



CITY OF ALBION CITY COUNCIL MEETING AGENDA

Meetings: First and Third Mondays – 7:00 p.m.

City Council Chambers ♦ Second Floor ♦ 112 West Cass Street ♦ Albion, MI 49224

COUNCIL-MANAGER GOVERNMENT

Council members and
other officials normally in
attendance.

Garrett Brown
Mayor

Maurice Barnes, Jr.
Council Member
1st Precinct

Lenn Reid
Council Member
2nd Precinct

Sonya Brown
Mayor Pro Tem
Council Member
3rd Precinct

Marcola Lawler
Council Member
4th Precinct

Jeanette Spicer
Council Member
5th Precinct

Andrew French
Council Member
6th Precinct

Scott Kipp
Interim City Manager

The Harkness Law Firm
Atty Cullen Harkness

Jill Domingo
City Clerk

NOTICE FOR PERSONS WITH
HEARING IMPAIRMENTS
WHO REQUIRE THE USE OF A
PORTABLE LISTENING DEVICE

Please contact the City
Clerk's office at
517.629.5535 and a listening
device will be provided
upon notification. If you
require a signer, please
notify City Hall at least five
(5) days prior to the posted
meeting time.

AGENDA

STUDY SESSION

**Albion City Hall
Council Chambers
112 West Cass Street
Albion, MI 49224**

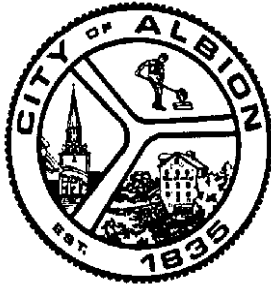
**Thursday, May 24, 2018
6:30 p.m.**

PLEASE TURN OFF CELL PHONES DURING MEETING

- I. CALL TO ORDER
- II. ROLL CALL
- III. PUBLIC COMMENTS (Persons addressing the City Council shall limit their comments to **agenda items only** and to no more than three (3) minutes. Proper decorum is required.)
- IV. ITEMS FOR INDIVIDUAL DISCUSSION
 - A. Council Goal Setting Session
 - B. Rental Certification
- V. PUBLIC COMMENTS (Persons addressing the City Council shall limit their comments to no more than three (3) minutes. Proper decorum is required.)
- VI. ADJOURN

2018 Albion City Council Goals

1. Neighborhood Stabilization
2. Infrastructure- Streets/Sidewalks/Water/Sewer
3. Quality Affordable Housing- Senior & General
4. Governance-Would like to see this completed in the next 3-6 months before New City Manager starts. MML Training for Boards & Commissions/Council Rules with Attorney Scott Smith.
5. Implementing a Master Calendar
6. Vision-What type of community are we planning for and utilizing resources to achieve these goals. Should start with Neighborhood Planning Councils.
7. New Water Tower
8. 2018 Millages-Recreation/Sidewalks/Streets



City of Albion

Planning, Building, Code Enforcement
112 West Cass Street
Albion, Michigan 49224

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Email: jtracy@cityofalbionmi.gov

PROPOSED RESIDENTIAL RENTAL REGISTRATION & CERTIFICATION

Purpose and intent

The city recognizes the importance to the general health, safety and welfare of all of its citizens, including its citizens who reside in residential dwellings, dwelling units and / or dormitories. The city therefore also recognizes a compelling interest in establishing standards for the maintenance of sanitary, health and safety of residential rental dwellings, dwelling units and dormitories. Proposed ordinance requires rental dwelling, dwelling units and / or dormitories to meet the minimum State of Michigan health and safety code requirements as referenced to in the international property maintenance code.

Proposed ordinance is designed to promote the continued maintenance of quality and safe residential rental properties and to enhance and maintain property value of all properties and to reduce the causes of blight and other deleterious factors affecting neighborhoods.

Registration

The owner of any residential rental dwelling, dwelling units and / or dormitory would be required to register rental property yearly. The registration would require the owners information to be supplied, and if applicable, local agent who shall be legally responsible for operating the registered rental property.

Certification

Proposed rental certification requires biannual inspection of rental properties. Biannual inspection of rental property is to ensure property meets the minimum health and safety codes. Biannual inspection is also to ensure property is maintained so as not to create blight and help deter decreased value to residential neighborhood.

POSSIBILITY OF VACANT PROPERTY REGISTRATION

Purpose and intent: The purpose of establishing a registration process for vacant properties with structures is to provide requirements for responsible parties to implement required vacant property maintenance for such properties which protect public health, safety and general welfare of the citizens and prevent neighborhood blight, ensure properties are secured, prevent deterioration, and protect property values and neighborhood integrity.

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CITY OF ALBION CODE OF ORDINANCE

CHAPTER 18 BUILDING AND BUILDING REGULATIONS

ARTICLE IX. RESIDENTIAL RENTAL REGISTRATION AND CERTIFICATION

Sec. 18 – 401 Purpose.

(a) The city recognizes the importance to the general health, safety and welfare of all of its citizens, including its citizens who rent residential rental structures. The city therefore also recognizes a compelling interest in establishing standards for the maintenance of sanitary, health and safety of residential rental structures and residential rental units in the city. This article is designed to promote the continued maintenance of quality and safe residential rental properties and to enhance and maintain property value of all properties and to reduce the causes of blight and other deleterious factors affecting neighborhoods.

(b) All residential rental structures shall be registered with the city and a valid and current rental certification shall be in effect at all times a residential rental structure is being occupied by a tenant. Approved certificate of rental certification shall only be available for those residential rental structures which meet and maintain the minimum standards as required by chapter 18, article IX, residential rental registration and certification, sec. 18-410 referenced codes and standards.

Sec. 18 – 402 Scope.

(a) *Application.* This Code shall apply to all rented or leased buildings, including manufactured homes, or any portions thereof, that are used or intended to be used for human habitation as single-family, two-family dwelling, multi-family dwelling, rooming house, rooming unit, housekeeping unit, sleeping unit or dormitory.

(b) *Alterations.* Existing certified buildings that are subject to this Code, but that do not comply with this Code shall, at the time of alteration or repair, and with respect to this new work, be altered or repaired to conform to this Code, the City Building Code (Chapter 18 of the Code of Ordinances), and the laws of the state of Michigan.

(c) *Relocation.* Buildings which are moved or relocated shall be considered new buildings and shall comply with all of the requirements of this Code.

(d) *Severability.* If a section, subsection, sentence, clause or phrase of this Code is, for any reason, held to be unconstitutional or a violation of the laws of the State of Michigan, such decision shall not affect the validity of the remaining portions of this Code.

Sec. 18 – 403 Definitions.

Code Enforcement Officer. The officer or building official charged with the enforcement of this code, or any duly authorized representative.

Director of Planning, Building, Code Enforcement. The official who is charged with the administration of this code, or any duly authorized representative.

Dwelling. A building, including manufactured homes, used in whole or in part for human occupancy.

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.

Dormitory. A room, building, or part of a building with sleeping accommodations for a number of people, or a building with many rooms that provide sleeping and living accommodation for a number of people, as at college.

Family. This term shall mean “traditional family” or “functional family” as defined below:

- a. *Traditional family* – an individual or group of two or more persons related by blood, marriage or adoption, or other legal relationship, together with foster children, with a maximum of not more than (3) three additional unrelated persons, who are domiciled together as a single domestic housekeeping unit in a dwelling.
- b. *Functional family* – a collective number of individuals domiciled together in one dwelling unit of not more than four (4) unrelated persons, and who are in fact cooking and living as a single nonprofit housekeeping unit. A functional family shall not include any society, club, fraternity, sorority, association, lodge, combine, federation group, coterie, or other organization.

Any person or group of persons seeking the legal rights and privileges of a “family” as defined in subparagraph a. or b. above in any administrative, judicial, or quasi-judicial proceeding, whether as the proponent or by way of defense, shall have the burden of proving that their relationship satisfies the criteria in either *subparagraph a.* or *b.* Above.

