 General: Foam extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 11, 11A and 16 listed in Appendix A.

1707.2 Design: The details of the system supplied with the plans and specifications shall include complete computations showing pressure drop in all system piping, friction loss calculations of liquid lines and a detailed layout of the entire hazard area to be protected. Hydraulic characteristics of foam

proportioners and foam makers as determined by tests shall be supplied by the manufacturer to the department (including the range of operating conditions required for the proposed installation) to permit determination of the adequacy of the hydraulics of the proposed protection.

1707.3 Actuation: A foam extinguishing system shall be automatically actuated with supplementary manual tripping capability.

1707.4 Tests: All piping except that piping which handles expanded foam shall be subjected to a 2 hour hydrostatic pressure test of 200 psi (1379 kPa) or 50 psi (345 kPa) in excess of the maximum pressure anticipated, whichever is greater, without leakage. The system shall be subjected to a flow test to insure that the hazard area is fully protected in conformance with the design specifications, and to determine the flow pressures, actual discharge capacity, foam quality, consumption rate of foam producing materials, manpower requirements and other operating characteristics.

SECTION 1708.0 CARBON DIOXIDE EXTINGUISHING SYSTEMS

1708.1 General: Carbon dioxide extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 12 listed in Appendix A.

1708.2 Design: The details of the system supplied with the plans and specifications shall include information and calculations of the amount of carbon dioxide, the location and flow rate of each nozzle including equivalent orifice area and the location, size and the carbon dioxide storage facility. Information shall be submitted pertaining to the location and function of the detection devices, operating devices, auxiliary equipment and electrical circuitry, if used. Sufficient information shall be indicated to identify properly the apparatus and devices used. Any special features shall be adequately explained.

1708.3 Actuation: Carbon dioxide extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

1708.4 Safety requirements: In any proposed use of a carbon dioxide system where there is a possiblity that persons may enter or be trapped in atmospheres made hazardous by a carbon dioxide discharge, warning signs, discharge alarms and breathing apparatus shall be provided to insure prompt evacuation of and to prevent entry into such atmospheres, and also to provide means for prompt rescue of any trapped personnel.

1708.5 Tests: A completed system shall be tested for tightness up to the selector valve, and for continuity of piping with free unobstructed flow beyond the selector valve. The labeling of devices with proper designations and instructions shall be checked. Operational tests shall be conducted on all devices except cylinder valves in multi-cylinder high pressure systems. Where conditions prevail that make it difficult to determine adequately the system requirements or design, a suitable discharge test and concentration analysis test shall be made. All tests are to be conducted as indicated in NFiPA 12 listed in Appendix A.

1708.6 Range hoods: In addition to the requirements of this section and the requirements of Section 1702.20, range hood CO_2 systems shall conform to the requirements of Sections 1708.6.1 through 1708.6.6.

1708.6.1 Multiple hoods: Where multiple hoods are served, each hood shall be provided with a separate manual station (actuator) and a separate CO_2 supply.

1708.6.2 Design requirements: Total CO_2 requirements shall be calculated on the following accumulative basis.*

1. Open area of hood (sq. ft.) ÷ 0.6 = pounds of CO_2.
2. Volume of hood (cu. ft.) (minimum depth of two feet) ÷ 8.0 = pounds of CO_2.
3. Hoods located over liquid surface operations; liquid surface area (sq. ft.) ÷ 0.4 = pounds CO_2 (10 pounds minimum).
4. Volume of plenum (cu. ft.) ÷ 8.0 = pounds of CO_2.
5. Volume of duct below fire damper (cu. ft.) ÷ 8.0 = pounds of CO_2.
6. Duct above fire damper, minimum 10 pounds CO_2.
7. In addition to the calculations, an additional 10 pounds of CO_2.

1708.6.3 Operation: Upon activation of the CO_2 system, the fan (s) shall cease to operate and the supply valve shall shut the pilot and burner(s) off.

1708.6.4 Fire dampers: Duct systems from range hoods shall not be equipped with fire dampers unless they are specifically approved for such use, or required as part of an approved extinguishing system or other approved system.

1708.6.5 CO_2 Bottle storage: CO_2 bottles shall be located at least 15 feet (4572 mm) from the range or range hood. The temperature in the storage area shall not exceed 120 degrees F. (49 degrees C.) or be less than 32 degrees F. (0 degrees C.).

1708.6.6 Warning light: An electric warning light of 10 watts or more shall be provided on the CO_2 bottle or system which will automatically illuminate when the bottle or system is depleted. The light shall be of a distinctive red color and shall be located in a conspicuous location.

SECTION 1709.0 HALOGENATED FIRE EXTINGUISHING SYSTEMS

1709.1 General: Halogenated fire extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 12A and 12B listed in Appendix A.

1709.2 Design: The details of the system supplied with the plans and specifications shall include information and calculations of the amount of extinguishing agent; container storage pressure; the location and flow rate of each nozzle including equivalent orifice area; the location, size and equivalent lengths of pipe, fittings and hose; and the location and size of the storage

* **Note:** 1 foot = 304.8 mm; 1 square foot = 0.093 m^2; 1 cubic foot = 0.028 m^3; 1 pound = 0.454 kg.

facility. Information shall be submitted pertaining to the location and function of the detection devices, auxiliary equipment and electrical circuitry, if used. Sufficient information shall be indicated to identify properly the apparatus and devices used. Any special features shall be adequately explained.

1709.3 Actuation: Halogenated fire extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

1709.4 Safety requirements: In any proposed use of a halogenated fire extingushing system where there is a possibility that persons may enter or be trapped in atmospheres made hazardous by a discharge, warning signs, discharge alarms and breathing apparatus shall be provided to insure prompt evacuation of and to prevent entry into such atmospheres, and also to provide means for prompt rescue of any trapped personnel.

1709.5 Tests: A completed system shall be tested for tightness up to the selector valve, and for continuity of piping with free unobstructed flow beyond the selector valve. The labeling of devices with proper designations and instructions shall be checked. Operational tests shall be conducted on all devices except cylinder valves in multi-cylinder systems. Where conditions prevail that make it difficult to determine adequately the system requirements or design, a suitable discharge test and concentration analysis shall be made. All tests are to be conducted as indicated in NFiPA 12A and 12B listed in Appendix A.

SECTION 1710.0 DRY CHEMICAL EXTINGUISHING SYSTEMS

1710.1 General: Dry chemical extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 17 listed in Appendix A.

1710.2 Design: The details of the system supplied with the plans and specifications shall include sufficient information and calculations on the amount of dry chemical; the size, length, and arrangement of connected piping, or piping and hose; description and location of nozzles so that the adequacy of the system can be determined. Information shall be submitted pertaining to the location and function of detection devices, operating devices, auxiliary equipment and electrical circuitry, if used. Sufficient information shall be indicated to identify properly the apparatus and devices used. Any special features shall be adequately explained.

1710.3 Actuation: Dry chemical extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

1710.4 Safety requirements: Where there is a possibility that personnel may be exposed to a dry chemical discharge, warning signs, discharge alarms and breathing apparatus shall be provided to ensure prompt evacuation of such locations, and also to provide means for prompt rescue for any trapped personnel.

1710.5 Tests: A completed system shall be tested by a discharge of expellant gas through the piping and nozzles. Observations for gas leakage and for

continuity of piping with free unobstructed flow shall be made. Observations shall be made of the flow of expellant gas through all nozzles. The labeling of devices with proper designations and instructions shall be checked. After testing, all piping and nozzles are to be blown clean, using compressed air or nitrogen and the system properly charged and placed in the normal "set" condition. All tests are to be conducted as indicated in NFiPA 17 listed in Appendix A.

1710.6 Range hoods: In addition to the requirements of this section and the requirements of Section 1702.20, range hood dry chemical systems shall conform to the following requirements of Sections 1710.6.1 through 1710.6.7.

1710.6.1 Labeling: Dry chemical systems shall bear the label of an approved agency and shall be installed in accordance with their recommendations and shall be approved by the department and fire department.

1710.6.2 Size: The size of hood and duct covered by a single system shall not exceed the approved agency's recommendations.

1710.6.3 Dry chemical: Dry chemical agent used shall be nontoxic.

1710.6.4 Multiple hood protection: Multiple hoods may be protected by a common system if in conformance with a report of an approved agency.

1710.6.5 Duct system limitation: Each duct system shall constitute an individual system serving only exhaust hoods on one floor.

1710.6.6 Container location: Dry chemical containers may be located either on the cooking equipment stand or at a location remote from the range or range hood, but consistent with the dry chemical supply line distance limitations listed by an approved agency, or as approved by the department and fire department.

1710.6.7 Portable fire extinguishers: A hand portable fire extinguisher shall be installed in the cooking area and shall have a rating of at least 20 B:C and be located not more than 15 feet (4572 mm) and not less than 10 feet (3048 mm) from the hazard. Dry chemical type extinguishers shall be of the alkaline type.

SECTION 1711.0 STANDPIPE SYSTEMS

1711.1 General: Standpipe systems shall be of an approved type and installed and maintained in accordance with the provisions of this code, the fire prevention code and NFiPA 14 listed in Appendix A.

1711.2 Where required: Standpipe systems shall be installed in the locations prescribed in Sections 1711.2.1 through 1711.2.11.

1711.2.1 Use Group A: In all buildings or structures or portions thereof of Use Group A when:

1. Two or more stories in height of Use Group A-1, A-2, or A-3, and having an occupant load of more than 300; or
2. Three or more stories in height regardless of the area per floor; or

3. Having an auditorium. Standpipes shall be located one on each side of the auditorium in each tier, one in each mezzanine, one in each tier of dressing rooms, and protecting each property, store and work room.
4. Having a stage. Standpipes shall be located on each side of the stage. Such standpipes shall be not less than 2½-inches in diameter, equipped with 1½-inch hose and ⅜ inch nozzles.

1711.2.2 Use Group B: In all buildings or structures or portions thereof of Use Group B when:

1. Three or more stories in height, and more than 3,000 square feet (279 m^2) in area per floor; or
2. Four or more stories in height regardless of the area per floor.

1711.2.3 Use Group E: In all buildings or structures or portions thereof of Use Group E when three or more stories in height regardless of the area per floor or when having a stage or auditorium in accordance with Sections 1711.2.1(3) and 1711.2.1(4).

1711.2.4 Use Group F: In all buildings or structures or portions thereof of Use Group F when:

1. Three or more stories in height, and more than 3,000 square feet (279 m^2) in area per floor; or
2. Four or more stories in height regardless of the area per floor.

1711.2.5 Use Group H: In all buildings or structures or portions thereof of Use Group H when:

1. Three or more stories in height, and more than 10,000 square feet (930 m^2) in area per floor; or
2. Four or more stories in height regardless of the area per floor.

1711.2.6 Use Group I: In all buildings or structures or portions thereof of Use Group I three or more stories in height regardless of the area per floor.

1711.2.7 Use Group M: In all buildings or structures or portions thereof of Use Group M when:

1. Three stories or more in height, and more than 3,000 square feet (279 m^2) in area per floor; or
2. Four or more stories in height regardless of the area per floor.

1711.2.8 Use Group R: In all buildings or structures or portions thereof of Use Group R when:

1. Three or more stories in height and of Use Group R-1 regardless of the area per floor; or
2. Three or more stories in height and more than 10,000 square feet (930 m^2) in area per floor; or
3. Four or more stories in height regardless of the area per floor.

1711.2.9 Use Group S: In all buildings or structures or portions thereof of Use Group S when:

1. Three or more stories in height, of Use Group S-1, and more than 3,000 square feet (279 m^2) in area per floor; or

2. Three or more stories in height, of Use Group S-2, and more than 10,000 square feet (930 m^2) in area per floor; or
3. Four or more stories in height of Use Groups S-1 or S-2 regardless of the area per floor.

Exception: Public garages (see Section 1711.2.11).

1711.2.10 Use Group U: In all buildings or structures or portions thereof of Use Group U when:

1. Three or more stories in height and more than 10,000 square feet (930 m^2) in area per floor; or
2. Four or more stories in height regardless of the area per floor; or
3. Classified as covered malls (see Section 619.10).

1711.2.11 Public garages (This section does not apply to open parking structures): In all Group I and II public garages when:

1. More than 10,000 square feet (930 m^2) in area per floor ; or
2. More than 7,500 square feet (698 m^2) in area per floor and more than one story in height; or
3. More than 5,000 square feet (465 m^2) in area per floor, and more than two stories in height; or
4. More than three stories in height; or
5. Located in buildings where the upper stories are designed for other uses; or
6. When located in any story that is more than 50 percent below grade.

1711.3 Standpipe system piping sizes: The riser piping, supply piping, and the water service piping shall be sized to maintain a residual pressure of at least 65 psi (448 kPa) at the topmost outlet of each riser while flowing the minimum quantities of water specified in Sections 1711.3.1 and 1711.3.2 of this code.

Exception: The 65 psi (448 kPa) residual pressure need not be maintained in buildings less than 75 feet (22860 mm) in height when provided throughout with an approved automatic fire suppression system.

1711.3.1 Riser sizing: The vertical water pipe(s) within a building to which fire hose outlets and valves are attached shall be sized for a minimum flow of 500 gpm (0.032 m^3/s).

Exceptions

1. Where only 1½-inch valves are required or are provided, the riser(s) shall be sized to provide a minimum flow of 100 gpm (0.0063 m^3/s). The minimum size shall be 2½ inches.
2. In buildings where limited area sprinkler systems are supplied water from a common standpipe riser, the riser shall be sized to satisfy total demand.
3. In totally sprinklered buildings where both the sprinkler system and standpipe fire hose outlets are supplied water from a common riser, the minimum riser diameter shall be adequate for the sprinkler system or the standpipe system, whichever is greater. The minimum riser diameter may be based on hydraulic calculations.

4. Except in totally sprinklered buildings, where the minimum diameter of the common riser is based on hydraulic calculations, all risers shall have a minimum diameter as described in Table 1711.

Table 1711
BUILDING HEIGHT AND STANDPIPE RISER SIZE

Maximum building height[a]	Minimum riser size
4 stories or 50 feet	2½ inches
6 stories or 75 feet	4 inches
76 feet to 250 feet	6 inches
over 250 feet	8 inches

Note a. 1 foot = 304.8 mm

1711.3.2 Supply pipe sizing: The supply piping, including the horizontal or common feeder lines within a building and the water service line outside of the building, shall be sized for a minimum flow of 500 gpm (0.032 m^3/s). When more than one standpipe riser is required or provided, all common supply piping shall be sized for a minimum flow of 500 gpm (0.032 m^3/s) for the first riser plus 250 gpm (0.016 m^3/s) for each additional riser, and the total need not exceed 2,500 gpm (0.16 m^3/s).

Exceptions

1. Where only 1½-inch valves are required or are provided, the supply piping shall be sized for a minimum flow of 100 gpm (0.0063 m^3/s) for each riser, and the total need not exceed 500 gpm (0.032 m^3/s). The minimum size shall be 2½ inches.
2. In buildings where limited area sprinkler systems are supplied water from a common standpipe riser, the supply piping shall be sized for a minimum flow of 500 gpm (0.032 m^3/s) plus the sprinkler demand for the first riser, plus 250 gpm (0.016 m^3/s) for each additional riser, and the total need not exceed 2,500 gpm (0.16 m^3/s).
3. In buildings of Use Groups B, I, R-1 and R-2 equipped throughout with an approved automatic fire suppression system, all common supply piping shall be sized for a minimum flow of 250 gpm (0.016 m^3/s) for the first riser plus 250 gpm (0.016 m^3/s) for each additional riser, and the total need not exceed 1,500 gpm (0.095 m^3/s).

1711.4 Number of risers: The number of standpipe risers shall be such that all parts of every floor area can be reached by a 30-foot (9144 mm) hose stream from a nozzle attached to not more than 100 feet (30480 mm) of hose connected to a riser outlet. In those buildings equipped with an interior smokeproof enclosure vestibule, at least one standpipe hose connection shall be located in the vestibule.

1711.4.1 Combination: The standpipe system riser(s) may also serve as the water sprinkler system riser(s) in buildings required to have both systems or in buildings having both systems. Control valves shall be installed where sprinklers are connected to the riser so that sprinklers are under the control of a separate floor control valve(s) to allow standpipes to remain operational

while the sprinkler system is in a closed position. If control valves are located in a separate room or building, a sign shall be provided on the entrance door. The lettering of such sign shall be of a conspicuous color and shall be at least 4 inches (102 mm) in height and shall read *Standpipe Control Valve* or indicate other types of systems.

1711.5 Outlets: Standpipe system outlets shall comply with the provisions of Sections 1711.5.1 through 1711.5.4.

1711.5.1 Hose connections: At each floor level, and not more than 5 feet (1524 mm) above the floor, there shall be connected to each standpipe a 2½-inch hose connection with valves and threads conforming to the local fire department standards. If deemed necessary by the local fire department, a 1½-inch hose connection shall be provided and equipped with not more than 100 feet (30480 mm) of 1½-inch approved lined fire hose with an approved variable fog nozzle and couplings and hung in an approved rack or cabinet. Hose provided for rack and cabinet use shall be of ozone resistant material and designed to be folded in a pin rack unit.

Exception: In totally sprinklered buildings, the 1½-inch hose connection, hose and cabinet are not required.

1711.5.2 Roof hydrants: Where standpipes are installed in buildings more than six stories or 75 feet (22860 mm) in height, at least one riser shall extend through the roof and terminate in a two-way, 2½-inch hose connection. The main control valve on a roof hydrant or manifolded hose connection shall be located in an area not subject to freezing, as close to the roof access as practical and plainly marked (see Section 1713.8).

1711.5.3 Pressure reducers: When the residual pressure at any standpipe fire hose outlet exceeds 100 psi (690 kPa), approved pressure reducing devices or discs shall be installed at the outlets to reduce the pressure to 100 psi (690 kPa) while the required quantity of water per minute is flowing. Any standpipe riser over 250 feet (76200 mm) in height shall be equipped with an approved pressure regulating device on each hose outlet, which controls discharge pressures under both flow (residual) and no-flow (static) conditions.

1711.5.4 Test gauges: An approved water pressure gauge shall be attached to the top of each standpipe riser for inspection and test purposes. Shutoff valves, with provisions for bleeding pressure from the gauge, shall be installed between the gauge and the top of the riser. Gauges shall be accessible and located in spaces not subject to freezing.

1711.6 Materials: All standpipes shall be constructed of approved materials. All pipe, fittings and valves shall be of extra heavy pattern when the normal working pressure will exceed 175 psi (1207 kPa).

1711.7 Tests: All standpipe systems shall be flow tested and hydrostatically tested in accordance with the fire prevention code listed in Appendix A.

SECTION 1712.0 STANDPIPES FOR BUILDINGS UNDER CONSTRUCTION OR DEMOLITION

1712.1 General: Standpipes required by this section may be temporary or permanent in nature, with or without a water supply, provided, however, that such standpipes conform to the requirements of Section 1711.0 as to number of risers, capacity, outlets and materials.

* **1712.2 Height:** The standpipe systems shall be carried up with each floor and shall be installed and ready for use as each floor progresses. Standpipes shall not be more than one floor below the highest forms or staging.

1712.3 Fire department connections: At the street level there shall be provided for each temporary or permanent standpipe installation one or more two-way fire department inlet connections. Fire department inlet connections shall be prominently marked and readily and easily accessible at all times (see Section 1713.8).

* **1712.4 Buildings under demolition:** Where a building is being demolished and a standpipe is existing within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be more than one floor below the floor above being demolished.

SECTION 1713.0 FIRE DEPARTMENT CONNECTIONS
(See Section 1712.3 for temporary standpipes)

1713.1 Required: All water sprinkler and standpipe systems shall be provided with at least one two-way fire department connection. Each inlet of the fire department connection shall be at least 2½ inches in diameter. The pipe from the standpipe system and the pipe from the water sprinkler system to the fire department connection shall not be smaller than 4 inches. Single fire department connections may be installed when approved by the department.

Exceptions

1. A fire department connection shall not be required for limited area sprinkler systems (see Section 1705.6.2).
2. On standpipe or sprinkler systems where the supply pipe to the system is less than 4 inches, the pipe from the system to the fire department connection shall not be smaller than 2½ inches.

1713.2 Connections: Fire department connections shall be arranged in such a manner that the use of any one water sprinkler connection will serve all the sprinklers, and the use of any one standpipe connection will serve all the standpipes within the building.

1713.3 Location: Fire department connections shall be located and be visible on a street front or in a location approved by the department. Such connections shall be located so that immediate access can be made by the fire department. Obstructions such as fences, bushes, trees, walls or any other similar object shall not be permitted for new or existing installations.

1713.4 Height: Fire department connections shall not be less than 18 inches (457 mm) and not more than 42 inches (1067 mm) in elevation, measured from the ground level to the center line of the inlets.

1713.5 Projection: Where the fire department connection would project beyond the property line or into the public way, a flush type fire department connection shall be provided.

1713.6 Hose thread: Hose thread in the fire department connection shall be uniform with that used by the local fire department.

1713.7 Fittings: Fire department inlet connections shall be fitted with check valves, ball drip valves and plugs with chains or frangible caps.

1713.8 Signs: A metal sign with raised letters at least 1 inch (25 mm) in height shall be mounted on all fire department connections serving sprinklers or standpipes. Such signs shall read *Automatic Sprinklers* and/or *Standpipe.*

SECTION 1714.0 WATER SUPPLY AND OTHER EXTINGUISHING MEDIA

1714.1 Required: All fire suppression and standpipe systems shall be provided with at least one automatic supply of extinguishing material of adequate pressure, capacity and reliability to perform the function intended, except as provided in Section 1712.0.

1714.2 Combination sprinkler/standpipe water supply: Where both sprinklers and standpipes are installed, they may have a common fire water service as their combined source of supply. The water supply line shall be adequately sized to meet the flow and pressure demands of the water supplies for the sprinkler system or the standpipe system, whichever is greater.

1714.3 Combination sprinkler/domestic water supply: A sprinkler system may be connected to the domestic water supply system provided the supply system is of adequate pressure, capacity and size for the simultaneous operation of the water sprinkler system and domestic water needs. Taps for domestic water from water sprinkler systems are prohibited.

1714.4 Size: The extinguishing material supply for fire suppression systems shall be sized in an approved manner in accordance with this code.

1714.5 Standpipe water service: All standpipe systems shall be connected to a street water main. Water mains shall be adequately sized and have enough pressure and discharge capacity to supply the total water demand for the building. Taps into the main and water service lines from the main to the building shall be at least equal in size to the largest supply line inside the building. Common supply lines from the main, from which standpipes, domestic or sprinkler systems are supplied, shall be sized to satisfy total demand.

1714.6 Standpipe interconnection: The required water supply shall be connected to the base of each standpipe riser. Where more than one standpipe riser is required, all risers shall be interconnected at their base with a common

supply line and an approved indicating valve shall be installed at the base of each riser so as to permit individual risers to be taken out of service if damaged or broken without interrupting the water supply to other risers.

1714.7 Standpipes in unheated areas: Standpipes installed so that all or any portion of the system is installed through unheated areas subject to freezing shall be so arranged through the use of approved devices as to admit water to the system automatically by opening a hose valve or through the use of approved remote control devices located at each hose station.

SECTION 1715.0 YARD HYDRANTS

1715.1 Fire hydrants: Fire hydrants installed on private property shall be located and installed as directed by the fire department. Hydrants shall conform to the standards of the administrative authority of the jurisdiction and the fire department. Hydrants shall not be installed on a water main less than 6 inches in diameter.

SECTION 1716.0 AUTOMATIC FIRE ALARM SYSTEMS

1716.1 Plans and specifications: Where an automatic fire alarm system is required by this code, the plans and specifications shall show the location and number of all sending stations and signals with specifications of the type, construction and operation of the system including all automatic detection devices. Installation of all equipment shall conform to requirements of this code and NFiPA 71, 72A, 72B, 72C, 72D, 72E, 74 and 1221 listed in Appendix A.

1716.2 Approval: The automatic fire alarm system shall be approved for the particular application and shall only be used for detection and signaling in the event of fire. The automatic detecting devices shall be smoke detectors, except an approved alternative type of detector shall be installed in spaces such as boiler rooms where during normal operation products of combustion are present in sufficient quantity to cause alarm.

1716.3 Where required: An automatic fire alarm system shall be installed and maintained in full operating condition in the locations described in Sections 1716.3.1 through 1716.3.4.

1716.3.1 Use Group I: In all buildings of Use Group I.

1716.3.2 Use Group R-1: In all buildings of Use Group R-1.

1716.3.3 Use Group B or R-2: In all buildings of Use Group B or R-2 when such buildings have floors used for human occupancy located more than 75 feet (22860 mm) above the lowest level of fire department vehicle access.

Exception: In buildings of Use Group R-2, smoke detectors are not required within the individual dwelling units except as required by Section 1716.3.4.

1716.3.4 Sleeping areas and dwelling units: In addition to any automatic fire alarm system required by Sections 1716.3.2 and 1716.3.3, a minimum of one single station smoke detector shall be installed in each guest room, suite or sleeping area in buildings of Use Groups R-1 and I-1 and in dwelling units in the immediate vicinity of the bedrooms in buildings of Use Group R-2 or R-3. When actuated, the detector shall provide an alarm suitable to warn the occupants within the individual unit (see Section 1717.3.1). In buildings of Use Groups R-1 and R-2 which have basements an additional smoke detector shall be installed in the basement. In buildings of Use Group R-3, smoke detectors shall be required on every story of the dwelling unit including basements. In dwelling units with split levels, a smoke detector installed on the upper level shall suffice for the adjacent lower level provided the lower level is less than one full story below the upper level. If there is an intervening door between the adjacent levels, a smoke detector shall be installed on both levels. All detectors shall be installed in an approved location. Where more than one detector is required to be installed within an individual dwelling unit, the detectors shall be wired in such a manner that the actuation of one alarm will actuate all the alarms in the individual unit.

1716.4 Sprinklered buildings exception: Buildings or portions thereof equipped with an automatic fire suppression system are not required to be equipped with an automatic fire alarm system but are required to be equipped with a manual fire alarm system conforming to Section 1717.0. This exception does not apply to single station smoke detectors as required in Section 1716.3.4.

1716.5 Manual pull stations: A manual fire alarm system conforming to the requirements of Section 1717.0 shall be installed in conjunction with an automatic fire alarm system.

Exception: Single station detectors required by Section 1716.3.4.

1716.6 Distances: Smoke detectors shall be installed not to exceed the lineal or square footage allowances specified, based on the test standards under which they were tested and approved.

1716.7 Not mandatory: In special use buildings and structures or parts thereof, an automatic fire alarm system may be installed in lieu of an automatic fire suppression system when approved by the department and fire department when such suppression would be detrimental or dangerous to the specific use and occupancy (see Section 1702.22).

1716.8 Power supply: The power for the automatic fire alarm system shall be provided from an emergency electrical system conforming to Section 2006.0.

Exception: Single station detectors required by Section 1716.3.4.

1716.9 Requirements: All automatic fire alarm systems shall be of the closed circuit type and shall be electrically or mechanically supervised. In addition, such systems shall comply with Sections 1716.9.1 through 1716.9.3.

Exception: Single station detectors required by Section 1716.3.4.

1716.9.1 Wiring: All wiring shall conform to the requirements of NFiPA 72A through 72E listed in Appendix A.

1716.9.2 Alarms: Audible alarms of the approved type shall be provided. The operation of any detection device shall cause all audible or visual alarms to operate. Visual and audible alarms shall be provided in occupancies housing the hard of hearing. Alarm sounding devices shall be of an approved type, shall provide a distinctive tone and shall not be used for any purpose other than that of a fire alarm. They shall be located so as to be seen or effectively heard above all other sounds, by all the occupants, in every occupied space within the building.

1716.9.3 Zones: Each floor shall be zoned separately. If the floor area exceeds 20,000 square feet (1860 m^2), additional zoning shall be provided. The length of any zone shall not exceed 200 feet (60960 mm) in any direction. Zoning indicator panels and controls shall be located as approved by the department. Annunciators shall lock in until the system is reset.

1716.10 Fire alarm acceptance tests: Upon completion of a fire alarm system, the installation shall be subjected to a performance test to demonstrate its efficiency of operation. Also, all connections and wiring, with signal devices disconnected, shall develop an insulation resistance of not less than 1 megohm.

SECTION 1717.0 MANUAL FIRE ALARM SYSTEMS (PULL STATIONS)

1717.1 Plans and specifications: Where a manual fire alarm system is required by this code, the plans and specifications shall show the location and number of all sending stations and signals with specifications of the type, construction and operation of the system. Installation of all equipment shall conform to the requirements of this code and NFiPA 72A listed in Appendix A.

1717.2 Approval: The manual fire alarm system shall be approved for the particular application and shall be used for the fire protection signaling purpose only. Alarm boxes shall be painted a distinctive red color.

1717.3 Where required: A manual fire alarm system shall be installed and maintained in full operating condition in the locations described in Sections 1717.3.1 through 1717.3.4.

1717.3.1 Automatic alarm system: In all buildings required to be equipped with an automatic fire alarm system (see Section 1716.5).

Exception: Single station detectors as required by Section 1716.3.4.

1717.3.2 Use Groups A-4 and E: In all new and existing buildings of Use Groups A-4 and E.

Exception: Sanctuary and nave areas of churches and similar religious buildings.

1717.3.3 Use Group B: In all buildings of Use Group B when three or more stories in height.

Exception: Buildings equipped throughout with an approved automatic fire suppression system and less than seven stories in height.

1717.3.4 Use Group R-2: In all buildings of Use Group R-2 when four or more stories in height.

1717.4 Location: Manual pull stations shall be located in each story, including basements, not more than 5 feet (1524 mm) from each exit. Where a stage is provided, a manual pull station shall be located adjacent to the lighting control panel.

1717.5 Coding: Coded stations shall be coded in conformance with NFiPA 72A listed in Appendix A.

1717.6 Power supply: The power for the fire alarm system shall be provided from an emergency electrical system conforming to Section 2006.0.

1717.7 Requirements: Fire alarm systems shall be of the closed circuit type and shall be electrically or mechanically supervised. In addition, such systems shall comply with Sections 1717.7.1 through 1717.7.5.

1717.7.1 Wiring: All wiring shall conform to the requirements of NFiPA 72A through 72E listed in Appendix A.

1717.7.2 Alarms: Audible alarms of the approved type shall be provided. The operation of any fire alarm device shall cause all audible or visual alarms to operate. Visual and audible alarms shall be provided in occupancies housing the hard of hearing. Alarm sounding devices shall be of approved type, shall provide a distinctive tone and shall not be used for any purpose other than that of a fire alarm. They shall be of such character and so located as to be seen or effectively heard above all other sounds, by all the occupants, in every occupied space within the building.

1717.7.3 Presignal system: A presignal system shall be permitted in buildings of Use Group I. Presignal systems shall not be installed in other occupancies unless approved by the department and by the fire department. Where a presignal system is installed, 24 hour personnel supervision shall be provided at a location approved by the fire department, in order that the alarm signal can be actuated in the event of fire or other emergency.

1717.7.4 Box height: The height of the manual pull station boxes shall be not more than 4 feet (1219 mm), measured vertically, from the floor level.

1717.7.5 Zones: Each floor shall be zoned separately. If the floor area exceeds 20,000 square feet (1860 m^2), additional zoning shall be provided. The length of any zone shall not exceed 300 feet (91440 mm) in any direction. Zoning indicator panels and controls shall be located as approved by the department. Annunciators shall lock in until the system is reset.

1717.8 Acceptance tests: Upon completion of a fire alarm system, the installation shall be subjected to a performance test to demonstrate its efficiency of operation. Also, all connections and wiring, with signal devices disconnected, shall develop an insulation resistance of not less than 1 megohm.

SECTION 1718.0 SUPERVISION

1718.1 Fire suppression systems: Fire suppression systems required for buildings of Use Groups A, E, I or R shall be supervised by methods 1, 2, 3 or 4 below. All other fire suppression systems shall be supervised by one of the following methods.

1. Approved central station system in accordance with NFiPA 71 listed in Appendix A.
2. Approved proprietary system in accordance with NFiPA 72D listed in Appendix A.
3. Approved remote station system of the jurisdiction in accordance with NFiPA 72C listed in Appendix A.
4. Approved local alarm service which will cause the sounding of an audible signal at a constantly attended location in accordance with NFiPA 72A listed in Appendix A.
5. Locking valves open.

Exceptions

1. Underground gate valves with roadway boxes.
2. Halogenated extinguishing systems.
3. Carbon dioxide extinguishing systems.
4. Dry chemical extinguishing systems.
5. Limited area sprinkler systems.

1718.2 Fire protection systems: All required fire protection systems shall be connected to an approved central station system, proprietary system, or remote station system of the jurisdiction when approved by the fire department.

Exceptions

1. Fire suppression systems shall conform to Section 1718.1.
2. Standpipe systems.
3. Fire alarm systems in buildings of Use Group R when less than five stories in height.
4. Single station detectors required by Section 1716.3.4.

SECTION 1719.0 FIRE EXTINGUISHERS

1719.1 Approval: Portable fire extinguishers shall be of an approved size and type suitable for the occupancy of the building and shall be installed in a location visible and readily accessible to the occupants.

1719.2 Where required: Portable fire extinguishers shall be provided in accordance with Sections 619.11, 1710.6.7, 1719.2.1 and 1818.7, this article and the fire prevention code listed in Appendix A.

1719.2.1 Use Group A-1: In buildings of Use Group A-1, approved portable 2½-gallon (0.0095 m^3) fire extinguishers shall be provided and located as follows: two on each tier or floor of the stage; one immediately outside of the motion picture projection room; one in each dressing room; and one in each

work, utility and storage room. Fire axes and fire hooks shall also be provided as directed by the fire official; and all fire extinguishers and fire tools shall be securely mounted on walls in plain view and readily accessible.

ARTICLE 18

PRECAUTIONS DURING BUILDING OPERATIONS

SECTION 1800.0 GENERAL

1800.1 Scope: The provisions of this article shall apply to all construction operations in connection with the erection, alteration, repair, removal or demolition of buildings and structures.

1800.2 Other laws: Nothing herein contained shall be construed to nullify any rules, regulations or statutes of state agencies governing the protection of the public or workers from health or other hazards involved in manufacturing, mining and other processes and operations which generate toxic gases, dust or other elements dangerous to the respiratory system, eyesight or health.

1800.3 Combustible and explosive hazards: The provisions of this code which apply to the storage, use or transportation of explosives, highly flammable and combustible substances, gases and chemicals shall be construed as supplemental to the requirements of the federal laws, the regulations of the Department of Transportation (DOT) and the rules and regulations of the jurisdiction.

SECTION 1801.0 PLANS, SPECIFICATIONS AND SPECIAL PERMITS

1801.1 Temporary construction: Before any construction operation is started, plans and specifications shall be filed with the building official showing the design and construction of all sidewalk sheds, truck runways, trestles, foot bridges, guard fences and other similar devices required in the operation. Approval of the building official shall be secured before the commencement of any work.

1801.2 Special permits: All special licenses and permits for the storage of materials on sidewalks and highways, for the use of water or other public facilities and for the storage and handling of explosives shall be secured from the administrative authorities having jurisdiction.

1801.3 Temporary encroachments: Subject to the approval of the building official, sidewalk sheds, underpinning and other temporary protective guards and devices may project beyond the interior and street lot lines as may be required to insure the safety of the adjoining property and the public. When necessary, the consent of the adjoining property owner shall be obtained.

SECTION 1802.0 TESTS

1802.1 Loading: It shall be unlawful to load any structure, temporary support, scaffolding, sidewalk bridge or sidewalk shed or any other device or construction equipment during the construction or demolition of any building or structure in excess of its safe working capacity as provided in Article 9 for allowable loads and working stresses.

1802.2 Unsafe equipment: Whenever any doubt arises as to the structural quality or strength of scaffolding plank or other construction equipment, such material shall be replaced. However, the building official may accept a strength test to two and one-half times the superimposed live load to which the material or structural member is to be subjected. The member shall sustain the test load without failure.

SECTION 1803.0 INSPECTION

1803.1 Unsafe conditions: When inspection of any construction operation reveals that any unsafe or illegal conditions exist, the building official shall notify the owner and direct the owner to take the necessary remedial measures to remove the hazard or violation.

1803.2 Failure to comply with orders: Unless the owner so notified proceeds to comply with the orders of the building official within 24 hours, the building official shall have full power to correct the unsafe conditions as provided in Sections 121.0 and 123.0. All expenses incurred in the correction of such unsafe conditions shall become a lien on the property.

1803.3 Unsafe construction equipment: When the strength and adequacy of any scaffold or other device or construction equipment is in doubt, or when any complaint is made, the building official shall inspect such equipment and shall prohibit its use until tested as required in Section 1802.2 or until all danger is removed.

SECTION 1804.0 MAINTENANCE

1804.1 General: All construction equipment and safeguards shall be constructed, installed and maintained in a substantial manner and shall be so operated as to insure protection to the workers engaged thereon and to the general public. It shall be unlawful to remove or render inoperative any structural, fire protective or sanitary safeguard or device herein required except when necessary for the actual installation and prosecution of the work.

SECTION 1805.0 EXISTING BUILDINGS

1805.1 Protection: All existing and adjoining public and private property shall be protected from damage incidental to construction operations.

1805.2 Chimney, soil and vent stacks: Whenever a new building or structure is erected to greater or less heights than an adjoining building, the construction

and extension of new or existing chimneys shall conform to the provisions of the mechanical code listed in Appendix A, and of soil and vent stacks and the location of window openings to the provisions of Article 22, 20:090.

1805.3 Adjoining walls: The owner of the new or altered structure shall preserve all adjoining independent and party walls from damage as provided herein. The owner shall underpin where necessary and support the adjoining building or structure by proper foundations to comply with Section 1807.0.

1805.3.1 Maintenance: In case an existing party wall is intended to be used by the person who causes an excavation to be made, and such party wall is in good condition and sufficient for the use of both the existing and proposed building, such person shall preserve the party wall from injury and support it by proper foundations at his own expense, so that it shall be and remain as safe and useful as it was before the excavation was commenced. During the demolition, the party wall shall be maintained weatherproof and structurally safe by adequate bracing until such time as the permanent structural supports shall have been provided.

1805.3.2 Beam holes: When a structure involving a party wall is being demolished, the owner of the demolished structure shall, at his own expense, bend over all wall anchors at the beam ends of the standing wall and shall brick up all open beam holes and otherwise maintain the safety and usefulness of the wall.

1805.3.3 Party wall exits: A party wall balcony or horizontal exit shall not be destroyed unless and until a substitute means of egress has been provided and approved by the building official.

1805.4 Adjoining roofs: When a new building or demolition of an existing building is being prosecuted at a greater height, the roof, roof outlets and roof structures of adjoining buildings shall be protected against damage with adequate safeguards by the person doing the work.

SECTION 1806.0 PROTECTION OF PUBLIC AND WORKERS

1806.1 General: Whenever a building or structure is erected, altered, repaired, removed or demolished, the operation shall be conducted in a safe manner and suitable protection for the general public and workers employed thereon shall be provided.

1806.2 Fences: Every construction operation located 5 feet (1524 mm) or less from the street lot line shall be enclosed with a fence not less than 8 feet (2438 mm) high to prevent entry of unauthorized persons. When located more than 5 feet (1524 mm) from the street lot line, a fence or other barrier shall be erected when required by the building official. All fences shall be of adequate strength to resist wind pressure as specified in Section 915.0.

1806.3 Sidewalk bridge: Whenever the ground is excavated under the sidewalk, a sidewalk bridge shall be constructed at least 4 feet (1219 mm) wide, or a protected walkway of equal width shall be erected in the street, provided the required permit for such walkway is obtained from the administrative authority.

1806.4 Sidewalk shed: Sidewalk sheds shall be provided in accordance with Sections 1806.4.1 through 1806.4.4.

1806.4.1 Within 10 feet of street lot line: When any building or part thereof which is located within 10 feet (3048 mm) of the street lot line is to be erected or raised to exceed 40 feet (12192 mm) in height, or whenever a building more than 40 feet (12192 mm) in height within 10 feet (3048 mm) of the street lot line is to be demolished, a sidewalk shed shall be erected and maintained for the full length of the building on all street fronts for the entire time that work is performed on the exterior of the building.

1806.4.2 Within 20 feet of street lot line: When the building being demolished or erected is located within 20 feet (6096 m) of the street lot line and is more than 40 feet (12192 mm) in height, exterior flare fans or catch platforms shall be erected at vertical intervals of not more than two stories.

1806.4.3 Buildings higher than six stories: When the building being demolished or erected is more than six stories or 75 feet (22860 mm) in height, unless set back from the street lot line a distance more than one-half its height, a sidewalk shed shall be provided.

1806.4.4 Walkway: An adequately lighted walkway at least 4 feet (1219 mm) wide and 8 feet (2438 mm) high in the clear shall be maintained under all sidewalk sheds for pedestrians. Where ramps are required, they shall conform to the provisions of this article and Section 815.0.

1806.5 Thrust-out platforms: The building official may approve thrust-out platforms or other substitute protection in lieu of sidewalk sheds when deemed adequate to insure the public safety. Thrust-out platforms shall not be used for the storage of materials.

1806.6 Watchman: Whenever a building is being demolished, erected or altered, a watchman shall be employed to warn the general public when intermittent hazardous operations are conducted across the sidewalk or walkway.

SECTION 1807.0 EXCAVATIONS

1807.1 Temporary support: Until permanent support has been provided, all excavations shall be safeguarded and protected by the person causing the excavations to be made, to avoid all danger to life or limb. Where necessary, such excavations shall be retained by temporary retaining walls, sheet piling and bracing or other approved method to support the adjoining earth.

1807.1.1 Examination of adjoining property: Before any excavation or demolition is undertaken, license to enter upon adjoining property for the purpose of physical examination shall be afforded by the owner and tenants of such adjoining property to the person undertaking such excavation or demolition, prior to the commencement and at reasonable periods during the progress of the work.

1807.1.2 Notice to the building official: If the person who causes an excavation to be made or an existing structure to be demolished has reason to believe that an adjoining structure is unsafe, that person shall forthwith report in writing to the building official. The building official shall inspect such premises, and if the structure is found unsafe, the building official shall order it repaired as provided in Section 121.0.

1807.1.3 Responsiblity of adjoining owner: The person making or causing an excavation to be made shall, before starting the work, give at least a one week notice in writing to the owner of each neighboring building or structure, the safety of which may be affected. Having received consent to enter a building, structure or premises, such person shall make the necessary provisions to protect it structurally and to insure it against damage by the elements which may ensue from such excavation. If license to enter is not afforded, then the adjoining owner shall have the entire responsibility of providing both temporary and permanent support of his premises at his own expense. For that purpose, the adjoining owner shall be afforded the license when necessary to enter the property where the excavation is to be made.

1807.1.4 Excavations for other than construction purposes: Excavations made for the purpose of removing soil, earth, sand, gravel, rock or other materials shall be performed in such a manner as will prevent injury to neighboring properties or to the street which adjoins the lot where such materials are excavated, and to safeguard the general public health and welfare.

1807.2 Permanent support: Permanent support shall be provided in accordance with Sections 1807.2.1 and 1807.2.2.

1807.2.1 Deep excavations: Whenever an excavation is made to a depth of more than two feet (610 mm) below the established curb, the person who causes such excavation to be made, if afforded the necessary license to enter the adjoining premises, shall preserve and protect from injury at all times and at his own expense such adjoining structure or premises which may be affected by the excavation. If the necessary license is not afforded, it shall then be the duty of the owner of the adjoining premises to make his building or structure safe by installing proper underpinning or foundations or otherwise. Such owner, if it be necessary for the prosecution of his work, shall be granted the necessary license to enter the premises where the excavation or demolition is contemplated.

1807.2.2 Shallow excavations: Wherever an excavation is made to a depth less than two feet (610 mm) below the curb, the owner of a neighboring building or structure, the safety of which may be affected by the proposed excavation, shall preserve and protect from injury and shall support his building or structure by the necessary underpinning or foundations. If necessary for that purpose, such owner shall be afforded a license to enter the premises where the excavation is contemplated.

SECTION 1808.0 REGULATION OF LOTS

1808.1 Grading of lot: When a building has been demolished and building operations have not been projected or approved, the vacant lot shall be filled, graded and maintained in conformity to the established street grades at curb level. The lot shall be maintained free from the accumulation of rubbish and all other unsafe or hazardous conditions which endanger the life or health of the public. Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

1808.2 Utility connections: All service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the authority having jurisdiction.

SECTION 1809.0 RETAINING WALLS AND PARTITION FENCES

1809.1 General: When the adjoining grade is not higher than the legal level, the person causing an excavation to be made shall erect, when necessary, a retaining wall at his own expense and on his own land. Such wall shall be built to a height sufficient to retain the adjoining earth, shall be properly coped as required in Section 1310.0 and shall be provided with a guardrail or fence not less than 42 inches (1067 mm) in height.

SECTION 1810.0 STORAGE OF MATERIALS

1810.1 General: All materials and equipment required in construction operations shall be stored and placed so as not to endanger the public, the workers or adjoining property.

1810.2 Design capacity: Materials or equipment stored within the building, or on sidewalks, sheds or scaffolds shall be placed so as not to overload any part of the construction beyond its design capacity, nor interfere with the safe prosecution of the work.

1810.3 Special loading: Unless the construction is designed for special loading, materials stored on sidewalk sheds and scaffolds shall not exceed a one day supply. All materials shall be piled in an orderly manner and height, to permit removal of individual pieces without endangering the stability of the pile.

1810.4 Pedestrian walkways: Materials or equipment shall not be stored on the street without a permit issued by the administrative official having jurisdiction. When so stored they shall not unduly interfere with vehicular traffic or the orderly travel of pedestrians on the highway or street. The piles shall be arranged to maintain a safe walkway not less than 4 feet (1219 mm) wide, unobstructed for its full length, and adequately lighted at night and at all necessary times for the use of the public.

1810.5 Obstructions: Material and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, utility boxes, catch basins or manholes, nor shall they be located within 20

feet (6096 mm) of a street intersection, or so placed as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.

SECTION 1811.0 REMOVAL OF WASTE MATERIAL

1811.1 General: Material shall not be dropped by gravity or thrown outside the exterior walls of a building during demolition or erection. Wood or metal chutes shall be provided for this purpose and any material which in its removal will cause an excessive amount of dust shall be wet down to prevent the creation of a nuisance.

SECTION 1812.0 PROTECTION OF ADJOINING PROPERTY

1812.1 General: Adjoining property shall be completely protected from any damage incidental to the building operation when the owner of the adjoining property permits free access to the building at all reasonable times to provide the necessary safeguards in accordance with Section 1807.0.

SECTION 1813.0 PROTECTION OF FLOOR AND WALL OPENINGS

1813.1 Noncombustible floor construction: The arches, slabs or structural floor fillings of buildings of Types 1 and 2 construction shall be installed as the building progresses.

1813.2 Combustible floor construction: In Types 3, 4 and 5 construction when double flooring is used, the underfloor shall be laid on each story as the building progresses; and when double floors are not used, the floors shall be planked over two stories below the level where work is being performed.

1813.3 Steel structural frames: In steel construction, the entire tier of iron or steel beams upon which the structural work is in progress shall be planked over, with the exception of necessary hoistways and permanent openings. Steel work shall not advance more than six floors ahead of the permanent floor construction.

1813.4 Guardrails: All floor and wall openings shall be protected with substantial guardrails and toe boards in accordance with ANSI A12.1 listed in Appendix A.

SECTION 1814.0 SCAFFOLDS

1814.1 Load capacity: Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load. All platforms and supporting elements of scaffolds shall be designed and constructed to support uniform minimum live loads in pounds per square foot of the platform area in accordance with the classifications described in Table 1814.

1814.2 Erection: Built-up, swinging and suspended scaffolds shall be erected by competent workers only.

1814.3 Scaffolding: Scaffolding shall be constructed in accordance with Sections 1814.3.1 and 1814.3.2.

1814.3.1 All buildings: All scaffolding exceeding 85 feet (25908 mm) or seven stories in height used in construction operations involving the erection, alteration or maintenance of buildings, shall be constructed of noncombustible or fire-retardant materials complying with the provisions of Section 1403.0.

Table 1814
SCAFFOLD LOAD CAPACITY

Classification	Service type	Load (pounds per square foot)
Light duty	Carpenters	25
	Stone setters (no stone on scaffold)	25
	Miscellaneous (no material on scaffold)	25
Medium duty	Bricklayers	50
	Stucco	50
	Lathers and plasterers	50
Heavy duty	Stone masons	75

Note a. 1 psf = 4.882 kg/m².

1814.3.2 Use Group I: All scaffolding used in construction operations involving the repair or partial demolition during occupancy of buildings of Use Groups I-2 and I-3 shall be constructed of noncombustible or fire-retardant materials complying with the provisions of Section 1403.0.

SECTION 1815.0 HOISTS

1815.1 Hoist protection: All material hoists shall be adequately protected. When erected on the outside of a building over 85 feet (25908 mm) or seven stories in height, the hoist structure shall be built of noncombustible or approved fire-retardant materials with the exception of the loading platform.

1815.2 Passengers prohibited: Persons shall not be permitted to ride a material hoist. Temporary elevators shall be installed when necessary to transport workers as provided in Article 21.

1815.3 Guarding of cables: All hoisting cables and signal cords shall be guarded whenever they pass through or cross working spaces to prevent injury to persons.

1815.4 Rigger's license: All persons engaged in the erection of derricks and other hoisting apparatus shall secure a license or certificate of fitness for the performance of such work from the authorized administrative official.

SECTION 1816.0 STAIRWAYS AND LADDERS

1816.1 Temporary stairways: When a building has been constructed to a greater height than 50 feet (15240 mm) or four stories, or when an existing

building exceeding 50 feet (15240 mm) in height is altered, at least one temporary lighted stairway shall be provided unless one or more of the permanent stairways are erected as the construction progresses.

1816.2 Ladders: Temporary ladders, when permitted for access to floors before stairways are installed, or which are designed for other working purposes, shall extend at least 42 inches (1067 mm) above the floor level which they serve.

SECTION 1817.0 LIGHTING

1817.1 General: All stairways and parts of buildings under demolition, erection or repair shall be adequately lighted while persons are engaged at work, to comply with the provisions of Sections 824.0 and 2001.2.5.

SECTION 1818.0 FIRE HAZARDS

1818.1 General: The provisions of this code and of the fire prevention code listed in Appendix A shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

1818.2 Temporary heating: Whenever salamanders or other heating devices are used for temporary heating, all regulations as to maximum temperature, distance from combustible materials, spark arrestors, removal of noxious gases, and other requirements prescribed by the building official shall be fully observed. When the source of temporary heat consists of salamanders or other open flame devices, temporary canvas enclosures shall comply with Section 1404.0.

1818.3 Steam boilers: All temporary or permanent high pressure steam boilers shall be operated only by licensed operating engineers in accordance with the provisions of the mechanical code listed in Appendix A. When located within a building or within 10 feet (3048 mm) thereof, all such boilers shall be enclosed with approved noncombustible construction.

1818.4 Storage of flammables: Storage of gasoline for hoists, oils, paints and other highly flammable materials shall be permitted only as specified in Article 6 and when stored in approved safety containers. The storage of larger quantities may be approved by the administrative official when stored in separate compartments or enclosures of approved noncombustible construction.

1818.5 Flame cutting and welding: The use of oxyacetylene torches for cutting or welding shall be permitted only in accordance with ANSI Z49.1 listed in Appendix A.

1818.6 Concrete forms: Combustible materials shall not be stored on any floor of a building under construction until all combustible concrete forms are removed from the tier immediately above.

1818.7 Fire extinguishing equipment: Required fire extinguishers, water buckets, auxiliary fire fighting tools or other portable extinguishing equip-

ment shall be installed and maintained on all floors of a construction operation in accessible locations as required in Article 17 and the fire prevention code listed in Appendix A.

1818.8 Standpipes and fire lines: Where standpipes are provided as a permanent part of the building, they shall be installed and made ready for instant use by the fire department as the structure progresses in accordance with the provisions of Section 1712.0. Free access from the street to such standpipes shall be maintained at all times. Materials shall not be stored within 5 feet (1524 mm) of any fire hydrant or in the roadway between such hydrant and the center line of the street.

1818.9 Housekeeping: Rubbish and trash shall not be allowed to accumulate on the site and shall be removed as fast as conditions warrant. Combustible rubbish shall be removed daily, and shall not be disposed of by burning on the premises or in the immediate vicinity. The entire premises and area adjoining and around the operation shall be kept in a safe and sanitary condition and free of accumulation of trash, rubbish, nuts, bolts, small tools and other equipment.

SECTION 1819.0 HEALTH HAZARDS

1819.1 General: Every construction or maintenance operation which results in the diffusion of dust, stone and other small particles, toxic gases or other harmful substances in quantities hazardous to health shall be safeguarded by means of local ventilation or other protective devices to insure the safety of the public as required by the regulations of the administrative official.

1819.2 Removal of dust: Dust, sand blasts or other harmful agents, when employed or occurring in construction operations, shall be disposed of at or near the point of origin to prevent their diffusion over adjoining premises or streets.

1819.3 Protective equipment: Facilities shall be provided in approved closed containers for housing the necessary vision, respiratory and protective equipment required in welding operations, and in accordance with the regulations of the administrative official.

SECTION 1820.0 WELDING SAFETY PRECAUTIONS

1820.1 Welding enclosures: All welding and flame cutting operations shall be performed in protected areas with full consideration of safety and fire hazards. Such closed spaces shall be properly ventilated while welding or cutting is being done. Suitable protection against the rays of the electric arc shall be maintained by the contractor where arc welding operations might be viewed within harmful range by persons other than the welding operators and inspectors.

1820.2 Flammable materials: Proper precautions shall be taken to avoid all risk of fire or explosion, and flammable or explosive materials shall not be stored in the vicinity of welding or cutting operations.

SECTION 1821.0 SANITATION

1821.1 General: Every building in the course of demolition, erection or repair shall be provided with toilet and drinking water facilities which shall be constructed and installed in accordance with the plumbing code listed in Appendix A.

SECTION 1822.0 DISPUTES

1822.1 General: The building official, when requested by any person, aggreived or otherwise, shall serve a written notice on any owner, tenant and their agents who fail to conform to the requirements of this article directing such person to take the necessary remedial action. If the person whose duty it is to protect his own or adjoining property under those provisions fails to proceed to fully comply with such notice within three days of receipt thereof, or within a reasonable time thereafter as determined by the building official, the building official may cause the necessary work to be done when the health, safety and general welfare of the public are involved. The cost of such work shall become a lien against the property of the offending owner, and the legal authority of the jurisdiction shall instutute appropriate action for its recovery.

ARTICLE 19

RESERVED FOR LOCAL JURISDICTION'S ORDINANCE ON SIGNS

ARTICLE 20

ELECTRIC WIRING, EQUIPMENT AND SYSTEMS

SECTION 2000.0 GENERAL

2000.1 Scope: The provisions of this article shall control the design and construction of all new installations of electrical conductors, equipment and systems in buildings or structures; and all alterations to existing wiring systems therein to insure safety. All such installations shall conform to the provisions of NFiPA 70 listed in Appendix A.

2000.2 Exceptions: Electrical wiring shall not be installed in a building or structure, nor shall an alteration of an existing electric wiring system be made, until a permit has been issued therefor as required in Section 2004.0, except as provided in Sections 2000.2.1 through 2000.2.3.

2000.2.1 Public service agencies: The provisions of this code shall not apply to installations for electric supply or communication agencies in the generation, transmission or distribution of electricity, or the operation of signals, or the transmission of intelligence, or to installations located within or on buildings or premises used exclusively by such agency, or on public thoroughfares.

2000.2.2 Railway utilities: The provisions of this code shall not apply to the installations or equipment employed by a railway utility in the exercise of its functions as a public carrier, and located outdoors or in buildings used exclusively for that purpose.

2000.2.3 Radio and television transmitting stations: The provisions of this code shall not apply to electrical equipment used for radio and television transmission, except the equipment and wiring for power supply and the installations of towers and antennae, whether erected on buildings or on the ground.

2000.3 Electric installation standards: Conformance of installation of electric conductors and equipment to NFiPA 70 listed in Appendix A shall be the prima facie evidence that such installations are reasonably safe for use in the service intended and in compliance with the provisions of this code.

2000.4 Electric equipment standards: The materials, appliances, and other equipment listed in published reports of inspected electrical equipment by the Underwriters Laboratories, Inc. (UL), and other approved agencies and

testing organizations, and installed in accordance with any instructions included as part of such listing, shall be approved as meeting the requirements of this code.

2000.5 Electrical inspections: Inspections conducted to determine compliance with the National Electrical Code shall be conducted by a certified electrical inspector or in accordance with 815 KAR 35:010.

SECTION 2001.0 PLANS AND SPECIFICATIONS

2001.1 General: Plans, specifications and schedules in sufficient detail shall be filed with the building official showing the location and capacity of all lighting facilities, electrically operated equipment and electrical circuits required for all service equipment of the building or structure except as may be modified by the administrative official.

2001.2 Items covered: All electrically controlled devices, including signal, communicating and lighting systems and their wiring, whenever required under the provisions of this code shall be shown on the plans and elevations of the building or structure with respect to those uses covered by Sections 2001.2.1 through 2001.2.8.

2001.2.1 Emergency and hazard use lighting: Places of public assembly and education and control of emergency lighting systems in accordance with Section 824.0 and hazardous uses in Article 6.

2001.2.2 Exit and elevator lighting: Stairway and exit illumination in accordance with Article 7 and Section 824.0; *Exit* sign lighting circuits, Section 823.0; elevator car illumination, Section 2105.0.

2001.2.3 Service equipment: Electrical equipment and control of heating, refrigerating and ventilating machinery and devices, in accordance with the mechanical code listed in Appendix A.

2001.2.4 Fire alarm and signal systems: Fire alarm signal systems, fire department communication and supervisory service in accordance with Sections 1716.0, 1717.0 and 1718.0.

2001.2.5 Construction operations: Temporary construction lighting requirements equivalent to 3 foot candles (32.29 lux) in accordance with Section 1817.0.

2001.2.6 Signs and towers: Wiring of display signs in accordance with Sections 1907.0 and 1914.0; and radio and television antennae, Sections 614.0 and 615.0.

2001.2.7 Elevators and moving stairways: Power control electric operation and circuit wiring of elevators and escalators in accordance with Article 21.

2001.2.8 Toilet and bathrooms: Illumination of toilets and bathrooms equivalent to 3 foot candles (32.29 lux) in accordance with Section 703.1.1.

*

2001.3 Other authorities: Where required by local law or ordinance, the plans and specifications for electric wiring shall be approved by all authorities having jurisdiction.

SECTION 2002.0 INSPECTION AND TESTS

2002.1 During installation: During the installation of electric systems and equipment, the certified electrical inspector shall make inspections to insure compliance with the provisions of this article, except as provided in Section 2004.0.

2002.2 Concealing work: Work in connection with an electric system shall not be covered or concealed until it has been inspected and permission to conceal has been granted by the certified electrical inspector.

2002.3 Final inspection and test: On completion of the work, the certified electrical inspector shall inspect the work and cause tests to be made of the operation of the entire system to insure compliance with all requirements.

SECTION 2003.0 TEMPORARY USE

2003.1 Permission: The certified electrical inspector may give temporary permission for a reasonable time to supply and use current in part of an electric installation before such installation has been fully completed and the final certificate of approval has been issued. The part covered by the temporary certificate shall comply with all the requirements specified for temporary lighting, heat or power in NFiPA 70 listed in Appendix A.

SECTION 2004.0 PERMIT AND CERTIFICATE OF INSPECTION

2004.1 General: Electrical wiring or equipment shall not be installed within or on any building, structure or premises, nor shall any alteration be made in any such existing installations, without first securing approval and a permit from the building official except as provided in Section 2004.2. It shall be unlawful to use or allow the use of, or to supply current for an electrical system in a building or structure, unless the required certificate of inspection and permit has been issued by the building official.

2004.2 Exemptions: A permit shall not be required for the execution and use of the classes of work specified in Sections 2004.2.1 through 2004.2.4.

2004.2.1 Repairs and maintenance: Minor repair work, including the replacement of lamps or the connection of approved portable electrical equipment to approved permanently installed receptacles.

2004.2.2 Public service agencies: The installation, alteration or repair of electrical equipment for the operation of communciations and signals or the transmission of intelligence by wire by public service agencies, except as provided in Article 17 for fire alarm systems.

2004.2.3 Power companies: The installation, alteration or repair of electrical equipment of a power or public service company for its use in the generation, transmission, distribution or metering of electricity.

2004.2.4 Temporary testing systems: The installation of any temporary system required for the testing or servicing of electrical equipment or apparatus.

SECTION 2005.0 EXISTING INSTALLATIONS

2005.1 General: Alterations shall not be made to any existing installations of electric wiring or equipment for which a permit is required within or on any building, structure or premises, except as provided in Section 2004.0, without first securing the approval and a permit from the building official.

2005.2 Defective wiring: If, upon inspection, an electric wiring system is found defective and unsafe, the building official shall revoke all certificates and permits in effect. Use of such system shall be discontinued until it has been made to conform to this article and the approved rules and after a new permit has been issued.

2005.3 Additional loads: When additional electrical loads are to be connected to existing service in buildings or structures in other than buildings of Use Group R, the building official may permit actual maximum demand figures to be used to establish the existing load. New loads shall be computed in accordance with the requirements of NFiPA 70 listed in Appendix A.

SECTION 2006.0 EMERGENCY ELECTRICAL SYSTEMS

2006.1 General: Emergency electrical systems are those systems required to automatically supply power for illumination and equipment in the event of failure of the normal power supply. The emergency electrical system shall conform to NFiPA 70 Article 700 listed in Appendix A, except as otherwise provided herein. The systems shall pick up their connected loads within 10 seconds after failure of the normal power supply and shall operate under all weather conditions.

2006.2 Capacity: The emergency systems shall have the capacity to operate equipment such as egress lighting, exit signs, door locks, and any other emergency equipment as required by other sections of this code.

2006.3 Power source: The emergency electrical system may be connected to a standby power system when the load pickup time complies with Section 2006.1 and the standby system is sized for the additional load.

SECTION 2007.0 STANDBY POWER SYSTEMS

2007.1 General: Standby power systems are those intended to automatically supply power to selected loads required by this code, other than those classified as emergency systems, in the event of failure of the normal power source.

Standby power systems shall conform to NFiPA 70 Article 701 listed in Appendix A, except as otherwise provided herein. The systems shall pick up their connected loads within 60 seconds of failure of the normal power supply and shall operate under all weather conditions.

2007.2 Capacity: Standby power systems shall have the capacity and rating to operate equipment such as mechanical systems, fire pumps, signal, lighting, communication, elevators, and other standby equipment as required by other

sections of this code. The capacity and rating shall include the ability to start all rotating equipment from a standing start. The system capacity need not be sized to operate all the connected equipment simultaneously where loads can be manually controlled.

2007.3 Connection of emergency systems: Where an emergency electrical system is connected to the standby power system as provided for in Section 2006.3, the load pickup time for emergency equipment shall comply with Section 2006.1 and the standby system shall be sized for the additional load.

ARTICLE 21

ELEVATOR, DUMBWAITER AND CONVEYOR EQUIPMENT, INSTALLATION AND MAINTENANCE

SECTION 2100.0 GENERAL

2100.1 Scope: Except as may be otherwise provided by statute, the provisions of this article shall control the design, construction, installation, maintenance and operation of all elevators, dumbwaiters, escalators, moving walks and special hoisting and conveying equipment hereafter operated, installed, relocated or altered in all buildings and structures. The design, construction, installation, maintenance and operation of all miscellaneous hoisting and elevating equipment and amusement devices shall be subject to such special requirements as are deemed necessary by the building official to secure their safe operation. The provisions of this article shall not apply to portable elevating devices used to handle materials only, and located and operated entirely within one story. The construction, alteration, maintenance, operation, inspection and tests of manlifts shall comply with ANSI A90.1 listed in Appendix A.

2100.2 Referenced standard: Except as otherwise provided in this code, and except where more restrictive provisions govern, the construction, alteration, maintenance, operation, inspections and tests of elevators, dumbwaiters, moving walks and escalators shall conform to ANSI A17.1 listed in Appendix A.

2100.3 Purpose and exceptions: The purpose of this code is to provide reasonable safety for life and limb. In case of practical difficulty or unnecessary hardship, the building official may grant exceptions from the literal requirements or permit the use of other methods, but only when it is clearly evident that reasonable safety is thereby secured.

SECTION 2101.0 PLANS, SPECIFICATIONS AND PERMITS

2101.1 Application: The person responsible for the installation, relocation, or alteration of any equipment covered by this article shall file an application for permit with the building official, accompanied by governing specifications

and accurately-scaled and fully-dimensioned plans showing: the location of the installation in relation to the plans and elevation of the building; the location of the machinery room and equipment to be installed, relocated or altered; and all structural supporting members thereof, including foundations. Such plans and specifications shall specify all materials to be employed and all loads to be supported or conveyed and shall be sufficiently complete to illustrate all details of construction and design.

2101.2 Permits: Equipment or devices subject to the provisions of this code shall not be constructed, installed, relocated or altered unless a permit has been received from the building official before the work is commenced. A copy of such permit shall be kept at the construction site at all times while the work is in progress.

2101.3 Identification of equipment: In buildings containing more than one elevator or device and where such devices are subject to periodic inspections, each such elevator or device shall be identified by a serial number, in figures not less than 1 inch (25 mm) high, attached to, painted, stenciled or otherwise registered on the crosshead of the elevator car and on the motor or machine; and on devices other than elevators, on the motor or machine. After such devices have been so designated, their numbers shall not be changed, except by permission of the building official, and all correspondence in regard to such device shall refer to said number.

SECTION 2102.0 TESTS AND INSPECTIONS

2102.1 General: All equipment and devices covered by the provisions of this code shall be subjected to acceptance and maintenance tests and periodic inspections as required herein.

2102.2 Acceptance tests: Acceptance tests and inspections shall be required on all new, relocated and altered equipment subject to the provisions of this article. Tests and inspections shall be of such nature as to determine whether the entire installation is designed, constructed and installed in compliance with this code, and shall include all parts of the equipment and machinery. All such tests shall be made in conformance with the requirements of Section 2102.5, in the presence of the building official, by the person installing such equipment.

2102.3 Periodic tests and periodic inspections: Periodic tests shall be required on all new and existing power elevators, and periodic inspections shall be made of all new and existing equipment subject to the provisions of this article.

2102.3.1 Periodic tests: Periodic tests shall be made by the building official, or by an approved agency, and shall be made at the expense and responsibility of the owner. Where such tests are not made by the building official, the approved agency shall submit a detailed report of the tests to the building official on approved forms not more than 30 days following the completion of the tests.

2102.3.2 Periodic inspections: Periodic inspections shall be made by the building official, or by an approved agency. Where such inspections are not made by the building official, the approved agency shall submit a detailed report of the inspection to the building official on approved forms not more than 30 days following the completion of the inspection.

2102.4 Frequency of tests and inspections: Tests and inspections shall be conducted at frequencies specified in Sections 2102.4.1 and 2102.4.2.

2102.4.1 Periodic inspection intervals: Periodic inspections shall hereafter be made at intervals of not more than twelve (12) months for all passenger elevators, manlifts and escalators.

2102.4.2 Periodic test intervals: Periodic tests shall be made at intervals not exceeding those set forth in ANSI A17.1 listed in Appendix A.

2102.5 Minimum requirements for tests and inspections: The minimum requirements for the inspection and test of the devices subject to this article shall conform to this section.

2102.5.1 Elevators, dumbwaiters and escalators: The equipment and machinery of elevators, dumbwaiters and escalators shall be inspected and tested to the requirements of ANSI A17.1 listed in Appendix A.

2102.5.2 Freight lifts, conveyors and amusement devices: Freight lifts, conveyors and amusement devices shall be inspected and subjected to tests to insure the load capacity and safety of operation. The tests shall cover all operating protectives and safety devices, structural adequacy of the supports, and anchorage to floors, walls, ceilings and foundations.

2102.5.3 Manlifts: All equipment and machinery of manlifts shall be inspected and tested to insure reasonable safety of operation and shall include tests of the brake, terminal and emergency stopping devices and belt tension. Acceptance tests shall also include a load capacity test as provided in ANSI A90.1 listed in Appendix A.

2102.5.4 Miscellaneous hoisting and elevating equipment: All miscellaneous hoisting and elevating equipment shall be subjected to such tests and inspections as may be required by the building official to insure safe operation.

SECTION 2103.0 CERTIFICATE OF COMPLIANCE

2103.1 General: The operation of all equipment governed by the provisions of this article and hereafter installed, relocated or altered shall be unlawful by persons other than the installer thereof until such equipment has been inspected and tested as herein required and a final or limited certificate of compliance has been issued therefor by the building official.

2103.2 Final certificate of compliance: The building official shall issue a final certificate of compliance for each unit of equipment which has satisfactorily met all the inspections and tests required by this article. Such final certificate shall bear the signature of the person who made the inspection and tests, and

shall designate the rated load and speed, the date of the acceptance tests and inspections, and the name of the building official who made or witnessed such tests and inspections. The final certificate shall also include the necessary space for inserting the name of the person who made the periodic inspection and witnessed the periodic and maintenance tests and the date of the periodic inspection and the maintenance test.

2103.3 Limited certificate of compliance: The building official may issued a limited certificate of compliance for any equipment covered by this article, which is hereafter being installed, relocated or altered, to permit its limited use by the person designated therein during the period of such installation, relocation or alteration. Such certificate shall be signed by the building official, shall bear the dates of issue, renewal and expiration, and shall designate the class of service allowed.

2103.3.1 Tests and minimum safeguards required: A limited certificate shall not be issued for an elevator until such elevator has satisfactorily passed tests for rated load, car and counterweight safety, and terminal stopping devices. Permanent or temporary guards and enclosures shall be installed on the car, around the hoistway and at the landing entrances. Equipment other than elevators shall be tested and protectives provided as deemed necessary by the building official to insure safe operation for the limited service specified.

2103.3.2 Special conditions: Automatic and continuous-pressure operation elevators shall not be placed in temporary operation from the landing push-buttons unless the door locking device and interlocks required by ANSI A17.1 listed in Appendix A are installed and operative. When the car can be operated only from the inside, landing entrance guards shall be provided with locks that can be released from the hoistway side only.

2103.3.3 Time limitation: Limited certificates of operation shall be issued for periods of not more than 30 days, but may be renewed by the building official for additional periods of not more than 30 days each.

2103.4 Posting certificates of compliance: The owner or lessee shall post the last issued certificate of compliance in a conspicuous place on the elevator available to the building official.

SECTION 2104.0 MAINTENANCE AND ACCIDENTS

2104.1 Owner responsibility: The owner or the owner's legal agent for the building in which the equipment is located shall be responsible for the care, maintenance and safe operation of all equipment covered by this article after the installation thereof and its acceptance by such owner or agent. The owner or legal agent shall make or cause to be made all periodic tests and inspections, and shall maintain all equipment in a safe operating condition, as required by this article.

2104.2 Contractor responsibility: The person installing any device covered by this article shall make all acceptance tests and be responsible for the care and

safe operation of such equipment during its construction and until temporarily or finally accepted by the building owner or the owner's legal agent.

2104.3 Maintenance items: All operating and electrical parts and accessory equipment or devices subject to this article shall be maintained in safe operating condition. The maintenance of elevators, dumbwaiters and escalators shall conform to ANSI A17.1 listed in Appendix A.

2104.4 Unsafe conditions: If upon inspection, any equipment covered in this article is found in an unsafe condition, or not in accordance with the provisions of this code, the building official shall thereupon serve a written notice of such finding upon the building owner or lessee, stating the time when recommended repairs or changes shall be completed. After the service of such notice, it shall be the duty of the owner to proceed within the time allowed to make such repairs or changes as are necessary to place the equipment in a safe condition. It shall be unlawful to operate such equipment after the date stated in the notice unless such recommended repairs or changes have been made and the equipment has been approved by the building official, or unless an extension of time has been secured from the building official in writing.

2104.4.1 Power to seal equipment: The building official, in addition to any other penalties herein provided, shall have the power to seal out of service any device or equipment covered by this article when in case of emergency in the opinion of the building official, such device is in a condition to render it unsafe for operation; or for willful failure to comply with recommendations and orders.

2104.4.2 Notice of sealing out of service: Before sealing any device out of service, the building official, except in case of emergency, shall serve written notice upon the building owner or lessee stating intention to seal the equipment out of service and the reasons therefor.

2104.4.3 Unlawful to remove seal: Any device sealed out of service by the building official shall be plainly marked with a sign or tag indicating the reason for such sealing. Any tampering with, defacing or removal of the sign, tag or seal without approval of the building official shall constitute a violation of this article.

2104.5 Accidents reported and recorded: The owner of the building shall immediately notify the building official of every accident involving personal injury or damage to apparatus on, about or in connection with any equipment covered by this article, and shall afford the building official every facility for investigating such accident. When an accident involves the failure, breakage, damage or destruction of any part of the apparatus or mechanism, it shall be unlawful to use such device until after an examination by the building official is made and approval of the equipment for continued use is granted. It shall be the duty of the building official to make a prompt examination into the cause of the accident and to enter a full and complete report thereof in the records of the building department. Such records shall be open for public inspection at all reasonable hours.

2104.6 Removal of damaged parts: It shall be unlawful to remove from the premises any part of the damaged construction or operating mechanism of elevators, or other equipment subject to the provisions of this article, until permission to do so has been granted by the building official.

SECTION 2105.0 EXISTING INSTALLATIONS

2105.1 Retroactive provisions: The provisions of this article are not retroactive except as specifically provided hereunder; and except further that if, upon inspection of any device covered by this code, the equipment is found in a dangerous condition, or there is an immediate hazard to those riding on or using such equipment, or if the design or the method of operation in combination with devices used is considered inherently dangerous in the opinion of the building official, the building official shall notify the owner or lessee in writing of the existing condition and shall recommend such alterations or additions as may be deemed necessary to eliminate the dangerous situation.

2105.2 Projections into hoistway: All ledges, floor beams, saddles, timbers and other projections, that project more than 2 inches (51 mm) from the inside of the general surface of the hoistway enclosure shall be fitted with smooth beveled guards set directly over the entire length of the projection, except door interlocks and contacts, door closers, door tracks and hangers, and door operating or signal devices in front of car openings, landing sills and separator beams between adjacent elevators. The angle of the bevels or guard plates shall be not less than 60 degrees (1.05 rad) from the horizontal.

2105.3 Emergency interlock release switch: Emergency interlock release switches are prohibited.

2105.4 Lighting: The cars and entrances of all elevators shall be properly lighted at all times when in service. Minimum illumination shall be not less than 5 foot candles (53.82 lux) at the landing edge of the platform.

2105.5 Belt and chain-driven machines: Single-belted and chain-driven machines are permitted only on freight elevators, and only when equipped with electrically released spring-applied brakes and with terminal stopping and electrical safety devices required for new electric elevators. The brakes shall be applied directly to the hoisting machine and shall be arranged to operate automatically if the driving belt or chain breaks or comes off. Double-belted elevator machines are permitted only on freight elevators and when driven by a line shafting which is used to apply power for other purposes.

2105.6 Replacement or relocation of gate switches or interlocks: The building official may require the replacement or relocation of car gate electric contacts, safety cutout switches or interlocks where such devices are found to be tied or blocked so as to render them inoperative.

2105.7 Removal of pipes from hoistway: The building official may order the removal from existing elevator hoistways of any pipe conveying gases, vapors or liquids which might endanger life if discharged into the hoistway or ignited.

2105.8 Existing passenger elevators: In addition to other provisions of this section, existing passenger elevators shall comply with Sections 2105.8.1 through 2105.8.5.

2105.8.1 Hoistway enclosure: All existing passenger hoistways shall be fully enclosed from floor to ceiling on all floors to comply with Section 2108.0.

2105.8.2 Hoistway doors and interlocks: All existing electric and electrically controlled and operated hydraulic passenger elevators equipped with mechanical locks and electrical contacts in good operating condition may be continued in their present form. If not so equipped, such passenger elevators shall be provided with hoistway landing doors equipped with approved interlocks conforming to the requirements for new elevators; except that approved interlock switches may be installed in connection with existing hoistway door closers, provided the combination door closer and interlocks conform to all the requirements for approved interlocks, except as to the required tests. The use of service and emergency keys for opening hoistway doors from the landing shall conform to the requirements of ANSI A17.1 listed in Appendix A.

2105.8.3 Car doors and gates: All openings on existing passenger elevator cars shall be provided with doors or gates. Car doors and gates of electric or electrically controlled and operated hydraulic passenger elevators shall be provided with approved car door or gate electric contacts conforming to ANSI A17.1 listed in Appendix A.

2105.8.4 Hydraulic passenger elevators: Hydraulic passenger elevators, except those equipped with electric control and operating devices, shall be provided with self-closing hoistway doors arranged to lock automatically when closed in lieu of interlocks. Car doors or gates on electric or electrically controlled and operated hydraulic elevators shall be equipped with car door or gate electric contacts conforming to the requirements for new elevators.

2105.8.5 Emergency signal or telephone: Existing power passenger and freight elevators shall be provided with emergency signal devices conforming to the requirements of ANSI A17.1 listed in Appendix A.

2105.9 Existing freight elevators: In addition to other provisions of this section, existing freight elevators shall comply with Sections 2105.9.1 through 2105.9.5.

2105.9.1 Hoistway enclosure: If not now enclosed, enclosures shall be required on existing freight elevators as required for existing passenger elevators in Section 2105.3, except as provided in Section 2105.9.3.

2105.9.2 Hoistway doors: All landing openings in existing electric or electrically controlled and operated hydraulic freight elevator hoistways which are enclosed in fireresistance rated partitions shall be provided with fire doors equipped either with approved hoistway door interlocks, or approved hoistway door electric contacts and mechanical locks conforming to ANSI A17.1 listed in Appendix A, or with fusible links and automatic self-closing devices.

2105.9.3 Landing gates: Where automatic self-closing landing doors with fusible links are used, or where fireresistance rated hoistway enclosures are not required, the landing openings of electric or electrically controlled and operated hydraulic elevators shall be equipped with landing gates not less than 5½ feet (1676 mm) high and provided with either hoistway gate interlocks or hoistway gate electric contacts and mechanical locks conforming to ANSI A17.1 listed in Appendix A.

2105.9.4 Hydraulic freight elevators: Interlocks or electric contacts shall not be used on hydraulic elevator landing doors or gates, except where such elevators are provided with electric control and operating devices; and provided further that the landing openings of such elevators shall be equipped with self-closing gates at least 5½ feet (1676 mm) high with approved mechanical locks. Full automatic gates shall be prohibited. Semi-automatic gates shall be prohibited, except on hydraulic elevators with mechanical control and operating devices.

2105.9.5 Gates on cars: All openings on existing electric or electrohydraulic freight elevator cars, except the opening immediately adjacent to the operating device, shall be provided with car gates and car gate electric contacts when the distance between the hoistway side of the landing door adjacent to such opening and the hoistway edge of the landing threshold is more than 4 inches (102 mm). All such elevators using lever, wheel or cable operating devices shall have car gates and car gate contacts installed at all car openings. All openings on existing continuous-pressure or automatic operation freight elevator cars that can be operated from the landings shall be provided with car gates and car gate electric contacts. Existing sidewalk elevators shall not be subject to the provisions of this section. Car gate electric contacts shall be of an approved type conforming to ANSI A17.1 listed in Appendix A.

SECTION 2106.0 ALTERATIONS

2106.1 General: Alterations to existing elevators shall conform to ANSI A17.1 listed in Appendix A. Alterations to all other devices subject to this article shall conform to such requirements as the building official deems necessary for safe operation.

2106.2 Relocated equipment: The relocation of an existing installation of any device covered by this article shall be deemed to be a new installation and shall conform to the requirements therefor.

SECTION 2107.0 POWER ELEVATOR OPERATION

2107.1 Designated operator: Every power elevator, except automatic and continuous-pressure operation types and sidewalk elevators, shall be in the charge of a competent designated operator.

2107.2 Emergency operation of elevators: In all structures where elevators are to be installed, elevator emergency operation shall be provided in accordance with the requirements of ANSI A17.1 listed in Appendix A and Sections 2107.2.1 through 2107.2.3.

2107.2.1 Buildings with elevator service: In all buildings and structures serviced by an elevator, at least one elevator shall be provided with a minimum clear distance between walls, or between wall and door excluding return panels, not less than 68 inches by 54 inches (1727 mm by 1372 mm), and a minimum distance from wall to return panel not less than 51 inches (1295 mm). The minimum clear width of the door shall be 32 inches (813 mm).

2107.2.2 Elevators for fire department use: In all structures where elevator service is required for fire department use (see Section 618.8), at least one elevator shall be provided with a minimum distance between walls, or between wall and door excluding return panels, not less than 80 inches by 54 inches (2032 mm by 1372 mm) and a minimum distance from wall to return panel not less than 51 inches (1295 mm), with a 42 inch (1067 mm) side-slide door to allow for turning a wheelchair or accommodating an ambulance stretcher in its horizontal position.

2107.2.3 Elevator operator: In every structure over 150 feet (45720 mm) in height, a competent elevator operator shall be available at all times to assist the fire department in obtaining access to any floor in the building or structure served by elevators except where an automatic or continuous-pressure operation elevator is available.

2107.3 Passenger restriction: Freight elevators shall be subject to the passenger restrictions indicated in Sections 2107.3.1 and 2107.3.2.

2107.3.1 Freight operators: Except as provided in Section 2107.3.2, it shall be unlawful for any person other than the operator or those individuals necessary to handle freight to ride on any elevator other than a passenger elevator. It shall be unlawful for the owner or other responsible person to permit any individual or other than above specified to ride on any elevator other than a passenger elevator.