Housekeeping Unit. A room or group of rooms forming a single habitable space equipped and intended to be used for living, sleeping, cooking and eating which does not contain, within such a unit, a toilet, lavatory and bathtub or shower.

Manufactured Home. Manufactured home means a structure, transportable in one or more sections, which in the traveling mode is 8 body feet or more in width or 40 body feet or more in length, or, when erected on site, is 320 square feet or more, and which is built on a permanent chassis and designed to be used as a dwelling with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems contained therein; except that such term shall include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the secretary (HUD) and complies with the standards established under this title. For mobile homes built prior to June 15, 1976, a label certifying compliance to the Standard for Mobile Homes, NFPA 501, in effect at the time of manufacture is required. For the purpose of these provisions, a mobile home shall be considered a manufactured home.

Occupancy. The purpose for which a building or portion thereof is utilized or occupied.

Occupant. Any individual living or sleeping in a building, or having possession of a space within a building.

Owner. Any person, agent, operator, firm or corporation having a legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding title to the property; or otherwise having control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

Rooming House. A building arranged or occupied for lodging, with or without meals, for compensation and not occupied as a one – or – two family dwelling.

Rooming Unit. Any room or group of rooms forming a single habitable unit occupied or intended to be occupied for sleeping or living, but not for cooking purposes.

Sleeping Unit. A room or space in which people sleep, which can also include permanent provisions for living, eating and either sanitation or kitchen facilities, but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

Sec. 18 – 404 Registration required.

Registration. The owner of any residential rental structure or residential rental unit shall register each residential rental structure and all residential rental units contained within the residential rental structure with the city and shall designate a person, as defined in section 18 – 403 *owner*, as the responsible local agent who shall be legally responsible for operating the registered residential rental structure or residential rental unit and shall also be responsible for providing access to such premises for making the inspections necessary to ensure compliance with the terms of this article and all applicable codes and ordinances adopted by the city. A certification shall not be issued unless an applicant complies with the registration sections of this article. The seller of a dwelling house sold on a land contract, within 30 days of its execution, shall provide a copy of the land contract or memorandum of land contract to the director of planning and building.

Sec. 18 – 405 Registration forms and fee.

(a) Applications for registration pursuant to this article shall be made in such form and in accordance with such instructions as may be provided by the city planning and building department and shall include at least the following information:

- (1) The name, address and telephone number of the applicant.
- (2) The names, addresses, telephone numbers and dates of birth of all owners of the residential rental structure.
- (3) The name, local address, telephone number and date of birth of the responsible local agent.
- (4) The number of residential rental structures at each site, the address of and number of residential rental units in each residential rental structure.
- (5) If applicable, an authorization appointing a responsible local agent signed by both the owner and the responsible local agent.

(b) Name, date of birth, address and contact number of occupant shall be made available by landlord upon request of planning and building department or designee in regard to violation(s) of code caused by legal occupant.

(c) A registration fee (*to be determined by council*) for each site/parcel (*to be determined*) where residential rental structure(s) are located shall be paid at the time of registration. No post office box will be accepted as a legal address. A post office box, however, may be accepted as a mailing address for legal correspondence upon written request of the property owner and maintaining the legal street address on file with the city's planning, building, code enforcement department. Upon registration, the director of planning, building & code enforcement department; building official or authorized representative, shall inform the applicant of certification requirements. The fee for each registration shall be as set by resolution of the city council from time to time. The owner shall be responsible for notifying the city of any change of address of either the owner or the responsible local agent.

Sec. 18 - 406 Registration term and renewal.

Registration pursuant to this article shall be made prior to the use or occupancy of any residential rental structure and / or residential rental unit(s) except as otherwise provided by this article. The term of the registration shall be valid for *two (2) year's*. Thereafter, as required, every *two (2) year's* between thirty (30) and seven (7) days before the expiration date on the registration issued for a residential rental structure and / or residential rental unit(s), every owner shall renew registration of residential rental structure and / or residential rental unit(s) with the city planning and building department. City shall issue notice of required renewal sixty days in advance.

Sec. 18 - 407 Transfer of ownership.

(a) It shall be unlawful for the owner of any residential rental structure or residential rental unit who has received a notice of violation of any code or ordinance of the city, including notices that the number of residential rental units exceeds that permitted by chapter 30 which pertains to zoning, to transfer, convey, lease or sell, including by land contract, his ownership and/or interest in any way to another, unless such

owner shall have first furnished to the grantee, lessee, vendee, or transferee a true copy of any notice of violation and shall have furnished to the building official a signed and notarized statement from the grantee, vendee, lessee, or transferee acknowledging the receipt of such notice of violation and acknowledging legal responsibility for correction of the violation.

(b) The new owner, upon acknowledging and accepting property with outstanding code violations must either correct code violations within 30 days of the transfer or due to the extensive nature of the violations, may enter into a work timeline agreement with the city within 10 days of the transfer in order to ensure repairs and renovations are made in accordance with all codes, ordinances and renovations standards established. Failure to do so may result in a municipal civil infraction, declaration of the building as a public nuisance, dangerous structure or blight. These time periods do not apply to property which has been determined to constitute a nuisance under chapter 18 article III – dangerous buildings under the city code of ordinance.

Sec. 18 - 407 Certification required.

No person shall lease, rent or cause to be occupied a residential rental structure or residential rental unit unless there is a valid certification issued by the city planning and building department in the name of the owner and issued for the specific residential rental structure and each residential rental unit. The certificate shall be produced upon request. The certificate may be issued after an inspection by but not limited to the code enforcement officer or building official. Under certain health and safety conditions, additional inspection(s) may be required to be performed by the building inspector, mechanical inspector, electrical inspector, plumbing inspector, and / or fire inspector to determine that each rental dwelling and rental unit complies with the provisions of the codes and ordinances of the city. Such inspections shall commence after the effective date of the ordinance from which this article is derived and shall continue until all rental dwellings and all rental units in the city have been inspected and continue, thereafter, as required every *two (2) year's*. Not more than 30 days before the expiration date on the certification issued for a rental property, every owner shall apply to the city planning and building department for the scheduling of an inspection for the issuance of a new certification for that residential rental structure.

Sec. 18 – 408 Every owner shall comply with the following provisions:

- (a) At the time a new tenant occupies a vacant dwelling unit, the new tenant shall be provided with a clean, healthful dwelling unit, free of visible mold and mildew.
- (b) Maintain the public or shared areas of a dwelling or the premises in a clean, safe, and sanitary condition.
- (c) Maintain in good repair every dwelling and premises and all parts thereof, including, but not limited to, plumbing, heating, ventilation, and electrical systems, and the interiors and exteriors of dwellings and dwelling units.
- (d) An owner or agent shall not allow a dwelling unit to be occupied by more persons than such dwelling unit is registered for or allow any portion of the dwelling unit to be occupied in such a manner that any of the provisions of this Code are violated.
- (e) Repairs, maintenance work, alterations or installations which are caused directly or indirectly by the enforcement of this Code shall be executed and installed in a workmanlike manner and installed in accordance with the manufacturer's installation instructions.
- (f) Equipment, systems, devices and safeguards required by this Code or a previous regulation or Code under which the building was constructed, altered or repaired shall be maintained in good working order. No owner, operator or occupant shall cause any service, facility, equipment or utility which is required by applicable law to be removed from or shut off for any occupied dwelling or dwelling unit, while occupied, except for such temporary interruption as necessary while repairs or alterations are in progress. The requirements of this Code are not intended to provide the basis for removal or abrogation of fire protection and safety systems and devices in existing buildings.
- (g) All water leaks shall be properly repaired.
- (h) All locations within the building for which the Landlord is responsible for under the lease, shall be kept free of visible mold and mildew.