2107.3.2 Other employees: Employees of the owner may ride on a freight elevator, subject to approval of the building official and the requirements of ANSI A17.1 listed in Appendix A.

2107.4 Use by handicapped persons: If interior access in multi-story buildings is provided by elevator(s), they shall conform with the requirements of ANSI A117.1 listed in Appendix A. *

SECTION 2108.0 HOISTWAY ENCLOSURES AND VENTING

2108.1 Hoistway enclosures: Hoistway enclosures shall be constructed in accordance with Sections 2108.1.1 through 2108.1.3.

2108.1.1 Elevator enclosures: All elevator and other hoistway enclosures other than dumbwaiter shafts shall be constructed to afford at least the fireresistance rating specified in Table 401 with approved opening protectives conforming to Section 2111.0 and Article 14.

2108.1.2 Dumbwaiter enclosures: Shaft enclosures and dumbwaiters having a car area of more than 3 square feet (0.28 m^2) which travel through more than

one story and serve more than two adjacent floors shall be of 1 hour fireresistance rated construction with approved ¾ hour opening protectives or the approved labeled equivalent complying with Article 14, except that when the load capacity exceeds 100 psf (488.2 kg/m²) the enclosure and opening protectives shall comply with the requirements of Section 2108.1.1 for fireresistance rating.

2108.1.3 Special dumbwaiter enclosures: The enclosure of dumbwaiters not more than 3 square feet (0.28 m²) in area with a load capacity of not more than 25 pounds (11.35 kg), and all dumbwaiters serving not more than two adjacent levels, shall be enclosed with approved noncombustible materials.

2108.2 Number of elevators permitted in hoistway: Where four or more elevators serve all or the same portion of a building, they shall be located in not less than two hoistways, and more than four elevators shall not be located in any one hoistway.

2108.3 Vents required: Hoistways of elevators and dumbwaiters serving more than three stories shall be provided with means for venting smoke and hot gases to the outer air in case of fire, except as listed in Sections 2108.3.1 and 2108.3.2.

Exception: Venting of hoistways is not required in a building equipped with a smoke control system that will restrict smoke and hot gases from entering the elevator shaft on the fire floor.

2108.3.1 Fire suppression system alternative: In buildings other than Use Groups R-1, R-2, I-1 and I-2 and similar buildings with overnight sleeping quarters, hoistways not extending into the top story may be provided with an approved automatic fire suppression system connected to the building water supply system or conforming to Section 1704.0 in lieu of the required vents.

2108.3.2 Sidewalk elevator hoistways: Sidewalk elevator hoistways are not required to be vented.

2108.4 Location of vents: Vents shall be located in the side of the hoistway enclosure directly below the floor or floors at the top of the hoistway, and shall open either directly to the outer air or through noncombustible ducts to the outer air. Cable slots entering the machine room shall be sleeved beneath the machine room floor and extended to not less than 12 inches (305 mm) below the shaft vent to inhibit the passage of smoke into the machine room.

2108.5 Area of vents: Except as herein provided, the area of the vents shall be not less than 3½ percent of the area of the hoistway nor less than 3 square feet (0.28 m²) for each elevator car, and not less than 3½ percent nor less than ½ square foot (0.047 m²) for each dumbwaiter car in the hoistway whichever is greater. Of the total required vent area, not less than one-third shall be of the permanently open type. Where mechanical ventilation conforming to the mechanical code listed in Appendix A and providing equivalent venting is provided in the overhead elevator machine room, the required vent area may be reduced, provided the conditions of Sections 2108.5.1 through 2108.5.4 are met.

2108.5.1 Restricted use: The building is not of Use Groups R-1, R-2, I-1 or I-2 or a similar building with overnight sleeping quarters.

2108.5.2 Machine room location: The machine room is so located that it does not have outside exposure.

2108.5.3 Hoistway extension: The hoistway does not extend to the top story of the building.

2108.5.4 Exhaust fan operation: The machine room exhaust fan is automatically reactivated by thermostatic means.

2108.6 Closed vents: Closed portions of the required vent area shall consist of windows, skylights or duct openings glazed with plain glass not more than ⅛ inch thick.

2108.6.1 Skylights: Skylights used as required vents shall conform to Section 1428.0.

2108.6.2 Windows: Windows used as required vents shall conform to Section 1416.0, except that they shall be glazed with ⅛ inch plain glass. *

SECTION 2109.0 ELEVATOR AND DUMBWAITER MACHINERY AND EQUIPMENT

2109.1 General: Elevator and dumbwaiter machinery and equipment shall conform to ANSI A17.1 listed in Apppendix A.

SECTION 2110.0 MACHINE ROOMS AND RELATED CONSTRUCTION FOR PASSENGER AND FREIGHT ELEVATORS AND DUMBWAITERS

2110.1 General: The construction of machine rooms and related construction for passenger and freight elevators and dumbwaiters shall be protected from the weather, and shall be enclosed with fireresistive enclosures. Enclosures and access doors thereto shall have a fire endurance at least equal to that required for the hoistway enclosure in Table 401.

SECTION 2111.0 ELEVATOR OPENING PROTECTIVES

2111.1 General: All hoistway enclosure doors for elevators, dumbwaiters and other hoisting equipment shall be constructed in accordance with the provisions of Article 14 and as herein required.

2111.2 Hoistway doors: Door openings of elevator hoistway enclosures shall be equipped with protective assemblies having a fireresistance rating of not less than 1½ hours or their approved labeled equivalent. However, when the shaft opens into a vestibule enclosed with not less than 2 hour fireresistance rated construction in which all vestibule openings are protected with assemblies having a fireresistance rating of not less than 1 hour, the fireresistance rating of the hoistway doors may be reduced to ¾ hour.

2111.3 Hardware: All hardware on opening protectives shall be of an approved type installed as tested, except that interlocks, mechanical elevator door locks and electric contacts and door operating mechanisms of approved types shall be exempt from the fire test requirements.

2111.4 Door operation on dangerous floors: In every structure where elevator emergency operation is provided in accordance with Section 2107.2, each elevator lobby and associated elevator machine rooms shall be provided with a smoke detector installed in accordance with NFiPA 72E listed in Appendix A. A designated level, which shall be the main floor level or other level that best serves the needs of emergency personnel for fire fighting or rescue purposes, shall be approved by the building and fire officials. The activation of a smoke detector in any elevator lobby other than the designated level, or in any associated machine room, shall cause all cars in all groups that serve that lobby or are served by that machine room to return nonstop to the designated level. If a smoke detector at the designated level is activated, the cars shall return to an approved alternate level. Manual control to override the smoke detectors shall be provided at the designated level in accordance with ANSI A17.1 listed in Appendix A. The smoke detector is to operate before the optical density exceeds 0.03 per foot (0.098 per m). The detector may serve to close the lobby doors.

Exception: Freight elevators located in or at openings into industrial areas.

SECTION 2112.0 ELEVATOR CAR EMERGENCY SIGNALS AND SIGNS

2112.1 Emergency signals: Elevator cars shall be provided with car emergency signals conforming to the requirements of ANSI A17.1 listed in Appendix A.

2112.2 Emergency signs: A pictograph sign, of a standarized type approved by the building official, shall be posted over each elevator call station on all floors, indicating that in case of fire occupants shall not use elevators and that stairways are the approved method of exit.

SECTION 2113.0 MANLIFTS

2113.1 Restricted use: Manlifts shall be accessible and their use shall be restricted to employees only. They shall comply with the applicable requirements of this article and shall be installed only when permitted by the building official in feed, flour and cereal mills, grain elevators and in similar buildings of other use groups.

2113.2 Enclosures: When the clear vertical distance between mounting platform and ceiling guard is less than 7½ feet (2286 mm), the manlift shall be completely enclosed to comply with Section 2108.0 without access openings.

2113.3 Accessibility: Entrances to manlifts shall not be provided from any floor or level with a clear ceiling height of less than 9 feet (2783 mm), and the minimum clearance between the head pulley and the roof or other overhead obstruction shall be not less than 5 feet (1524 mm).

2113.4 Speed: The speed of manlifts shall not exceed 80 feet per minute (0.406 m/s) except by special approval of the building official.

2113.5 Manlift safeties: Manlift safeties shall conform to Sections 2113.5.1 through 2113.5.3.

2113.5.1 Manlift manual stops: An approved manually operated stopping device shall be provided to permit passengers riding on a manlift to control the operation of the lift at all floors and at any level in the travel of the device.

2113.5.2 Manlift automatic stops: An approved safety device shall be provided which will automatically stop the lift in the event that a rider fails to alight at the top landing but such automatic device shall not be capable of restoring the operating circuit when it has been interrupted for any cause.

2113.5.3 Secondary manlift stop: All new installations shall be provided with a secondary safety stop to act immediately after and in the event of a failure of the automatic stop brake or other device required in Section 2113.5.2.

2113.6 Manlift construction: Manlifts shall be constructed in accordance with Sections 2113.6.1 through 2113.6.6.

2113.6.1 Floor openings: Floor openings shall be circular and not less than 24 inches (610 mm) in dimension from belt to perimeter. The floor openings shall be provided with bevel guards underneath the landing with a slope of not less than 45 degrees (0.79 rad) from the horizontal, extending not less than 42 inches (1067 mm) back from the handhold.

2113.6.2 Guards: The floor opening shall be protected with a railing or guard of metal or other approved noncombustible material at least 42 inches (1067 mm) in height on the up-running side and 66 inches (1676 mm) in height on the down-running side, located not more than 12 inches (305 mm) from the edge of the opening.

2113.6.3 Entrance and exit: The entrance to and egress from the manlift shall be equipped with a gate at all floors and landings, hung to swing away from the opening and located not less than 2 feet (610 mm) from the floor openings. The landings shall be constructed to provide safe footing and shall be kept clear of obstructions and lighted to an intensity of not less than 3 foot candles (32.29 lux). The runs of the manlift shall be illuminated throughout the entire height to an intensity of not less than 1 foot candle (10.76 lux).

2113.6.4 Steps: Manlift steps shall be uniform in size and not less than 12 inches (305 mm) nor more than 14 inches (356 mm) deep from the plane of the belt to the edge of the tread. Steps shall be of adequate strength to support a load of 400 pounds (181.6 kg). The vertical distance between step treads shall be not less than 16 feet (4877 mm).

2113.6.5 Belts: All manlift belts shall be of approved types, not less than 12 inches (305 mm) wide and of adequate strength to support a load of 200 pounds (90.8 kg) on each step of one run without loss of traction.

2113.6.6 Handholds: Manlift handholds shall be located not less than 4 feet (1219 mm) nor more than 4 $^{2}/_{3}$ feet (1422 mm) above each step tread on both runs of the manlift with a 2 inch (51 mm) clearance from the belt. Such handholds shall be not less than 9 inches (229 mm) in length in the clear.

2113.7 Final acceptance: All manlifts shall be subject to acceptance by the building official and periodic tests and inspections as provided in Section 2102.0.

2113.8 Manlift instruction signs: Manlift instruction signs shall be provided in accordance with Sections 2113.8.1 and 2113.8.2.

2113.8.1 Landing signs: Approved signs shall be provided on each landing and stenciled on the belt at approximately eye level above each step giving the following instructions: *For Employes Only. Face the Belt. Use the Handhold. To Stop, Pull Rope.*

2113.8.2 Terminal sign: The top landing shall be provided with an illluminated warning sign in block letters not less than 2 inches (51 mm) high which shall be located within easy view of ascending passengers at a level of not more than 2 feet (610 mm) above the top landing, reading: *Top Floor, Get Off.*

SECTION 2114.0 INDUSTRIAL LIFTS AND LOADING RAMPS

2114.1 General: Except as exempted by Section 2100.0 or as may be otherwise provided by statute, the provisions of this section and Section 2115.0 shall control the design, construction, installation, maintenance and operation of all automotive lifts, industrial lifts and loading dock ramps hereafter installed, relocated or altered in all buildings or structures. The purpose of this code is to provide safety for life and limb. In case of practical difficulty or unnecessary hardship, the building official may grant exceptions from the literal requirements or permit the use of other methods, but only when it is evident that safety is hereby secured.

2114.2 General requirements: Industrial lifts and loading ramps shall comply with the requirements of Sections 2114.2.1 through 2114.2.3.

2114.2.1 Markings and labels: All material lifts and loading ramps shall be marked with the name of manufacturer, model number, serial number, and rated capacity. Such markings shall be legibly stamped or etched on a metal plate which shall be permanently secured in a convenient place for inspection. Such data plates shall not be obscured, obliterated or changed.

2114.2.2 Controls: The controls shall be so located that the operator has a full and unobstructed view of the lift area at all times. All control devices shall be accessible to the operator without exposing him to danger. Alterations or changes shall not be made in the control device, or its manner of use, which will render its normal functioning inoperative.

2114.2.3 Lift control: When the device used for controlling the travel of the lift in either direction is not continuous-pressure or deadman type, an emergency stop button shall be provided and so located as to be readily accessible to the operator at all times.

2114.3 Maintenance: Maintenance of industrial lifts and loading ramps shall be provided in accordance with Sections 2114.3.1 through 2114.3.3.

2114.3.1 Owner responsibility: The owner or the owner's agent shall be responsible for the care, maintenance, and safe operation of all equipment covered by this article after the installation thereof and its acceptance by such owner or agent or its approval by the building official. The owner or agent shall not permit the equipment to be used unless it is, to the best of such owner's or agent's knowledge, in safe operating condition.

2114.3.2 Housekeeping: The spaces around or beneath the equipment shall be kept clean. Rubbish or oil shall not be allowed to accumulate therein, nor shall any part of this space be used for storage of materials or equipment. All parts, except those requiring freedom of movement, shall be kept tight at all times. All mechanical working parts shall be kept free of rust, and properly lubricated and adjusted. The owner, or the owner's agent, shall be responsible for inspecting the oil level in all hydraulic systems to insure that it is at or above the manufacturer's prescribed minimum level.

2114.3.3 Lighting: The entire operating area shall be illuminated to provide a distributed intensity of not less than 3 foot candles (32.29 lux) over the area of operating floor and platform.

2114.4 Pressure tanks: All separate tanks for liquid storage under pressure, not an integral part of the cylinder assembly, shall conform to the provisions of ASME *Code for Unfired Pressure Vessels* listed in Appendix A and shall be marked with a securely attached metal label to indicate the approved operating pressure. For hydropneumatic systems, the storage capacity shall be such that with the lift in fully elevated position there shall remain not less than 3 inches (76 mm) of usable oil in the storage tank. Adequate means shall be provided to determine that the oil level in reservoir, with lift in the lowest position, is at or above the safe minimum operating level as prescribed by the manufacturer.

2114.5 Design and construction: The construction and installation of all power industrial lifts and loading ramps shall comply with the provisions of this section and ANSI A10.5 listed in Appendix A.

2114.5.1 Rated load: The lifting capacity shall be not less than 50 psf (244.1 kg/m^2) for gross platform area.

2114.5.2 Platform construction: The platform and its supports shall be designed for the loads to be transmitted within strength and deflection limitations such that when one-half the capacity load is applied as a static center concentration within 12 inches (305 mm) of the loading edge, the lift platform shall not deflect more than ½ inch (13 mm) at any edge point.

2114.6 Platform and hoist protection: Platform and hoist protection shall be provided in accordance with Sections 2114.6.1 through 2114.6.4.

2114.6.1 Unprotected space not more than 5 feet: When the lift rise is such that the unprotected vertical distance from the landing to the bottom edge of the vertical side of the platform is not more than 5 feet (1524 mm), protection shall be provided as described in Sections 2114.6.1.1 through 2114.6.1.3.

2114.6.1.1 Toe guards: A toe guard plate not less than 8 inches (203 mm) in width shall be provided on all unprotected sides. It shall be made of steel, not less than No. 11 Manufacturers' Standard Gage (0.120 in.) in thickness, attached flush with the vertical edge of the platform, and slanted inwardly at an angle of approximately 30 degrees (0.52 rad) from the vertical. Skirts may be used in lieu of toe guards.

2114.6.1.2 Skirts: For automatic operation, the unprotected sides of the platform shall be provided with metal or wood sheathing or skirts attached to the platform to protect the exposed vertical openings.

2114.6.1.3 Enclosures: When toe guard or skirt protection is not provided, the unprotected sides may be provided with solid or mesh enclosures to the full height of the lift rise. Mesh enclosure shall, by test, reject a 2 inch (51 mm) ball.

2114.6.2 Unprotected space more than 5 feet: When the unprotected space exceeds that set forth in Section 2114.6.1, protection shall be provided as described in Sections 2114.6.2.1 and 2114.6.2.2.

2114.6.2.1 Loading or unloading side: Sides used for loading or unloading at the lower level shall be protected with skirts as described in Section 2114.6.1, or by a landing gate with electrical contact, or an automatic landing gate.

2114.6.2.2 Other sides: Sides not used for loading or unloading shall be protected with skirts or enclosures as described in Section 2114.6.1.

2114.6.3 Lift rise more than 5½ feet: When the lift rise exceeds 5½ feet (1676 mm) above the lowest level, additional protection shall be provided as described in Sections 2114.6.3.1 and 2114.6.3.2.

2114.6.3.1 Landing gate: The upper landing shall be provided with a landing gate equipped with mechanical lock and electrical contact.

2114.6.3.2 Enclosure: The sides of the platform not used for loading or unloading shall be provided with railings, mesh, or solid enclosures not less than 3½ feet (1067 mm) high.

2114.6.4 Surface installations: When the lift is surface mounted, toe clearance space shall be provided on all unprotected sides. Such toe clearance shall provide not less than 3 inches (76 mm) vertical and 4 inches (102 mm) horizontal clearance when the platform is at its lowest position.

2114.7 Platform protection, loading ramps: The sides or edges of loading ramps which rise above the surrounding platform shall be provided with skirts or toe guards protecting the opening under the sides of the ramp.

2114.8 Overload protection: Overload protection shall be provided in accordance with Sections 2114.8.1 and 2114.8.2.

2114.8.1 Electric hydraulic operation: Hydraulic overload protection shall be provided by means of a relief valve that will prevent raising of the elevating device when it is loaded to 125 percent of rated capacity. The relief valve shall be so designed that its operation will not cause the platform to lower.

2114.8.2 Electric operation: Electric overload protection shall be provided by means of a thermal cutout or other suitable device.

SECTION 2115.0 AUTOMOTIVE LIFTS

2115.1 General: All electric, hydraulic and hydropneumatic automotive lifts shall comply with the requirements of Section 2106.0 and ANSI B153.1 listed in Appendix A.

2115.2 Types: Lifts shall be classified as semi-hydraulic, full hydraulic or mechanical lifts according to their operation as described in Sections 2115.2.1 through 2115.2.3.

2115.2.1 Semi-hydraulic hydropneumatic: A semi-hydraulic lift is an automotive lift of the plunger type which employs compressed air as the primary lifting and load-sustaining agent; such compressed air acts continuously against a column of liquid to provide the lifting and load-sustaining effort.

2115.2.2 Full-hydraulic: A full-hydraulic lift is an automotive lift of the plunger type that employs a liquid under pressure as the direct lifting and load-sustaining agent. Such a lift is so designed and constructed that the full weight of the load and lifting assembly rests on a continuous column of liquid which extends from the cylinder to the liquid control valve.

2115.2.3 Mechanical lifts: A mechanical lift is an automotive lift so designed that the motive power is transmitted to the lifting frame by mechanical means. There are three principal types: cable and drum; rack and pinion; and screw type.

2115.3 Safeties: All mechanical automotive lifts shall be equipped with approved safeties as specified in Sections 2115.3.1 through 2115.3.3.

2115.3.1 Limit stop: Every mechanical automotive lift shall be equipped with an automatic overtravel device to stop the motor or drive machine before the lifting frame reaches safe limits of travel.

2115.3.2 Holding brake: When the friction of the gear train of the driving mechanism is insufficient to hold the load, the mechanical automotive lift shall be equipped with a brake or other locking device to automatically hold the lift at any level immediately on failure of the lifting power for any cause.

2115.3.3 Stopping brake: When the structural members of the lifting frame are so designed that they interfere with open doors or other projections from the vehicle, the automotive lift shall be provided with a quick acting automatic brake to stop the ascent of the lift in case of emergency.

2115.4 Controls: Controls shall be provided in accordance with Sections 2115.4.1 and 2115.4.2.

2115.4.1 Automatic release: The direct control device shall be of a type that will automatically return itself to the neutral or off position upon release by the operator.

2115.4.2 Speed control: A speed control device shall be provided to control the descent of the lift at a speed of not more than 20 feet per minute (0.10 m/s) under rated load.

SECTION 2116.0 CONVEYORS

2116.1 Enclosures: All package elevators, boosters or lifts connecting successive floors or levels shall be enclosed in fireresistance rated construction in conformance with the requirements of Sections 2108.0 and 2110.0 and Article 14.

2116.2 Opening protectives: Opening protectives shall be provided in accordance with Sections 2116.2.1 through 2116.2.3.

2116.2.1 Plans and specifications: Whenever conveyor or other material handling devices are designed to pass through floors, ceilings, partitions or walls, the plans and specifications shall give the necessary details of the opening protectives in respect to location, structural strength and fireresistance rating.

2116.2.2 Fire curtains: Openings in partitions and walls through which conveyors pass shall have automatic fire dampers or curtains to prevent the spread of fire when, in the opinion of the building official, such protection is necessary due to the hazard of operation of the conveyors.

2116.2.3 Fire doors: All opening protectives shall meet the fireresistance rating requirements of Article 14 for the location, type of construction and use of the building or structure.

2116.3 Machinery guards: All conveying devices shall be manufactured, installed, and guarded in accordance with ANSI B20.1 listed in Appendix A.

2116.4 Chute enclosures: All slides and chutes shall be enclosed with fireresistance rated construction, or protected with approved automatic shutters of noncombustible construction, to insure a full firestop between floors of the building or structure.

2116.5 Conveyor safeties: All power-operated conveyors, belts and other material moving devices shall be equipped with automatic limit switches which will shut off the power in an emergency and automatically stop all operation of the device.

SECTION 2117.0 ESCALATORS

2117.1 General: All escalators and their enclosures shall comply with the provisions of this section and ANSI A17.1 listed in Appendix A. When serving as a required exit element, escalators shall meet the additional requirements of Section 820.0.

2117.2 Construction materials: Escalator construction materials shall comply with the provisions of Sections 2117.2.1 and 2117.2.2.

2117.2.1 Machine room enclosure: When not approved as a required exit element, the stairwell may be open when protected with an exhaust system or ventilation and water curtains as provided in Section 620.3, or with a power operated shutter conforming to Section 2117.3; except that the machine room shall be enclosed with 1 hour fireresistance rated construction and shall be properly lighted and ventilated. When such escalator serves as a required exit element, the complete enclosure including the machine room shall be constructed with a fireresistance rating complying with the requirements of Section 816.0 for interior stairways.

2117.2.2 Noncombustible materials: The escalator shall be constructed entirely of noncombustible and fire-retardant materials except electrical equipment, wiring, wheels, handrails and the use of 1/28 inch wood veneers on balustrades backed up with noncombustible materials.

2117.3 Automatic fire shutter: Unenclosed escalators that do not meet the requirements of Article 8 for exit stairways and which are not protected as specified in Section 620.3 shall be equipped with a power-operated automatic shutter at every floor pierced thereby, constructed of noncombustible materials with a fireresistance rating of not less than 1½ hours.

2117.3.1 Construction: The shutter shall close immediately upon the automatic detection of fire or smoke by an approved device and shall completely shut off the well opening. The shutter shall operate at a speed of not more than 30 feet per minute (0.15 m/s) and shall be equipped with a sensitive leading edge to arrest its progress when in contact with any obstacle, and to continue its progress on release therefrom.

ARTICLE 22

PLUMBING SYSTEMS

SECTION 2200.0 GENERAL

2200.1 General: See Kentucky State Plumbing Code for all the requirements for plumbing installations as set forth in Chapter 20, Title 815 of Kentucky Administrative Regulations. Informational copies are available from the Kentucky Division of Plumbing, U.S. 127 South, Frankfort, Kentucky 40601.

ARTICLE 23

LIGHT-TRANSMITTING PLASTIC CONSTRUCTION

SECTION 2300.0 GENERAL

2300.1 Scope: The provisions of this article shall govern the quality and methods of application of plastics for use as light-transmitting materials in buildings and structures. When used as interior finish, plastic materials shall meet the requirements of Section 1421.0.

2300.2 Approved materials: The use of all plastics which meet the strength, durability, sanitary and fireresistive requirements of this code, ASTM D635, ASTM D1929, ASTM D2843 and ASTM E84 listed in Appendix A shall be permitted subject to the limitations of this article.

2300.2.1 Approved plastic: An approved plastic shall be any thermoplastic, thermosetting, or reinforced thermosetting plastic material which has a self-ignition temperature of 650 degrees F. (343.33 degrees C.) or greater when tested in accordance with ASTM D1929 listed in Appendix A, a smoke density rating not greater than 450 when tested in the manner intended for use by ASTM E84 listed in Appendix A or not greater than 75 when tested in the thickness intended for use according to ASTM D2843 listed in Appendix A, and which meets one of the following combustibility classifications:

Class C 1: Plastic materials which have a burning extent of 1 inch (25 mm) or less when tested in nominal .060 inch thickness, or in the thickness intended for use, by ASTM D635 listed in Appendix A; or

Class C 2: Plastic materials which have a burning rate of 2.5 inches per minute (1.06 mm/s) or less when tested in nominal .060 inch thickness, or in the thickness intended for use, by ASTM D635 listed in Appendix A.

2300.2.2 Application for approval: Applicants for approval of a plastic material shall furnish, in accordance with Section 1104.0, all necessary technical data required by the building official. The data may include the chemical composition; pertinent physical, mechanical and thermal properties such as fireresistance, flammability, and flame spread; weather resistance; electrical properties; products of combustion and coefficients of expansion.

2300.3 Identification: All plastic materials approved for use under this code shall be identified by the trade formula number or name or other acceptable

identification. Each unit or package shall bear the approval number or other identification mark of the approving authority.

SECTION 2301.0 DESIGN AND INSTALLATION

2301.1 Structural requirements: All plastic materials and their assemblies shall be of adequate strength and durability to withstand the loads and forces specified in Articles 9 and 10 for their approved use.

2301.2 Connections and supports: All fastenings, connections and supports shall be proportioned to safely transmit two and one-half times the design live load. Adequate allowance shall be made in the fastenings and supports for differential expansion and contraction of the connected materials.

SECTION 2302.0 GLAZING OF UNPROTECTED OPENINGS

2302.1 Use in Type 5B construction: Doors, sash and framed openings which are not required to be fireresistance rated may be glazed with approved plastic materials in buildings of Type 5B construction.

2302.2 Use Group F: In buildings of all types of construction of Use Group F, doors, sash and framed openings which are not required to be fireresistance rated may be glazed with approved plastic materials.

2302.3 Other types of construction and use groups: In other types of construction and use groups, such openings not required to be fireresistance rated by Section 1414.0 may be glazed or equipped with approved plastic materials subject to the requirements of Sections 2302.3.1 through 2302.3.4.

2302.3.1 Area: The area of such glazing shall not exceed 25 percent of the wall face of the story in which it is installed (see Section 2302.4).

2302.3.2 Size: The area of a unit or pane of glazing installed above the first story shall not exceed 16 square feet (1.49 m^2) and the vertical dimension of a unit or pane shall not exceed 4 feet (1219 mm). There shall be a minimum 3 feet (914 mm) vertical spandrel wall between stories.

2302.3.3 Height: Approved plastics shall not be installed more than 75 feet (22860 mm) above grade level.

2302.3.4 Protection: Approved thermoplastic materials may be installed in areas up to 50 percent of the wall area of each story in structures less than 150 feet (45720 mm) in height which are provided on each floor above the first floor with continuous architectural projections constituting an effective fire canopy extending at least 3 feet (914 mm) from the surface of the wall in which the glazing is installed. The size and the dimensions of individual units shall not be limited in such installations except as required to meet structural loading requirements.

2302.4 Automatic fire suppression: When an approved automatic fire suppression system is provided throughout the building, the permissible area of glazing permitted by Section 2302.3.1 may be increased 100 percent.

SECTION 2303.0 EXTERIOR WALL PANELS

2303.1 General: Approved plastic materials may be used as wall panels in exterior walls not required to have a fireresistance rating in other than buildings of Use Groups A-1, A-2, H, I-2 and I-3 subject to the requirements of Sections 2303.1.1 through 2303.3.

2303.1.1 Installation: Exterior wall panels installed as provided herein shall not alter the type of construction classification of the building.

2303.1.2 Height limitation: Approved plastics shall not be installed more than 75 feet (22860 mm) above grade level, except as allowed by Section 2303.2.

2303.1.3 Area limitation and separation: Area limitation and separation requirements of exterior wall panels shall be as provided in Table 2303.

Table 2303
AREA LIMITATION AND SEPARATION REQUIREMENTS FOR PLASTIC WALL PANELS[a]

Fire separation	Class of plastic	Max. % area of ext. wall in plastic panels	Max. sq. ft. single area	Minimum separation of panels (ft.)	
				Vertical	Horizontal
Less than 6 ft.	—	NP[c]	NP	—	—
6 ft. or more but less than 11 ft.	C1 C2	10 NP	50 NP	8 —	4 —
11 ft. or more but less than 30 ft.	C1 C2	25 15	90 70	6 8	4 4
Over 30 ft.	C1 C2	50 50	Not limited 100	3[b] 6[b]	0 3

Note a. See Section 2303.3 for combination of glazing and wall panel areas permitted.
Note b. See Section 2303.1.5.
Note c. Not permitted.
Note d. 1 foot = 304.8 mm; 1 square foot = 0.093 m^2.

2303.1.4 Spandrel separation: Vertical spandrel wall separation between stories shall be 3 feet (914 mm) for Class C1 plastic wall panels and 4 feet (1219 mm) for Class C2 plastic wall panels.

2303.1.5 Fire canopies: In structures which are provided on any floor above the first with continuous architectural projections constituting an effective fire canopy extending at least 36 inches (914 mm) from the surface of the wall in which plastic wall panels are installed, there need not be vertical separation at that floor except that provided by the vertical thickness of the projection.

2303.2 Automatic fire suppression: When an approved automatic fire suppression system is provided throughout the building, the maximum percent area of exterior wall in plastic panels and the maximum square feet of single area given in Table 2303 may be increased 100 percent, but the area of plastic wall panels shall not exceed 50 percent of the wall area. These uses shall be exempt from height limitations.

2303.3 Combinations of glazing and wall panels: Combinations of plastic glazing and plastic wall panels shall be subject to the area, height, percentage limitations and separation requirements applicable to the class of plastic as prescribed for wall panel installations

SECTION 2304.0 ROOF PANELS

2304.1 General: Approved plastic roof panels may be installed in other than buildings of Use Groups H, I-2 and I-3 as follows:

1. In roofs of buildings equipped throughout with an approved automatic fire suppression system;
2. Where the roof construction is not required to have a fireresistance rating by Table 401; or
3. Where the roof panels meet the requirements for roof coverings.

2304.2 Separations: Individual roof panels shall be separated from each other by a distance of not less than 4 feet (1219 mm) measured in a horizontal plane.

Exception: The separation between roof panels is not required in a building equipped throughout with an approved automatic fire suppression system.

2304.3 Location: Where exterior wall openings are required to be fireresistance rated by Section 1414.0, a roof panel or unit shall not be installed within 6 feet (1829 mm) of such exterior wall.

2304.4 Area limitations: Roof panels or units shall be limited in area and the aggregate area of panels shall be limited by a percentage of the floor area of the room or space sheltered in accordance with Table 2304.

Exceptions

1. The area limitations of Section 2304.4 may be increased 100 percent in buildings equipped throughout with an approved automatic fire suppression system.
2. Low hazard use buildings such as swimming pool shelters and greenhouses are exempt from the area limitations of Section 2304.4 provided the buildings do not exceed 5,000 square feet (465 m^2) in area and have a minimum fire separation of 4 feet (1219 mm).
3. Roof coverings over terraces and patios of buildings of Use Group R-3 are exempt from the area limitations of Section 2304.4 and shall be permitted with approved plastics.

Table 2304
AREA LIMITATIONS FOR ROOF PANELS

Class of plastic	Maximum area individual unit of panel (sq. ft.)	Maximum aggregate area (% of floor area)
C1	300	30
C2	100	25

Note a. 1 square foot = 0.093 m^2.

SECTION 2305.0 SKYLIGHT ASSEMBLIES

2305.1 Skylight assemblies: Skylight assemblies may be glazed with approved plastic materials in accordance with the provisions of this section.

Exceptions

1. This section shall not apply to a skylight of approved plastic on a building which is not more than one story in height, has a fire separation of at least 30 feet (9144 mm) and the room or space sheltered by the roof is not classified as Use Group H, I-2 or I-3 or a means of egress.
2. This section shall not apply to skylights in which the approved plastic meets the required roof covering class according to Section 1427.0.

2305.2 Mounting: The plastic shall be mounted above the plane of the roof on a curb constructed consistent with the requirements for the type of construction classification, but at least 4 inches (102 mm) above the plane of the roof. Edges of plastic skylights or domes shall be protected by metal or other noncombustible material.

Exceptions

1. Curb requirements for skylights may be omitted when used on roofs with a minimum slope of 3 units vertical in 12 units horizontal (3:12) in buildings of Use Group R-3 and on buildings with an unclassified roof covering.
2. The metal or noncombustible edge material is not required where unclassified roof coverings are permitted.

2305.2.1 Slope: Flat or corrugated plastic skylights shall slope at least 4 units vertical in 12 units horizontal (4:12). Dome-shape skylights shall rise above the mounting flange a minimum distance equal to 10 percent of the maximum span of the dome, but not less than 3 inches (76 mm).

2305.3 Maximum area of skylight units: Each skylight unit shall have a maximum area within the curb of 100 square feet (9.30 m^2).

Exception: The area of skylight units shall not be limited in buildings equipped throughout with an automatic fire suppression system.

2305.4 Aggregate area of skylights: The aggregate area of skylights shall not exceed 33 percent when Class C1 materials are used, and 25 percent when Class C2 materials are used, of the floor area of the room or space sheltered by the roof in which they are installed.

Exception: The aggregate area of approved plastic skylights may be increased 100 percent beyond the limitations set forth above if the building is equipped throughout with an approved automatic fire suppression system.

2305.5 Separation: Skylights shall be separated from each other by a distance of not less than 4 feet (1219 mm) measured in a horizontal plane.

Exception: The separation shall not be required provided the building is equipped throughout with an approved automatic fire suppression system.

2305.6 Location: Where exterior wall openings are required to be fireresistance rated by Section 1414.0, a skylight shall not be installed within 6 feet (1829 mm) of such exterior wall.

2305.7 Combinations of roof panels and skylights: Combinations of plastic roof panels and skylights shall be subject to the area and percentage limitations and separation requirements applicable to roof panel installations.

SECTION 2306.0 LIGHT-DIFFUSING SYSTEMS

2306.1 General: Light-diffusing systems shall not be installed in buildings of Use Groups H, I-2 or I-3, nor in exits unless the building is protected throughout by an approved automatic fire suppression system. Plastic diffusers shall be supported directly or indirectly from ceiling or roof construction by use of noncombustible hangers. Hangers shall be at least No. 12 Steel Wire Gage (0.106 inch) galvanized wire or equivalent.

2306.2 Installation: Approved plastic diffusers shall comply with Section 1421.0 unless the plastic panels will fall from their mountings before igniting and at an ambient temperature of at least 200 degrees F. (93 degrees C.) below their ignition temperature. The panels shall remain in place at an ambient room temperature of 175 degrees F. (79 degrees C.) for a period of not less than 15 minutes.

2306.3 Size limitations: Individual panels or units shall not exceed 10 feet (3048 mm) in length nor 30 square feet (2.79 m^2) in area.

2306.4 Fire suppression system: In buildings having an approved automatic fire suppression system throughout, plastic light-diffusing systems shall be protected both above and below unless the system has been specifically approved for installation only above the system. Areas of light-diffusing systems shall not be limited when protected in accordance with this section.

2306.5 Electrical lighting fixtures: Plastic light-transmitting panels and light diffuser panels installed in approved electrical lighting fixtures shall comply with Section 1421.0 unless the plastic panels meet the requirements of Section 2306.2. The area of approved plastic materials when used in required exits or corridors shall not exceed 30 percent of the aggregate area of the ceiling in which they are installed, unless the building is equipped throughout with an approved automatic fire suppression system.

SECTION 2307.0 PARTITIONS

2307.1 General: Approved light-transmitting plastics may be used in or as partitions provided the requirements of Section 1421.0 are met. Such partitions may be installed as provided in Section 1405.7.

SECTION 2308.0 BATHROOM ACCESSORIES

2308.1 Use of plastics: Approved plastics shall be permitted as glazing in shower stalls, shower doors, bathtub enclosures and similar accessory units (see Section 1301.5.6).

SECTION 2309.0 AWNINGS AND SIMILAR STRUCTURES

2309.1 General: Approved light-transmitting plastics may be used on awnings and similar structures in conformance with general performance provisions of other sections of the code. *

ARTICLE 24

ENERGY CONSERVATION

SECTION 2400.0 GENERAL

2400.1 Scope: The provisions of this article regulate the design and construction of the exterior envelope and selection of HVAC, service water heating, electrical distribution and illuminating systems and equipment required for the purpose of effective use of energy, and shall govern all buildings or structures, or portions thereof, hereafter erected that provide facilities or shelter for human occupancy.

Exceptions

1. Buildings or structures, or portions thereof, which are neither heated nor cooled.
2. Buildings or structures, or portions thereof, whose peak design rate of energy usage is less than 1 Watt per square foot (10.75 W/m^2) or 3.4 Btuh per square foot (10.75 W/m^2) of floor area for all purposes.
3. Buildings of Use Groups F and U whose peak design rate of annual energy usage is less than 29,784 Btu per square foot (94 kW/m^2) or 8.76 kW hours per square foot (94 kW/m^2) of floor area.
4. Buildings and structures shall comply with this code or with the CABO *Model Energy Code* listed in Appendix A.

2400.2 Other standards: Compliance with the applicable provisions of ASHRAE 90A or 90B listed in Appendix A shall be deemed to meet the requirements of this article, unless otherwise specifically provided herein.

SECTION 2401.0 PLANS AND SPECIFICATIONS

2401.1 General: Plans, specifications and necessary computations shall be submitted to indicate conformance with this section and other applicable sections of this code, and the mechanical and plumbing codes listed in Appendix A.

2401.2 Details: The plans and specifications shall show in sufficient detail all pertinent data and features of the building and the equipment and systems as herein governed, including but not limited to exterior envelope, component materials, *U* values of the respective elements including insulation, *R* values of insulating materials, size and type of apparatus and equipment, equipment and system controls and other pertinent data to indicate conformance with the requirements herein.

SECTION 2402.0 EXTERIOR ENVELOPE REQUIREMENTS

2402.1 General: The intent of this section is to provide minimum requirements for exterior envelope construction in the interest of energy conservation. Calculation and measurement procedures and information contained in ASHRAE 90A listed in Appendix A shall be used, except where otherwise noted, to determine conformance with the requirements herein.

In addition to the criteria set forth in this article, the proposed design may take into consideration the thermal mass of the building in considering energy conservation.

2402.1.1 Thermal performance: All buildings and structures that are heated or mechanically cooled shall be constructed so as to provide the required thermal performance of the various components.

The required thermal transmittance values (U_o) of any one component, such as roof/ceiling, wall or floor may be increased and the U_o value for other components decreased provided that the overall heat gain or loss for the entire building envelope does not exceed the total resulting from conformance to the required U_o values.

2402.1.2 Different requirements: A building that is designed to be both heated and cooled shall meet the more stringent of the heating or cooling requirements for the exterior envelope as provided in this section when requirements differ.

2402.1.3 Exterior walls: For the purpose of this article the gross area of exterior walls consists of all opaque wall areas, including foundation walls above grade, peripheral edges of floors, window areas including sash, and door areas, where such surfaces are exposed to outdoor air and enclose a heated or mechanically cooled space.

2402.1.4 Roof assembly: For the purpose of this article a roof assembly shall be considered as all components of the roof/ceiling envelope through which heat flows, thereby creating a building transmission heat loss or gain, where such assembly is exposed to outdoor air and encloses a heated or mechanically cooled space.

2402.1.4.1 Gross roof area: The gross area of a roof assembly consists of the total interior surface of such assembly, including skylights, exposed to the heated or mechanically cooled space.

2402.1.4.2 Ceiling plenums: Where air-ceiling plenums are employed, the roof/ceiling assembly shall for thermal transmittance purposes not include the ceiling proper nor the plenum space as part of the assembly and for gross area purposes shall be based upon the interior face of the upper plenum surface.

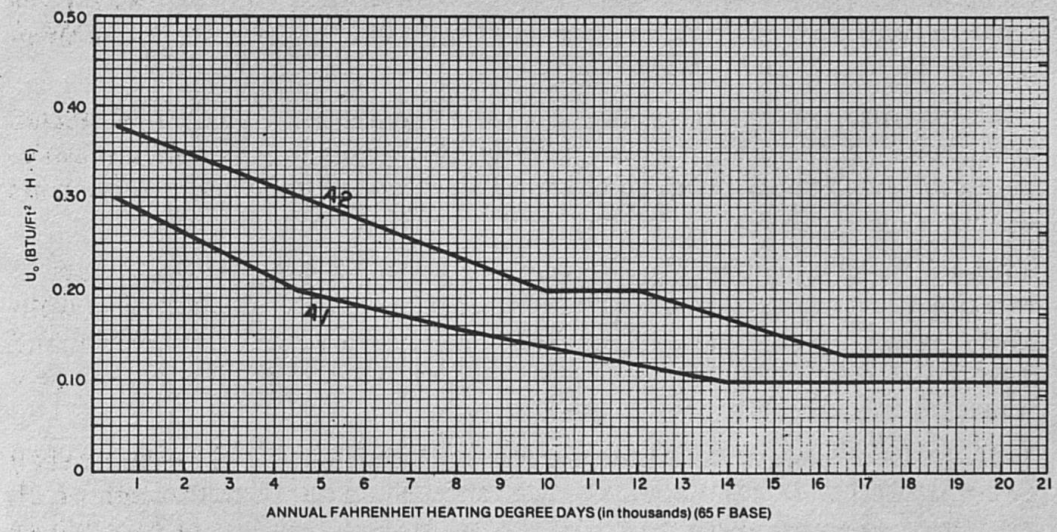
2402.2 Criteria for residential buildings: The requirements herein shall apply to all buildings or structures or portions thereof of Use Group R that are heated or mechanically cooled when not more than three stories in height.

2402.2.1 Walls: The gross area of exterior walls above grade, including foundation walls, shall have a combined thermal transmittance (U_o) value not exceeding those specified in Figure 2402.2.1a.

Exceptions

1. In locations with less than 500 heating degree days, there shall not be a maximum U_o requirement if only heating is provided and the U_o shall be 0.30 maximum for Type A1 and 0.38 maximum for Type A2 buildings as described in Figure 2402.2.1a if the building is mechanically cooled.
2. The opaque exterior wall areas may be constructed having thermal transmittance U_w values in conjunction with glazed openings areas in accordance with Figures 2402.2.1b and 2402.2.1c.

Figure 2402.2.1a
MAXIMUM ALLOWABLE U_o VALUES
FOR GROSS EXTERIOR WALL ASSEMBLIES[a]



Note a. Line A1 inside graph denotes detached one- and two-family dwellings and Line A2 inside graph denotes all other residential buildings not more than three stories in height.

2402.2.2 Roof/ceiling: The roof/ceiling assemblies shall have a combined thermal transmittance value U_o as specified in Figure 2402.2.2.

Exceptions

1. Roof/ceiling assemblies in which the finished interior surface is essentially the underside of the roof deck may have a U_o value not to exceed 0.08 for any heating degree day area.
2. Where domed skylights are used the domed skylight area is exempt from the roof/ceiling U_o value computation, provided all the following conditions are met.
   a. The area of the domed skylights does not exceed 10 percent of the roof/ceiling area.

b. Double-domed units are used when heating degree days exceed 2,500.
c. Curbs are insulated to a U_o value of 0.21 maximum.
d. The infiltration coefficient of the skylight units does not exceed 0.05 Btu per hour per square foot per degree F. (0.28 W/m² · K).
e. If domed skylights exceed 10 percent of the roof/ceiling area, energy balance calculations made in accordance with AAMA Standard 1602.1 listed in Appendix A shall be used to calculate the percentage of skylights permitted.

Figure 2402.2.1b
SINGLE GLAZED OPENINGS

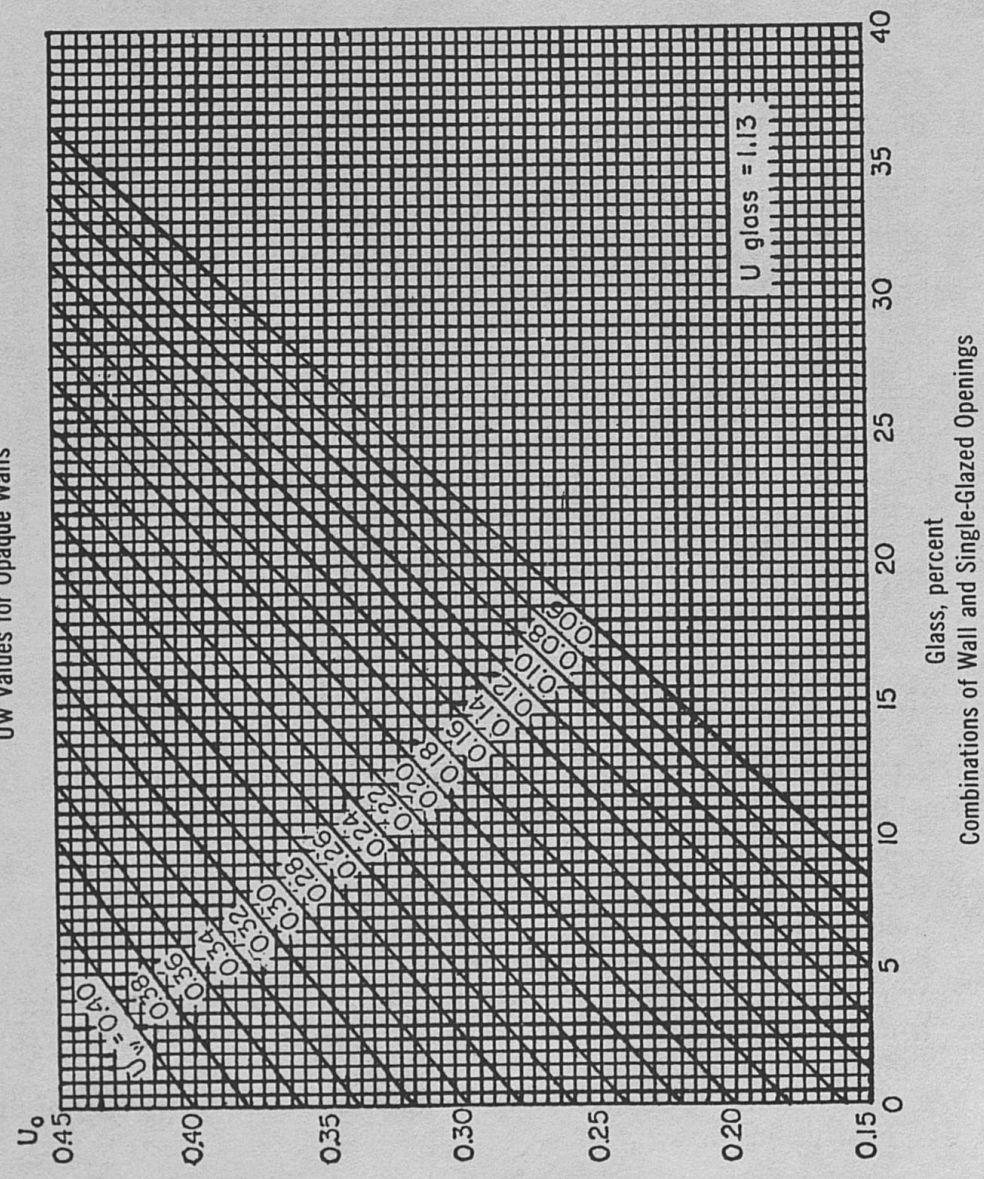
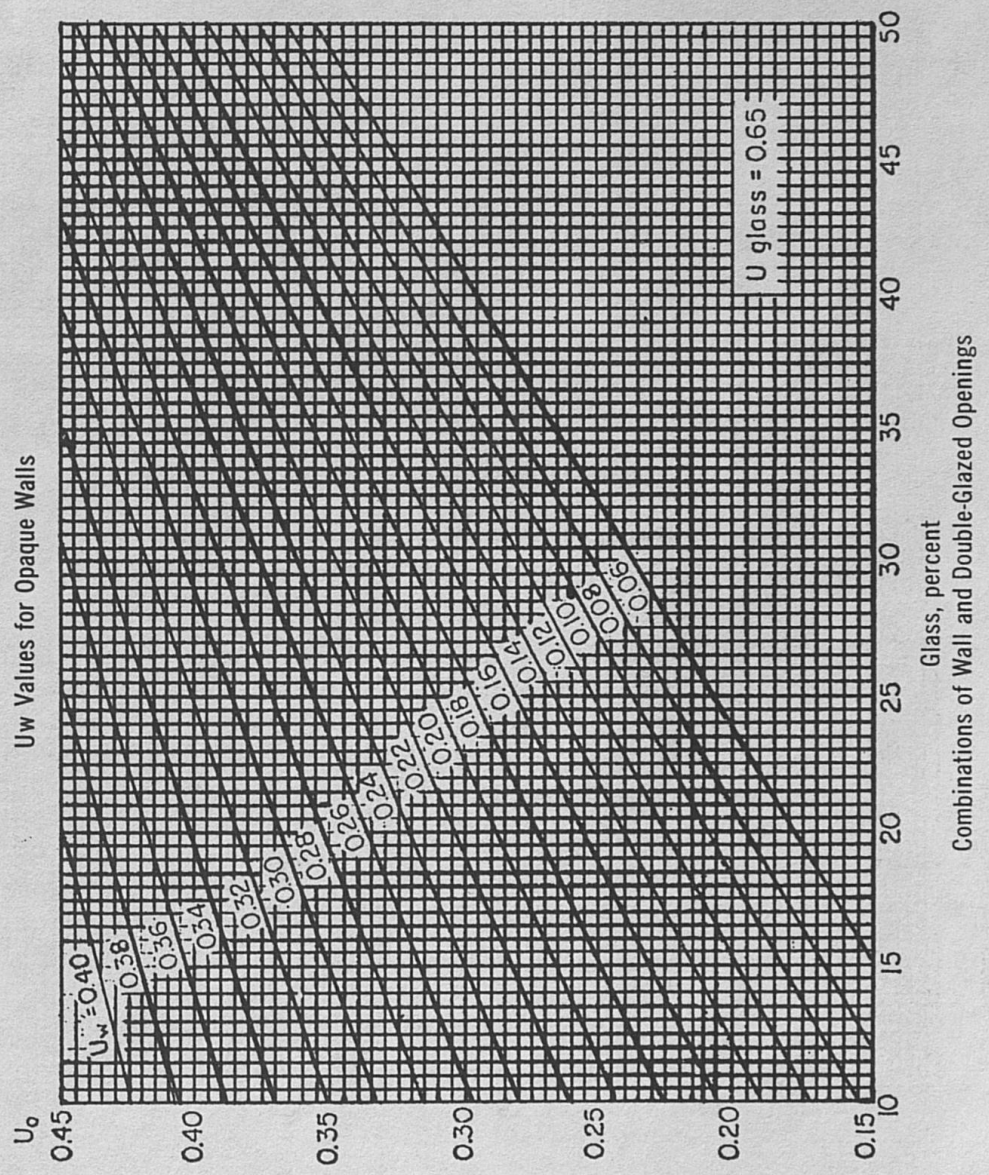


Figure 2402.2.1c
DOUBLE GLAZED OPENINGS



2402.2.3 Floors over unheated spaces: The floor of a heated or mechanical cooled space located over an unheated space shall have a combined thermal transmittance value (U_o) as specified in Figure 2402.2.3. For floors over outdoor air, such as overhangs, the U_o value shall meet the same requirements as for roofs in Section 2402.2.2.

Figure 2402.2.2
MAXIMUM ALLOWABLE U_o VALUES
FOR ROOF/CEILING ASSEMBLIES

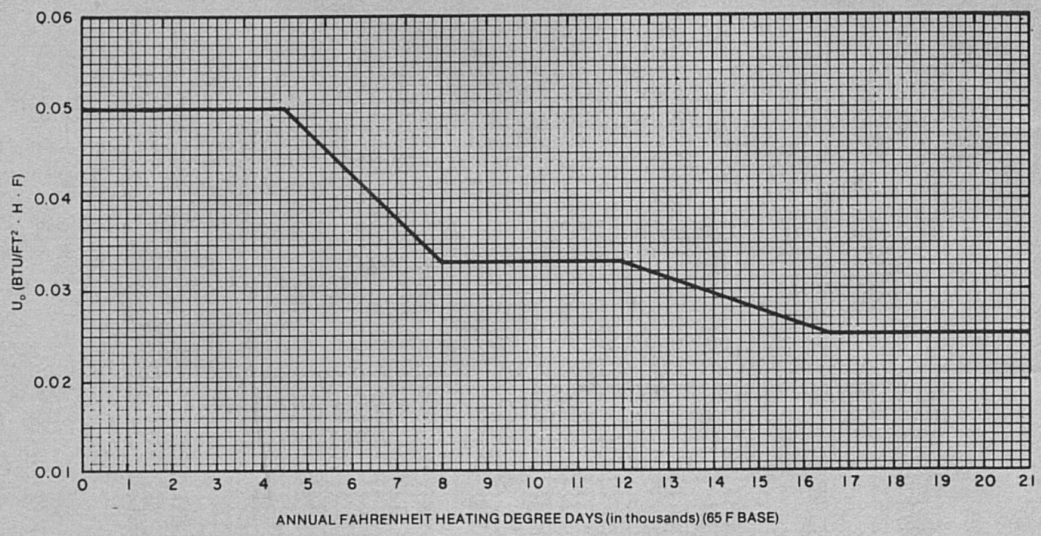
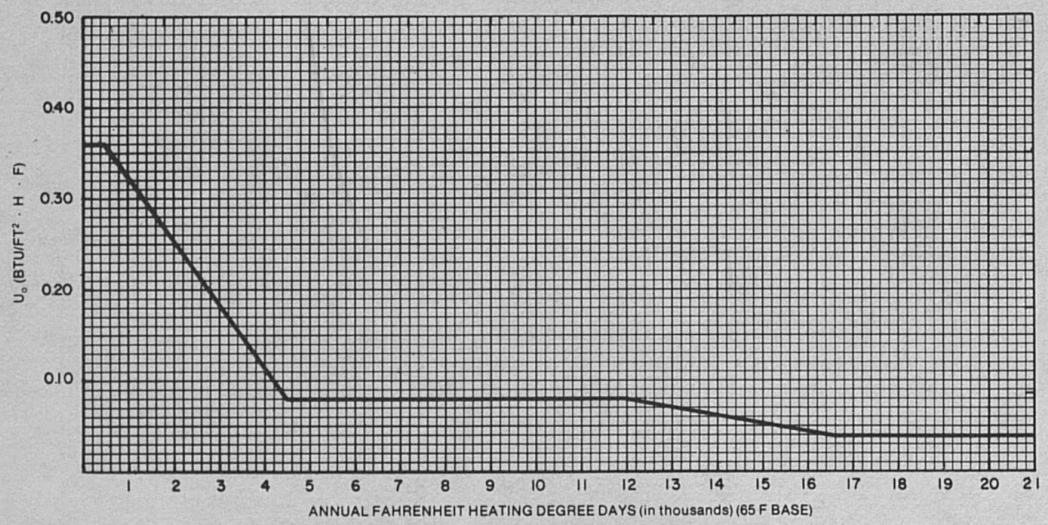


Figure 2402.2.3
MAXIMUM ALLOWABLE U_o VALUES
FOR FLOORS OVER UNHEATED SPACES



2402.2.4 Slab-on-grade floors: For slab-on-grade floors, the perimeter of the floor shall be insulated with a material having a thermal resistance value (R) not less than those specified in Figure 2402.2.4. The insulation shall extend downward from the top of the slab for a minimum distance of 24 inches (610 mm), or downward to the bottom of the slab then horizontally beneath the slab for a minimum total distance of 24 inches (610 mm).

Exception: There shall be no insulation requirements for heated slabs in locations having less than 500 heating degree days or for unheated slabs in locations having less than 2,500 heating degree days.

Figure 2402.2.4
MINIMUM ALLOWABLE *R* VALUES
FOR PERIMETER INSULATION FOR SLAB-ON-GRADE FLOORS

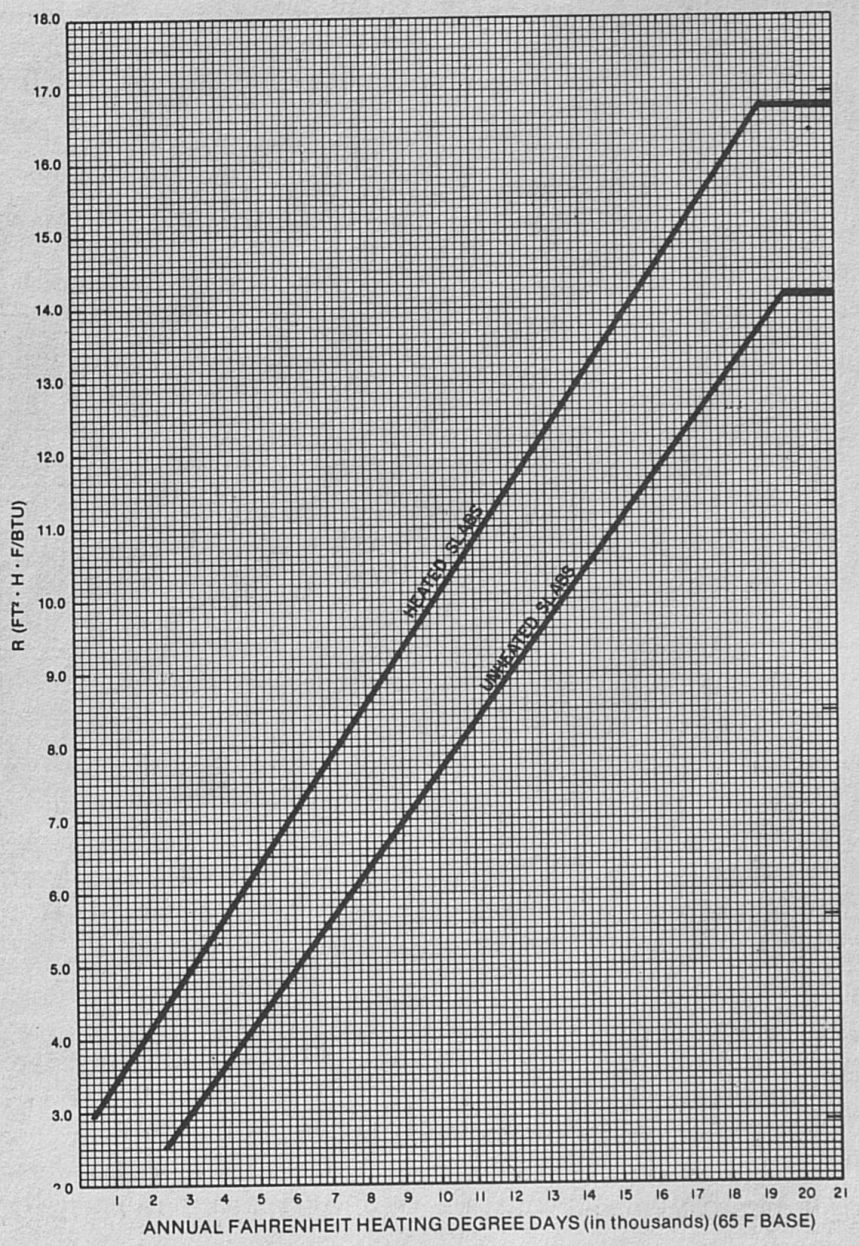


FIG 3
R VALUES—SLAB ON GRADE

2402.2.5 Crawl space plenums: The exterior walls of crawl spaces used as plenums for supply or return air shall be insulated to provide a thermal resistance (*R*), excluding film resistances of

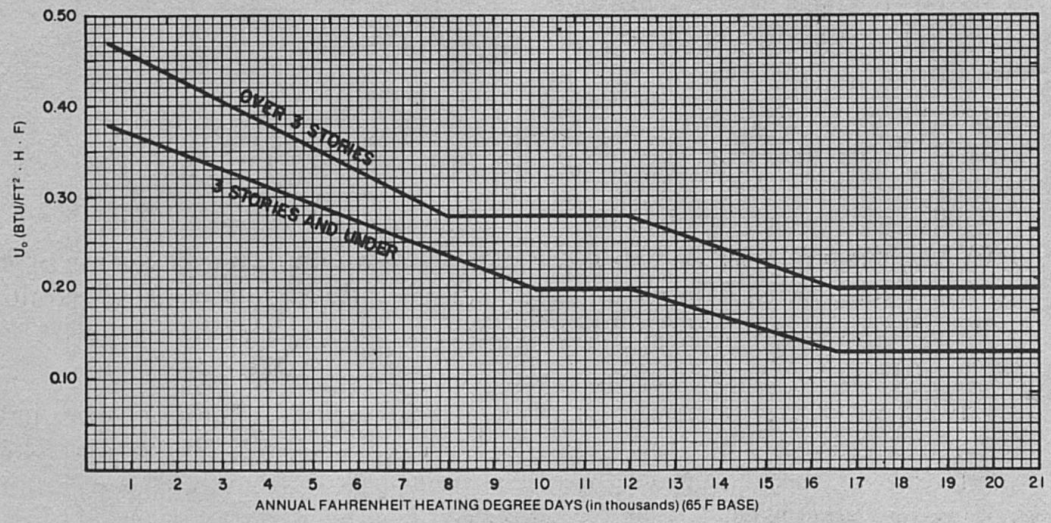
$$R = \frac{\Delta t}{15} \text{ where;}$$

Δt is the design temperature differential between the air in the plenum and the outdoor air.

2402.3 Other buildings: The requirements herein shall govern all buildings and structures or portions thereof other than defined by Section 2402.2.

2402.3.1 Heating criteria for walls: All buildings or structures included in this section that are heated shall have a combined thermal transmittance value (U_o) for the gross area of exterior walls not exceeding those specified in Figure 2402.3.1.

Figure 2402.3.1
MAXIMUM ALLOWABLE U_o VALUES
FOR GROSS EXTERIOR WALL ASSEMBLIES



2402.3.2 Heating criteria for roof/ceiling: All buildings or structures that are heated shall have a combined thermal transmittance value (U_o) for roof/ceiling assemblies not exceeding those specified in Figure 2402.3.2.

Exceptions

1. Where domed skylights are used, the domed skylight area is exempt from the roof/ceiling U_o value computation provided the following conditions are met.
   a. The area of the domed skylights does not exceed 10 percent of the roof/ceiling.
   b. Double-domed units are used when heating degree days exceed 2,500.
   c. Curbs are insulated to a U_o value of 0.21 maximum.
   d. The infiltration coefficient of the skylights units does not exceed 0.05 Btu per hour per square foot per degree F. (0.28 W/m² · K).
   e. If domed skylights exceed 10 percent of the roof/ceiling area, energy balance calculations made in accordance with AAMA Standard 1602.1 listed in Appendix A shall be used to calculate the percentage of skylights permitted.

Figure 2402.3.2
MAXIMUM ALLOWABLE U_o VALUES
FOR ROOF/CEILING ASSEMBLIES



2402.3.3 Heating criteria for floors over unheated spaces: The floor of a heated space located over an unheated space shall have a thermal transmittance value (U_o) not exceeding those specified in Figure 2402.2.3.

2402.3.4 Heating criteria for slab-on-grade floors: For slab-on-grade floor, the perimeter of the floor shall be insulated with a material having a thermal resistance value (R) not less than those specified in Figure 2402.2.4. The insulation shall extend downward from the top of the slab for a minimum distance of 24 inches (610 mm), or downward to the bottom of the slab then horizontally beneath the slab for a minimum total distance of 24 inches (610 mm).

2402.3.5 Cooling criteria for walls: All buildings or structures or portions thereof that are mechanically cooled shall have an overall thermal transfer value for the gross area of exterior walls not exceeding those specified in Figure 2402.3.5.

2402.3.6 Cooling criteria for roof/ceiling: All buildings or structures or portions thereof that are mechanically cooled shall have an overall thermal transfer value (OTTV) for the gross area of the roof assembly not exceeding 8.5 Btu per hour per square foot (26.8 W/m²).

2402.3.6.1 Thermal transmittance value (U_o): All buildings or structures or portions thereof that are mechanically cooled shall have a combined thermal transmittance value (U_o) for roof/ceiling assemblies not exceeding those specified in Figure 2402.3.2 for heating.

Exceptions

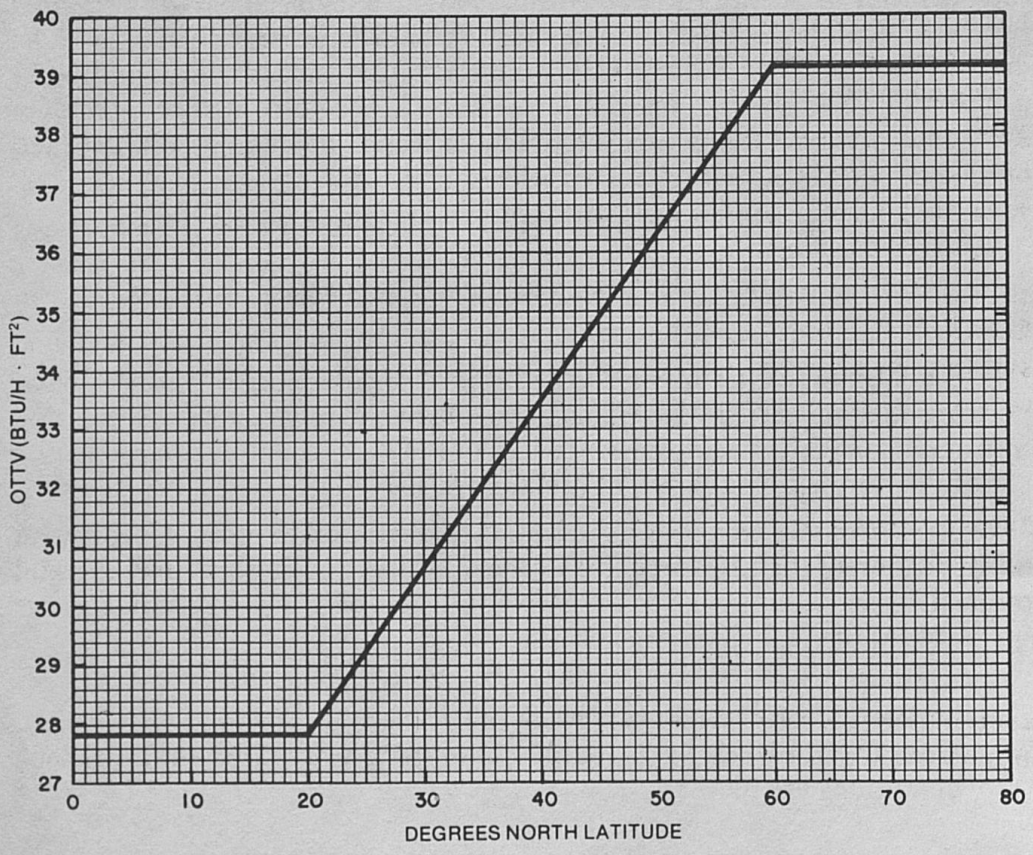
1. Where domed skylights are used, the domed skylight area is exempted from the roof/ceiling U_o value computation provided the following conditions are met.

a. The area of the domed skylights does not exceed 10 percent of the roof/ceiling area.
b. Double-domed units are used when heating degree days exceed 2,500.
c. Curbs are insulated to a U_o value of 0.21 maximum.
d. The infiltration coefficient of the skylight units does not exceed 0.05 Btu per hour per square foot per degree F. (0.28 W/m² · K).
e. If domed skylights exceed 10 percent of the roof/ceiling area, energy balance calculations made in accordance with AAMA Standard 1602.1 listed in Appendix A shall be used to calculate the percentage of skylights permitted.

2402.3.7 Exposed floors: All buildings or structures or portions thereof that are mechanically cooled shall have a combined thermal transmittance value (U_o) for floors exposed to outdoor air not exceeding those specified in Figure 2402.2.3.

2402.4 Air leakage: The requirements of this section shall apply to all buildings or structures and apply only to those locations separating outdoor

Figure 2402.3.5
MAXIMUM OVERALL THERMAL TRANSFER VALUES FOR GROSS EXTERIOR WALLS



ambient conditions from interior spaces that are heated or mechanically cooled and are not applicable to separation of interior spaces from each other.

2402.4.1 Standard: Compliance with the criteria for air leakage shall be determined by ASTM E283 listed in Appendix A at a pressure differential of 1.567 lb/ft^2 (75.03 Pa).

2402.4.2 Acceptance criteria: The air infiltration rate for windows shall not exceed 0.5 cfm per foot (0.00077 m^3/s · m) of sash crack.

2402.4.2.1 Sliding and swinging doors: The air infiltration rate for sliding and swinging doors in buildings of Use Group R shall not exceed 0.5 cfm per square foot (0.0024 m^3/s · m^2) of door area. *

2402.4.2.2 Other doors: The air infiltration rate for swinging, revolving or sliding doors in other than buildings of Use Group R shall not exceed 11 cfm per lineal foot (0.017 m^3/s · m) of door crack.

2402.4.3 Caulking and sealants: Exterior joints around windows and door frames, between wall cavities and window or door frames, between wall and foundation, between wall and roof, between wall panels, at penetrations or utility services through walls, floors and roofs, and all other openings in the exterior envelope shall be sealed in an approved manner.

SECTION 2403.0 ENERGY CONSERVATION IN ELECTRICAL DISTRIBUTION SYSTEMS *

2403.1 Lighting switching: Switching shall be provided for each lighting circuit, or for portions of each circuit, so that the partial lighting required for custodial or for effective complementary use with natural lighting may be operated selectively.

2403.2 Separate metering: In all buildings of Use Group R-2, provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units.

SECTION 2404.0 MECHANICAL SYSTEMS

2404.1 General: Heating, ventilating and air conditioning equipment and systems shall comply with the energy conservation provisions of the mechanical code listed in Appendix A.

SECTION 2405.0 WATER HEATING

2405.1 General: Hot water heating systems and equipment shall comply with the energy conservation provisions of the plumbing code listed in Appendix A.

SECTION 2406.0 ALTERNATIVE SYSTEMS

2406.1 General: Alternative building systems and equipment design may be approved by the building official when they can be shown to have energy

consumption not greater than that of a similar building with similar forms of energy requirements, designed in accordance with the provisions of this article.

2406.1.1 Nondepletable sources: When such alterative systems utilize solar, geothermal, wind or other nondepletable energy sources for all or part of its energy sources, such nondepletable energy supplied to the building shall be excluded from the total energy chargeable to the proposed alternative design.

2406.2 Documentation: Proposed alternative designs, submitted as requests for exception to the standard design criteria, must be accompanied by an energy analysis prepared in accordance with ASHRAE 90B listed in Appendix A.

ARTICLE 25

BARRIER FREE DESIGN

SECTION 2500.0 PHYSICALLY DISABLED AND AGED

2500.1 Purpose and scope: It is the express intention of this regulation to achieve uniformity in the technical design criteria necessary to establish a barrier free environment thereby allowing a physically disabled person to get to, enter and use a building or facility, so that they may have access to education, employment, living and recreational opportunities and be as self-sufficient as possible.

SECTION 2501.0 NEW CONSTRUCTION

2501.1 New construction: This regulation shall be mandatory to and in all new buildings and facilities, including both rooms and spaces, site improvements, exterior facilities and public walks as follows.

1. Storage, miscellaneous and temporary occupancies in which the total occupant load is in excess of 100 persons or 20,000 square feet or three stories.
2. Factory and industrial occupancies in which the total occupant load is in excess of 100 persons or 20,000 square feet.
3. Business occupancies in which the total occupant load is in excess of 100 persons, or 10,000 square feet.
4. Mercantile occupancies in which the total occupant load is in excess of 100 persons, 3,000 square feet of consumer area or 10,000 square feet of the total floor area.
5. Churches, parochial and private schools and other similar nonpublic assembly type occupancies in which the total occupant load is in excess of 250 persons or 3,200 square feet.
6. Assembly occupancies (other than those in Subsection [2501.1.5]) in which the total occupant load is in excess of 50 persons or 1,500 square feet total area.
7. Residential occupancies, with the exception of single family dwellings, duplexes and multi-family housing projects of less than 25 units. The common areas of condominiums are required to be accessible, but not the interior of the condominium units.

Figures referred to in this article will appear on Pages 424 - 444.

8. Institutional occupancies, with the exception of child day care facilities providing care for less than 13 children.
9. All buildings and facilities which are leased or owned by the state, county, city or other municipal corporation, regardless of type of use, occupant load or total square footage. Only new leases will be treated as new facilities.
10. Any establishment which is physically located within any building or facility otherwise covered by this section or within the premises of which is physically located any such covered establishment; and which also holds itself out as serving patrons of such covered establishment.
11. All gasoline service stations, regardless of size or occupant capacity.
12. Any building of an occupant load, occupancy type or size not listed in this section shall be exempted from the requirements of this regulation as a "small business concern."

SECTION 2502.0 EXISTING BUILDINGS

2502.1 Existing buildings: This regulation shall be mandatory for existing buildings of the categories listed in 2501.0, as follows.

1. Alterations and repairs may be made to any structure without requiring other areas of the existing structure to comply with the accessibility requirement of this regulation provided such new work conforms to that of a new structure.
2. Additions to an existing facility shall comply with the standards established by this regulation; however, the existing portion need not comply provided such addition does not result in decreased accessibility.
3. Remodeling involving major structural changes to a building shall require full compliance with all applicable provisions of this regulation.
4. The restoration or authentic reconstruction of buildings designated as historic properties by the Kentucky Heritage Commission or the National Register of Historic Places are exempt from the requirements of this regulation.

SECTION 2503.0 MODIFICATIONS

2503.1 Modifications: Modifications of the technical provisions of this regulation may be allowed where such modification provides equal facilitation.

SECTION 2504.0 PROBLEM SITES

2504.1 Problem sites: It is not the intent of this regulation to discourage development of sites with extreme conditions, for example, where housing would be built on steep slopes or recreation facilities provided in natural terrain, and where full accessibility might prove impractical.

SECTION 2505.0 INTERPRETATIONS

2505.1 Interpretive decisions: Where any provision of this regulation can be shown to be clearly unreasonable or impractical as applied to a particular building or use, or if full compliance would create a safety hazard, because of a particular use or condition, any person may request to appear before the Architectural Barriers Advisory Committee of the Department of Housing, Buildings and Construction. After advice from the committee, the department shall render its decision in the matter and said decision shall be appealable to the Board of Housing, Buildings and Construction.

SECTION 2506.0 ENFORCEMENT

2506.1 Enforcement: It shall be the duty of the local building official or the state building official having plan review and inspection responsibility under the *Kentucky Building Code* to enforce the provisions of this regulation.

SECTION 2507.0 ELEMENT DISTRIBUTION

2507.1 Distribution of accessible elements: Residential units accessible to the physically handicapped must not be segregated from other units. For example, in large apartment complexes, hotels or motels, all the units or rooms for the disabled may not be placed in one building but must be dispersed throughout the complex.

SECTION 2508.0 DISAGREEMENTS

2508.1 Disagreements: Any figures or numbers not in agreement with the written language of this regulation shall be superceded by said written words or numbers.

2508.2 Technical provisions: Section 2510.0 through 2542.0 constitute the technical provisions of this regulation.

SECTION 2509.0 GENERAL DEFINITIONS

2509.1 Definitions: The following terms shall, for the purpose of this regulation, have the meaning indiciated in this section.

Access aisle: An accessible pedestrian space between elements such as parking spaces, seating, and desks, that provides clearances appropriate for use of the elements.

Accessible: Describes a site, building, facility, or portion thereof that complies with this section and that can be approached, entered, and used by physically disabled people.

Accessible element: Part of an accessible route or accessible functional space; an item specified by this regulation (for example, telephone, controls, and the like).

Accessible route: A continuous unobstructed path connecting all accessible elements and spaces in a building or facility that can be negotiated by a severely disabled person using a wheelchair and that is also safe for and usable by people with other disabilities. Interior accessible routes may include corridors, floors, ramps, elevators, and clear floor space at fixtures. Enterior accessible routes may include parking access aisle, curb ramps, walks and ramps.

Adaptability: The ability of certain building elements, such as kitchen counters and sinks to be added to, raised, lowered, or otherwise altered so as to accommodate the needs of either the disabled or nondisabled, or to accommodate the needs of persons with different types or degrees of disability.

Assembly area: A room or space accommodating 50 or more individuals for religious, recreational, educational, political, social or amusement purposes, or for the consumption of food and drink, including all connected rooms or spaces with a common means of egress and ingress. Such areas as conference rooms would have to be accessible in accordance with other parts of this standard but would not have to meet all of the criteria associated with assembly areas.

Automatic door: A door equipped with a power operated mechanism and controls that open and close the door automatically upon receipt of a momentary actuating signal. The switch that begins the automatic cycle may be a photoelectric device, floor mat, or manual switch mounted on or near the door itself (see power assisted door).

Circulation path: An exterior or interior way of passage from one place to another for pedestrians including, but not limited to, walks, hallways, courtyards, stairways and stair landings.

Clear: Unobstructed.

Common use: Refers to those interior and exterior rooms, spaces, or elements that are made available for the use of a restricted group of people (for example, residents of an apartment building, occupants of an office building, or guests of such residents or occupants).

Coverage: The extent or range of accessibility that a particular administrative authority adopts and requires.

Cross slope: The slope of a pedestrian way that is perpendicular to the direction of travel (see running slope).

Curb ramp: A short ramp cutting through a curb.

Detectable: Perceptible by one or more of the senses.

Disability: A limitation or loss of use of a physical, mental, or sensory body part or function.

Dwelling unit: A single unit providing complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking, and sanitation.

Egress, means of: A continuous and unobstructed path of travel from any point in a building or structure to a public way and consists of three separate and distinct parts;

1. The exitway access;
2. The exitway; and
3. The exitway discharge; a means of egress comprises the vertical and horizontal means of travel and shall include intervening room spaces, doors, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts, and yards.

Emergency: Refers to facilities resulting from or anticipating unforeseen combinations of circumstances, for example, storm shelters, bomb shelters, and comparable refuges.

Functional spaces: The rooms and spaces in a building or facility that house the major activities for which the building or facility is intended.

Handicapped: Those with significant limitations in using specific parts of the environment.

Housing: A building, facility, or portion thereof, excluding in-patient health care facilities, that contains one or more dwelling units or sleeping accommodations. Housing may include, but is not limited to, one and two family dwellings, apartments, group homes, hotels, motels, dormitories, and mobile homes.

Marked crossing: A crosswalk or other identified path intended for pedestrian use in crossing a vehicular way.

Operable part: A part of a piece of equipment or appliance used to insert or withdraw objects, or to activate, deactivate, or adjust the equipment or appliance (for example, coin slot, pushbutton, handle).

Power assisted door: A door with a mechanism that helps to open the door, or relieve the opening resistance of a door, upon the activation of a switch or a continued force applied to the door itself. If the switch or door is released, such doors immediately begin to close or close completely within three to 30 seconds (see automatic door).

Principal entrance: An entrance intended to be used by the residents or users to enter or leave a building or facility. This may include, but is not limited to, the main entrance.

Public use: Describes interior and exterior rooms or spaces that are made available to the general public. Public use may be provided at a building or facility that is privately or publicly owned.

Ramp: A walking surface that has a running slope greater than 1:20.

Reasonable number: A number that is sufficient to accommodate the disabled users of a site, building, facility, or element.

Running slope: The slope of a pedestrian way that is parallel to the direction of travel (see cross slope).

Service entrance: An entrance intended primarily for delivery or service.

Signage: Verbal, symbolic, and pictorial information.

Site: A parcel of land bounded by a property line or a designated portion of a public right-of-way.

Site improvements: Landscaping, paving for pedestrian and vehicular ways, outdoor lighting, recreational facilities, and the like, added to a site.

Sleeping accommodations: Rooms in which people sleep, for example, dormitory and hotel or motel guest rooms, but not including dwelling units.

Tactile: Describes an object that can be perceived using the sense of touch.

Tactile warning: A standardized surface texture applied to or built into walking surfaces or other elements to warn visually impaired people of hazards in the path of travel.

Temporary: Applies to facilities that are not of permanent construction but are extensively used or essential for public use for a given (short) period of time; for example, temporary classrooms or classroom buildings at schools and colleges, or facilities around a major construction site to make passage accessible, usable, and safe for everybody. Structures directly associated with the actual processes of major construction, such as port-a-potties, scaffolding, bridging, trailers, and the like, are not included.

Vehicular way: A route intended for vehicular traffic, such as a street, driveway, or parking lot.

Walk: An exterior pathway with a prepared surface intended for pedestrian use, including general pedestrian areas such as plazas and courts.

Walking aid: A device used by a person who has difficulty walking (for example, a cane, crutch, walker or brace).