- DRAFT
- (i) Buildings shall have approved address numbers placed in a position to be plainly legible and visible from the street or road fronting the property. These numbers shall contrast with their background. Address numbers shall be Arabic numerals. Numbers shall be a minimum of 4 inches (102mm) in height with a minimum stroke width of ½ inch (12.7 mm). Two or more units with the same street address shall be individually identified by approved number or alphabet letter.
 - (j) Refuse service shall meet the requirements of Chapter 66 of the city ordinance.
 - (k) Grass shall be maintained and noxious vegetation shall be abated as required by Chapter 90 of the city ordinance.
 - (l) Comply with other applicable provisions of this Code.

Sec. 18 – 409 Building Maintenance

- (a) Every legal occupant shall notify the owner or his/her agent in writing of any water leaks or of any other condition believed to be in violation of this code which directly affects the dwelling unit within a reasonable time of discovery of any leaks or condition.
- (b) After notification is made by legal occupant to landlord, the legal occupant may notify the planning and building department or authorized designee, of a complaint regarding any condition believed to be in violation of this code. Complaint shall be filed on a form supplied by the planning and building department. Complaint may be followed up with an inspection of rental structure/premises by but not limited to the code enforcement officer or building official. Under certain health and safety conditions, additional inspection(s) may be required to be performed by the building inspector, mechanical inspector, electrical inspector, plumbing inspector, and / or fire inspector. If a complaint is made and violation is found to have been created by occupant, or false, the occupant who filed complainant shall be charged an inspection fee, or fees for additional inspections if required.
- (c) Every occupant shall properly maintain all facilities, including bathroom and kitchen facilities, in a manner that is clean and sanitary, so as not to place other occupants within that building at risk for safety or health reasons.
- (d) An occupant shall not sublet or allow any portion of the dwelling unit to be occupied in such a manner that any of the provisions of this code are violated.
- (e) Every occupant shall properly use the designated parking area provided by the applicable lease and shall not park across sidewalks or front yard.
- (f) Occupants shall not place any article of furniture and/ or an appliance manufactured for and intended primarily for indoor use out of doors, in yards, on open porches, or patios.
- (g) No occupant of any rental unit or building shall cause intentional destruction nor allow the intentional destruction by others to the rental unit or building or any part thereof.
- (h) No occupant shall access, nor permit access by others, to the rooftop of any structure. Exception: access by property maintenance personnel shall be permitted for necessary repairs.
- (i) Every occupant shall properly maintain all facilities in a clean and sanitary manner free of excessive accumulations of waste product or clutter. All areas for which the tenant is responsible for under the lease, shall be kept free of visible mold or mildew.
- (j) No occupant of any rental unit or building shall allow any refuse, debris or other substance to accumulate in the rental unit or building or any other area, which said occupant has use or possession thereof, or area which might put other occupants of that building at risk for health or safety reasons.

Sec. 18 – 410 REFERENCED CODES AND STANDARDS.

Chapters 2 through 8 of the 2015 edition of the International Property Maintenance Code are hereby adopted in their entirety, except as added, amended or deleted, as follows:

Add Sec. 301.4 Owner occupied rental. Owner occupied portions of residential dwelling buildings shall be inspected every *two (2) year's* to ensure that a non-owner occupant of that residential dwelling building

will not be subject to risk because of safety or sanitary conditions existing in the owner occupied portion of the residential dwelling building.

Add Sec. 302.3.1 Whenever any public sidewalk shall be obstructed or encumbered because of any snow ice, water, slush, mud, dirt, filth, rubbish, debris, leaves or any other thing, article or substance which may have fallen, formed, accumulated or been placed or dropped upon the sidewalk, it shall be removed as required by sec. 74-22 sidewalk obstruction; snow and ice accumulations, of the city code of ordinances.

Delete Sec. 302.4 Weeds

Add Sec. 302.4.1 Noxious weeds, grass and brush shall be maintained and abated in compliance with chapter 90 – vegetation article III. – noxious weeds, grass and brush, of the city code of ordinance.

Delete Sec. 302.8 Motor Vehicles

Insert Sec. 304.14 Insert “during the period from May 1 to October 1.

Delete Sec. 308 Rubbish and Garbage 308.1 through 308.3.2

Add Sec. 308.4 Solid waste shall be kept properly stored and disposed of in compliance with chapter 66 – solid waste, of the city code of ordinance.

Insert Sec. 602.3 Insert “during the period from October 1 to May 1.

Insert Sec. 602.4 Insert “during the period from October 1 to May 1.

Sec. 18 – 411 Penalty for violation.

Any violation of chapter 18, article IX, shall constitute a civil infraction and complaints shall be processed and punished according to section 1-26 of the city code of ordinance. *et. seq.*

Means of appeal: Any person directly affected by a decision of the code official or a notice or order issued under this code shall have the right to appeal to the building board of appeals, provided that a written application for appeal is filed within twenty (20) days after the day the decision, notice or order was served. An application for appeal shall be based on a claim 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 the requirements of this code are adequately satisfied by other means.

Chapter 3:

General Requirements

General Comments

The title for Chapter 3 ("General Requirements") indicates that it is broad in scope. It includes a variety of requirements for exterior property areas, as well as interior and exterior elements of the structure. Chapter 3 provides specific criteria for regulating the installation and maintenance of building components. This chapter also contains requirements regulating the safety, sanitation and appearance of the interior and exterior of structures and all exterior property areas.

Section 301 identifies the scope of Chapter 3 as containing provisions for maintaining a structure and its exterior property areas, and establishes who is responsible for complying with the chapter's provisions. This section also provides minimum maintenance requirements for vacant structures and land.

Section 302 establishes criteria for maintaining exterior property areas and accessory structures and provides vehicle storage regulations.

Section 303 contains the requirements for swimming pools, spas, hot tubs, protective barriers and gates in these barriers.

Section 304 establishes maintenance requirements for the structural, weather resistance, sanitary and safety performance of the exterior of a structure.

Section 305 establishes maintenance requirements for the structural, sanitary and safety performance of the interior of a structure.

Section 306 contains provisions for maintaining components of a structure, as well as for determining unsafe conditions based on specific parameters.

Section 307 provides for the safety and maintenance of handrails and guardrails.

Sections 308 and 309 establish the responsible parties for exterminating insects and rodents, and maintaining sanitary conditions in various types of occupancies. When specific requirements are not

provided in the code, the following three options for establishing the necessary criteria are available:

1. If the jurisdiction has already established criteria, the code official can continue to enforce that criteria.
2. The jurisdiction may adopt its own criteria and incorporate them as an amendment to the appropriate section of the code.
3. The code official may adopt and enforce criteria already established by the *International Building Code*® (IBC®).

Inadequate sanitation and insect or rodent infestations can have a significant impact on a community. A poorly kept neighborhood affects the self-image of a community, as well as the impression neighboring communities and visitors have about the area. Responsible property owners may shy away from neighborhoods that look unkempt. As a result, property values decrease and the cycle can continue until the neighborhood is considered a slum.

An area that is neat, clean and well maintained attracts owners and occupants who are usually willing to keep the area attractive, if only to protect their own interests. The code official, with vigorous enforcement of sanitation and extermination regulations, can help a community maintain a positive self-image. This creates a favorable image to the rest of the community and its visitors.

Purpose

Chapter 3 provides requirements that are intended to maintain a minimum level of safety and sanitation for both the general public and the occupants of a structure, and to maintain a building's structural and weather-resistant performance.

SECTION 301 GENERAL

301.1 Scope. The provisions of this chapter shall govern the minimum conditions and the responsibilities of persons for maintenance of structures, equipment and *exterior property*.

❖ This chapter establishes minimum requirements for maintenance of property areas, premises and structures. The code deals with all types and all ages of

structures; therefore, the criteria must be of a minimum nature, consistent with a reasonable level of protection for the health and safety of the occupants.

301.2 Responsibility. The *owner* of the *premises* shall maintain the structures and *exterior property* in compliance with these requirements, except as otherwise provided for in this code. A person shall not occupy as owner-occupant or permit another person to occupy *premises* that are not in a sanitary and safe condition and that do not comply with the require-

GENERAL REQUIREMENTS

ments of this chapter. *Occupants* of a *dwelling unit*, *rooming unit* or *housekeeping unit* are responsible for keeping in a clean, sanitary and safe condition that part of the *dwelling unit*, *rooming unit*, *housekeeping unit* or *premises* which they occupy and control.

- ❖ The owner is responsible for complying with the requirements of Chapter 3, except when the code places the responsibility on the occupants to keep their portion of the premises in a safe and sanitary condition.

Simply stated, owners must provide a safe and sanitary property and premises when they let it for occupancy. Occupants must continue to keep it safe and sanitary while they occupy, control or use the property and premises.

301.3 Vacant structures and land. Vacant structures and *premises* thereof or vacant land shall be maintained in a clean, safe, secure and sanitary condition as provided herein so as not to cause a blighting problem or adversely affect the public health or safety.

- ❖ Both vacant structures and vacant land present special concerns to communities. Because no one is living on these premises, they are often ignored by the owners. Consequently, this section establishes the code official's authority to order the cleanup of vacant lands and the securing of vacant structures that might present an attractive nuisance.

When the owner fails to secure a vacant structure, Section 108.2 provides the code official with the authority to arrange for securing such buildings. Additionally, Section 110 authorizes the code official to pursue demolition of any structure that is deemed unreasonable to repair. When a structure is reasonable to repair, the code official is authorized to require the necessary repairs.

SECTION 302 EXTERIOR PROPERTY AREAS

302.1 Sanitation. *Exterior property* and *premises* shall be maintained in a clean, safe and sanitary condition. The *occupant* shall keep that part of the *exterior property* that such *occupant* occupies or controls in a clean and sanitary condition.

- ❖ This section establishes a simple, straightforward requirement that exterior areas shall be clean and free from rubbish and garbage (see the definitions in Chapter 2). The code official may find that enforcement of this section is frequently neither straightforward nor simple.

Each jurisdiction has neighborhoods within the overall community that have distinct characteristics. Deteriorated, low-cost housing may dominate in one area, while another has expensive, well-maintained housing units. Sanitation standards should be enforced uniformly and consistently.

302.2 Grading and drainage. *Premises* shall be graded and maintained to prevent the erosion of soil and to prevent the

accumulation of stagnant water thereon, or within any structure located thereon.

Exception: *Approved* retention areas and reservoirs.

- ❖ Improperly graded property areas create health and safety hazards. Stagnant water provides a home for many nuisance insects, especially the mosquito. Stagnant water next to a structure can cause mold growth, which can lead to the decay of wooden members. Ponded water is an attractive nuisance for children and has contributed to numerous drowning deaths.

Stagnant water is foul or stale water. Regrading the premises may be necessary to prevent stagnant water. If reggrading is not practical, some type of water-diversion system must be installed. Other solutions include replacing nonabsorbent soil with absorbent soil, installing underground drain tile or building an underground leaching pit.

Soil erosion can be a nuisance if material is being deposited in drainage systems or on adjacent properties, and is an indication of improper grading. Planting and maintaining an acceptable ground cover generally prevents erosion.

As indicated by the exception, water retention areas or reservoirs are permitted by the code even though they may contain stagnant water; however, the code official must approve their use.

302.3 Sidewalks and driveways. Sidewalks, walkways, stairs, driveways, parking spaces and similar areas shall be kept in a proper state of repair, and maintained free from hazardous conditions.

- ❖ The code official is authorized to require that all sidewalks, walkways, stairs, driveways, parking spaces, etc., are usable and kept in proper repair. Walking surfaces that have deteriorated to a condition that presents a hazard to pedestrians must be repaired or replaced to eliminate the hazard and thus reduce the potential for accidents or injuries.

302.4 Weeds. *Premises* and *exterior property* shall be maintained free from weeds or plant growth in excess of [JURISDICTION TO INSERT HEIGHT IN INCHES]. Noxious weeds shall be prohibited. Weeds shall be defined as all grasses, annual plants and vegetation, other than trees or shrubs provided; however, this term shall not include cultivated flowers and gardens.

Upon failure of the *owner* or agent having charge of a property to cut and destroy weeds after service of a notice of violation, they shall be subject to prosecution in accordance with Section 106.3 and as prescribed by the authority having jurisdiction. Upon failure to comply with the notice of violation, any duly authorized employee of the jurisdiction or contractor hired by the jurisdiction shall be authorized to enter upon the property in violation and cut and destroy the weeds growing thereon, and the costs of such removal shall be paid by the *owner* or agent responsible for the property.

- ❖ Criteria establishing maximum heights for grass and weeds are necessary to reduce rodent shelters and pollen dust problems.

This section provides a mechanism for removal of weeds on neglected or abandoned properties after proper notice has been given to the responsible owner or agent (see Sections 107 and 108.3). It is important that the code official act quickly in requiring weed removal to prevent the weeds from contributing to a blight condition that could eventually become a harbor for pests and rodents.

All noxious weeds are prohibited; however, each community has different weeds that are considered noxious. The code official should confer with the state or local agricultural agent to become familiar with weeds that are noxious in his or her community.

Cultivated flowers and gardens are not considered to be weeds. The word "cultivated" is important. Cultivated is defined as "to loosen or dig (soil) around growing plants." Uncultivated gardens should be treated the same as weeds and tall grasses.

302.5 Rodent harborage. Structures and *exterior property* shall be kept free from rodent harborage and *infestation*. Where rodents are found, they shall be promptly exterminated by *approved* processes that will not be injurious to human health. After pest elimination, proper precautions shall be taken to eliminate rodent harborage and prevent reinfestation.

- ❖ Rodents carry disease organisms in their feces and on their bodies. The code official must require the extermination of all rodents by approved processes. All harborage areas should be eliminated by removing piles of rubbish, towing or repairing inoperable cars and cutting back weeds. Garbage should be stored in solid containers with tight-fitting lids and disposed of regularly.

302.6 Exhaust vents. Pipes, ducts, conductors, fans or blowers shall not discharge gases, steam, vapor, hot air, grease, smoke, odors or other gaseous or particulate wastes directly upon abutting or adjacent public or private property or that of another *tenant*.

- ❖ There are three common problems associated with exhaust vent discharges:
 - Odor problems caused from exhaust gases emanating from business and industrial properties.
 - Noise problems created by exhaust vents.
 - Health and safety problems created by exhausts that contain hazardous or potentially hazardous discharge.

To reduce these problems, exhaust vents are prohibited from discharging directly on abutting or adjacent public and private property.

302.7 Accessory structures. Accessory structures, including *detached* garages, fences and walls, shall be maintained structurally sound and in good repair.

- ❖ Accessory structures must be maintained in accordance with the criteria established by this section.

Property owners often give detached garages, sheds, fences, retaining walls and similar structures a lower maintenance priority than the primary structure; thus, these structures are more frequently in disrepair. A thorough inspection of all property areas and accessory buildings is necessary to identify violations of the code and to improve a neighborhood's appearance.

302.8 Motor vehicles. Except as provided for in other regulations, no inoperative or unlicensed motor vehicle shall be parked, kept or stored on any *premises*, and no vehicle shall at any time be in a state of major disassembly, disrepair, or in the process of being stripped or dismantled. Painting of vehicles is prohibited unless conducted inside an *approved* spray booth.

Exception: A vehicle of any type is permitted to undergo major overhaul, including body work, provided that such work is performed inside a structure or similarly enclosed area designed and *approved* for such purposes.