SECTION 2510.0 MINIMUM REQUIREMENTS

2510.1 Accessible site and exterior facilities: An accessible site shall meet the following minimum requirements.

1. Route:	At least one accessible route complying with Section 2512.0 shall be provided from public transportation stops, accessible parking spaces, accessible passenger loading zones if provided, and public street or sidewalks to an accessible building entrance.
2. Buildings:	At least one accessible route complying with Section 2512.0 shall connect accessible buildings, facilities, elements, and spaces that are on the same site.
3. Protrusions:	All objects that protrude from surfaces or posts into circulation paths shall comply with Section 2512.3.

4. Surfaces:	Ground surfaces along accessible routes and in accessible spaces shall comply with Section 2512.2.
5. Parking:	When parking is provided, parking spaces and access aisles shall comply with Section 2513.0.
6. Stairs:	Stairs shall comply with Section 2516.0 (816.0).
7. Elevators:	All passenger elevators shall comply with Section 2517.0.
8. Doors:	All doors or gates to accessible spaces and elements and along accessible routes shall comply with Section 2520.0.
9. Drinking fountains:	All drinking fountains along accessible routes shall comply with Section 2522.0.
10. Toilet rooms:	All toilet rooms provided for public use or as otherwise required by the *Kentucky Building Code* shall comply with Section 2529.0. Bathing facilities on accessible routes shall comply with Section 2530.0.
11. Tactile warnings:	Tactile warnings shall be provided at hazardous conditions as specified in Section 2536.0.
12. Signs:	All signs shall comply with Section 2537.0.
13. Telephones:	If public telephones are provided, they shall comply with Section 2538.0.
14. Seating:	If seating, tables, or work surfaces are provided in accessible spaces, they shall comply with Section 2539.0.
15. Assembly areas:	If places of assembly are provided, they shall comply with Section 2540.0.

2510.2 Accessible buildings: Accessible buildings and facilities shall meet the following minimum requirements.

1. Accessible route:	At least one accessible route complying with Section 2512.1 shall connect accessible building or facility entrances with all accessible spaces and elements within the building or facility.
2. Protrusions:	All objects that overhang circulation paths shall comply with Section 2512.3.
3. Surfaces:	Ground and floor surfaces along accessible routes and in accessible rooms and spaces shall comply with Section 2512.2.
4. Stairs:	Stairs shall comply with Section 2516.0 (816.0). This requirement is not mandatory within dwelling units.
5. Elevators:	All passenger elevators shall comply with Section 2517.0.
6. Windows:	If windows intended to be operated by occupants are provided, then a reasonable number, but

	always at least one of the windows in each accessible space, shall comply with Section 2519.0.
7. Doors:	All doors to accessible spaces along accessible routes shall comply with Section 2520.0.
8. Entrances:	All principal entrances shall comply with Section 2521.0.
9. Drinking fountains:	All drinking fountains along accessible routes shall comply with Section 2522.0.
10. Toilet rooms:	All toilet rooms provided for public use or as otherwise required by the *Kentucky Building Code* shall comply with Section 2529.0. Bathing facilities on accessible routes shall comply with Section 2530.0.
11. Storage:	If storage facilities such as cabinets, shelves, closets and drawers are provided in accessible spaces, they shall comply with Section 2532.0.
12. Controls:	Controls and operating mechanisms in accessible spaces, along accessible routes, or as parts of accessible elements (for example, light switches and dispenser controls), shall comply with Section 2534.0.
13. Emergency warning:	If emergency warning systems are provided, they shall comply with Section 2535.0.
14. Tactile warnings:	Tactile warnings shall be provided at hazardous conditions as specified in Section 2536.0.
15. Signs:	If signs are provided, they shall comply with Section 2537.0.
16. Telephones:	If public telephones are provided, they shall comply with Section 2538.0.
17. Seating:	If seating tables, or work surfaces are provided in accessible spaces, they shall comply with Section 2539.0.
18. Assembly areas:	If places of assembly are provided, they shall comply with Section 2540.0.
19. Sleeping accommodations:	If sleeping accommodations are provided, they shall comply with Section 2541.0.

2510.3 Accessible housing: Accessible housing shall comply with the minimum requirements in Subsections 2510.1 and 2510.2. It shall also meet the following requirements.

1. Dwelling units:	Accessible dwelling units shall comply with Section 2542.0.
2. Accessible route:	Each accessible dwelling unit shall be connected to an accessible entrance complying with Section 2521.0 by an accessible route complying with Section 2512.0.

3. Common areas: Common use spaces and facilities (for example, swimming pools, playgrounds, entrances, rental offices, lobbies, elevators, mail box areas, lounges, storage rooms, halls, corridors, and the like) that serve one or more accessible dwelling units shall comply with Subsections 2510.1 and 2510.2. At least one accessible route shall connect all accessible entrances to each accessible dwelling unit.

SECTION 2511.0 SPACE ALLOWANCES AND REACH RANGES

2511.1 Wheelchair passage width: The minimum clear width for single wheelchair passage shall be 32 inches at a point and 35 inches continuously.

2511.2 Width for wheelchair passing: The minimum width for two wheelchairs to pass is 60 inches.

2511.3 Wheelchair turning space: The space required for a wheelchair to make a 180 degree turn is a clear space of 60 inches diameter or a T-shaped space with a minimum clear width of 36 inches.

2511.4 Clear floor or ground space for wheelchairs:

1. Size and approach: The minimum clear floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 inches by 48 inches. The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object. Clear floor or ground space for wheelchairs may be part of the knee space required under objects.
2. Maneuvering space: One full unobstructed side of the clear floor or ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space. If a clear floor space is located in an alcove or otherwise confined in all or part of three sides, additional maneuvering clearances shall be provided (see Figure 1).
3. Surfaces: Clear floor or ground spaces for wheelchairs shall comply with Section 2512.2.

2511.5 High forward reach: If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 40 inches. If the high forward reach is over an obstruction, reach and clearances shall be shown in Figure 2.

2511.6 Side reach: If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 48 inches and the low side reach shall be no less than 9 inches above the floor. If the side reach is over an obstruction, the reach and clearances shall be as shown in Figure 3.

SECTION 2512.0 ACCESSIBLE ROUTE, GROUND AND FLOOR SURFACES AND PROTRUDING OBJECTS

2512.1 Accessible route: All walks, halls, corridors, aisles, and other spaces that are part of an accessible route shall comply with this subsection.

1. Location:
    1. At least one accessible route shall be provided from public transportation stops, accessible parking and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance they serve.
    2. At least one accessible route shall connect accessible buildings, facilities, elements and spaces that are on the same site.
    3. At least one accessible route shall connect accessible building or facility entrances with all accessible spaces and elements and with all accessible dwelling units within the building or facility.
    4. An accessible route shall connect at least one accessible entrance of each accessible dwelling unit with those exterior and interior spaces and facilities that serve the accessible dwelling unit.
2. Width: The minimum clear width of an accessible route shall be 36 inches except at doors (see Section 2520.5). If a person in a wheelchair must make a turn around an obstruction, the minimum clear width of the accessible route shall be as shown in Figure 4.
3. Passing space: If an accessible route has less than 60 inches clear width, then passing spaces at least 60 inches by 60 inches shall be located at reasonable intervals not to exceed 200 feet. A T-intersection of two corridors or walks is an acceptable passing place.
4. Head room: Accessible routes shall comply with Subsection 2512.3.2.
5. Surface texture: The surface of an accessible route shall comply with Subsection 2512.2.
6. Slope: An accessible route with a running slope greater than 1:20 is a ramp and shall comply with Section 2515.0 (815.0). Nowhere shall the cross slope of an accessible route exceed 1:50.
7. Changes in level: Changes in level along an accessible route shall comply with Subsection 2512.2.1. If an accessible route has changes in level greater than ½ inch, then a curb ramp, ramp or elevator shall be provided that complies with Sections 2514.0, 2515.0 and 2517.0, respectively. Stairs shall not be part of an accessible route.
8. Doors: Doors along an accessible route shall comply with Section 2520.0.
9. Egress: At least one accessible route serving any accessible space or element shall also serve as a means of egress.

2512.2 Ground and floor surfaces: Ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm and relatively nonslip under all weather conditions and shall comply with this subsection.

1. Changes in level: Changes in level up to ¼ inch may be vertical and

without edge treatment. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2. Changes in level greater than ½ inch shall be accomplished by means of a ramp that complies with Section 2514.0 or 2515.0.

2. Carpet: If carpet or carpet tile is used on a ground floor surface, then it shall be securely attached; have a firm cushion, pad, or backing or no cushion or pad; and have a level loop, textured loop, level cut pile or level cut/uncut pile texture. The maximum combined thickness of pile, cushion and backing shall be ½ inch. Exposed edges and trim shall be securely fastened in place and shall comply with item 1 of Section 2512.2.
3. Gratings: If gratings are located in walking surfaces, then they shall have spaces no greater than ½ inch wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

2512.3 Protruding objects:

1. Protrusions: Objects projecting from walls (for example, telephones) with their leading edges between 27 inches and 80 inches above the finished floor shall protrude no more than four inches into walks, halls, corridors, passageways, or aisles. Objects mounted with their leading edges at or below 27 inches above the finished floor may protrude any amount. Free standing objects mounted on posts or pylons may overhang 12 inches maximum from 27 inches to 80 inches above the ground or finished floor. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space (see Figure 5).
2. Head room: Walks, halls, corridors, passageways, aisles, or other circulation spaces shall have 80 inches in minimum clear head room (see Figure 5).

SECTION 2513.0 PARKING AND PASSENGER LOADING ZONES

2513.1 Minimum number: Where parking spaces are provided, the minimum number of spaces shall be in accordance with Table 2513.1 and shall comply with Subsections 2513.2 through 2513.4. Where passenger loading zones are provided at least one shall comply with Subsection 2313.5.

Table 2513.1
PARKING SPACES

1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 or over	2% of total — 20 plus 1 for each 200 over 1,000

2513.2 Parking spaces: Parking spaces for disabled people shall be at least 96 inches wide and shall have an adjacent access aisle 60 inches wide minimum (see Figure 6). Parking access aisles shall be part of the accessible route to the building or facility and shall comply with Section 2512.1. Two accessible parking spaces may share a common access aisle. Parked vehicle overhangs shall not reduce the clear width of an accessible circulation route.

2513.3 Signage: Accessible parking spaces shall be designated as reserved for the disabled by a sign showing the international symbol of accessibility. Such signs shall be above grade.

2513.4 Passenger loading zones: Passenger loading zones shall provide an access aisle at least 48 inches wide and 20 feet long adjacent and parallel to the vehicle pull up space. If there are curbs between the access aisle and the vehicle pull up space, then a curb ramp complying with Section 2514.0 shall be provided.

2513.5 Vertical clearance: Provide minimum vertical clearance of eight feet six inches at accessible parking spaces, at accessible passenger loading zones and along vehicle access route to such areas from site entrances.

SECTION 2514.0 CURB RAMPS

2514.1 Location: Curb ramps complying with this section shall be provided wherever an accessible route crosses a curb.

2514.2 Slope: Slopes of curb ramps shall comply with Section 815.0. The slope shall be measured at a ratio of rise to horizontal run.

2514.3 Width: The minimum width of a curb ramp shall be 36 inches, exclusive of flared sides.

2514.4 Surface: Surfaces of curb ramps shall comply with Section 2512.2. Transitions from ramps to walks and ramps to gutters or streets shall be flush and free from abrupt changes.

2514.5 Sides or curb ramps: If a curb ramp is located where pedestrians must walk across the ramp, then it shall have flared sides; the maximum slope of flare shall be 1:10. Curb ramps with returned curbs may be used where pedestrians would not normally walk across the ramps. Curb ramps shall not have handrails.

2514.6 Built up curb ramps: Built up curb ramps, or curb ramps that project into vehicular path, shall not be permitted in new construction. They may be permitted in existing conditions only where such application is determined to be the only reasonable means of access and where the location of the built up curb ramp is not in an uncontrolled vehicular path. Built up curb ramps shall comply with this section.

2514.7 Warning textures: A curb ramp shall have a tactile warning texture contrasting to adjoining surfaces and complying with Section 2536.0, extending the full width and depth of the curb ramps, including any flares.

2514.8 Obstructions: Curb ramps shall be located or protected to prevent their obstruction by parked vehicles.

2514.9 Location at marked crossings: Curb ramps at marked crossings shall be wholly contained within the markings, excluding any flared sides.

2514.10 Diagonal curb ramps: If diagonal (or corner type) curb ramps have returned curbs or other well defined edges, such edges shall be parallel to the direction of pedestrian flow. If diagonal curb ramps have flared sides, they shall also have at least a 24 inch long segment of straight curb located on each side of the curb ramps and within the marked crossing.

2514.11 Islands: Any raised islands in crossings shall be cut through level with the street or have curb ramps at both sides and a level area at least 48 inches long in the part of the island intersected by the crossings.

2514.12 Uncurbed intersections: If there is no curb at the intersection of a walk and an adjoining street, parking lot, or busy driveway, then the walk shall have a tactile warning texture complying with Section 2536.5 at the edge of the vehicular way.

SECTION 2515.0 RAMPS

2515.1 Ramps: Any part of an accessible route with a slope greater than 1:20 shall be considered a ramp and shall comply with Section 815.0.

SECTION 2516.0 STAIRS

2516.1 Stairs: Stairways shall comply with Section 816.0. These specifications are not mandatory for stairs within dwelling units.

SECTION 2517.0 ELEVATORS

2517.1 Accessibility: All public passenger elevators shall be required to be accessible and shall comply with the provisions of Article 21.

2517.2 Where required: At least one public passenger elevator shall be required in buildings three stories or greater in height; except that residential buildings three stories in height and containing no more than 24 units shall not be required to have an elevator.

2517.3 Exceptions: Elevators are not mandatory for buildings of less than three stories. If an elevator is provided, however, it shall have dimensions sufficient to accommodate a person in a wheelchair. This means the vertical access for wheelchairs from one level to the other is not required except in buildings three stories or more.

SECTION 2518.0 PLATFORM LIFTS

2518.1 Platform lifts: Platform lifts are permitted if they conform to ANSI standards for inclined stairway lifts or inclined and vertical wheelchair lifts and if they are not in violation of fire safety regulations as established by the department.

SECTION 2519.0 WINDOWS

2519.1 General: If windows intended to be operated by occupants are provided, at least one operable window in each accessible space shall comply with this section.

2519.2 Window hardware: Windows requiring pushing, pulling or lifting to open (for example, doublehung, sliding, or casement and awning units without cranks) shall require no more than five pounds of pressure to open or close. Locks, cranks, and other window hardware shall comply with Section 2534.0.

SECTION 2520.0 DOORS

2520.1 General: All doors to accessible spaces and elements and along accessible routes shall comply with the requirements of this section.

2520.2 Revolving doors and turnstiles: Revolving doors or turnstiles shall not be the only means of passage at an accessible entrance or along an accessible route.

2520.3 Gates: Gates, including ticket gates, shall meet applicable specifications of this section.

2520.4 Double leaf doorways: If doorways have two door leaves, then at least one leaf shall meet the specifications in Subsections 2520.5 and 2520.6. That leaf shall be an active leaf.

2520.5 Clear width: Doorways shall have a minimum clear opening of 32 inches with the door open 90 degrees, measured between the face of the door and the stop. Openings more than 24 inches in depth shall have a minimum clear opening of 36 inches.

2520.6 Maneuvering clearances at doors: Minimum maneuvering clearances for doors that are not automatic shall be as shown in Figure 7. The floor or ground area within the required clearances shall be level and clear. Doors required to be a minimum of 44 inches in institutional buildings shall be exempt from the requirements for space at the latch side of the door.

2520.7 Two doors in series: The minimum space between two doors in series shall be 48 inches plus the width of any door swinging into the space. Doors in series shall swing either in the same direction or away from the space between the doors.

2520.8 Thresholds at doorways: Thresholds at doorways shall not exceed ½ inch in height except that tresholds at exterior sliding doors shall not exceed ¾ inch. Raised thresholds and floor level changes at accessible doorways shall be beveled with a slope no greater than 1:2, and shall meet the requirements of item 1 of Section 2512.2.

2520.9 Door hardware: Handles, pulls, latches, locks and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the

wrist to operate. Lever operated mechanisms, push type mechanisms and U shaped handles are acceptable designs. When sliding doors are full open, operating hardware shall be exposed and usable from both sides. Doors to hazardous areas shall have hardware complying with Section 2536.3.

2520.10 Door closers: If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least three seconds to move to a point three inches from the latch, measured to the leading edge of the door.

2520.11 Door opening force: The maximum force for pushing or pulling open a door shall be as follows:

1. Fire doors shall have a minimum opening force of 15 pounds and as required in Section 812.5.4.
2. Other doors: Exterior hinged doors, 8.5 pounds; interior hinged doors, five pounds; sliding or folding doors, five pounds. These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.

2520.12 Automatic doors and power assisted doors: If an automatic door is used, then it shall comply with American National Standard for Power-Operated Doors, ANSI A156.10-1979. Slowly opening, low powered, automatic doors shall be considered a type of custom design installation as described in Paragraph 1.1.1. of ANSI A156.10-1979. Such doors shall not open to back check faster than three seconds and shall require no more than 15 pounds to stop door movement. If a power assisted door is used, its door opening force shall comply with Subsection 2520.11 of this section and its closing shall conform to the requirements in Section 10 of ANSI A156.10-1979.

2520.13 Framed glass doors: Where framed glass doors are used, the bottom rail shall be a minimum height of 7½ inches.

SECTION 2521.0 ENTRANCES

2521.1 Principal entrances: Principal entrances to a building or facility shall be part of an accessible route and shall comply with Section 2512.1. Such entrances shall be connected by an accessible route to public transportation stops, to accessible parking and passenger loading zones, and to public streets or sidewalks if available. They shall also be connected by an accessible route to all accessible spaces or elements within the building or facility.

2521.2 Service entrances: A service entrance shall not be the sole accessible entrance unless it is the only entrance to a building or facility (for example, in a factory or garage).

SECTION 2522.0 DRINKING FOUNTAINS AND WATER COOLERS

2522.1 Minimum number: Where drinking fountains or water coolers are required, a reasonable number, but always at least one per floor or wing or both, shall comply with this section and shall be on an accessible route.

2522.2 Spout height: Spouts shall be no higher than 36 inches, measured from the floor or ground surfaces to the spout outlet. Dual units with one spout at 30 inches and another at 36 inches or higher are acceptable.

2522.3 Spout location: The spouts of drinking fountains and water coolers shall be at the front of the unit and shall direct the water flow in a trajectory that is parallel or nearly parallel to the front of the unit. The spout shall provide a flow of water so as to allow the insertion of a cup or glass under the flow of water.

2522.4 Controls: Controls shall comply with Section 2534.4.

2522.5 Clearances: Wall and post mounted cantilevered units shall have a clear knee space between the bottom of the apron and the floor or ground at least 27 inches high, 30 inches wide, and 17 inches to 19 inches deep. Such units shall also have a minimum clear floor space 30 inches by 48 inches to allow a person in a wheelchair to make a parallel approach to the unit. This clear floor space shall comply with Section 2511.4.

SECTION 2523.0 WATER CLOSETS

2523.1 General: Accessible water closets shall comply with this section. For water closets in adaptable dwelling units, see Section 2542.4.2.

2523.2 Clear floor space: Clear floor space for water closets not in stalls shall comply with Figure 9. Clear floor space may be arranged to allow either a left handed or right handed approach.

2523.3 Height: The height of water closets shall be 17 inches to 19 inches measured to the top of the toilet seat (see Figure 10). Seats shall not be sprung to return to a lifted position when not in use.

2523.4 Grab bars: Grab bars for water closets shall comply with Figures 9 and 10, and Section 2511.4. Grab bars may be mounted by any desired method as long as they have a gripping surface at the location as shown and do not obstruct the required floor area.

2523.5 Flush controls: Flush controls shall be hand operated and shall comply with Section 2534.4. Controls for flush valves shall be mounted no more than 40 inches above the floor.

2523.6 Dispensers: Toilet paper dispensers shall be installed within reach as shown in Figure 10. Dispensers shall not control delivery and shall permit continuous paper flow.

SECTION 2524.0 TOILET STALLS

2524.1 Location: Accessible toilet stalls shall be on an accessible route and shall meet the requirements of this section.

2524.2 Water closets: Water closets in stalls shall comply with Section 2523.0.

2524.3 Size and arrangement: The size and arrangement of the toilet stalls shall comply with Figure 11a. In existing buildings, alternate stalls (Figure

11b) may be used where available space prohibits installation of the standard stall. Arrangements shown for stalls may be reversed to allow either a left or right handed approach.

2524.4 Toe clearances: In standard stalls, the front partition and at least one side partition shall provide a toe clearance of at least 9 inches above the floor. If the depth of the stall is greater than 60 inches, then the toe clearance is not required.

2524.5 Doors: Toilet stall doors shall comply with Section 2520.0. Doors of toilet stalls shall be out swinging doors. Doors on toilet stalls shall have either a self-closing mechanism or a pull mounted on the hinged side of the stall door.

2524.6 Grab bars: Provide grab bars at toilet stalls as shown in Figures 10 and 11. Grab bars may be mounted by any desired method as long as they have a gripping surface at the locations shown and do not obstruct the required clear floor area. Grab bars shall comply with Section 2533.0.

SECTION 2525.0 URINALS

2525.1 General: Accessible urinals shall comply with this section.

2525.2 Heights: Urinals shall be stall type or wall hung with an elongated rim at a maximum of 17 inches above the floor (see Figure 12.1).

2525.3 Clear floor space: A clear floor space 30 inches by 48 inches shall be provided in front of urinals to allow forward approach. This clear space shall adjoin or overlap an accessible route and shall comply with Section 2511.4.

2525.4 Flush controls: Flush controls shall be hand operated, shall comply with Section 2534.4 and shall be mounted no more than 40 inches above the finished floor.

2525.5 Urinal shields: Urinal shields that do not extend beyond the front edge of the urinal rim may be provided with 29 inches clearance between them.

SECTION 2526.0 LAVATORIES AND MIRRORS

2526.1 General: The requirements of this section shall apply to lavatory fixtures, vanities, and built in lavatories.

2526.2 Height and clearances: Lavatories shall be mounted with a clearance of at least 29 inches from the floor to the bottom of the apron. Thirty-four inches is the maximum height of the top of the front lip of the lavatory. Knee and toe clearances shall comply with Figure 12.

2526.3 Clear floor space: A clear floor space 30 inches by 48 inches complying with Section 2511.4 shall be provided in front of a lavatory to allow a forward approach. Such clear floor space shall adjoin or overlap an accessible route and shall extend a maximum of 19 inches underneath the lavatory.

2526.4 Exposed pipes and surfaces: If hot water exceeds 120 degrees Fahrenheit, the hot water and drain pipes under lavatories shall be insulated or otherwise covered. There shall be no sharp or abrasive surfaces under lavatories.

2526.5 Faucets: Faucets shall comply with Section 2534.4. Lever operated, push type and electronically controlled mechanisms are examples of acceptable designs. Self-closing valves are allowed if the faucet remains open for at least ten seconds.

2526.6 Mirrors: Mirrors shall be mounted with the bottom edge no higher than 40 inches from the floor.

SECTION 2527.0 BATHTUBS

2527.1 General: Accessible bathtubs shall comply with this section. For bathtubs in accessible dwelling units, see Section 2542.4.4.

2527.2 Floor space: Clear floor space in front of bathtubs shall be as shown in Figure 13.

2527.3 Seat: An in-tub seat or a seat at the head end of the tub shall be provided as shown in Figures 13 and 14. The structural strength of seats and their attachments shall comply with Section 2533.3. Seats shall be mounted securely and shall not slip during use.

2527.4 Grab bars: Grab bars complying with Section 2533.0 shall be provided as shown in Figures 13 and 14.

2527.5 Controls: Faucets and other controls complying with Section 2534.4 shall be located as shown in Figure 14.

2527.6 Shower unit: A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head or as a hand held shower shall be provided.

2527.7 Bathtub enclosures: If provided, enclosures for bathtubs shall not obstruct controls or transfer from wheelchairs onto bathtub seats or into tubs. Enclosures on bathtubs shall not have tracks mounted on their rims.

SECTION 2528.0 SHOWER STALLS

2528.1 General: Accessible shower stalls shall comply with this section. For shower stalls in accessible dwelling units, see Section 2542.4.5.

2528.2 Size and clearances: Shower stall size and clear floor space shall comply with Figure 15.

2528.3 Seat: A seat shall be provided in transfer shower stalls as shown in Figure 16. The seat shall be mounted 17 inches to 19 inches from the bathroom floor and shall extend the full depth of the stall. The seat shall be on the wall opposite the controls. The structural strength of the seats and their attachments shall comply with Section 2533.3.

2528.4 Grab bars: Grab bars complying with Section 2533.0 shall be provided as shown in Figure 17.

2528.5 Controls: Faucets and other controls complying with Section 2534.4 shall be located as shown in Figure 17. In transfer shower stalls all controls, faucets, and the shower unit shall be mounted on the side wall opposite the seat.

2528.6 Shower unit: A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head or as a hand held shower shall be provided.

2528.7 Curbs: If provided, curbs in transfer shower stalls shall be no higher than 4 inches. Roll in shower stalls shall not have curbs.

2528.8 Shower enclosures: If provided enclosures for shower stalls shall not obstruct controls or obstruct transfer from wheelchairs onto shower seats.

SECTION 2529.0 TOILET ROOMS

2529.1 General: All toilet rooms provided for public use or otherwise required by the *Kentucky Building Code* shall be on an accessible route and shall comply with this section.

2529.2 Doors: All doors to accessible toilet rooms shall comply with Section 2520.0. Doors shall not swing into the clear floor space required for any fixture.

2529.3 Clear floor space: The accessible fixtures and controls required in Subsections 2529.4 through 2529.7 shall be on an accessible route. An unobstructed turning space complying with Section 2511.3 shall be provided within an accessible toilet room. The clear floor space at fixtures and controls, the accessible route, and the turning space may overlap.

2529.4 Water closets: If toilet stalls are provided, then a reasonable number, but always at least one, shall comply with Section 2524.0; its water closet shall comply with Section 2522.0. If water closets are not in stalls, then a reasonable number, but always at least one, shall comply with Section 2523.0.

2529.5 Urinals: If urinals are provided, then a reasonable number, but always at least one, shall comply with Section 2525.0.

2529.6 Lavatories and mirrors: If lavatories and mirrors are provided, then a reasonable number, but always at least one of each, shall comply with Section 2526.0.

2529.7 Controls and dispensers: If controls, dispensers, receptacles, or other equipment is provided, at least one of each shall be on an accessible route and shall comply with Section 2534.0.

2529.8 Emergency lighting: Where emergency lighting in a building is required by Section 824.0, the emergency lighting shall be provided in accessible toilet rooms.

SECTION 2530.0 BATHROOMS, BATHING FACILITIES AND SHOWER ROOMS

2530.1 General: Bathrooms, bathing facilities or shower rooms on an accessible route shall comply with this section. For bathrooms in accessible dwelling units, see Section 2542.4.

2530.2 Doors: Doors to accessible bathrooms shall comply with Section 2520.0. Doors shall not swing into the floor space required for any fixture.

2530.3 Clear floor space: The accessible fixtures and controls required in Subsections 2530.4 through 2530.9 shall be on an accessible route. An unobstructed turning space complying with Section 2511.3 shall be provided within an accessible bathroom. The clear floor space at fixtures and controls, the accessible route, and the turning space may overlap.

2530.4 Water closets: If toilet stalls are provided, then a reasonable number, but always at least one, shall comply with Section 2524.0; its water closet shall comply with Section 2523.0. If water closets are not in stalls, then a reasonable number, but always at least one, shall comply with Section 2523.0.

2530.5 Urinals: If urinals are provided, then a reasonable number, but always at least one, shall comply with Section 2525.0.

2530.6 Lavatories and mirrors: If lavatories and mirrors are provided, then a reasonable number, but always at least one, shall comply with Section 2526.0.

2530.7 Controls and dispensers: If controls, dispensers, receptacles or other equipment is provided, at least one of each shall be on an accessible route and shall comply with Section 2534.0.

2530.8 Bathing and shower facilities: If tubs or showers are provided, then at least one accessible tub that complies with Section 2527.0 or at least one accessible shower that complies with Section 2527.0 or at least one accessible shower that complies with Section 2528.0 shall be provided.

2530.9 Medicine cabinets: If medicine cabinets are provided, at least one shall be located with a usable shelf no higher than 40 inches above the floor space. The floor space shall comply with Section 2511.4.

SECTION 2531.0 SINKS

2531.1 General: If accessible sinks are provided, they shall comply with this section. Sinks in kitchens of accessible dwelling units shall comply with Section 2542.5.5.

2531.2 Height: Sinks shall be mounted with the counter or rim no higher than 34 inches from the floor.

2531.3 Knee clearance: Knee clearance that is 27 inches high, 30 inches wide, and 19 inches deep shall be provided underneath sinks.

2531.4 Depth: Each sink shall be a maximum of 6½ inches deep.

2531.5 Clear floor space: A clear floor space at least 30 inches by 48 inches complying with Section 2511.4 shall be provided in front of a sink to allow forward approach. The clear floor space shall be on an accessible route and shall extend a maximum of 19 inches underneath the sink.

2531.6 Exposed pipes and surfaces: If hot water exceeds 120 degrees Fahrenheit, hot water and drain pipes under sinks shall be insulated or otherwise covered. There shall be no sharp or abrasive surfaces under sinks.

2531.7 Faucets: Faucets shall comply with Section 2534.4. Lever operated, push type, touch type, or electronically controlled mechanisms are acceptable designs.

SECTION 2532.0 STORAGE

2532.1 General: Accessible storage facilities such as cabinets, shelves, closets, and drawers shall comply with this section.

2532.2 Clear floor space: A clear floor space at least 30 inches by 48 inches complying with Section 2511.4 that allows either a forward or parallel approach by a person using a wheelchair shall be provided accessible storage facilities.

2532.3 Height: Accessible storage spaces shall be within at least one of the reach ranges specified in Section 2511.5 and 2511.6. Clothes rods shall be a maximum of 48 inches from the floor.

2532.4 Hardware: Hardware for accessible storage facilities shall comply with Section 2534.4. Touch latches and U shaped pulls are acceptable.

SECTION 2533.0 HANDRAILS, GRAB BARS AND TUB AND SHOWER SEATS

2533.1 General: All handrails, grab bars, and tub and shower seats shall comply with this section.

2533.2 Size and spacing of grab bars and handrails: The outside diameter or width of the gripping surfaces of a handrail or grab bar shall be 1¼ inch to 1½ inch or the shape shall provide an equivalent gripping surface. If handrails or grab bars are mounted adjacent to a wall, the space between the wall and the handrail or grab bars shall be 1½ inch (see Figure 18). Handrails may be located in a recess if the recess is a maximum of three inches deep and extends at least 18 inches above the top of the rail (see Figure 18).

2533.3 Structural strength: Handrails, grab bars, tub and shower seats, fasteners, and mounting devices shall support a minimum concentrated load of 250 pounds and shall not rotate in their fittings.

2533.4 Eliminating hazards: A handrail or grab bar and any wall or other surface adjacent to it shall be free of any sharp or abrasive elements. Edges shall have a minimum radius of ⅛ inch.

SECTION 2534.0 CONTROLS AND OPERATING MECHANISMS

2534.1 General: Controls and operating mechanisms in accessible spaces, along accessible routes, or as part of accessible elements (for example, light switches, dispenser controls) shall comply with this section.

2534.2 Clear floor space: Clear floor space complying with Section 2511.4 that allows a forward or parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment.

2534.3 Height: The highest operable part of all controls, dispensers, receptacles, and other operable equipment shall be placed within at least one of the reach ranges specified in Section 2511.5 and 2511.6. Except where the use of special equipment dictates otherwise, electrical and communications systems receptacles on walls shall be mounted no less than 15 inches above the floor.

2534.4 Operation: Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than five pounds of force.

SECTION 2535.0 ALARMS

2535.1 General: If emergency warning systems are provided, they shall include both audible alarms complying with Subsection 2535.2 and visual alarms complying with Subsection 2535.3. In facilities with sleeping accommodations, accessible sleeping accommodations shall have an auxiliary visual alarm system complying with Subsection 2535.4.

2535.2 Audible alarms: Audible emergency alarms shall produce a sound that exceeds the ambient room or space noise by at least 15 decibels or exceeds any maximum sound level with a duration of 30 seconds by five decibels, whichever is louder. Sound levels for alarm signals shall not exceed 120 decibels.

2535.3 Visual alarms: Electronically powered internally illuminated emergency exit signs or adjacent devices shall flash as a visual emergency alarm in conjunction with audible emergency alarms. The flashing frequency of visual alarm devices shall be less than five Hz. If such alarms use electricity from the building as a power source, then they shall be installed on the same system as the audible emergency alarms.

2535.4 Auxiliary alarms: Accessible sleeping accommodations shall have a visual alarm connected to the building emergency alarm system or shall have a standard 110 volt electrical receptacle into which such an alarm could be connected. Instructions for use of the auxiliary alarm or connection shall be provided.

2535.5 Alarm activators: Alarm activators shall comply with Section 2534.0, Controls and operating mechanisms.

2535.6 Special alarm systems: Specialized alarm systems utilizing advanced technology will be considered on a case-by-case basis.

SECTION 2536.0 TACTILE WARNINGS

2536.1 General: Where tactile warnings are required, they shall comply with this section.

2536.2 Tactile warnings on walking surfaces: Tactile warning textures on walking surfaces shall contrast with that of the surrounding surface. Raised strips or grooves shall comply with Figure 19. Grooves may be used indoors only.

2536.3 Tactile warnings on doors to hazardous areas: Doors that lead to areas that might prove dangerous to a blind person (for example, doors leading to platforms, mechanical rooms, stages, and the like) shall be made identifiable to the touch by a textured surface on the door handle, knob, pull or other operating hardware. This textured surface may be made by knurling or roughening or by a material applied to the contact surface. Such textured surfaces shall not be provided for emergency exit doors or any doors other than those to hazardous areas.

2536.4 Tactile warnings at stairs: All stairs (except those in dwelling units, in enclosed stair towers, or set to the side of the path of travel) shall have a tactile warning at the top of stair runs.

2536.5 Tactile warnings at hazardous vehicular areas: If a walk crosses or adjoins a frequently used vehicular way, and if there are no curbs, railings, or other elements detectable by a person who has a severe visual impairment separating the pedestrian and vehicular areas, then the boundary between the areas shall be defined by a continuous 36 inch wide tactile warning texture complying with Subsection 2536.2.

2536.6 Tactile warnings at reflecting pools: The edges of reflecting pools shall be protected by railings, walls, curbs, or tactile warnings complying with Subsection 2536.2.

2536.7 Standardization: Textured surfaces for tactile warnings shall be standard within a building, facility, site or complex of buildings.

SECTION 2537.0 SIGNAGE

2537.1 General: All signage that provides emergency information of general circulation directions or identifies rooms and spaces shall comply with this section.

2537.2 Character proportion and contrast: Letters and numbers on sign systems shall:

1. Have a width to height ratio of between 3:5 and 1:1;
2. Have a stroke width to height ratio between 1:5 and 1:10;
3. Contrast in value with their backgrounds, preferably light letters on a dark background; and
4. Have a matte finish on a matte finish background.

2537.3 Raised or incised characters: Provide numbers and letters that are:

1. Raised or incised from the background surface 1/32 inch and also incise or raise symbols and pictographs in this manner;

2. Between ⅝ inch and 2 inches high;
3. Sans serif with sharply defined edges; and
4. If incised, provide with at least ¼ inch stroke width.

2537.4 Mounting location and height: Signage shall be placed in a standardized location throughout a building or facility as follows:

1. Interior signage shall be located on the door or alongside of the door on the latch side and shall be mounted at between 4′6″ and 5′6″ above finished floor.
2. Exterior signage shall be installed at entrances and walks to direct individuals to accessible routes and entrances required.
3. Symbols of accessibility. If accessible facilities are identified, then the international sign of accessibility shall be used.

SECTION 2538.0 TELEPHONES

2538.1 General: If public telephones are provided, then they shall comply with this section.

2538.2 Clear floor or ground space: A clear floor or ground space at least 30 inches by 48 inches that allows either a forward or parallel approach by a person using a wheelchair shall be provided at telephones. The clear floor or ground space shall comply with Section 2511.4. Bases, enclosures, and fixed seats shall not impede approaches to telephones by people who use wheelchairs.

2538.3 Mounting height: The highest operable part of the telephone shall be within reach ranges specified in Section 2511.5 or 2511.6. Telephones mounted diagonally shall have the highest operable part no higher than 54 inches above the floor.

2538.4 Enclosures: If telephone enclosures are provided, they may overhang the clear floor space required in Subsection 2538.2 within the following limits:

1. Side reach possible: The overhang shall be no greater than 19 inches; the height of the lowest overhanging part shall be equal to or greater than 27 inches.
2. Full height enclosures: Entrances to full height enclosures shall be 30 inches clear minimum.
3. Forward reach required: If the overhang is greater than 12 inches, then the clear width of the enclosure shall be 30 inches minimum, if the clear width of the enclosure is less than 30 inches, then the height of the lowest overhanging part shall be equal to or greater than 27 inches.
4. Where telephone enclosures protrude into walls, halls, corridors, or aisles, they shall also comply with Section 2512.3.

2538.5 Equipment for hearing impaired people: Telephones shall be equipped with a receiver that generates a magnetic field in the area of the receiver cap. If banks of public telephones are provided, a minimum of 5 percent, but at least one in a building or facility shall be equipped with a volume control.

2538.6 Controls: Telephones shall have pushbutton controls where service for such equipment is available.

2538.7 Telephone books: Telephone books, if provided, shall be located so that they can be used by a person in a wheelchair.

2538.8 Cord length: The cord from the telephone to the headset shall be at least 29 inches long.

SECTION 2539.0 SEATING, TABLES AND WORK SURFACES

2539.1 General: If fixed or built-in seating, tables, or work surfaces are provided in accessible spaces, the minimum number of spaces for use by persons in wheelchairs shall be in accordance with Table 2540.1.

2539.2 Seating: If seating spaces for people in wheelchairs are provided at tables, counters, or work surfaces, clear floor space complying with Section 2511.4 shall be provided. Such clear floor space shall not overlap knee space by more than 19 inches.

2539.3 Knee clearances: If seating for people in wheelchairs is provided at tables, counters or work surfaces, knee spaces at least 27 inches high, 30 inches wide, and 19 inches deep shall be provided.

2539.4 Height of work surfaces: The tops of tables and work surfaces shall be from 28 inches to 34 inches from the floor to ground.

SECTION 2540.0 ASSEMBLY AREAS

2540.1 Minimum number: Assembly areas shall have designated spaces for wheelchair use in each assembly area that complies with this section and the minimum number of wheelchair spaces shall be in accordance with Table 2540.1. Assembly areas with audio-amplification systems shall have a listening system complying with Subsections 2540.6 and 2540.7 to assist persons with severe hearing loss in the appreciation of audio presentations.

Table 2540.1
ACCESSIBLE LOCATIONS

Total seating capacity of the facility	Minimum number of wheelchair spaces
50 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
over 500	10 plus a reasonable number not to exceed 1% to be determined by Section 2505.1

2540.2 Size of wheelchair locations: Each wheelchair location shall provide minimum clear ground or floor space of 66 inches wide by 48 inches deep for forward or rear access and 66 inches deep for side access and shall accommodate two people in wheelchairs.

2540.3 Placement of wheelchair locations: Wheelchair areas shall be an integral part of any fixed seating plan and shall be dispersed throughout the seating area. They shall adjoin an accessible route that also serves as a means of egress in case of emergency and shall be located to provide lines of sight comparable to those for all viewing areas.

Exception: In alteration work where it is structurally impossible to alter seating location to disperse seating throughout, seating may be located in collected areas, but must adjoin an accessible route.

2540.4 Surfaces: The ground or floor at wheelchair locations shall be level and shall comply with Section 2512.2.

2540.5 Access to performing areas: An accessible route shall be provided to performing areas, including stages, arena floors, dressing rooms, locker rooms, and other spaces used by performers.

2540.6 Placement of listening systems: If the listening system provided serves individual fixed seats, then such seats shall be located within a 50 foot viewing distance of the stage or playing area and shall have a complete view of the stage or playing area.

2540.7 Types of listening systems: Audio loops and radio frequency systems are two acceptables types of listening systems. The department will rely upon the advice of the Kentucky Commission for the Deaf and Hearing Impaired in its interpretation and enforcement of the provisions relating to accessibility for the hearing impaired.

2540.8 Applicability: The provisions of this section are intended to apply to performing arts and movie theaters as well as public meeting places, auditoriums and gymnasiums, among others.

SECTION 2541.0 HOTELS AND MOTELS

2541.1 Minimum requirements: In hotel and motel buildings, lodging houses, boarding houses, and dormitory buildings, providing sleeping accommodations for 20 or more individuals, a minimum of 5 percent of those accommodations shall be accessible to and shall comply with Section 2510.1 and 2510.2.