- ❖ Improper storage of inoperable vehicles can be a serious problem for a community. The vehicles are unsightly, clutter the neighborhood, provide a harborage for rodents and are an attractive nuisance for children.

This section establishes criteria for acceptable vehicle storage. No inoperable or unlicensed vehicles are permitted on a property unless approved in other regulations adopted by the community. This regulation addresses two problems associated with vehicle storage and repair:

- The blighting influence that improperly stored inoperable vehicles have on a neighborhood.
- The neighborhood mechanic who attempts to operate a vehicle repair business from home.

Major vehicle repairs are permitted, but only if the work is performed in a structure designed and approved for such use. Of course, this regulation does not affect the storage of vehicles on property that complies with applicable zoning or license requirements, such as repair garages, salvage yards and similar establishments.

302.9 Defacement of property. No person shall willfully or wantonly damage, mutilate or deface any exterior surface of any structure or building on any private or public property by placing thereon any marking, carving or graffiti.

It shall be the responsibility of the *owner* to restore said surface to an *approved* state of maintenance and repair.

- ❖ Graffiti, carving and damage is a problem that plagues exterior surfaces of walls, fencing and sidewalks in cities and towns of all sizes. This problem begins as an eyesore and can result in serious consequences, including declining property values and degradation of the structures' ability to repel rain and snow.

It must be the responsibility of the owner to restore said surface to an approved state of maintenance and repair.

SECTION 303 SWIMMING POOLS, SPAS AND HOT TUBS

303.1 Swimming pools. Swimming pools shall be maintained in a clean and sanitary condition, and in good repair.

❖ Swimming pools, if neglected, can become a health hazard, resulting in insect-attracting stagnant water.

303.2 Enclosures. Private swimming pools, hot tubs and spas, containing water more than 24 inches (610 mm) in depth shall be completely surrounded by a fence or barrier not less than 48 inches (1219 mm) in height above the finished ground level measured on the side of the barrier away from the pool. Gates and doors in such barriers shall be self-closing and self-latching. Where the self-latching device is not less than 54 inches (1372 mm) above the bottom of the gate, the release mechanism shall be located on the pool side of the gate. Self-closing and self-latching gates shall be maintained such that the gate will positively close and latch when released from an open position of 6 inches (152 mm) from the gatepost. No existing pool enclosure shall be removed, replaced or changed in a manner that reduces its effectiveness as a safety barrier.

Exception: Spas or hot tubs with a safety cover that complies with ASTM F1346 shall be exempt from the provisions of this section.

❖ This performance-based criteria was specifically added to address pool-related problems where a child could possibly drown by gaining entry into a pool through a gate that failed to close and latch properly. Gates that may have deteriorated over time through age, wear and exposure to the elements are now addressed so that they will continue to provide the intended level of protection. The exception to this section allows for safety covers that comply with ASTM F1346. This exception is consistent with current provisions in the IBC and the *International Residential Code*® (IRC®).

ASTM F1346 requires fastening the safety cover to the hot tub or spa via key locks, combination locks or similar devices that will keep the cover in place; testing to demonstrate that the cover can support a minimum required weight; limitations on openings in the cover; and minimum installation requirements.

SECTION 304 EXTERIOR STRUCTURE

304.1 General. The exterior of a structure shall be maintained in good repair, structurally sound and sanitary so as not to pose a threat to the public health, safety or welfare.

❖ The exterior of structures must perform four primary functions:

- It must be in good repair. There should be no evidence of deterioration, or damaged or loose elements.
- It must be structurally sound. There should not be any loose or collapsing pieces. Stairways,

porches, balconies and similar structural elements must safely perform their intended functions.

- It must be kept in a sanitary condition. There shall be no accumulation of litter or debris on porches and other parts of the exterior structure.
- It must be capable of preventing the elements (rain, snow and wind) and rodents from entering the interior areas.

304.1.1 Unsafe conditions. The following conditions shall be determined as unsafe and shall be repaired or replaced to comply with the *International Building Code* or the *International Existing Building Code* as required for existing buildings:

1. The nominal strength of any structural member is exceeded by nominal loads, the load effects or the required strength;
2. The *anchorage* of the floor or roof to walls or columns, and of walls and columns to foundations is not capable of resisting all nominal loads or load effects;
3. Structures or components thereof that have reached their limit state;
4. Siding and masonry joints including joints between the building envelope and the perimeter of windows, doors and skylights are not maintained, weather resistant or water tight;
5. Structural members that have evidence of *deterioration* or that are not capable of safely supporting all nominal loads and load effects;
6. Foundation systems that are not firmly supported by footings, are not plumb and free from open cracks and breaks, are not properly *anchored* or are not capable of supporting all nominal loads and resisting all load effects;
7. Exterior walls that are not *anchored* to supporting and supported elements or are not plumb and free of holes, cracks or breaks and loose or rotting materials, are not properly *anchored* or are not capable of supporting all nominal loads and resisting all load effects;
8. Roofing or roofing components that have defects that admit rain, roof surfaces with inadequate drainage, or any portion of the roof framing that is not in good repair with signs of *deterioration*, fatigue or without proper anchorage and incapable of supporting all nominal loads and resisting all load effects;
9. Flooring and flooring components with defects that affect serviceability or flooring components that show signs of *deterioration* or fatigue, are not properly *anchored* or are incapable of supporting all nominal loads and resisting all load effects;
10. Veneer, cornices, belt courses, corbels, trim, wall facings and similar decorative features not properly anchored or that are anchored with connections not capable of supporting all nominal loads and resisting all load effects;

11. Overhang extensions or projections including, but not limited to, trash chutes, canopies, marquees, signs, awnings, fire escapes, standpipes and exhaust ducts not properly *anchored* or that are *anchored* with connections not capable of supporting all nominal loads and resisting all load effects;
12. Exterior stairs, decks, porches, balconies and all similar appurtenances attached thereto, including *guards* and handrails, are not structurally sound, not properly *anchored* or that are *anchored* with connections not capable of supporting all nominal loads and resisting all load effects; or
13. Chimneys, cooling towers, smokestacks and similar appurtenances not structurally sound or not properly *anchored*, or that are *anchored* with connections not capable of supporting all nominal loads and resisting all load effects.

Exceptions:

1. Where substantiated otherwise by an *approved* method.
 2. Demolition of unsafe conditions shall be permitted where *approved* by the *code official*.
- ❖ The purpose of these requirements is to set out general and specific delineations in a building or structure that would make it unsafe. These delineations allow the code official more specific references to conditions that characterize an unsafe building or structure.

Section 304.1.1 describes in detail unsafe conditions related to the exterior of the structure to provide the code official the ability to require replacement or repair.

Item 1 indicates that if the strength of the structural member is exceeded by either the nominal loads or load effects, the condition is to be regarded as unsafe. Nominal strength and load effects, as defined by the IBC and Items 2–13 of this section, are when a structure or component is regarded as incapable of performing its intended function and thus becomes unsafe.

Item 2 deals with required strength of connections between structural members. More specifically, each connection must be able to resist nominal loads and load effects; otherwise, the building or affected portion thereof is to be regarded as unsafe. Anchorage of various elements of a structure is essential to its stability. When anchorage is not capable of transferring the intended loads, the structure or component is said to be unsafe.

Item 3 specifies that any condition beyond which a structure or member becomes unfit for service and is no longer useful for its intended function is to be unsafe. This includes its serviceability limit and strength limit state. "Limit state," as defined by the IBC, is a condition beyond which a structure or member becomes unfit for service and is no longer useful for its intended function (serviceability limit state) or to be unsafe (strength limit state). Any structure reaching this state is said to be unsafe.

Since weather penetration can degrade structural components, Item 4 specifies that if any joint in the building envelope allows weather to penetrate, it may be used as a basis to classify the structure as unsafe. This may be, in and of itself, the basis for the classification. However, supporting evidence of deterioration caused by the penetration would add weight to the characterization as unsafe.

Item 5 addresses structural members. Structural members are essential to the structural integrity of any building. If any structural member is deteriorated to the point that it cannot safely support the nominal loads, the building may be regarded as unsafe.

Item 6 addresses foundations. Foundation systems are essential to the structural integrity of any building. If any portion of any foundation system is not supported by adequate soil, is not plumb as intended to distribute the loads, has cracks or breaks or is inadequately anchored, the building may be regarded as unsafe.

Item 7 addresses exterior walls. Exterior walls are essential to the structural integrity of any building. If any portion of any exterior or bearing wall system is not supported by adequate foundation, is not plumb as intended to distribute the loads, has cracks or breaks or is inadequately anchored, the building may be regarded as unsafe.

Item 8 addresses roofing and roofing components. Since weather penetration can degrade structural components, this section specifies that if any roof component allows weather to penetrate, it may be used as a basis to classify the structure as unsafe. This may be, in and of itself, the basis for the classification. However, supporting evidence of deterioration caused by the penetration would add weight to the characterization as unsafe. Additionally, any structural component of the roof assembly not capable of supporting design loads is a basis for classifying as unsafe.

Item 9 addresses flooring and flooring components. Walking surfaces in floors with fatigue, defects or deterioration are a basis for determining that a building or structure is unsafe. If a floor may collapse due to any of these conditions or is likely to cause harm or injury, it may be regarded as unsafe.

Item 10 addresses exterior wall facings. Decorative features either inside or outside that may become detached and fall is a basis for classifying a building or portion thereof as unsafe. Lateral movement, such as an earthquake or wind, may cause any feature such as this to fall if not secured properly.

Item 11 addresses overhangs and projections from a building. As with decorative features, any overhang, extension or projection—such as trash chutes, canopies, marquis, sign, etc.—that is not anchored properly and can fall is a basis for declaring that an unsafe condition exists.

Item 12 addresses exterior stairs, decks and similar appurtenances. Exterior stairs, decks, porches, balconies and all similar appurtenances are all portions of a

means of egress system and as such represent a significant safety concern if left in an unsafe condition. Should any of these elements of a means of egress system become structurally unsound, the building or portion thereof may be regarded as unsafe.

Item 13 addresses chimneys, cooling towers and similar appurtenances. As with decorative features and other appurtenances, chimneys, cooling towers, smokestacks or similar large vertical elements that become structurally unsound may be regarded as unsafe.

Exception 1 is to recognize that a qualified entity could substantiate an alternative method or material that meets the purpose and intent of the code. This alternative would need to be approved by the code official. An engineering study that substantiates the structural integrity in a rational analysis may be the basis for accepting a contention that the building is not unsafe.

Exception 2 allows a building owner the option of demolition of an unsafe condition subject to the code official's approval. If the building or structure or portion thereof is demolished, and does not exist, the condition is considered to be resolved.

304.2 Protective treatment. Exterior surfaces, including but not limited to, doors, door and window frames, cornices, porches, trim, balconies, decks and fences, shall be maintained in good condition. Exterior wood surfaces, other than decay-resistant woods, shall be protected from the elements and decay by painting or other protective covering or treatment. Peeling, flaking and chipped paint shall be eliminated and surfaces repainted. Siding and masonry joints, as well as those between the building envelope and the perimeter of windows, doors and skylights, shall be maintained weather resistant and water tight. Metal surfaces subject to rust or corrosion shall be coated to inhibit such rust and corrosion, and surfaces with rust or corrosion shall be stabilized and coated to inhibit future rust and corrosion. Oxidation stains shall be removed from exterior surfaces. Surfaces designed for stabilization by oxidation are exempt from this requirement.

❖ Other sections of the code require items such as walls, doors, windows and architectural trim to be maintained in good repair and condition. This section makes it clear that if paint or other protective covering or treatment is used to provide protection from the elements, it cannot be peeling, flaking or chipped. Additionally, buildings with deteriorated paint or with masonry joints and siding in disrepair or not weather tight will eventually decay and exert a blighting influence on the community.

[F] **304.3 Address identification.** Buildings shall be provided with approved address identification. The address identification shall be legible and placed in a position to be visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numerals or alphabetical letters. Numbers shall not be spelled out. Each character shall be a minimum of 4 inches (102 mm) in height with a mini-

mum stroke width of 0.5 inch (12.7 mm). Where required by the fire code official, address identification shall be provided in additional approved locations to facilitate emergency response. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.

❖ Identifying buildings during an emergency (i.e., fire department, ambulances, medical, police) is greatly aided by the proper placement of address identification. In other than emergencies, the address identification serves as a convenience for people attempting to locate a building. The size and contrast criteria are intended to aid visibility from the street. Where multiple structures are remotely located on a site or set back into a property, at locations where multiple addresses are provided (e.g., strip malls) or where the address is not readily visible from the public way, an approved method of identification will also be required. The fire code official has the authority to require that address numbers be located in all locations deemed necessary to properly identify the building by street address. The primary concern is for emergency personnel to locate the building without going through a lengthy search procedure. In the case of a strip mall, identification would be provided for the backs of buildings that face alleys or roads since the emergency response unit may often be directed to the back entrance. The address numbers must be maintained in a readily visible condition to provide for continuous identification. This would include repainting faded numbers or trimming trees or other vegetation that may be obscuring visibility of the address.



304.4 Structural members. Structural members shall be maintained free from *deterioration*, and shall be capable of safely supporting the imposed dead and live loads.

❖ Building components that must support other building components are considered structural. Structural members must be kept sound and capable of supporting all of the dead and live loads imposed upon them. Dead loads are the loads created by the structure

itself. The footing must adequately carry the load of the foundation, beams, joists, walls, roof and other similar members located above it.

Live loads are the weights that are added to the finished structure. Live loads include furniture, appliances, equipment and other items added to the inside of the building. Snow, rain, ice and wind are environmental conditions that are also considered live loads in the code.

304.5 Foundation walls. Foundation walls shall be maintained plumb and free from open cracks and breaks and shall be kept in such condition so as to prevent the entry of rodents and other pests.

- ❖ The foundation must safely support the entire structure. Minor problems left uncorrected can become major. Major foundation problems can result in collapse of the structure.

Minor damage includes hairline cracks, loose and flaking mortar and surface deterioration of cement blocks and poured concrete walls. Major damage includes large horizontal and vertical step cracks, and large areas of missing foundation material (see Commentary Figure 304.5).

Three of the most frequent causes of foundation failure result from damage caused at the time of construction, soil problems (settling, sliding, heaving and expanding) and the effects of water. Water entering

the foundation through cracks, holes or breaks can freeze and expand, causing damage to the foundation.

The code official should order replacement of structural elements when major damage has occurred and should order appropriate maintenance, such as tuck-pointing, if the damage is only minor.

All conditions that permit entry of rodents or other pests must also be corrected.

304.6 Exterior walls. Exterior walls shall be free from holes, breaks, and loose or rotting materials; and maintained weathertight and properly surface coated where required to prevent deterioration.

- ❖ Holes, cracks, decayed wood or any other condition that permits rain or dampness to enter the structure must be repaired. Exterior surface materials must be properly coated to prevent deterioration if they are not naturally decay resistant. Many materials do not require surface coating, including: certain metals (aluminum, copper, etc.); masonry products (bricks, stone, stucco, etc.); naturally, decay-resistant woods (redwood, cedar, etc.); and woods that have been treated with chemicals to prevent decay.