SECTION 2542.0 DWELLING UNITS

2542.1 General: Where multi-family housing projects are required to be accessible, a minimum of one in 25 dwelling units shall meet the requirements of this section.

2542.2 Minimum requirements: An accessible dwelling unit shall be on an accessible route, and accessible dwelling units shall have the following accessible elements and spaces as a minimum.

1. Common spaces: Common spaces and facilities serving individual accessible dwelling units (for example, entry walks, trash disposal facilities, and mail boxes) shall comply with Sections 2510.0 through 2540.0.
2. Accessible spaces: Accessible spaces shall have maneuvering space complying with Section 2511.2 and 2511.3 and surfaces complying with Section 2512.2.
3. Accessible route: At least one accessible route complying with Section 2512.1 shall connect the accessible entrances with all accessible spacess and elements within the dwelling units.
4. Parking: If parking spaces are assigned for use with individual dwelling units, then at least one parking space per accessible dwelling unit shall comply with Section 2513.3.
5. Windows: If windows intended to be operated by occupants are provided, then they shall comply with Section 2519.0.
6. Doors: Doors to and in accessible spaces that are intended for passage shall comply with Section 2520.0.
7. Entrances: All entrances to accessible dwelling units shall comply with Section 2521.0.
8. Storage: Storage in accessible spaces in dwelling units, including cabinets, shelves, closets, and drawers, shall comply with Section 2532.0.
9. Controls: All controls in accessible spaces shall comply with Section 2534.0. Those portions of heating, ventilating, and air conditioning equipment requiring regular, periodic maintenance and adjustment by the resident of a dwelling shall be accessible to people in wheelchairs. If air distribution registers must be placed in or close to ceilings for proper air circulation, this specification shall not apply to registers.
10. Alarms: If emergency alarms are provided, alarm connections complying with Sections 2535.4, 2535.5, and 2535.6 shall be provided in the dwelling unit.
11. Telephone: If telephone connections are installed in the dwelling unit, a reasonable number, but always at least one, shall comply with Sections 2538.2 and 2538.3.
12. Bathroom: A reasonable number, but always at least one, of full bathrooms shall comply with Section 2542.5. A full bathroom shall include a water closet, a lavatory, and a bathtub or shower.
13. Kitchen: The kitchen shall comply with Section 2542.6.
14. Laundry: If laundry facilities are provided, they shall comply with Section 2542.7.
15. Unit spaces: The following spaces shall be accessible and shall be on an accessible route:
    1. The living area;

2. The dining area;
3. The sleeping area, or the bedroom in one bedroom dwelling units, or at least two bedrooms or sleeping spaces in dwelling units with two or more bedrooms; and
4. Patios, terraces, balconies, carports, and garages, if provided with the dwelling unit.

2542.3 Adaptability: The specifications of Subsection 2542.6 are based on the concept of adaptability.

2542.4 Consumer information: To ensure that the existence of adaptable features will be known to the owner or occupant of a dwelling, consumer information shall be provided for each accessible dwelling unit for rent or sale.

2542.5 Bathrooms: Bathrooms shall be on an accessible route and shall comply with the requirements of this subsection.

1. Minimum dimensions: Accessible bathrooms shall accommodate wheelchair turning space in accordance with Section 2511.3. Door operations shall not interfere with maneuverability.
2. Water closets:
   1. Clear floor space: Clear floor space at the water closet shall be as shown in Figure 9. The water closet may be located with the clear area at either the right or left side of the toilet.
   2. Height: The height of the water closet shall be at least 17 to 19 inches measured to the top of the toilet seat.
   3. Grab bars: Grab bars shall be installed as shown in Figure 10 and shall comply with Section 2533.0.
   4. Dispenser: The toilet paper dispenser shall be installed within reach as shown in Figure 10.
3. Lavatory, mirrors, and medicine cabinets:
   1. Lavatory and mirror: The lavatory and mirrors shall comply with Section 2526.0.
   2. Medicine cabinet: If a medicine cabinet is provided above the lavatory, then the bottom of the medicine cabinet shall be located with a usable shelf no higher than 44 inches above the floor.
4. Bathtubs: If a bathtub is provided, then it shall have the following features:
   1. Floor space: Clear floor space at bathtubs shall be as shown in Figure 13.
   2. Seat: An in-tub seat or a seat at the head end of the tub shall be provided as shown in Figures 13 and 14. The structural strength of seats and their attachments shall comply with Section 2533.3. Seats shall be mounted securely and shall not slip during use.
   3. Grab bars: Grab bars shall be installed as shown in Figure 14 and shall comply with Section 2533.0.
   4. Controls: Faucets and other controls shall be located as shown in Figure 14 and shall comply with Section 2534.4. Single lever and

mixing devices are acceptable designs.

5. Shower unit: A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head at various heights or as a hand held shower shall be provided.

5. Showers: If a shower is provided, it shall have the following features:
   1. Size and clearances: Shower stall size and clear floor space shall comply with Figure 15.
   2. Seat: A seat shall be provided in the transfer shower stalls as shown in Figure 16. The seat shall be 17 inches to 19 inches high, measured from the bathroom floor and shall extend the full depth of the stall. The seat shall be on the wall opposite the controls. The structural strength of seats and their attachments shall comply with Section 2533.3. Seats shall be mounted securely and shall not slip during use.
   3. Grab bars: Grab bars complying with Section 2533.0 shall be provided as shown in Figure 17.
   4. Controls: Faucets and other controls shall be located as shown in Figure 17 and shall comply with Section 2534.4. In transfer shower stalls, all controls, faucets, and the shower unit shall be mounted on the side wall opposite the seat.
   5. Shower unit: A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head at various heights or as a hand held shower shall be provided.
6. Bathtub and shower enclosure: Enclosures for bathtubs or shower stalls shall not obstruct controls or transfer from wheelchairs onto shower or bathtub seats. Enclosures on bathtubs shall not have tracks mounted on their rims.
7. Clear floor space: Clear floor space at fixtures may overlap.

2542.6 Kitchens: Kitchens and their components shall be on an accessible route and shall comply with the requirements of this subsection.

1. Clearance: Clearances between all opposite base cabinets, counter tops, appliances or walls shall accommodate wheelchair turning space in accordance with Section 2511.3.
2. Clear floor space: A clear floor space at least 30 inches by 48 inches complying with Section 2511.4 that allows either a forward or a parallel approach by a person in a wheelchair shall be provided at all appliances in the kitchen, including the range or cooktop oven, refrigerator/freezer, dishwasher, and trash compactor. Laundry equipment located in the kitchen shall comply with Section 2542.7.
3. Controls: All controls in kitchens shall comply with Section 2534.0.
4. Work surfaces: At least one 30-inch section of counter shall provide a work surface that complies with the following requirements:
   1. The counter either shall be adjustable (or replaceable as a unit) to provide alternative heights of 28 inches to 36 inches, or shall be fixed at 30 inches measured from the floor to the top of the counter surface.

2. Base cabinets, if provided, shall be removable under the full 30-inch minimum frontage of the counter. The finished floor shall extend under the counter to the wall.
3. Counter thickness and supporting structure shall be two inches maximum over the required clear area.
4. A clear floor space 30 inches by 48 inches shall allow a forward approach to the counter. Nineteen inches maximum of the clear floor space may extend underneath the counter. The knee space shall have a minimum clear width of 30 inches and a minimum clear depth of 19 inches.
5. There shall be no sharp or abrasive surfaces under the counters.

5. Sink: The sink and surrounding counter shall comply with the following requirements:
   1. The sink and surrounding counter either shall be adjustable (or replaceable as a unit) to provide alternative heights of 28 inches to 36 inches, or shall be fixed at 30 inches measured from the floor to the top of the counter surface or sink rim. The total width of sink and counter area shall be 30 inches minimum.
   2. Where the sink is adjustable, rough-in plumbing shall be located to accept conditions of supply and drain pipes for sinks mounted at the height of 28 inches.
   3. The depth of a sink bowl shall be no greater than 6½ inches.
   4. Faucets shall comply with Section 2534.4. Lever operated or push type mechanisms are two acceptable designs.
   5. Base cabinets, where provided, shall be removable under the full 30 inch minimum frontage of the sink and surrounding counter. The finished flooring shall extend under the counter to the wall.
   6. Counter thickness and supporting structure shall be two inches maximum over the required clear space.
   7. A clear floor space 30 inches by 48 inches shall allow forward approach to the sink. Nineteen inches maximum of the clear floor space may extend underneath the sink. The knee space shall have a minimum clear width of 30 inches and a clear depth of 19 inches.
   8. There shall be no sharp or abrasive surfaces under sinks. If hot water exceeds 120 degres Fahrenheit, hot water and drain pipes under sinks shall be insulated or otherwise covered.
6. Ranges and cooktops: Ranges and cooktops comply with item 2 of Section 2542.6 and Section 2534.0. If ovens or cooktops have knee spaces underneath, then they shall be insulated or otherwise protected on the exposed contact surfaces to prevent burns, abrasions, or electrical shock. The clear floor space may overlap the knee space, if provided, by 19 inches maximum. The location of controls for ranges and cooktops shall not require reaching across burners.
7. Ovens: Ovens shall comply with item 2 of Section 2542.6 and Section 2534.0. Ovens shall be of the self-cleaning type or be located adjacent

to a counter with knee space below. For side opening ovens, the door latch side shall be next to the open counter space, and there shall be a pull-out shelf under the oven extending the full width of the oven and pulling out not less than 10 inches when fully extended. Ovens shall have controls on front panels; they may be located on either side of the door.

8. Refrigerator/freezers: Refrigerator/freezer type shall comply with Section 2534.0. Refrigerators shall be:
   1. Of the vertical side-by-side refrigerator/freezer type; or
   2. Of the over and under type and meet the following requirements:
      a. Have at least 50 percent of the freezer space below 54 inches above the floor.
      b. Have 100 percent of the refrigerator space and controls below 54 inches. Freezers with less than 100 percent of the storage volume within the limits specified in Section 2542.6 or 2542.7 shall be the self-defrosting type.
9. Dishwashers: Dishwashers shall comply with item 2 of Section 2542.6 and Section 2534.0. Dishwashers shall have all rack space accessible from the front of the machine for loading and unloading dishes.
10. Kitchen storage: At least 50 percent of kitchen storage areas shall comply with Section 2532.0. Door pulls or handles for wall cabinets shall be mounted as close to the bottom of cabinet doors as possible. Door pulls or handles for base cabinets shall be mounted as close to the top of cabinet doors as possible.

2542.7 Laundry facilities: If laundry equipment is provided within individual accessible dwelling units, or if separate laundry facilities serve one or more accessible dwelling units, then they shall meet the requirements of this subsection.

1. Location: Laundry facilities and laundry equipment shall be on an accessible route.
2. Washing machines and clothes dryers: Washing machines and clothes dryers in common use laundry rooms shall be front loading.
3. Controls: Laundry equipment shall comply with Section 2534.0.

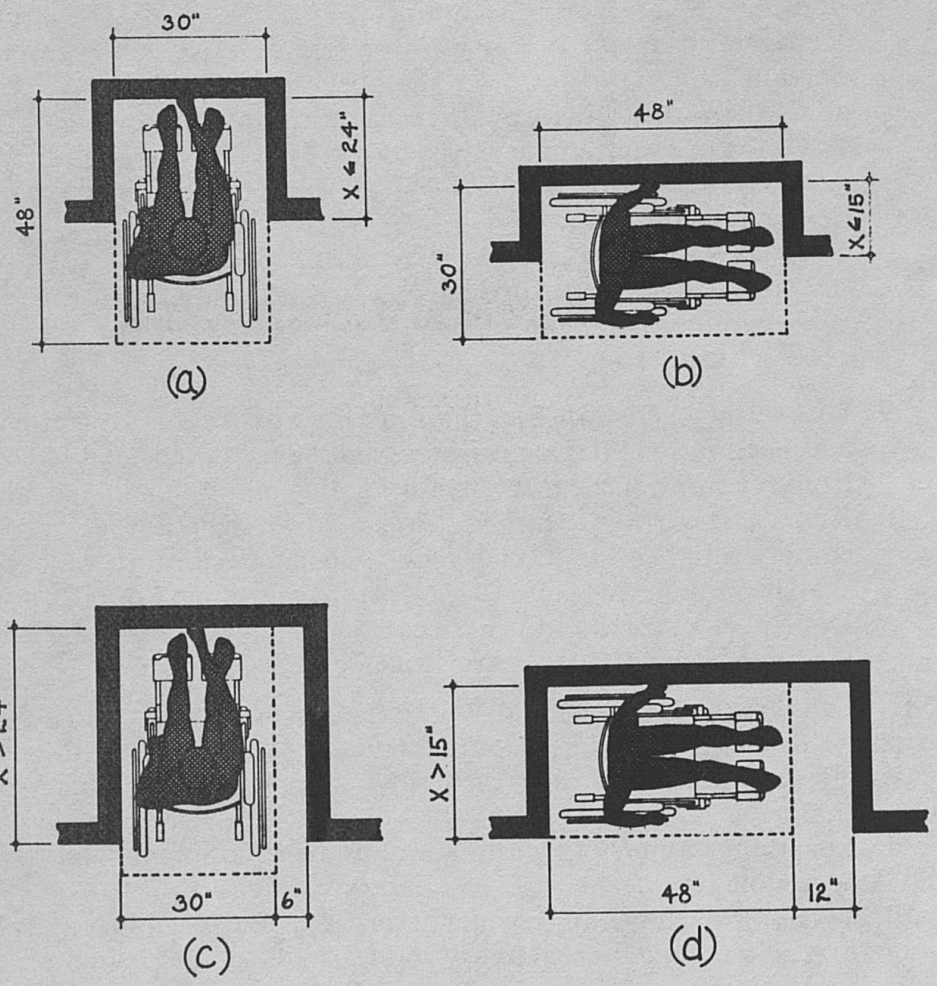


Figure 1
CLEAR FLOOR SPACE IN ALCOVES

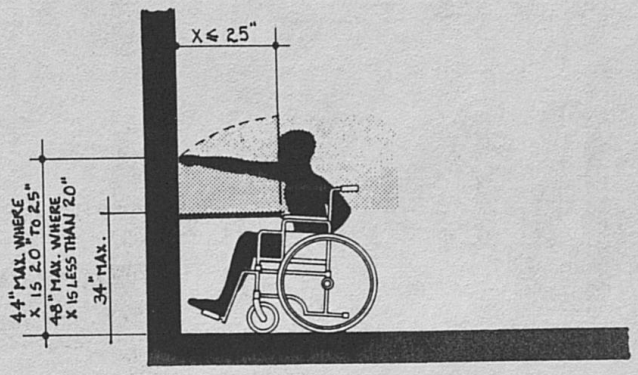


Figure 2
MAXIMUM FORWARD REACH OVER AN OBSTRUCTION

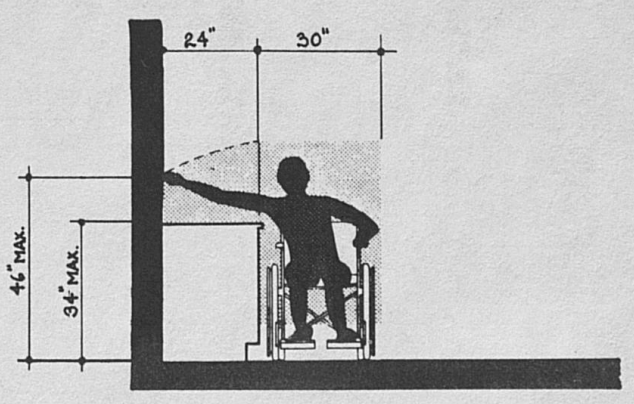
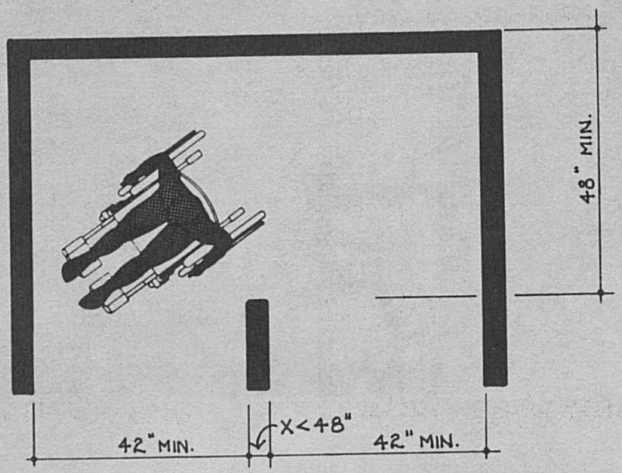
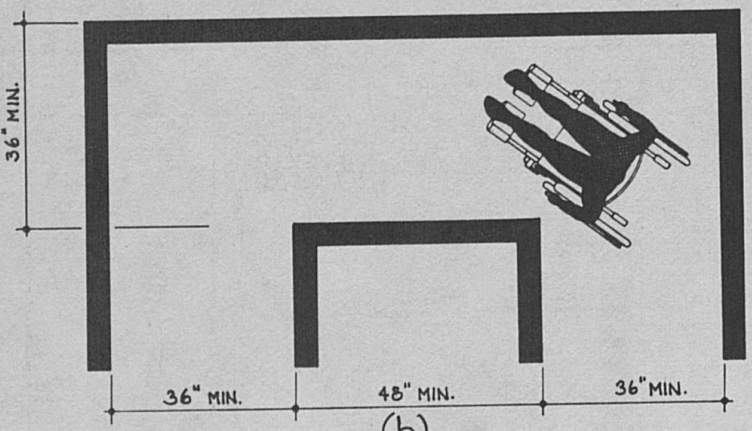


Figure 3
MAXIMUM SIDE REACH OVER AN OBSTRUCTION



(a)
TURNS AROUND AN OBSTRUCTION



(b)
90° TURN

Figure 4
WIDTH OF ACCESSIBLE ROUTE

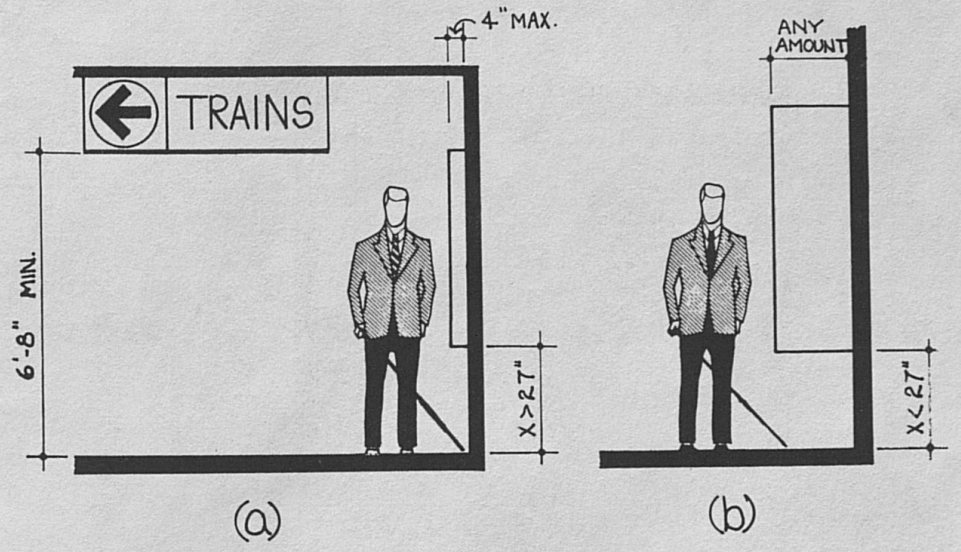


Figure 5
PROTRUDING OBJECTS

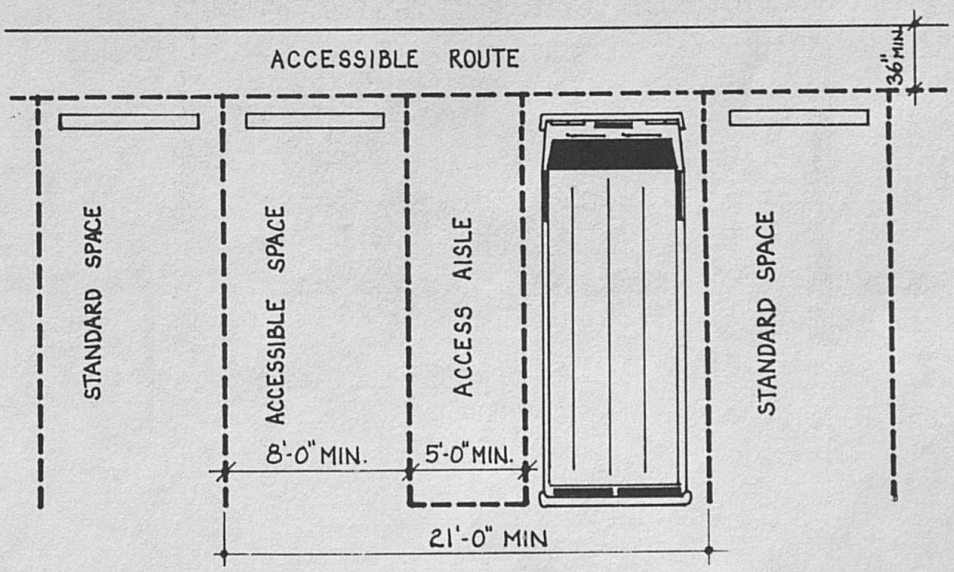


Figure 6
DIMENSIONS OF PARKING SPACES

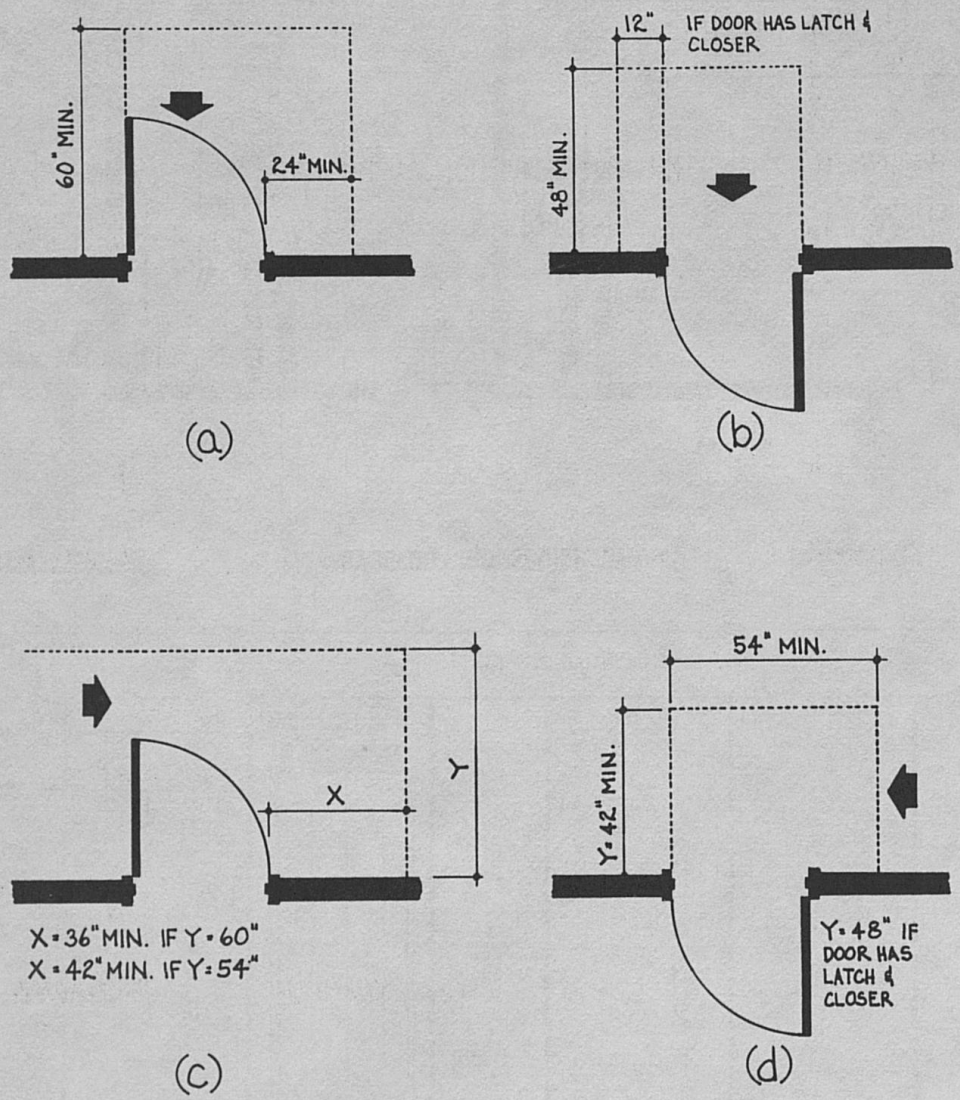


Figure 7
MANEUVERING CLEARANCES AT DOORS

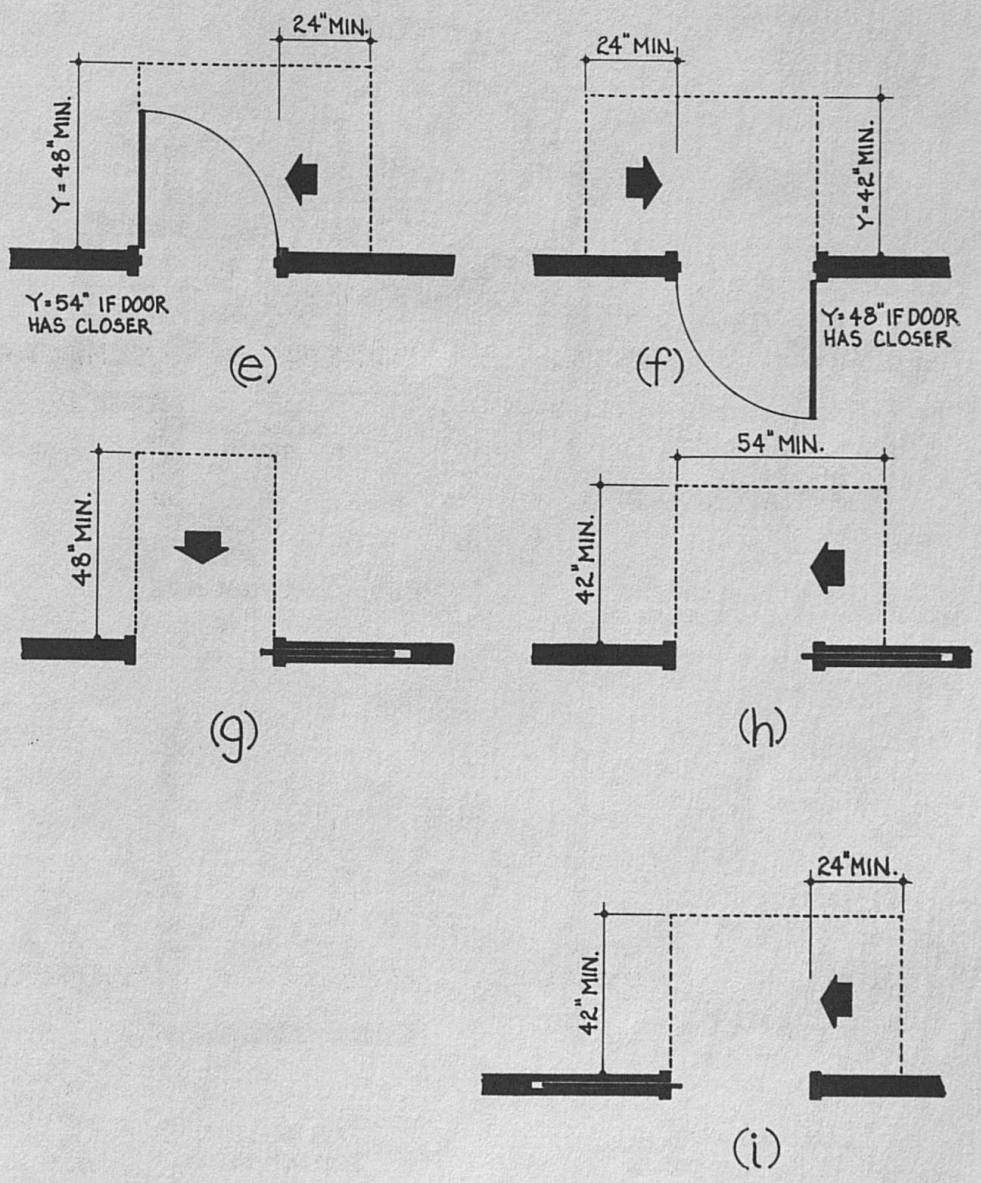


Figure 7
MANEUVERING CLEARANCES AT DOORS

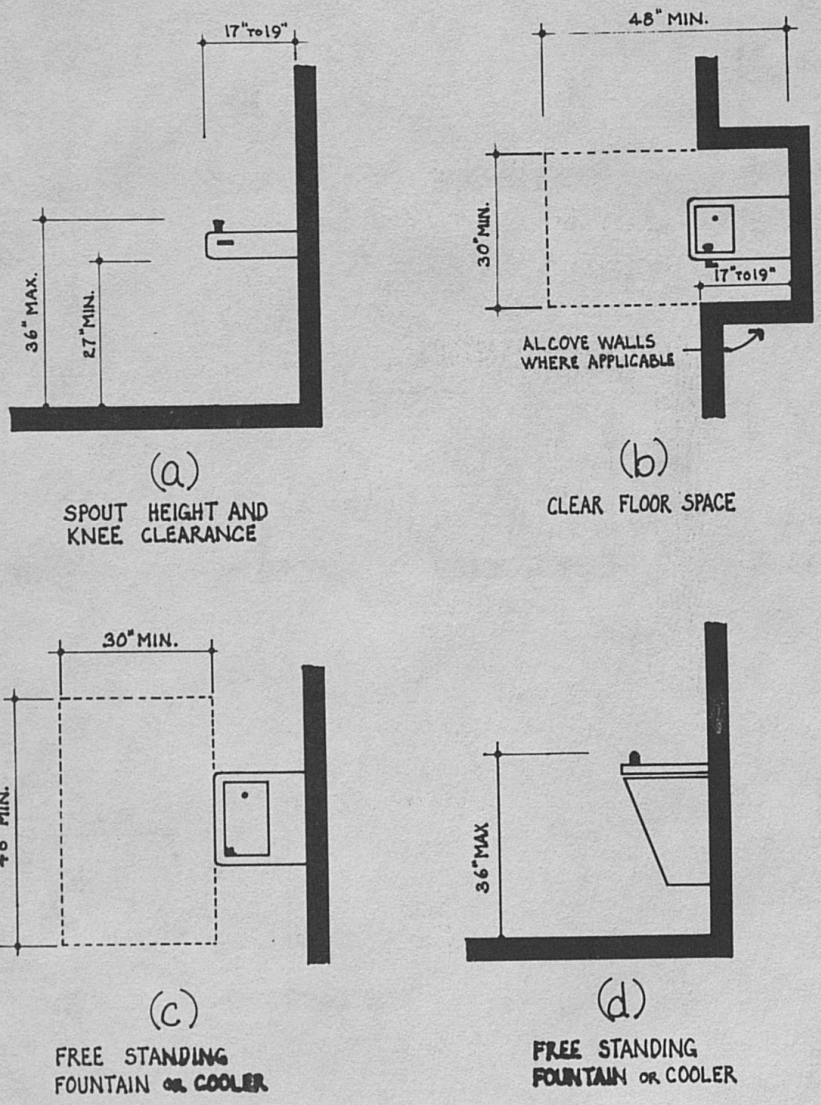


Figure 8
DRINKING FOUNTAINS AND WATER COOLERS

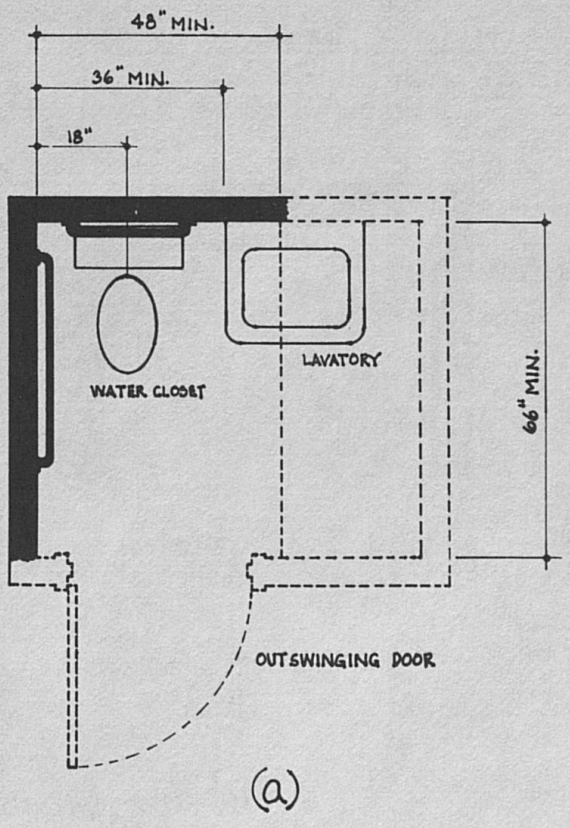


Figure 9
CLEAR FLOOR SPACE AT WATER CLOSETS

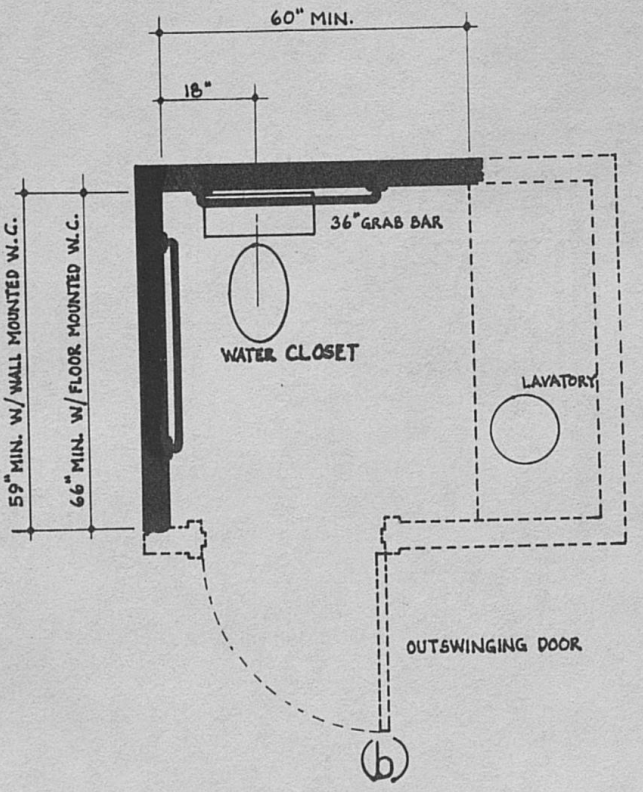


Figure 9
CLEAR FLOOR SPACE AT WATER CLOSETS

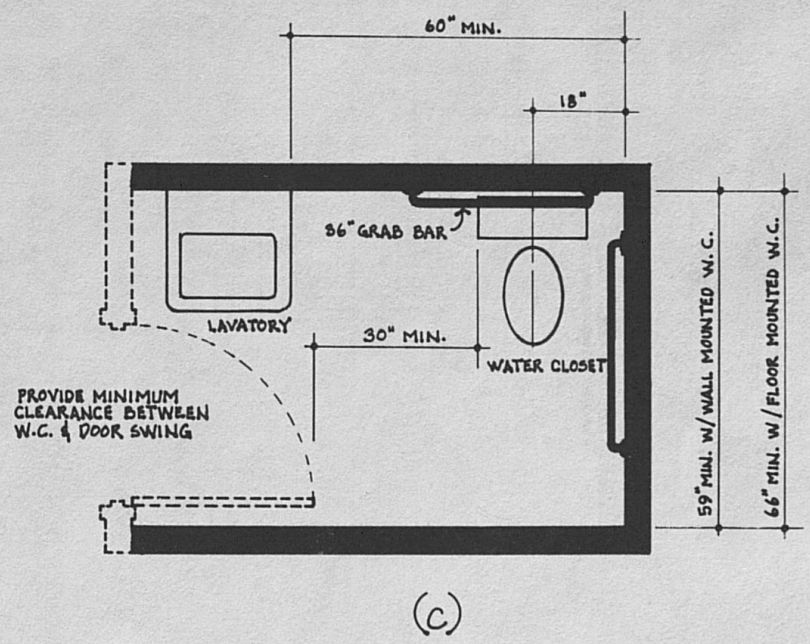


Figure 9
CLEAR FLOOR SPACE AT WATER CLOSETS

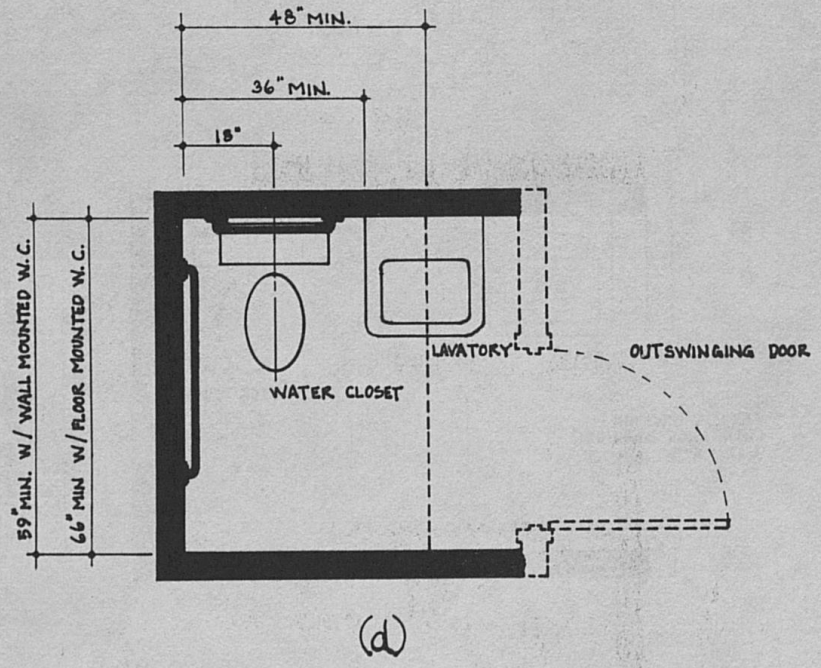


Figure 9
CLEAR FLOOR SPACE AT WATER CLOSETS

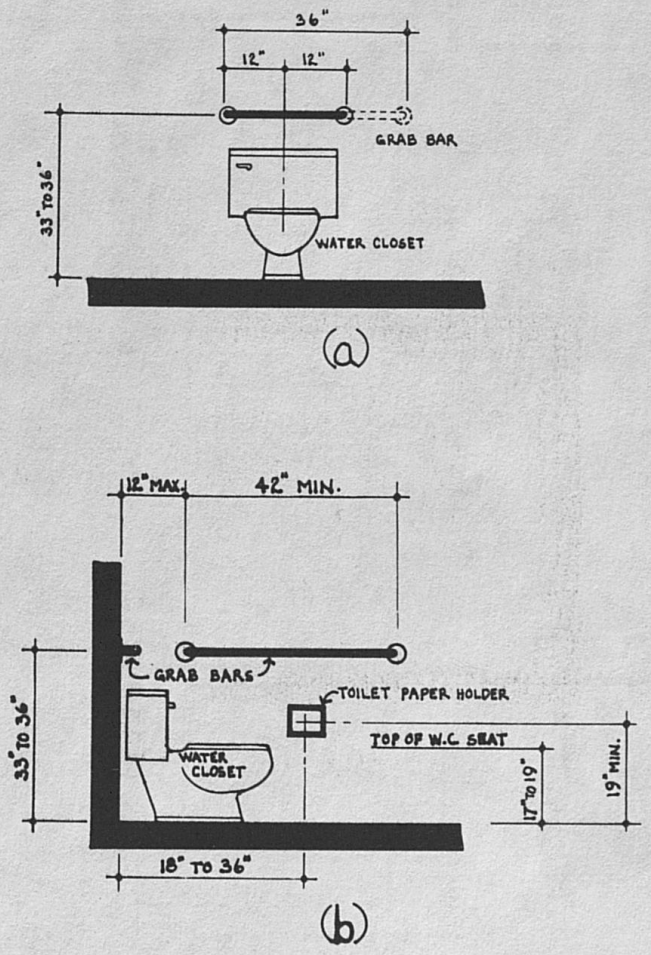


Figure 10
GRAB BARS AT WATER CLOSETS

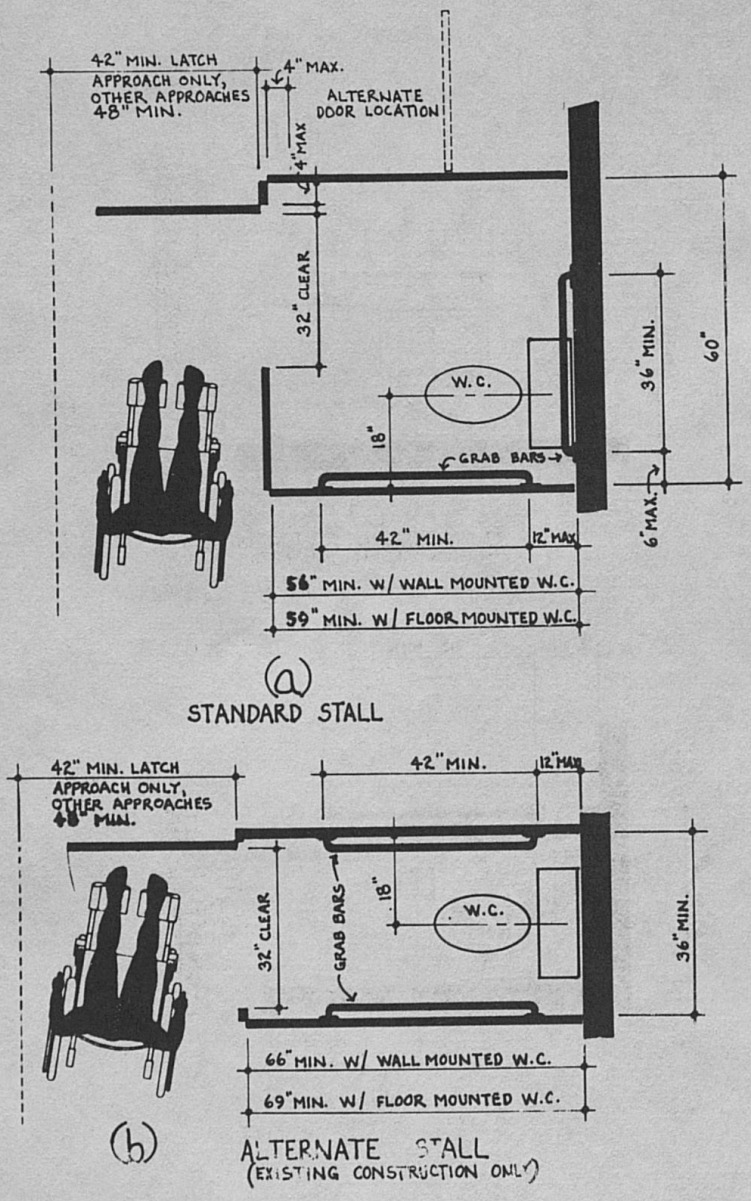
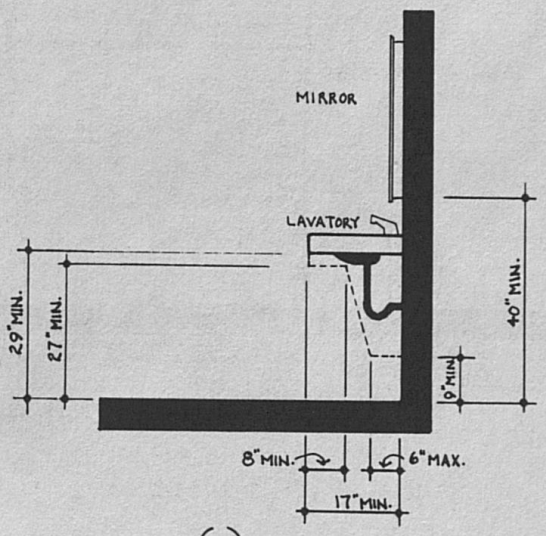
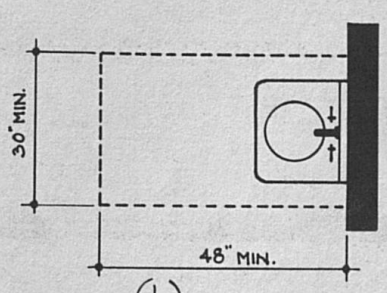


Figure 11
TOILET STALLS

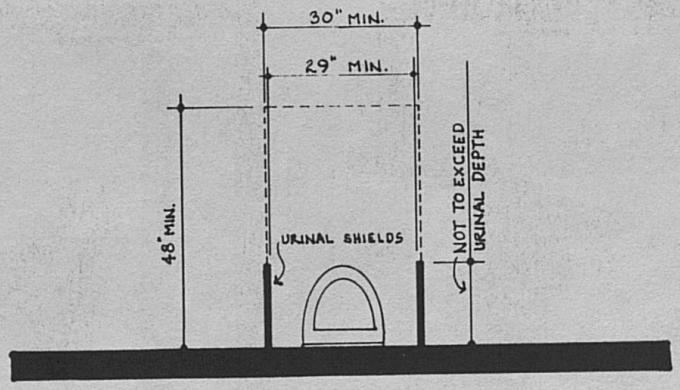


(a)
LAVATORY CLEARANCES

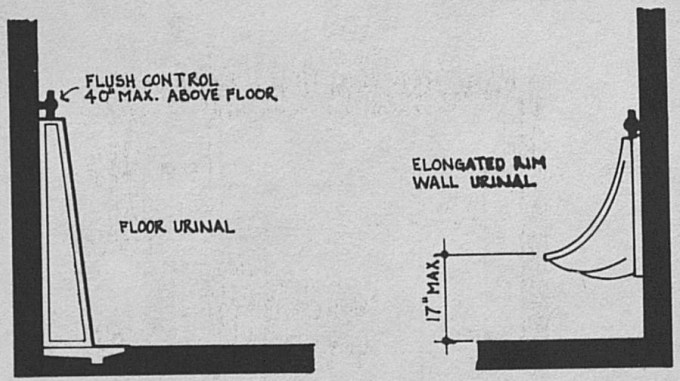


(b)
CLEAR FLOOR SPACE

Figure 12
LAVATORY CLEARANCES

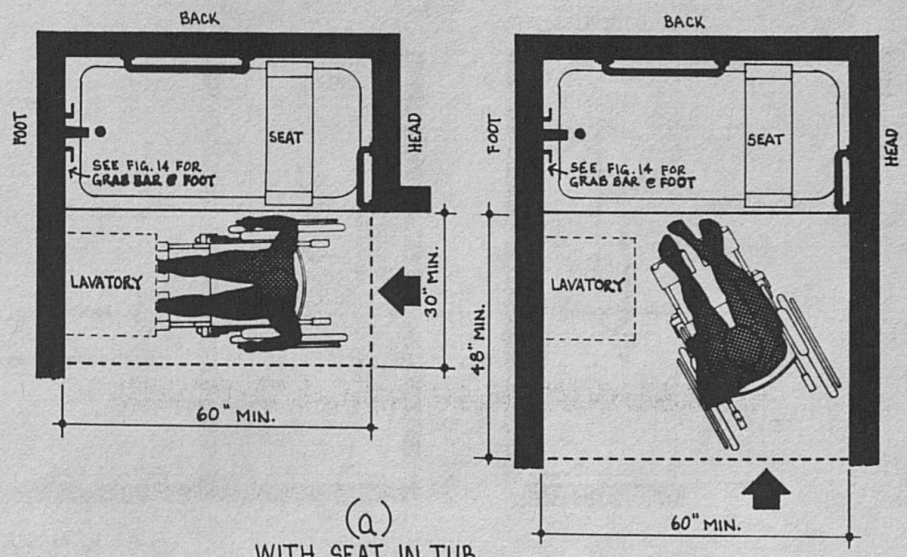


(a)
CLEAR FLOOR SPACE & URINAL SHIELDS

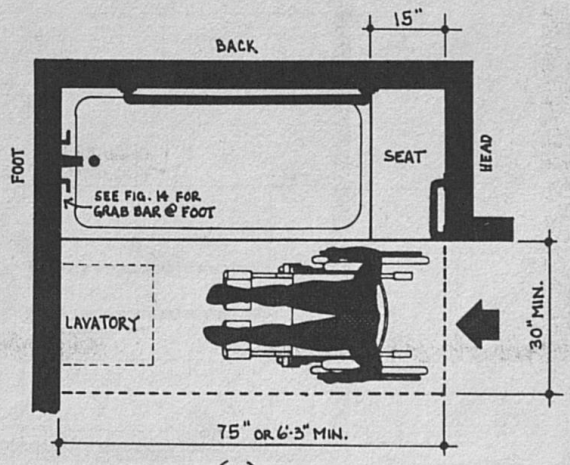


(b)
URINAL TYPE & MOUNTING HEIGHTS

Figure 12.1
URINALS



(a)
WITH SEAT IN TUB



(b)
WITH SEAT AT HEAD OF TUB

Figure 13
CLEAR FLOOR SPACE AT BATHTUBS

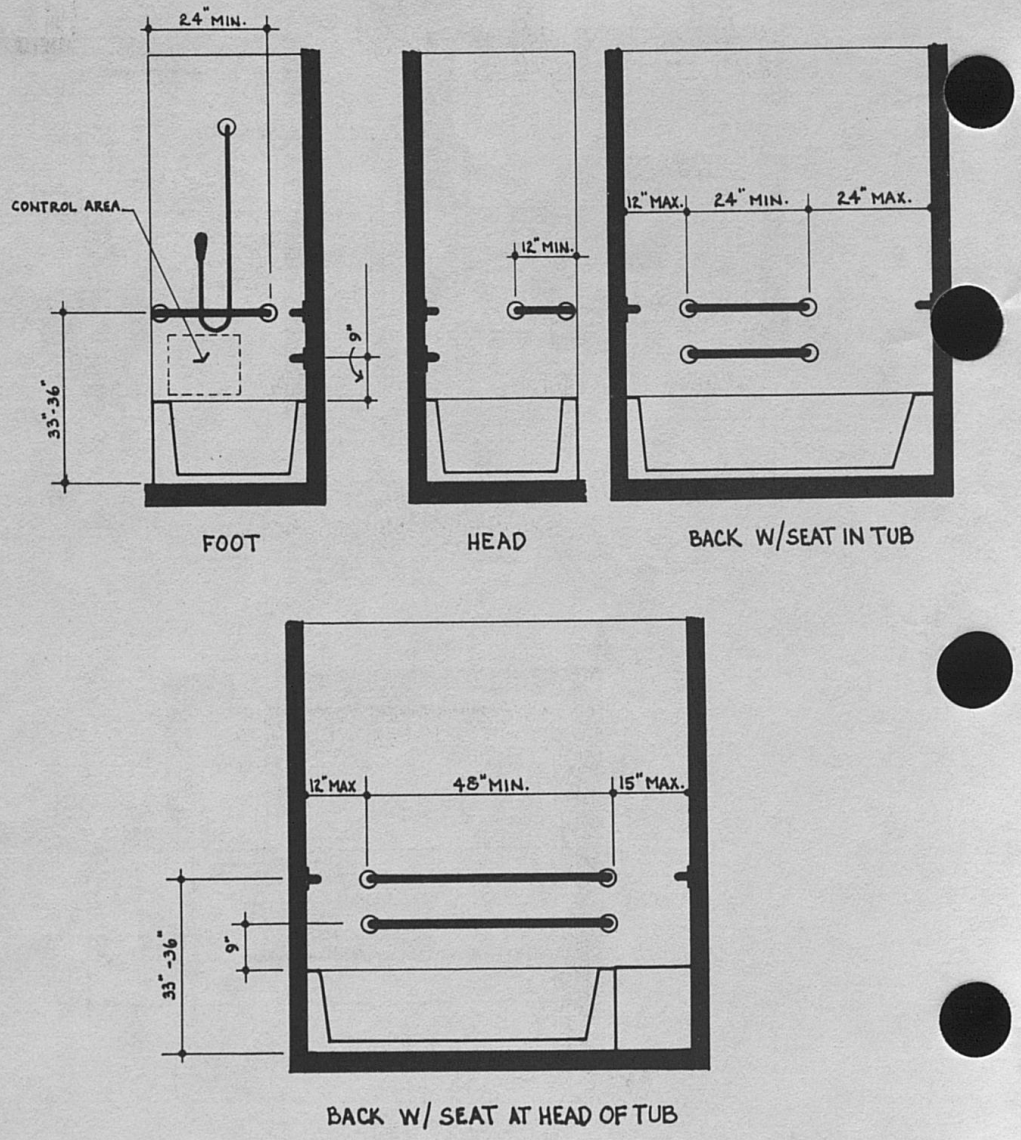


Figure 14
GRAB BARS AT BATHTUBS

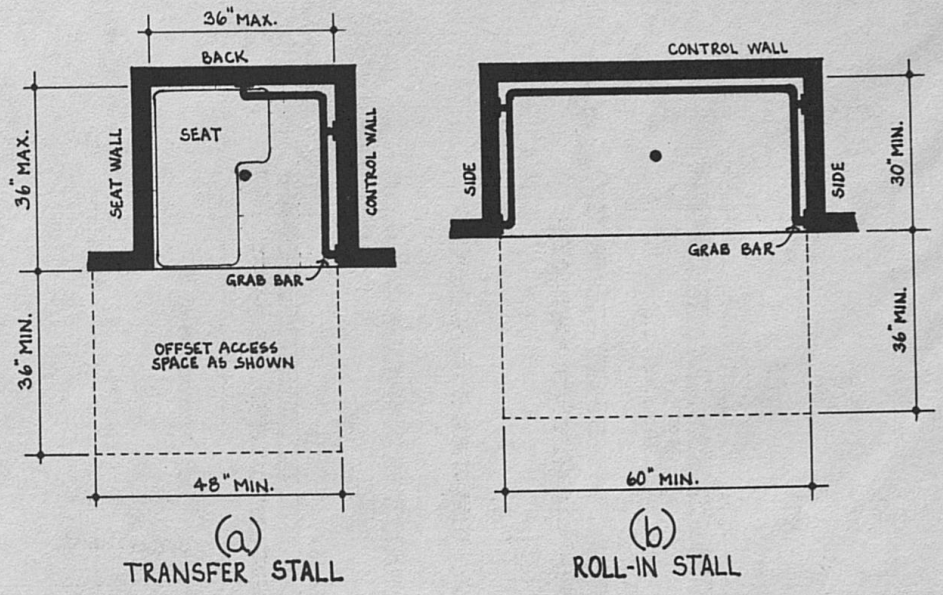


Figure 15
SHOWER SIZE AND CLEARANCES

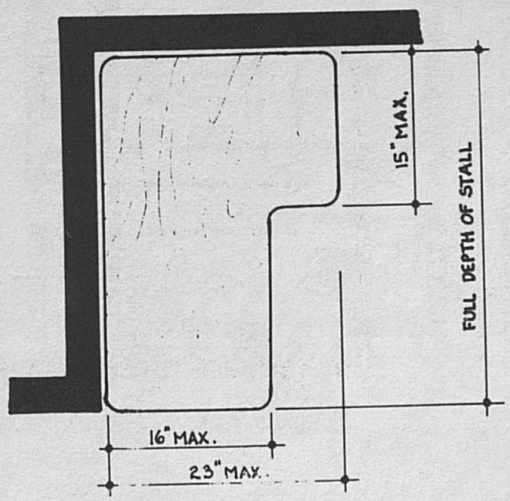


Figure 16
SHOWER SEAT DESIGN

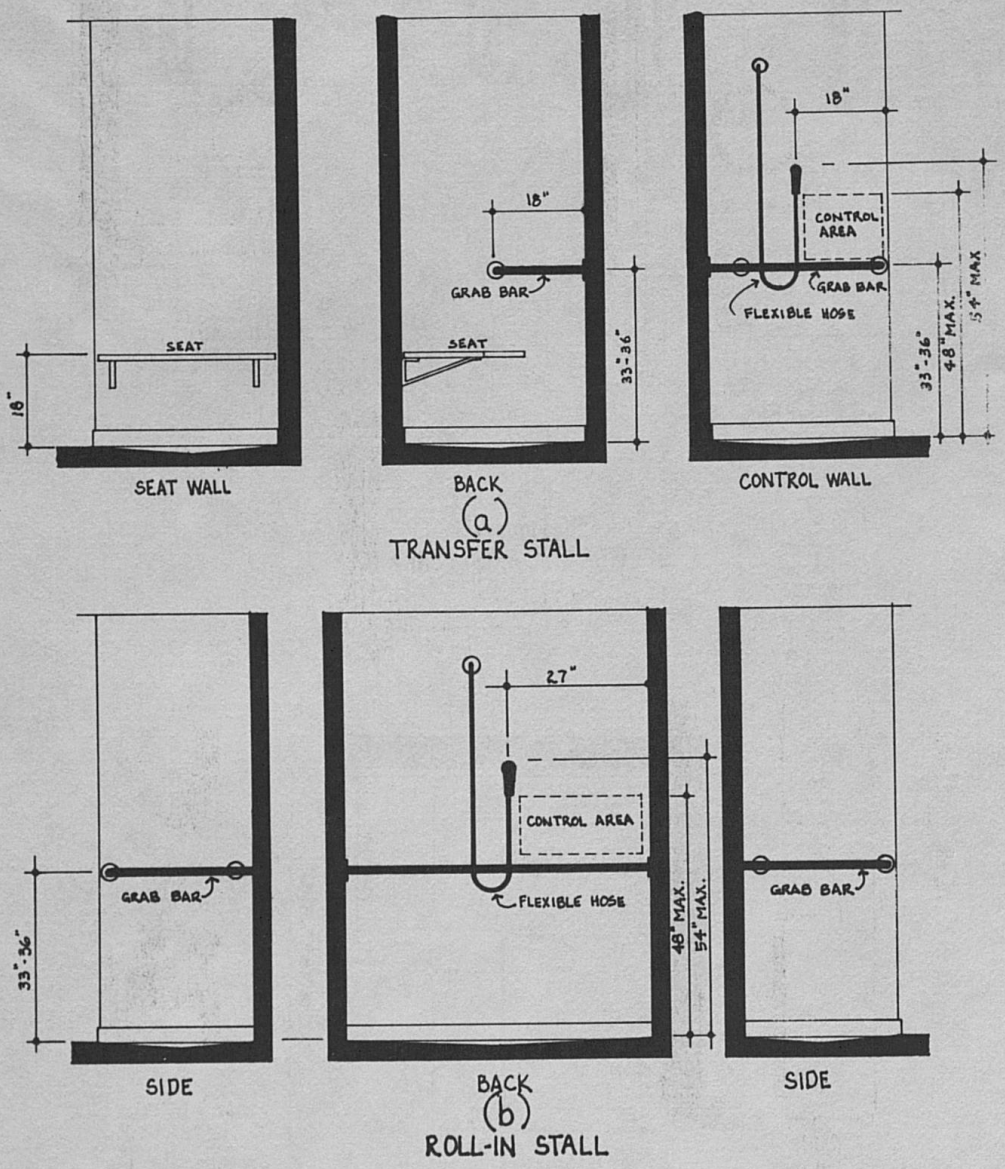


Figure 17
GRAB BARS AT SHOWER STALLS

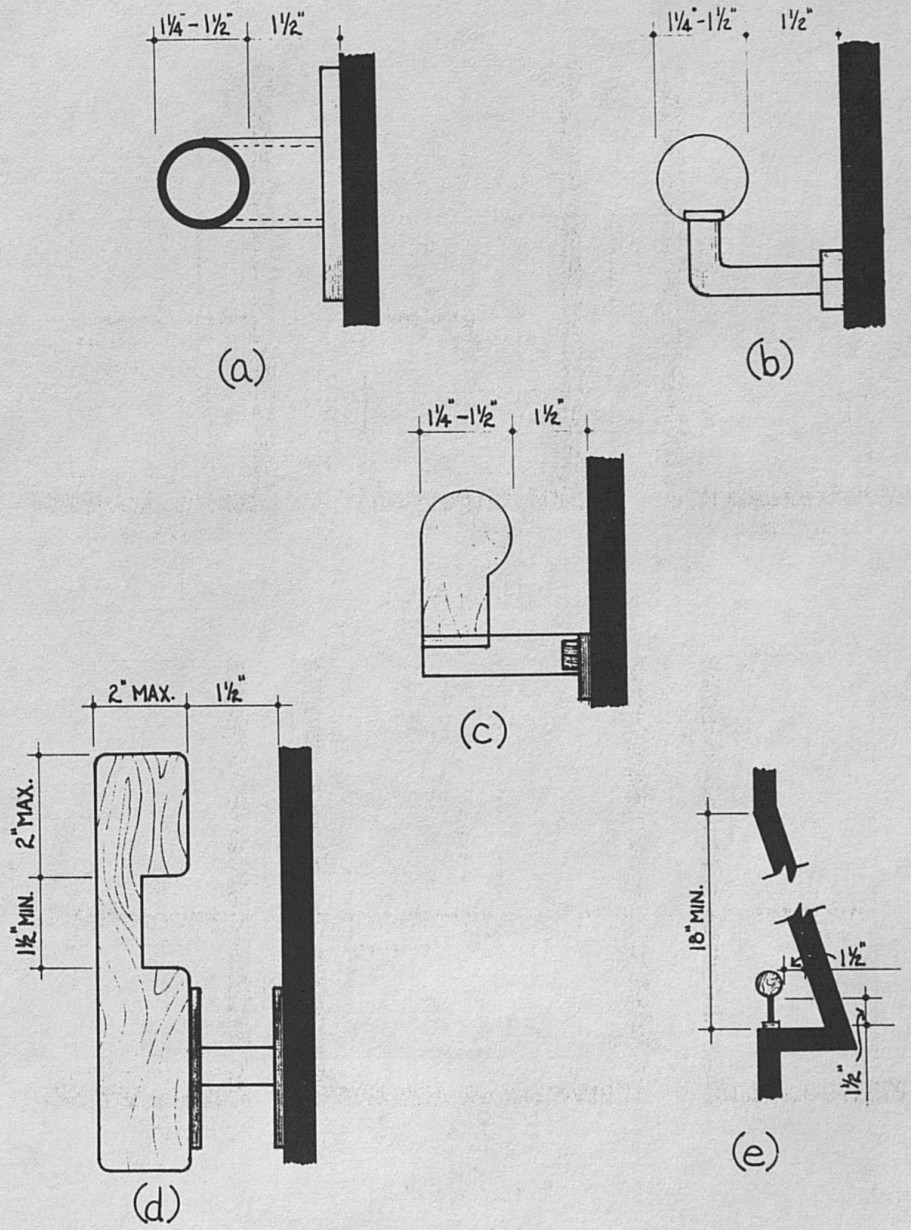


Figure 18
GRAB BARS AND HANDRAILS

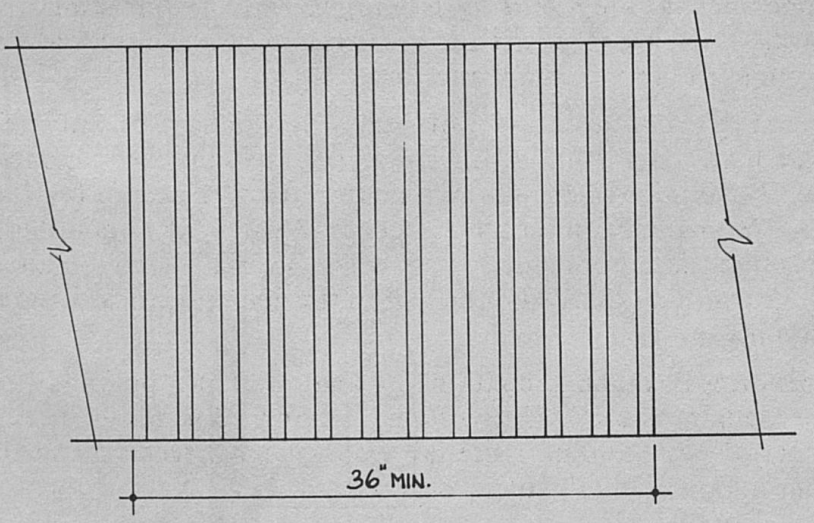


Figure 19
TACTILE WARNINGS ON WALKING SURFACES

GENERAL NOTES CONCERNING STANDARDS CITED IN THE KENTUCKY BUILDING CODE

The appendices of the *Kentucky Building Code* contain listings of the many standards which are referenced in the text and other sources of information which are useful in the compliance process.

Appendix A contains a listing of standards which are directly referenced in the code text. The listing of the standards includes the standard title and number, the issuing agency as well as the effective date of the standard. In addition, each section of the code which references the standard is identified. These standards are intended to serve as criteria for compliance with the *Kentucky Building Code* and the text of the code specifically indicates their applicability.

Appendices B, C and D contain information that is potentially useful to a designer, engineer or building official seeking information related to dead loads of various building materials and systems, recommended fastening methods and metric unit conversion factors.

Wherever possible, the standards in Appendix A have been listed under the designation of the principal authoring agency. Many of these standards are reissued by one or more agencies, in addition to the authoring agency, under their own designations. While there may be some variation in details in the various versions of the same standard issued by several agencies, these differences are generally of such minor nature that any of the versions is acceptable even though not specifically listed herein.

For example, the standard fire test procedure for building construction and materials originating in a committee of the American Society for Testing Materials and issued as ASTM E119 *Methods of Fire Tests of Building Construction and Materials,* is also published by the National Fire Protection Association and issued as NFiPA 251 *Standard Methods of Fire Tests of Building Construction and Materials,* and by Underwriters' Laboratories, Incorporated, which issues it as UL 263 *Standards for Fire Tests of Building Construction and Materials.*

APPENDIX A
REFERENCED STANDARDS

The following is a listing of the standards referenced in this code, the effective date of the standard, the promulgating agency of the standard and the section(s) of this code that refer to the standard.

AA

Aluminum Association
818 Connecticut Avenue, N.W.
Washington, D.C. 20006

Standard reference number	Title	Referenced in code Section number
ASM 35—80	Aluminum Sheet Metal Work in Building Construction—Specifications for	1208.1
SAS 30—82	Aluminum Structures—Specifications for	1208.1

AAMA

Architectural Aluminum Manufacturers Association
2700 River Road
Suite 118
Des Plaines, Illinois 60018

Standard reference number	Title	Referenced in code Section number
1402.3—82	Aluminum Siding and High Performance Coatings for Aluminum Siding—Specifications for	Table 1225.4 Table 1304
1602.1—77	Calculating Skylight Manual Energy Balance—Voluntary Standard Procedure for	2402.2.2 2402.3.2, 2402.3.6.1

AASHTO

American Association of State Highway and Transportation Officials
444 North Capitol Street, N.W.
Suite 225
Washington, D.C. 20001

Standard reference number	Title	Referenced in code Section number
HB-12—83	Highway Bridges, Standard Specifications for	Table 906

ACI

American Concrete Institute
P.O. Box 19150
Redford Station
Detroit, Michigan 48219

Standard reference number	Title	Referenced in code Section number
318—83	Reinforced Concrete—Building Code Requirements for —1983 Supplement	1009.2, 1009.6, 1012.3, 1012.4, 1115.1, 1116.1, 1116.2, 1204.1, 1216.1, 1216.4
318.1—83	Structural Plain Concrete—Building Code Requirements for	1215.4
506.2—77	Shotcrete, Specification for Materials, Proportioning, and Application of	1218.9
531—79	Concrete Masonry Structures—Building Code Requirements for	1204.1, 1209.1, 1210.1, 1211.1, 1220.3, 1221.1, 1309.2, 1407.3

AHA

American Hardboard Association
887-B Wilmette Road
Palatine, Illinois 60067

Standard reference number	Title	Referenced in code Section number
A194.1—73	Cellulosic Fiber Insulating Board	1122.1
A135.4—82	Basic Hardboard	1122.1, 1123.1
A135.6—73	Hardboard Siding	1120.7, 1123.2

AISC

American Institute of Steel Construction, Inc.
Wrigley Building, 8th Floor
400 N. Michigan Avenue
Chicago, Illinois 60611

Standard reference number	Title	Referenced in code Section number
S326—78	Design, Fabrication and Erection of Structural Steel for Buildings—Specification for	1201.1, 1201.5, 1205.1

AISI

American Iron and Steel Institute
1000 Sixteenth Street, N.W.
Washington, D.C. 20036

Standard reference number	Title	Referenced in code Section number
AISI—80	Design of Cold Formed Steel Structural Members —Specification for	1202.1
AISI—74	Design of Cold Formed Stainless Steel Structural Members—Specification for	1202.1
AISI—73	Structural Applications of Steel Cables for Buildings —Criteria for	1207.2
AISI—80	Designing Fire Protection for Steel Columns	1403.1.1

AITC

American Institute of Timber Construction
333 W. Hampden Avenue
Englewood, Colorado 80110

Standard reference number	Title	Referenced in code Section number
102—78	Structural Timber Framing —Standard for the Design of	1224.1
108—80	Heavy Timber Construction—Standard for	1224.1
109—81	Structural Glued Laminated Timber —Treating Standard for	1227.2
112—81	Tongue and Groove Heavy Timber Roof Decking —Standard for	1224.1
117—82	Structural Glued Laminated Timber of Softwood Species—Design Standard Specifications for	1224.1
119—81	Hardwood Glued Laminated Timber —Standard Specifications for	1224.1
A190.1—83	Structural Glue Laminated Timber	1224.1

ANSI

American National Standards Institute, Inc.
1430 Broadway
New York, New York 10018

Standard reference number	Title	Referenced in code Section number
A10.5—81	Material Hoists—Safety Requirements for	2114.5
A12.1—73	Floor and Wall Openings, Railings, and Toe Boards —Safety Requirements for	1813.4
A17.1—81	Elevators, Dumbwaiters, Escalators and Moving Walks— Safety Code for	

ANSI (cont'd.)

A17.1b—83	—1983 Supplement	908.2
		2100.2, 2102.4.2, 2102.5.1, 2103.3.2, 2104.3, 2105.8.2, 2105.8.3, 2105.8.5, 2105.9.2, 2105.9.3, 2105.9.5, 2106.1, 2107.2, 2107.3.2, 2109.1, 2110.1, 2111.4, 2112.1, 2117.1
ANSI/NBS 211—70 (A41.1)	Masonry—Building Code Requirements for	1012.3
		1211.1, 1222.1, 1407.3
ANSI/NBS Handbook H74—60 (A41.2)	Reinforced Masonry—Building Code Requirements for	1204.1
		1209.1, 1210.1, 1211.1, 1221.1, 1407.3
A58.1—82	Loads, Minimum Design in Buildings and other Structures—Building Code Requirements for	614.4
		901.2, 904.1
A90.1—76	Manlifts—Safety Standard for	2100.1
		2102.5.3
A108.4—76	Tile, Ceramic, Installed with Water Resistant Organic Adhesives	1115.6
A108.5—76	Tile, Ceramic, Installed with Dry Set Portland Cement Mortar	1114.5.1
		1114.5.2
A108.6—76	Tile, Ceramic, Installed with Grouting Epoxy	1114.7
A108.7—76	Tile, Electrically Conductive Ceramic, Installed with Conductive Dry Set Portland Cement Mortar	1114.5.1
		1114.5.2
A117.1—80	Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped—Specifications for	2107.4
		Article 25
A118.1—76	Dry Set Portland Cement Mortar—(For Ceramic Tile)	1114.5.1
A118.2—76	Conductive Dry Set Portland Cement Mortar, Standard Specification for (Ceramic Tile)	1114.5.1
A118.3—76	Epoxy, Chemical Resistant, Water Cleanable Tile Setting and Grouting—Standard Specifications for	1114.7
A118.4—76	Latex Portland Cement Mortar—Standard Specification for (Ceramic Tile)	1114.5.2
A136.1—76	Adhesives, Organic, for Installation of Ceramic Tile Types I and II—Standard for	1114.6
A208.1—79	Mat Formed Wood Particle Board	1122.1
		1124.1, 1124.2
B20.1—76	Conveyors and Related Equipment—Safety Standard for	2116.3
B153.1—81	Construction, Care and Use of Automotive Lifts—Safety Requirements for	2115.1
Z49.1—73	Safety in Welding and Cutting	1818.5
Z97.1—75	Safety Glazing Material Used in Buildings—Performance Specifications and Methods of Test for	
Z97.1a—77	—1977 Supplement to Z97.1—75	1301.5.6

APA

American Plywood Association
7011 S. 19th Street
Tacoma, Washington, 98466

Standard reference number	Title	Referenced in code Section number
E30—83	Design/Construction Guide Residential and Commercial	1121.1
H815—83	Design and Fabrication of All-Plywood Beams	1227.3
S811—82	Plywood Curved Panels—Design and Fabrication of	1226.1 1227.3
S812—83	Plywood Lumber Beams—Design and Fabrication of	1226.1 1227.3
U310—78	Plywood Diaphragm Construction	1226.1 1227.3
U813—82	Plywood Stressed-Skin Panels—Design and Fabrication of	1226.1 1227.3
U814—82	Plywood Sandwich Panels—Design and Fabrication of	1226.1 1227.3
Y510—83	Plywood Design Specifications	1123.1

ASHRAE

American Society of Heating,
Refrigerating and Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, Georgia 30329

Standard reference number	Title	Referenced in code Section number
90A—80	Energy Conservation in New Building Design	2400.2 2402.1
90B—75	Energy Conservation in New Building Design	2400.2 2406.2

ASME

American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, New York 10017

Standard reference number	Title	Referenced in code Section number
ASME—83	Boiler and Pressure Vessel Code	2114.4

ASTM

American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

Standard reference number	Title	Referenced in code Section number
A36—81a	Structural Steel—Specifications for	1015.1
A48—83	Gray Iron Castings—Specifications for	1206.1
A252—82	Welded and Seamless Steel Pipe Piles —Specifications for	1015.1 1016.1
A256—82	Cast Iron—Compression Testing of	1206.1
A283—81	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars—Specifications for	1015.1 1016.1
A416—80	Uncoated Seven Wire Stress Relieved Strand for Prestressed Concrete—Specifications for	1018.3.2
A572—82	High Strength Low Alloy Columbium Vanadium Steels of Structural Quality—Specifications for	1015.1
A588—82	High Strength Low Alloy Structural Steel with 50,000 psi Minimum Yield Point to 4 in. Thick— Specifications for	1015.1
C5—79	Quicklime for Structural Purposes —Specifications for	Table 1117
C28—80	Gypsum Plasters—Specifications for	1120.4
C34—75	Structural Clay Loadbearing Wall Tile —Specifications for	1107.1
C35—81	Inorganic Aggregates for Use in Gypsum Plaster —Specifications for	Table 1117
C36—80	Gypsum Wallboard—Specifications for	Table 1119
C37—81	Gypsum Lath—Specifications for	Table 1117
C56—81	Structural Clay Nonloadbearing Tile —Specifications for	1107.1
C59—81	Gypsum Casting and Molding Plaster —Specifications for	Table 1117
C61—81	Gypsum Keene's Cement—Specifications for	Table 1117
C62—81	Building Brick (Solid Masonry Units made from Clay or Shale)—Specifications for	1106.1
C64—77	Refractories for Incinerators and Boilers —Specifications for	1502.2
C67—81	Brick and Structural Clay Tile— Sampling and Testing	1209.2
C73—75	Calcium Silicate Face Brick (Sand Lime Brick) —Specifications for	1106.1
C79—82	Gypsum Sheathing Board—Specifications for	Table 1119
C105—81	Ground Fire Clay as a Refractory Mortar for Laying Up Fireclay Brick—Specifications for	1502.2
C126—82	Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units—Specifications for	1108.1
C144—81	Aggregate for Masonry Mortar—Specifications for	1114.2.1
C150—83a	Portland Cement—Standard Specification for	Table 1116 Table 1117
C206—79	Finished Hydrated Lime—Specification for	Table 1117
C208—82	Insulating Board (Cellulosic Fiber) Structural and Decorative—Specifications for	1120.1 1122.1
C212—81	Structural Clay Facing Tile—Specification for	1107.1

ASTM (cont'd.)

C216—81	Facing Brick (Solid Masonry Units Made from Clay or Shale)—Specification for	1106.1
C270—82	Mortar for Unit Masonry—Specification for	1114.1 1114.2.1
C332—82	Lightweight Aggregates for Insulating Concrete —Specification for	1115.1
C404—81	Aggregates for Masonry Grout —Specification for	1114.2.2
C474—78	Joint Treatment Materials for Gypsum Wallboard Construction—Standard Methods of Testing	Table 1119
C475—81	Joint Treatment Materials for Gypsum Wallboard Construction—Standard Methods of Testing	Table 1119
C476—83	Mortar and Grout for Reinforced Masonry —Specification for	1114.1
C514—82	Nails for the Application of Gypsum Wallboard —Standard Specification for	Table 1119
C532—79	Structural Insulating Formboard (Cellulosic Fiber) —Specification for	1120.1
C587—78	Gypsum Veneer Plaster—Specification for	Table 1117
C588—80	Gypsum Base for Veneer Plasters—Specification for	Table 1117
C630—82	Water Resistant Gypsum Backing Board —Specification for	Table 1119 1122.2
C631—81	Bonding Compounds for Interior Plastering —Standard Specification for	Table 1117
C645—81	Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board—Standard Specification for	Table 1117 Table 1119
C652—81a	Hollow Brick (Hollow Masonry Units Made from Clay or Shale)—Specification for	1106.1
C754—82	Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board—Standard Specification for Installation of	Table 1219
C841—81	Installation of Interior Lathing and Furring —Specification for	Table 1219
C842—79	Application of Interior Gypsum Plaster —Specification for	Table 1219
C843—76	Application of Gypsum Veneer Plaster —Specification for	Table 1219
C844—79	Application of Gypsum Base to Receive Gypsum Veneer Plaster—Specification for	Table 1219
C847—82	Metal Lath—Specification for	Table 1117
C894—78	Type W Screws for the Application of Gypsum Board to Wood Framing—Standard Specification for	Table 1117 Table 1119
C897—78	Aggregate for Job-Mixed Portland Cement-Based Plasters—Standard Specification for	Table 1117
C926—81	Portland Cement Based-Plaster—Specification for Application of	1118.3 1228.1
C932—80	Surface-Applied Bonding Agents for Exterior Plastering —Standard Specification for	Table 1117
C933—80	Welded Wire Lath—Standard Specification for	Table 1117

ASTM (cont'd.)

C954—81	Steel Drill Screws for the Application of Gypsum Board to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness —Standard Specification for ..... Table 1117 Table 1119
C955—81	Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases —Standard Specification for ..... Table 1117
D25—79	Round Timber Piles—Specification for 1019.1
D56—82	Flash Point by Tag Closed Tester—Test for .....Table 306.2
D92—78	Flash and Fire Points by Cleveland Open Cup— Method of Test for.....Table 306.2
D93—80	Flash Point by Pensky—Martens Closed Tester— Method of Test for.....Table 306.2
D568—77	Rate of Burning and/or Extent and Time of Burning of Flexible Plastics in a Vertical Position, Test for 1907.4.2
D635—81	Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position —Test for 2300.2 2300.2.1
D1143—81	Piles under Axial Compressive Load—Testing 1014.4
D1929—77	Ignition Properties of Plastics—Test for..... 1317.4 2300.2, 2300.2.1
D2277—80	Fiberboard Nail Base Sheathing —Specification for..... 1122.1
D2843—77	Density of Smoke from the Burning or Decomposition of Plastics—Test for 2300.2 2300.2.1
D2898—81	Accelerated Weathering of Fire-Retardant Treated Wood for Fire Testing..... 1403.5.2
D3689—78	Individual Piles under Static Axial Tensile Load —Testing..... 1014.7
E72—80	Strength Tests of Panels for Building Construction —Conducting 1221.2 1222.2, 1225.2.3
E84—81a	Surface Burning Characteristics of Building Materials —Test for ..... 1317.1.1 1317.3.8.4, 1317.3.9.2.2, 1317.4, 1403.4.1.2, 1403.5.1, 1404.2, 1421.3, Table 1421.5, 1421.5.3, 2300.2, 2300.2.1
E90—81	Airborne Sound Transmission Loss of Building Partitions—Laboratory Measurements of 715.2
E108—82	Fire Tests of Roof Coverings 1427.1
E119—83	Fire Test of Building Construction and Materials —Methods of 1115.2 1317.2, 1403.1.1, 1403.5.2
E136—82	Behavior of Materials in a Vertical Tube Furnace at 750° C.—Standard Test Method for..... 1403.4.1.1
E152—81a	Fire Test of Door Assemblies..... 810.4.2 1403.3.2
E163—80	Fire Test of Window Assemblies 1403.3.4
E283—73	Rate of Air Leakage through Exterior Windows..... 2402.4.1
E447—80	Compressive Strength of Masonry Prisms—Test for 1221.2 1222.2
E492—77	Impact Sound Transmission Through Floor/Ceiling Assemblies Using the Tapping Machine—Laboratory Measurement of 715.3

ASTM (cont'd.)