304.7 Roofs and drainage. The roof and flashing shall be sound, tight and not have defects that admit rain. Roof drainage shall be adequate to prevent dampness or deterioration in the walls or interior portion of the structure. Roof drains, gut-

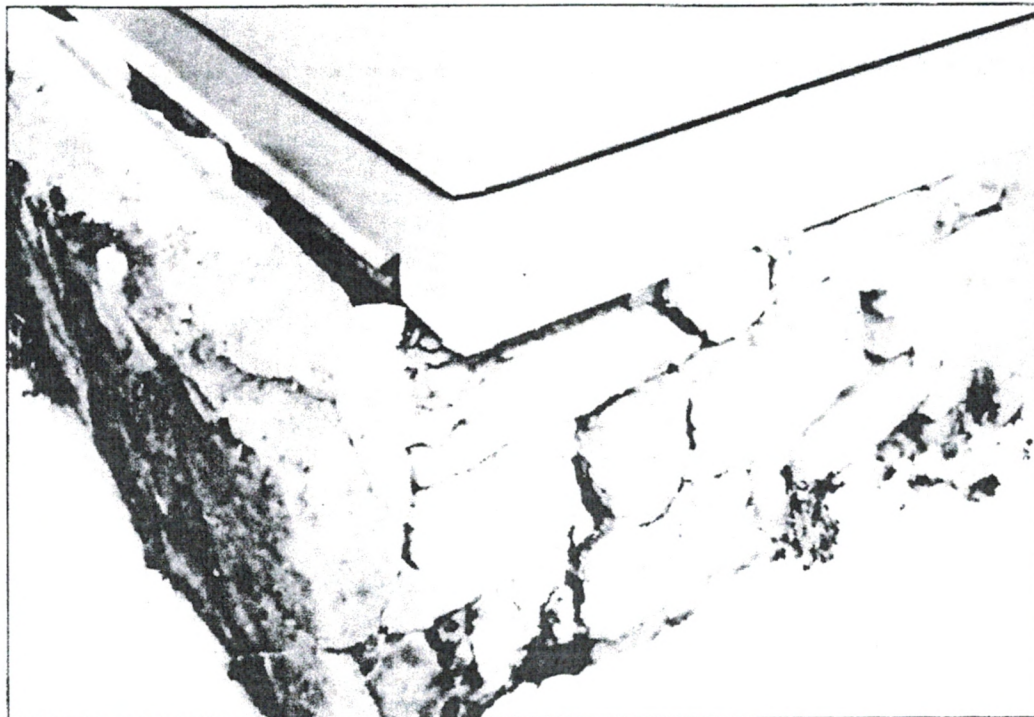


Figure 304.5

MAJOR DAMAGE TO A FOUNDATION WALL

This foundation is crumbling. Failure to repair it will eventually lead to its collapse.

ters and downspouts shall be maintained in good repair and free from obstructions. Roof water shall not be discharged in a manner that creates a public nuisance.

- ❖ A secure, nonleaking roof is necessary to keep a building properly maintained. Even small leaks can cause thousands of dollars in damage to insulation, plaster, studs and joists. Roof leaks usually occur along valley areas, around plumbing vents, chimneys, dormers and other penetrations through the roof.

Water runoff should be diverted away from the structure to prevent damage to the foundation and other structural elements. Runoff must be diverted away from neighboring properties, public sidewalks, alleys and streets to prevent nuisance problems. Two problems that can result from improper water runoff are flooding of basements and standing water or ice buildup on sidewalks, alleys and streets. Drains, gutters and downspouts must be kept in working order so that water runoff is properly diverted.

304.8 Decorative features. Cornices, belt courses, corbels, terra cotta trim, wall facings and similar decorative features shall be maintained in good repair with proper anchorage and in a safe condition.

- ❖ Exterior decorative features require regular maintenance to prevent their deterioration and to keep them from falling from the building.

304.9 Overhang extensions. Overhang extensions including, but not limited to, canopies, marquees, signs, metal awnings, fire escapes, standpipes and exhaust ducts shall be maintained in good repair and be properly *anchored* so as to be kept in a sound condition. Where required, all exposed surfaces of metal or wood shall be protected from the elements and against decay or rust by periodic application of weather-coating materials, such as paint or similar surface treatment.

- ❖ Most problems related to overhang extensions, especially signs, marquees, fire escapes and awnings, are a result of deterioration at the points where they are anchored to the building. Anchorage points should be carefully inspected on a regular basis.

Fire escapes, standpipes and exhaust ducts serve the critical functions of providing proper exiting, fire protection and the removal of exhaust products. Regular maintenance is important for their continued compliance with the code.

304.10 Stairways, decks, porches and balconies. Every exterior stairway, deck, porch and balcony, and all appurtenances attached thereto, shall be maintained structurally sound, in good repair, with proper anchorage and capable of supporting the imposed loads.

- ❖ Regular maintenance is required to keep stairs, decks, porches and balconies in good repair so they do not become a hazard to occupants or visitors. Positive anchorage of elevated decks and exterior stairs that may be subject to collapse is especially important.

Although not mandated, the applicable building code could be consulted for the live loads that these elements are typically required to support.

304.11 Chimneys and towers. Chimneys, cooling towers, smoke stacks, and similar appurtenances shall be maintained structurally safe and sound, and in good repair. Exposed surfaces of metal or wood shall be protected from the elements and against decay or rust by periodic application of weather-coating materials, such as paint or similar surface treatment.

- ❖ Chimneys, towers of all types and other similar appurtenances are frequently ignored until they become nonfunctional or are in danger of collapse. Because of the corrosiveness of exhaust gases, chimneys and smokestacks often deteriorate on the inside first. The code official should examine chimneys and towers for excessive rust, loose or missing mortar and cracked or disintegrating bricks.

Occasionally, deterioration may prevent the chimney or smokestack from operating properly. Obstructed chimneys have resulted in numerous carbon monoxide deaths. If fuel-burning appliances vent into chimneys or smokestacks, the code official should see that the exhaust gases are being properly conveyed to the chimney, including the connection of the vent to the chimney.

Weather-coating materials may be applied periodically to reduce the effects of the elements on these items.

304.12 Handrails and guards. Every handrail and *guard* shall be firmly fastened and capable of supporting normally imposed loads and shall be maintained in good condition.

- ❖ This section provides for the safety and maintenance of handrails and guards.

304.13 Window, skylight and door frames. Every window, skylight, door and frame shall be kept in sound condition, good repair and weather tight.

- ❖ All windows, skylights and doors must be installed in their frames so that they are weather tight (i.e., able to prevent wind, rain or other elements from entering the structure). A workmanlike installation will provide appropriate protection while maintaining operational capability.

304.13.1 Glazing. Glazing materials shall be maintained free from cracks and holes.

- ❖ All glass is to be maintained without open cracks or holes, which can admit wind and moisture. Defective glass poses hazards to occupants.

304.13.2 Openable windows. Every window, other than a fixed window, shall be easily openable and capable of being held in position by window hardware.

- ❖ Windows that have broken or are missing hold-open hardware create a dual hazard.

First, windows without hardware are frequently propped open with sticks and other objects. These objects can be dislodged and cause the windows to fall, causing bodily injuries.

Second, in the event of a fire, occupants are at an increased risk if windows cannot be readily secured in an open position. People have died because of inop-

erable windows, even though they could have easily broken the windows and escaped. It is advisable for the code official to check windows to make sure they open properly and remain open with their own hardware.

304.14 Insect screens. During the period from [DATE] to [DATE], every door, window and other outside opening required for *ventilation* of habitable rooms, food preparation areas, food service areas or any areas where products to be included or utilized in food for human consumption are processed, manufactured, packaged or stored shall be supplied with *approved* tightly fitting screens of minimum 16 mesh per inch (16 mesh per 25 mm), and every screen door used for insect control shall have a self-closing device in good working condition.

Exception: Screens shall not be required where other *approved* means, such as air curtains or insect repellent fans, are employed.

- ❖ Screens reduce insect infestations. Communities are required to establish the number of months screens must be used on windows and doors to accommodate the time period that insects are active. Insect populations become dormant or die during the cold season; thus, screens would not be required during cold months.