E518—80	Flexural Bond Strength of Masonry —Test for	1221.2, 1222.2
E519—81	Diagonal Tension (Shear) in Masonry Assemblages —Test for	1221.2, 1222.2
E648—78	Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source—Test for	1404.3, Table 1421.7

AWPA

American Wood Preservers Association
7735 Old Georgetown Road
Bethesda, Maryland 20014

Standard reference number	Title	Referenced in code Section number
C1—82	Pressure Treatment (General Requirements) —All Timber Products	1315.2.2
C2—83	Pressure Treatment—Lumber, Timber, Bridge Ties and Mine Ties	1007.1, 1007.2, 1315.2.2
C3—81	Pressure Treatment—Piles	1007.1, 1019.2
C4—81	Pressure Treatment—Poles	1007.2
C9—77	Pressure Treatment—Plywood	1315.2.2
C20—83	Fire-Retardant Pressure Treatment —Structural Lumber	1403.5.2
C27—83	Fire-Retardant Pressure Treatment —Plywood	1403.5.2
M4—80	Preservative Treated Wood Products—Care of	1019.2
P1—78	Creosote—Standard for	1315.2.2
P2—68	Creosote—Coal Tar Solutions	1315.2.2
P5—83	Water Borne Preservatives	1315.2.2
P8—77	Oil Borne Preservatives	1315.2.2
P9—77	Organic Preservatives Systems —Standard for Solvents for	1315.2.2

AWPB

American Wood Preservers Bureau
P.O. Box 6085, 2772 S. Randolph St.
Arlington, Virginia 22206

Standard reference number	Title	Referenced in code Section number
FDN—80	Softwood Lumber, Timber and Plywood Pressure Treated with Water Borne Preservatives for Ground Contact Use in Residential and Light Commercial Foundations —Quality Control Program for	1007.3

AWPB (cont'd.)

LP-2—80	Softwood Lumber, Timber and Plywood Pressure Treated with Water Borne Preservatives for Above Ground Use —Standard for	1315.2.2 1315.3.1
LP-22—80	Softwood Lumber, Timber and Plywood Pressure Treated with Water Borne Preservatives for Ground Contact Use—Standard for	1315.2.2 1315.3.2, 1315.3.3
LP-33—78	Pressure Treated Lumber and Plywood with Light Petroleum Solvent Penta Solution (for Ground Contact)—Quality Control Standards for	1315.2.2 1315.3.3
LP-44—78	Pressure Treated Lumber and Plywood with Volatile Petroleum Solvent (LPG) Penta Solution (for Ground Contact)—Quality Control Standards for	1315.2.2 1315.3.3
LP-55—78	Pressure Treated Lumber and Plywood with Creosote or Creosote Coal Tar Solution (for Ground Contact) —Quality Control Standards for	1315.2.2 1315.3.3
LP-77—78	Pressure Treated Lumber and Plywood with Heavy Petroleum Solvent Penta Solution (for Ground Contact)—Quality Control Standards for	1315.2.2 1315.3.3
MP-1—79	Dual Treatment of Marine Piling Pressure Treated with Water Borne Preservatives and Creosote for Use in Marine Waters—Standards for	1019.2
MP-2—79	Marine Piling Pressure Treated with Creosote for Use in Marine Waters—Standard for	1019.2
MP-4—75	Marine Piling Pressure Treated with Water Borne Preservatives for Use in Marine Waters —Standard for	1019.2

AWPI

American Wood Preservers Institute
1651 Old Meadow Road
McLean, Virginia 22101

Standard reference number	Title	Referenced in code Section number
AWPI-PBA—81	Pole Building Design	1007.2

BIA

Brick Institute of America
1750 Old Meadow Road
McLean, Virginia 22102

Standard reference number	Title	Referenced in code Section number
BIA—69	Engineered Brick Masonry—Building Code Requirements for	1204.1 1209.1, 1211.1, 1220.2, 1221.1, 1309.2, 1407.3
TN5A—70	Sound Insulation—Clay Masonry Walls	715.4

BOCA

Building Officials and Code Administrators International
4051 West Flossmoor Road
Country Club Hills, Illinois 60477-5795

Standard reference number	Title	Referenced in code Section number
B/NFPC—84	The Kentucky Fire Safety Standards (815 KAR 10:020 Fire Safety Standards) shall be used as the fire prevention code	200.3, 306.2.1, Table 306.2.1, 602.1, 603.1, 603.2, 604.1, 606.1, 607.2, 618.2, 619.11, 620.1.6, 621.1, 1700.2, 1711.1, 1711.7, 1719.2, 1818.1, 1818.7
B/NMC—84	Basic/National Mechanical Code	200.3, Table 306.2.1, 401.4.2, 401.4.3, 600.4, 600.5, 604.1, 605.3, 606.3, 607.3, 607.3.1, 609.3, 617.4, 701.1, 706.3, 707.1, 709.3, 713.3.1, 713.3.3, 1102.6, 1405.8.1, 1405.8.2.11, 1417.2, 1500.2, 1600.2, 1601.1, 1601.3, 1602.1, 1603.1, 1607.3, 1608.3, 1702.20, 1702.21, 1805.2, 1818.3, 2001.2.3, 2108.5, 2401.1, 2404.1
B/NPC—84	The Kentucky State Plumbing Code (815 KAR Chapter 20) shall be used as the plumbing code	200.3, 401.4.3, 609.2.5, 710.7, 713.3.1, 1102.6, 1312.4.1, 1426.7.2, 1821.1, 2200.1, 2201.3, 2203.3, 2205.1, 2205.3, 2401.1, 2405.1

CABO

Council of American Building Officials
5205 Leesburg Pike
Suite 1201
Falls Church, Virginia 22041

Standard reference number	Title	Referenced in code Section number
CABO—83	One and Two Family Dwelling Code*	309.5
CABO—83	Model Energy Code*	2400.1

*Publications available from BOCA

CPSC

Consumer Product Safety Commission
Office of the Secretary
Washington, D.C. 20207

Standard reference number	Title	Referenced in code Section number
16CFR Part 1201—82	Architectural Glazing Standards and Related Materials	1301.5.6.3
16CFR Part 1209—82	Cellulose Insulation—Interim Safety Standard	1316.4
16CFR Part 1404—82	Cellulose Insulation	1316.4

CRSI

Concrete Reinforcing Steel Institute
933 N. Plum Grove Road
Schaumburg, Illinois 60195

Standard reference number	Title	Referenced in code Section number
CRSI—80	Reinforced Concrete Fire Resistance	1403.1.1

DOC

United States Department of Commerce
National Bureau of Standards
Washington, D.C. 20234

Standard reference number	Title	Referenced in code Section number
FF1—70	Surface Flammability of Carpet and Rugs —Standard for the (CPSC 16CFR Part 1630-82)	Table 1421.7 1421.7.1
PS1—83	Plywood—Construction and Industrial	1121.1
PS20—79	American Softwood Lumber Standard	201.0 (Nominal Dimension)

FM

Factory Mutual Engineering Corporation
Standards Laboratories Department
1151 Boston Providence Turnpike
Norwood, Massachusetts 02062

Standard reference number	Title	Referenced in code Section number
4880—72	Factory Mutual Building Corner Fire Test	1317.4
4450—77	Class I Insulated Steel Deck Roofs —Approval Standard for	1317.3.4

GA

Gypsum Association
1603 Orrington Avenue, Suite 1210
Evanston, Illinois 60201

Standard reference number	Title	Referenced in code Section number
216—82	Gypsum Board—Specifications for Application and Finishing of	Table 1219
600—81	Fire Resistance Design Manual	715.4, 1403.1.2

HPMA

Hardwood Plywood Manufacturers Association
P.O. Box 2789
Reston, Virginia 22090

Standard reference number	Title	Referenced in code Section number
HP-SG—82	Hardwood Plywood—Structural Design Guide for	1121.1
PS51—71	Hardwood and Decorative Plywood	1121.1

IMIAWC

International Masonry Industry All Weather Council
International Masonry Institute
823 15th St., N.W.
Washington, D.C. 20005

Standard reference number	Title	Referenced in code Section number
IMIAWC—79	Cold Weather Masonry—Recommended Practices and Guide Specifications for	1209.3

KY

Commonwealth of Kentucky
Department of Housing, Buildings and Construction
U.S. 127 South
Frankfort, Kentucky 40601

Standard reference number	Title	Referenced in code Section number
B/NFPC—84	The Kentucky Fire Safety Standards (815 KAR 10:020 Fire Safety Standards) shall be used as the fire prevention code	200.3 306.2.1, Table 306.2.1, 602.1, 603.1, 603.2, 604.1, 606.1, 607.2, 618.2, 619.11, 620.1.6, 621.1, 1700.2, 1711.1, 1711.7, 1719.2, 1818.1, 1818.7
B/NPC—84	The Kentucky State Plumbing Code (815 KAR Chapter 20) shall be used as the plumbing code	200.3 401.4.3, 609.2.5, 710.7, 713.3.1, 1102.6, 1312.4.1, 1426.7.2, 1821.1, 2200.1, 2201.3, 2203.3, 2205.1, 2205.3, 2401.1, 2405.1

MBMA

Metal Building Manufacturers Association
1230 Keith Building
Cleveland, Ohio 44115

Standard reference number	Title	Referenced in code Section number
MBMA—81	Metal Building Systems Manual	1202.1

NCMA

National Concrete Masonry Association
2302 Horse Pen Road
Herndon, Virginia 22070

Standard reference number	Title	Referenced in code Section number
TEK69 A—78	STC Values of Concrete Masonry Walls	715.4
TR 75-B—70	Design and Construction of Load Bearing Concrete Masonry—Specifications for	1204.1, 1209.1, 1210.1, 1211.1, 1221.1, 1309.2, 1407.3

NFiPA

National Fire Protection Association
Batterymarch Park
Quincy, Massachusetts 02269

Standard reference number	Title	Referenced in code Section number
11—83	Foam Extinguishing Systems	1707.1
11A—83	High Expansion Foam Systems	1707.1
12—80	Carbon Dioxide Extinguishing Systems	1708.1, 1708.5
12A—80	Halogenated Extinguishing Agent Systems —Halon 1301	1709.1, 1709.5
12B—80	Halogenated Fire Extinguishing Agent Systems —Halon 1211	1709.1, 1709.5
13—83	Installation of Sprinkler Systems	620.3, 1414.4.1, 1704.1
14—83	Standpipe and Hose Systems	1711.1
15—82	Water Spray Fixed Systems	1706.1, 1706.4
16—80	Foam Water Sprinkler and Spray Systems	1707.1
17—80	Dry Chemical Extinguishing System	1710.1, 1710.5
26—83	Supervision of Water Supply Valves	1704.6
30—81	Flammable and Combustible Liquids Code	602.1
33—82	Spray Application Using Flammable and Combustible Materials	607.1
34—82	Dipping and Coating Processes Using Flammable or Combustible Liquids	607.1
40—82	Cellulose Nitrate Motion Picture Film	605.1
61A—73	Manufacturing and Handling Starch	606.1
61B—80	Prevention of Fire and Dust Explosions in Grain Elevators and Bulk Grain Handling Facilities	606.1
61C—73	Prevention of Fire and Dust Explosions in Feed Mills	606.1
61D—73	Milling of Agricultural Commodities for Human Consumption	606.1
65—80	Processing and Finishing of Aluminum	606.1
70—84	National Electrical Code	401.4.4, 607.2, 1307.4, 1405.8.1, 1907.3, 1914.1, 2000.1, 2000.3, 2003.1, 2005.3, 2006.1, 2007.1

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71—82	Central Station Signaling Systems	1716.1 1718.1
72A—79	Local Protective Signaling Systems	1716.1 1716.9.1, 1717.1, 1717.5, 1717.7.1, 1718.1
72B—79	Auxiliary Protective Signaling Systems	1716.1 1716.9.1, 1717.7.1
72C—82	Remote Station Protective Signaling Systems	1716.1 1716.9.1, 1717.7.1, 1718.1
72D—79	Proprietary Protective Signaling Systems	1716.1 1716.9.1, 1717.7.1, 1718.1
72E—82	Automatic Fire Detectors	619.12.1 1716.1, 1716.9.1, 1717.7.1, 2111.4
74—80	Household Fire Warning Equipment	1716.1
80—81	Fire Doors and Windows	1408.3.1 1415.2
82—83	Incinerators, Waste and Linen Handling Systems and Equipment, Standard on	1606.1
85F—82	Pulverized Fuel Systems—Installation and Operation	606.1
102—78	Assembly Seating, Tents and Air Supported Structures	611.1 612.1
495—82	Code for Explosive Materials	Table 306.2.1
651—80	Manufacture of Aluminum or Magnesium Powder —Standard for the	606.1
653—71	Dust Explosions in Coal Preparation Plants, —Prevention of	606.1
654—82	Dust Explosions in the Plastics Industry —Prevention of	606.1
655—82	Sulfur Fires and Explosions—Prevention of	606.1
664—81	Dust Explosions in Woodworking and Wood Floor Manufacturing Plants—Prevention of	606.1
701—77	Fire Tests for Flame Resistant Textile and Film —Standard Methods of	621.2.2 1404.4.1, 1404.4.3, 1907.4.2
1221—80	Public Fire Service Communications	1716.1
	These NFiPA standards are to be used for fire suppression requirements and design only, where referenced in a specific code required in the body of the code.	
NFPA 43C	Gaseous Oxidizing Materials	
NFPA 418	Heliports	
NFPA 58	LP Gas Storage	
NFPA 231	High Piles Storage in Excess of 12 Ft. in Height	
NFPA 231C	Rack and Palletized Storage in Excess of 12 Ft. in Height	
NFPA 231D	Rubber Tire Storage	
NFPA 231E	Baled Cotton Storage	
NFPA 231F	Rolled Paper Storage	
NFPA 96	Rangehoods	
NFPA 75	Computer Rooms	
NFPA 232AM	Archieves and Record Centers	
NFPA 59A	L.N. Gas Storage and Handling	
NFPA 69	Explosion Prevention Systems	
NFPA 81	Fur Storage	
NFPA 214	Cooling Towers	
NFPA 303	Marinas and Boatyards	
NFPA 910	Library Stacks	

NFiPA (cont'd.)

NFPA 664	Wood Working Facilities
NFPA 409	Aircraft Hangars
NFPA 40	Cellulose Nitrate Film
NFPA 40C	Pyroxylin Plastics
NFPA 30, NFPA 36	Flammable Liquids
NFPA 33	Paint Spray
NFPA 34	Dipping and Coating
NFPA 45	Laboratories
NFPA 44A	Fireworks

NFoPA

National Forest Products Association
1619 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Standard reference number	Title	Referenced in code Section number
NFoPA—81	Design Values for Joists and Rafters	1225.7.3 1225.8.4
NFoPA—77	Span Tables for Joists and Rafters	1225.7.3 1225.8.4
NFoPA—82	National Design Specification for Wood Construction —82 Supplement—Design Values for Wood Construction	1007.1 1223.1, 1224.1, 1225.8.4
TR7—82	All Weather Wood Foundation System —Basic Requirements, 1983 Supplement	1007.3

PCI

Prestressed Concrete Institute
201 North Wells Street
Chicago, Illinois 60606

Standard reference number	Title	Referenced in code Section number
MNL 124-77—82	Fire Resistance of Precast Prestressed Concrete —Design for	1403.1.1

RCSHSB

Red Cedar Shingle and Handsplit Shake Bureau
515 116th Avenue, N.E., Suite 275
Bellevue, Washington 98004

Standard reference number	Title	Referenced in code Section number
RCSHSB—75	Certigrade Red Cedar Shingles —Grading rules for	1225.8.2

SJI

Steel Joist Institute
1205 48th Avenue North, Suite A
Myrtle Beach, South Carolina 29577

Standard reference number	Title	Referenced in code Section number
SJI—82	Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders	1203.1

SPI

The Society of the Plastics Industry, Inc.
355 Lexington Avenue
New York, New York 10017

Standard reference number	Title	Referenced in code Section number
PICC-401—80	An Enclosed Room Fire Test	1317.4

TPI

Truss Plate Institute, Inc.
100 West Church St.
Frederick, Maryland 21701

Standard reference number	Title	Referenced in code Section number
TPI—82	Trusses—Design Specifications for Metal Plate Connected Wood	1225.8.4

UL

Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, Illinois 60062

Standard reference number	Title	Referenced in code Section number
10A—80	Doors—Tin Clad Fire	1415.2
14B—79	Hardware, Sliding, for Standard Horizontally Mounted Tin Clad Fire Doors	1415.2
14C—79	Hardware, Swinging, for Standard Tin Clad Fire Doors	1415.2
63—82	Fire Door Frames—Standard for	1403.3.2
555—79	Fire Dampers, and Ceiling Dampers	1417.1
910—82	Cables used in Air-Handling Spaces, Test Method for Fire and Smoke Characteristics of	1405.8.1.1

UL (cont'd.)

Subject 1040—80	Outline of Investigation for Insulated Wall Construction	1317.4
Subject 1256—79	Roof Deck Constructions —Outline of Investigation for	1317.3.4

USD

United States Diving, Inc.
P.O. Box 1811
Indianapolis, Indiana 46206

Standard reference number	Title	Referenced in code Section number
USD—83	1983 Rules and Regulations of United States Diving, Inc.	616.9.1

APPENDIX B

UNIT DEAD LOADS FOR DESIGN PURPOSES

The intent of this appendix is to assist the designer and building official in establishing the minimum weights for materials commmonly used in building construction. Some material assemblies have a range in weight. A typical figure is indicated, but when there is reason to suspect a considerable deviation, the actual weight should be determined.

Note on use of Appendix B tables: When making calculations based on the tables in this appendix, the weights of masonry include mortar but not plaster. For plaster, add 5 psf for each face plastered. Values given represent averages. In some cases there is a considerable range of weight for the same construction. For metric conversion, 1 psf equals 4.882 kg/m^2 and 1 pcf equals 16.02 kg/m^3.

Table B-1
UNIT DESIGN DEAD LOADS FOR CONCRETE SLABS

Concrete slabs	Pounds per square foot
Concrete, reinforced stone, per inch of thickness	12½
Concrete, reinforced lightweight sand, per inch of thickness	9½
Concrete, reinforced, lightweight, per inch of thickness	9
Concrete, plain stone, per inch of thickness	12
Concrete, plain, lightweight, per inch of thickness	8½

Table B-2
UNIT DESIGN DEAD LOADS FOR RIBBED SLABS

Ribbed slabs Depth, in inches (rib depth plus slab thickness)*	Pounds per square foot					
	Width of rib, in inches					
	4	5	6	7	8	9
12-inch clay tile fillers (normal weight concrete):						
4 plus 2	49	51	52	54	—	—
6 plus 2	60	63	65	67	—	—
8 plus 2½	79	82	85	87	—	—
10 plus 3	96	100	103	106	—	—
12 plus 3	108	112	116	120	—	—
20-inch wide forms:						
6 plus 2½	45	48	50	50	—	—
8 plus 2½	51	54	57	60	—	—
10 plus 2½	57	60	64	68	—	—
12 plus 2½	63	67	72	76	—	—
14 plus 2½	—	74	79	84	—	—
16 plus 2½	—	—	88	93	98	—
20 plus 2½	—	—	—	111	118	—

* Make appropriate allowances for tapered ends.

Table B-2 (cont'd.)
UNIT DESIGN DEAD LOADS FOR RIBBED SLABS

Ribbed slabs Depth, in inches (rib depth plus slab thickness)*	Pounds per square foot					
	Width of rib, in inches					
	4	5	6	7	8	9
30-inch wide forms:						
6 plus 2½	41	43	45	47	—	—
8 plus 2½	45	47	50	53	—	—
10 plus 2½	49	52	55	58	—	—
12 plus 2½	53	57	60	64	—	—
14 plus 2½	—	62	66	70	—	—
16 plus 2½	—	—	72	76	80	—
20 plus 2½	—	—	—	90	95	101
Two-way clay tile fillers (12x12):						
4 plus 2	61	62	64	—	—	—
6 plus 2	87	89	90	—	—	—
8 plus 2½	100	103	107	—	—	—
10 plus 3	121	126	131	—	—	—
12 plus 3	136	141	146	—	—	—

* Make appropriate allowances for tapered ends.

Table B-3
UNIT DESIGN DEAD LOADS FOR WAFFLE SLABS

Waffle slabs Depth, in inches (Rib depth plus slab thickness)	Pounds per square foot
19 x 19, 5 @ 24	
6 plus 2½	66
8 plus 2½	78
10 plus 2½	85
12 plus 2½	101
30 x 30, 6 @ 36	
8 plus 3	73
10 plus 3	83
12 plus 3	95
14 plus 3	106
16 plus 3	114
20 plus 3	135

Table B-4
UNIT DESIGN DEAD LOADS FOR FLOOR FINISH

Floor finish	Pounds per square foot
Double ⅞-inch wood on sleepers, light concrete fill	19
Double ⅞-inch wood on sleepers, stone concrete fill	28
Single ⅞-inch wood on sleepers, light concrete fill	16
Single ⅞-inch wood on sleepers, stone concrete fill	25
3-inch wood block on mastic, no fill	10

Table B-4 (cont'd.)
UNIT DESIGN DEAD LOADS FOR FLOOR FINISH

Floor finish	Pounds per square foot
1-inch cement finish on stone concrete fill	32
1-inch terrazzo on stone concrete fill	32
Marble and mortar on stone concrete fill	33
Linoleum on stone concrete fill	32
Linoleum on light concrete fill	22
1½-inch asphalt mastic flooring	18
3-inch wood block on ½-inch mortar base	16
Solid flat tile on 1-inch mortar base	23
2-inch asphalt block, ½-inch mortar	30
1-inch terrazzo, 2-inch stone concrete	32
Floor finish tile per inch depth	12
Cement finish per inch depth	12
Gypsum slabs per inch depth	4
Precast concrete plank per inch depth	(as determined by test)
Hardwood flooring per inch depth	4
Underflooring per inch depth	3
Linoleum	2
Asphalt tile	2
Brick pavers per inch thickness	10

Table B-5
UNIT DESIGN DEAD LOADS FOR WATERPROOFING

Waterproofing	Pounds per square foot
Five-ply membrane	5

Table B-6
UNIT DESIGN DEAD LOADS FOR FLOOR FILL

Floor fill	Pounds per square foot
Cinder fill, per inch	5
Cinder concrete, per inch	9
Lightweight concrete, per inch	7
Sand, per inch	8
Stone, concrete, per inch	12

Table B-7
UNIT DESIGN DEAD LOADS FOR WOOD JOIST FLOORS

Wood joist floors (no plaster)—double wood floor joist sizes in inches	Pounds per square foot	
	12-in. spacing	16-in. spacing
2 x 6	6	5
2 x 8	6	6
2 x 10	7	6
2 x 12	8	7
3 x 6	7	6
3 x 8	8	7
3 x 10	9	8
3 x 12	11	9
3 x 14	12	10

Table B-8
UNIT DESIGN DEAD LOADS FOR MATERIALS

Materials	Pounds per cubic foot
Cast stone masonry (cement, stone, sand)	144
Cinder fill	57
Concrete, plain:	
Cinder	108
Expanded slag aggregate	100
Haydite (burned clay aggregate)	90
Slag	132
Stone (including gravel)	144
Vermiculite and perlite aggregate, nonloadbearing	25-50
Other light aggregate, loadbearing	70-105
Concrete, reinforced:	
Cinder	111
Slag	138
Stone (including gravel)	150
Earth (dry)	96
Earth (damp)	108
Earth (wet)	120
Cork	15
Masonry, ashlar:	
Granite	168
Limestone, crystalline	168
Limestone, oolitic	135
Marble	173
Sandstone	144
Masonry, rubble mortar:	
Granite	153
Limestone, crystalline	147
Limestone, oolitic	138
Marble	156
Sandstone	137
Rubble stone masonry	156
Terra cotta, architectural:	
Voids filled	120
Voids unfilled	72
Timber, seasoned:	
Ash, commercial white	41
Cypress, southern	32
Fir, Douglas, Coast region	34
Oak, commercial reds and whites	45
Redwood	28
Spruce, red, white, and Sitka	28
Southern pine, short leaf	39
Southern pine, long leaf	48
Timber, hemlock	30

Table B-9
UNIT DESIGN DEAD LOADS FOR ROOF AND WALL COVERINGS

Roof and wall coverings	Pounds per square foot
Asphalt shingles	2
Cement asbestos shingles	4
Cement tile	16

Table B-9 (cont'd.)
UNIT DESIGN DEAD LOADS FOR ROOF AND WALL COVERINGS

Roof and wall coverings	Pounds per square foot
Clay tile (for mortar add 10 lb):	
2-inch book tile	12
3-inch book tile	20
Roman	12
Spanish	19
Ludowici	10
Composition:	
Three-ply ready roofing	1
Four-ply felt and gravel	5½
Five-ply felt and gravel	6
Copper or tin	1
Corrugated asbestos cement roofing	4
Fiber board, ½ inch	¾
Formed sheet steel	1-3
Formed steel decking	(see manufacturer)
Gypsum sheathing, ½-inch	2
Rigid insulation, ½-inch	¾
Sheet lead	3
Skylight, metal frame, ⅜-inch wired glass	8
Slate, 3/16-inch	7
Slate, ¼-inch	10
Spanish tile	20
Wood sheathing, per inch thickness	3
Wood shingles	3

Table B-10
UNIT DESIGN DEAD LOADS FOR SUSPENDED CEILINGS

Suspended ceilings	Pounds per square foot
Cement on wood lath	12
Cement on metal lath	15
Gypsum on wood or metal lath	10
Plaster on tile or concrete	5
Suspended metal lath and gypsum plaster	10
Suspended metal lath and cement plaster	15
Plaster on wood lath	8

Table B-11
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

Walls and partitions (unplastered)	Pounds per square foot
4 -inch clay brick, high absorption	34
4 -inch clay brick, medium absorption	39
4 -inch clay brick, low absorption	46
4 -inch sand/lime brick	38
4 -inch concrete brick, heavy aggregate	46
4 -inch concrete brick, light aggregate	33
8 -inch clay brick, high absorption	69
8 -inch clay brick, medium absorption	79
8 -inch clay brick, low absorption	89
8 -inch sand/lime brick	74
8 -inch concrete brick, heavy aggregate	89

Table B-11 (cont'd.)
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

Walls and partitions (unplastered)	Pounds per square foot
8 -inch concrete brick, light aggregate	68
12 -inch common brick	120
12 -inch pressed brick	130
12 -inch sand/lime brick	105
12½-inch concrete brick, heavy aggregate	130
12½-inch concrete brick, light aggregate	98
17 -inch clay brick, high absorption	134
17 -inch clay brick, medium absorption	155
17 -inch clay brick, low absorption	173
17 -inch sand/lime brick	138
17 -inch concrete brick, heavy aggregate	174
17 -inch concrete brick, light aggregate	130
22 -inch clay brick, high absorption	168
22 -inch clay brick, medium absorption	194
22 -inch clay brick, low absorption	216
22 -inch sand/lime brick	173
22 -inch concrete brick, heavy aggregate	216
22 -inch concrete brick, light aggregate	160
4 -inch brick, 4 inch loadbearing structural clay tile -backing	60
4 -inch brick, 8 inch loadbearing structural clay tile -backing	75
8 -inch brick, 4 inch loadbearing structural clay tile -backing	102
8 -inch combination brick and concrete block	72
12 -inch combination brick and concrete block	90
8 -inch loadbearing structural clay tile	42
12 -inch loadbearing structural clay tile	58
8 -inch concrete block, heavy aggregate	55
12 -inch concrete block, heavy aggregate	85
8 -inch concrete block, light aggregate	38
12 -inch concrete block, light aggregate	55
2 -inch furring tile, one side of masonry wall, add -to above figures	12
4 -inch hollow concrete block—stone aggregate	30
—lightweight	20
6 -inch hollow concrete block—stone aggregate	42
—lightweight	30
8 -inch hollow concrete block—stone aggregate	55
—lightweight	38
10 -inch hollow concrete block—stone aggregate	62
—lightweight	46
12 -inch hollow concrete block—stone aggregate	85
—lightweight	55
4 -inch solid concrete block—stone aggregate	45
—lightweight	34
6 -inch solid concrete block—stone aggregate	50
—lightweight	37
8 -inch solid concrete block—stone aggregate	67
—lightweight	48
10 -inch solid concrete block—stone aggregate	84
—lightweight	62

Table B-11 (cont'd.)
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

Walls and partitions (unplastered)	Pounds per square foot
12 -inch solid concrete block—stone aggregate	108
—lightweight	72
4 -inch loadbearing clay tile	24
6 -inch loadbearing clay tile	36
2 -inch nonloadbearing clay tile	11
3 -inch nonloadbearing clay tile	18
4 -inch nonloadbearing clay tile	20
6 -inch nonloadbearing clay tile	30
8 -inch nonloadbearing clay tile	36
10 -inch nonloadbearing clay tile	40
4 -inch nonloadbearing hollow concrete block	20
6 -inch nonloadbearing hollow concrete block	30
8 -inch nonloadbearing hollow concrete block	40
T.C. 1½-inch split terra cotta furring	8
2 -inch split terra cotta furring	10
3 -inch split terra cotta furring	12
2 -inch hollow gypsum block	9½
3 -inch hollow gypsum block	10
4 -inch hollow gypsum block	15
5 -inch hollow gypsum block	18
6 -inch hollow gypsum block	24
2 -inch solid gypsum block	12
3 -inch solid gypsum block	18
4 -inch solid gypsum block	24
2 -inch facing tile	15
4 -inch facing tile	25
6 -inch facing tile	38
2 -inch solid plaster	20
4 -inch solid plaster	32
4 -inch hollow plaster	22
Wood studs 2 x 4, unplastered	4
Wood studs 2 x 4, plastered one side	12
Wood studs 2 x 4, plastered two sides	20
4 -inch glass block	18

Table B-12
UNIT DESIGN DEAD LOADS FOR LATH AND PLASTER PARTITIONS

Lath and plaster partitions	Pounds per square foot
2 -inch solid cement on metal lath	25
2 -inch solid gypsum on metal lath	18
2 -inch solid gypsum on gypsum lath	18
2 -inch metal studs, gypsum and metal lath both sides	18
3 -inch metal studs, gypsum and metal lath both sides	19
4 -inch metal studs, gypsum and metal lath both sides	20
6 -inch wood studs, plaster and wood lath both sides	18
6 -inch wood studs, plaster and metal lath both sides	18
6 -inch wood studs, plaster and plaster boards both sides	18
6 -inch wood studs, unplastered gypsum board both sides (dry wall)	10

Table B-13
UNIT DESIGN DEAD LOADS FOR PLASTER WORK

Plaster work	Pounds per square foot
Gypsum (one side)	5
Cement (one side)	10
Gypsum on wood lath	8
Gypsum on metal lath	8
Gypsum on plaster board or fiber board	8
Cement on wood lath	10
Cement on metal lath	10

APPENDIX C

RECOMMENDED FASTENING SCHEDULE

Building element	Nail size and type	Number and location
Stud to sole plate	8d common	4 toe nail or
	16d common	2 direct nail
Stud to cap plate	16d common	2 toe nail or 2 direct nail
Double studs	10d common	12″ o.c. direct
Corner studs	16d common	24″ o.c. direct
Sole plate to joist or blocking	16d common	16″ o.c.
Double cap plate	10d common	16″ o.c. direct nail
Cap plate laps	10d common	2 direct nail
Ribbon strip, 6″ or less	10d common	2 each direct bearing
Ribbon strip, 6″ or more	10d common	3 each direct bearing
Roof rafter to plate	8d common	3 toe nail
Roof rafter to ridge	16d common	2 toe nail or direct nail
Jack rafter to hip	10d common	3 toe nail or
	16d common	2 direct nail
Floor joists to studs	10d common	5 direct or
(No ceiling joists)	10d common	3 direct
Floor joists to studs (With ceiling joists)	10d common	2 direct
Floor joists to sill or girder	8d common	3 toe nail
Ledger strip	16d common	3 each direct joist
Ceiling joists to plate	16d common	3 toe nail
Ceiling joists (laps over partition)	10d common	3 direct nail
Ceiling joists (parallel to rafter)	10d common	3 direct nail
Collar beam	10d common	3 direct
Bridging to joists	8d common	2 each direct end
Diagonal brace (to stud and plate)	8d common	2 each direct bearing
Tail beams to headers (when nailing permitted)	20d common	1 each end 4 sq. ft. floor area
Header beams to trimmers (when nailing permitted)	20d common	1 each end 8 sq. ft. floor area
1″ roof decking (6″ or less in width)	8d common	2 each direct rafter
1″ roof decking (over 6″ in width)	8d common	3 each direct rafter

Building element	Nail size and type	Number and location
1″ subflooring (6″ or less)	8d common	2 each direct joist
1″ subflooring (8″ or more)	8d common	3 each direct joist
2″ subflooring	16d common	2 each direct joist
1″ wall sheathing (8″ or less in width)	8d common	2 each direct stud
1″ wall sheathing (over 8″ in width)	8d common	3 each direct stud
Plywood roof and wall sheathing (½″ or less)	6d common	6″ o.c. direct edges and 12″ o.c. intermediate
(⅝″ or greater)	8d common	6″ o.c. direct edges and 12″ o.c. intermediate
(5/16″, ⅜″, or ½″)	16 gage galvanized wire staples, ⅜″ minimum crown; length of 1″ plus plywood thickness	4″ o.c. edges and 8″ o.c. intermediate
(⅝″)	Same as immediately above	2½″ o.c. edges and 5″ o.c. intermediate
Plywood subflooring:		
(½″)	6d common *or* 6d annular or spiral thread	6″ o.c. direct edges and 10″ o.c. intermediate
(⅝″, ¾″)	8d common *or* 6d annular or spiral thread	6″ o.c. direct edges and 10″ o.c. intermediate
(1″, 1⅛″)	10d common *or* 8d ring shank *or* 8d annular or spiral thread	6″ o.c. direct edges and 6″ o.c. intermediate
(½″)	16 gage galvanized wire staples	4″ o.c. edges and 7″ o.c. intermediate
(⅝″)	⅜″ minimum crown, 1⅝″ length	2½″ o.c. edges and 4″ o.c. intermediate

Building element	Nail size and type	Number and location
Built-up girders and beams	20d common	32″ o.c. direct
Continuous header to stud	8d common	4 toe nail
Continuous header, two pieces	16d common	16″ o.c. direct
½″ fiber board sheathing	1½″ galvanized roofing nail *or* 6d common nail *or* 16 gage staple, 1⅛″ long with minimum crown of 7/16″	3″ o.c. exterior edge, 6″ o.c. intermediate
25/32″ fiber board sheathing	1¾″ galvanized roofing nail *or* 8d common nail *or* 16 gage staple, 1½″ long with minimum crown of 7/16″	3″ o.c. exterior edge, 6″ o.c. intermediate
Gypsum sheathing	12 gage 1¼″ large head corrosion resistive	4″ o.c. on edge, 8″ o.c. intermediate
Particle board underlayment (¼″-¾″)	6d annular threaded	6″ o.c. direct edges and 10″ o.c. intermediate
Particle board roof and wall sheathing		
½″ or less	6d common	6″ o.c. direct edges and 12″ o.c. intermediate
⅝″ or greater	8d common	6″ o.c. direct edges and 12″ o.c. intermediate
Particle board subflooring (⅝″ or greater)	8d common	6″ o.c. direct edges and 10″ o.c. intermediate
Shingles, wood[a]	No. 14 B&S Gage corrosion resistive	2 each bearing
Weather boarding	8d corrosion resistive	2 each bearing

Note a. Shingle nails shall penetrate not less than ¾ inch into nailing strips, sheathing or supporting construction except as otherwise provided in Section 1225.4.4.

Table C-1
MAXIMUM SPACING OF GYPSUM WALLBOARD FASTENERS
(For nonfireresistance rated construction assemblies)[e]

Thickness of gypsum wallboard (inch)	Plane of framing surface	Long dimension of gypsum wallboard sheets in relation to direction of framing members	Maximum spacing of framing members (center-to-center in inches)	Maximum spacing of fasteners (center-to-center in inches)		Nails[a] to wood[d]
				Nails[a,b]	Screws[c]	
½	Horizontal	Either direction	16	7	12	No. 13 gage, 1⅜" long, 19/64" head No. .098 gage, 1¼" long, Annular ringed 5d, cooler nail
	Horizontal	Perpendicular	24	7	12	
	Vertical	Either direction	24	8	12	
⅝	Horizontal	Either direction	16	7	12	No. 13 gage, 1⅝" long, 19/64" head No. .098 gage, 1⅜" long, Annual ringed, 6d cooler nail
	Horizontal	Perpendicular	24	7	12	
	Vertical	Either direction	24	8	12	
Fastening required with adhesive application						
½ or ⅝	Horizontal	Either direction	16	16	16	As required for ½" and ⅝" gypsum wallboard, see above
		Perpendicular	24	12	16	
	Vertical	Either Direction	24	16	24	
2 layers each ⅜" (¾" total)	Horizontal	Perpendicular	24	16	16	Base ply nailed as required for ½" gypsum wallboard and face ply placed with adhesive
	Vertical	Either direction	24	24	24	

Note a. Where the metal framing has a clinching design formed to receive the nails by two edges of metal, the nails shall be not less than ⅝ inch longer than the wallboard thickness, and shall have ringed shanks. Where the metal framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d cooler nail (No. 13½ gage, 1⅝ inches long, 15/64 inch head) for ½ inch gypsum wallboard; 6d cooler (No. 13 gage, 1⅞ inches long, 15/64 head) for ⅝-inch gypsum wallboard.

Note b. Two nails at 2 inches to 2½ inches apart may be used if the pairs are spaced 12 inches center-to-center except around perimeters.

Note c. Screws shall be No. 6 with tapered head and long enough to penetrate into wood framing not less than ⅝ inch and metal framing not less than ¼ inch.

Note d. All nails shall meet ASTM C514 or Federal Specification FF-N-105C.

Note e. For fireresistance rated construction, see the pertinent fire test information.

Note f. 1 inch = 25.4 mm.

Table C-2
ALLOWABLE SHEAR FOR WIND OR SEISMIC FORCES IN POUNDS PER FOOT FOR VERTICAL DIAPHRAGMS OF LATH AND PLASTER OR GYPSUM BOARD FRAME WALL ASSEMBLIES[a]

Type of material	Thickness of material	Wall construction	Nail spacing[b] maximum (in inches)	Shear[c] value	Minimum nail size
Gypsum lath, plain or perforated	3/8" Lath and 1/2" Plaster	Unblocked	5	100	No. 13 gage, 1 1/8" long, 19/64" head, plasterboard blued nail.
Gypsum sheathing board	1/2"x2'x8'	Unblocked	4	75	No. 11 gage, 1 1/4" long, 7/64" head, diamond-point, galvanized.
	1/2"x4'	Blocked	4	175	
	1/2"x4'	Unblocked	7	100	
Gypsum wallboard or veneer base	1/2"	Unblocked	7	100	5d cooler nails.
			"	125	
		Blocked	7	125	
			4	150	
	5/8"	Blocked	4	175	6d cooler nails.
		Blocked Two ply	Base ply 9 Face ply 7	250	Base ply—6d cooler nails. Face ply—8d cooler nails.

Note a. These vertical diaphragms shall not be used to resist loads imposed by masonry or concrete construction. Values are for short time loading due to wind or earthquake and must be reduced 25 percent for normal loading.

Note b. Applies to nailing at all studs, top and bottom plates and blocking.

Note c. Values shown are for gypsum board applied to one side only. The shear values may be doubled when identical materials are applied to both sides of wall.

Note d. 1 inch = 25.4 mm.

APPENDIX D

METRIC EQUIVALENTS

1 inch equals 25.4 millimeters
1 foot equals 304.8 millimeters
1 square inch equals 645.16 square millimeters
1 square foot equals 0.093 square meters
1 cubic foot equals 0.028 cubic meters
1 cubic yard equals 0.765 cubic meters
1 gallon equals 0.00379 cubic meters
1 pound (avdp.) equals 0.454 kilograms
1 ton equals 0.907 metric ton or 907.2 kilograms
1 pound per square inch equals 6.895 kilo-Pascals or 0.000703 kilogram per square millimeter
1 pound per foot equals 1.489 kilograms per meter
1 pound per square foot equals 47.88 Pascals or 4.882 kilograms per square meter
1 pound per cubic foot equals 16.02 kilograms per cubic meter
1 foot per minute equals 0.00508 meters per second
1 inch per ton equals 0.028 millimeters per kilogram
1 cubic foot per square foot equals 0.301 cubic meters per square meter
1 gallon per minute per square foot equals 0.00068 cubic meters per second per square meter
1 gallon per minute equals 0.0000631 cubic meters per second
1 mile per hour equals 0.447 meters per second
1 cubic foot per minute equals 0.0004719 cubic meter per second
1 foot candle equals 10.764 lux
1 inch water column (at 60 degrees F.) equals 248.84 Pascals
1 ton per square foot equals 9765 kilograms per square meter
1 degree (angle) equals 0.01745 radian
1 Btu per hour per square foot per degree F. equals 5.678 Watts per square meter per degree K
1 Btu per hour equals 0.2931 Watt
1 Btu per cubic foot equals 10.468 Watts per cubic meter
Temperature (degrees C.) equals [temperature (degrees F.) -32] divided by 1.8
1 degree F. per minute equals 0.00926 degrees C. per second

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