The requirements for tight-fitting screens (not less than 16 mesh per 25 mm) in any food preparation, storage or service area are extremely important. Improper insect protection in these areas can lead to large-scale contamination of food supplies.

As indicated in the exception, air curtains, insect repellent fans or similar systems may be accepted. The code official must be sure that such a system is operational and employed whenever the doors and windows are open. Although permitted for any opening, these systems are useful for openings that are difficult to screen properly, such as out-swinging doors.

304.15 Doors. Exterior doors, door assemblies, operator systems if provided, and hardware shall be maintained in good condition. Locks at all entrances to dwelling units and sleeping units shall tightly secure the door. Locks on means of egress doors shall be in accordance with Section 702.3.

- ❖ All exterior doors, door assemblies, operator systems and hardware must properly perform their intended functions (e.g., open and close easily and keep out the elements). Locks must be readily released without keys, special knowledge or effort in accordance with Section 702.3. Security locks that comply with this requirement must function to secure the door as well. Malfunctioning or sticking locks that cannot secure the door may also impede egress because of difficulty in operation or release. The phrase "operator systems if provided" draws attention to automated doors. Maintaining the proper performance of the operator systems, where present, further assures proper egress will be maintained.

304.16 Basement hatchways. Every *basement* hatchway shall be maintained to prevent the entrance of rodents, rain and surface drainage water.

- ❖ Basement hatchways must prevent rain, water and rodents from entering the structure. When maintenance is ignored, wood members (including doors) decay, metal doors and latches rust and hinges break.

Drainage must be provided to prevent water from accumulating around hatchways and leaking inside the structure.

304.17 Guards for basement windows. Every *basement* window that is openable shall be supplied with rodent shields, storm windows or other *approved* protection against the entry of rodents.

- ❖ Basement windows are especially susceptible to the entry of the Norway rat, one of several rodents that frequently nest in the ground near structures. Ratproof shields, screens, storm windows or other protective materials must be installed on windows capable of being opened to eliminate their use as an entry point.

304.18 Building security. Doors, windows or hatchways for *dwelling units*, room units or *housekeeping units* shall be provided with devices designed to provide security for the *occupants* and property within.

- ❖ This section establishes criteria for providing security for occupants of dwelling units, rooming units and housekeeping units that are rented, leased or let.

304.18.1 Doors. Doors providing access to a *dwelling unit*, *rooming unit* or *housekeeping unit* that is rented, leased or let shall be equipped with a deadbolt lock designed to be readily openable from the side from which egress is to be made without the need for keys, special knowledge or effort and shall have a minimum lock throw of 1 inch (25 mm). Such deadbolt locks shall be installed according to the manufacturer's specifications and maintained in good working order. For the purpose of this section, a sliding bolt shall not be considered an acceptable deadbolt lock.

- ❖ Everyone has a right to feel safe in their own dwelling; therefore, the installation of locking hardware to secure entry doorways is essential. When installed for security purposes, however, locks and latches can intentionally prohibit the use of an egress door and thus interfere with or prevent the egress of occupants at the time of an emergency, such as a fire. The ability of occupants to easily egress a building in case of a fire or emergency situation is a primary concern to help prevent the loss of human life. Examples of special knowledge would be a combination lock or an unlocking device in an unknown, unexpected or hidden location. Special effort would require unusual and unexpected physical ability to unlock or make the door fully available for egress.

304.18.2 Windows. Operable windows located in whole or in part within 6 feet (1828 mm) above ground level or a walking surface below that provide access to a *dwelling unit*, *rooming*

unit or *housekeeping unit* that is rented, leased or let shall be equipped with a window sash locking device.

- ❖ In order to coordinate the provisions of the code with the U.S. Housing and Urban Development Department (HUD) housing quality standard requirements for rental properties, a height requirement of 6 feet (1827 mm) above the ground was established for windows. This could be considered a security concern, thus dictating the need for window locks.

304.18.3 Basement hatchways. *Basement hatchways* that provide access to a *dwelling unit*, *rooming unit* or *housekeeping unit* that is rented, leased or let shall be equipped with devices that secure the units from unauthorized entry.

- ❖ Windows to basements are equally problematic from a security point of view and, therefore, need to be equipped with locking devices to provide security for the units.

304.19 Gates. Exterior gates, gate assemblies, operator systems if provided, and hardware shall be maintained in good condition. Latches at all entrances shall tightly secure the gates.

- ❖ Similar to Section 304.15 addressing doors, all gate assemblies, operator systems and hardware must be maintained to perform their intended functions (i.e., open and close as intended). Malfunctioning or sticking latches that cannot secure the gate may also impede egress because of difficulty in operation or release. The phrase “operator systems if provided” draws attention to automated doors. Maintaining the proper performance of the operator systems, where present, further assures proper egress will be maintained.

SECTION 305 INTERIOR STRUCTURE

305.1 General. The interior of a structure and equipment therein shall be maintained in good repair, structurally sound and in a sanitary condition. *Occupants* shall keep that part of the structure that they occupy or control in a clean and sanitary condition. Every *owner* of a structure containing a *rooming house*, *housekeeping units*, a hotel, a dormitory, two or more *dwelling units* or two or more nonresidential occupancies, shall maintain, in a clean and sanitary condition, the shared or public areas of the structure and *exterior property*.

- ❖ The interior of a structure and its equipment must be maintained so as not to adversely affect the occupants' health and safety. A structure must protect occupants from the exterior environment.

305.1.1 Unsafe conditions. The following conditions shall be determined as unsafe and shall be repaired or replaced to comply with the *International Building Code* or the *International Existing Building Code* as required for existing buildings:

1. The nominal strength of any structural member is exceeded by nominal loads, the load effects or the required strength;

2. The anchorage of the floor or roof to walls or columns, and of walls and columns to foundations is not capable of resisting all nominal loads or load effects;
3. Structures or components thereof that have reached their limit state;
4. Structural members are incapable of supporting nominal loads and load effects;
5. Stairs, landings, balconies and all similar walking surfaces, including *guards* and handrails, are not structurally sound, not properly *anchored* or are *anchored* with connections not capable of supporting all nominal loads and resisting all load effects;
6. Foundation systems that are not firmly supported by footings are not plumb and free from open cracks and breaks, are not properly *anchored* or are not capable of supporting all nominal loads and resisting all load effects.

Exceptions:

1. Where substantiated otherwise by an *approved* method.
 2. Demolition of unsafe conditions shall be permitted when *approved* by the *code official*.
- ❖ Section 305.1.1 describes unsafe conditions related to the interior of the structure, and thus details situations which can prompt the code official to require replacement or repair.

Item 1 indicates that if the strength of the structural member is exceeded by either the nominal loads or load effects, the condition is to be regarded as unsafe. Nominal strength and load effects, as defined by the IBC and Items 2–6 of this section, are when a structure or component is regarded as incapable of performing its intended function and thus becomes unsafe.

Item 2 deals with required strength of connections between structural members. More specifically, each connection must be able to resist nominal loads and load effects; otherwise, the building or affected portion thereof is to be regarded as unsafe. Anchorage of various elements of a structure is essential to its stability. When anchorage is not capable of transferring the intended loads, the structure or component is said to be unsafe.

Item 3 specifies that any condition beyond which a structure or member becomes unfit for service and is no longer useful for its intended function is considered to be unsafe. This includes its serviceability limit and strength limit state. “Limit state,” as defined by the IBC, is a condition beyond which a structure or member becomes unfit for service and is no longer useful for its intended function (serviceability limit state) or to be unsafe (strength limit state). Any structure reaching this state is said to be unsafe.

Items 4 through 6: The interior of a building may contain other structural elements as well. These items, which include stairs, walking surfaces, handrails and guards, are specifically denoted as essential structural elements that must be preserved to allow for safe means of egress and protection.

Item 4 addresses structural members that have become unable to support the intended loads.

Item 5 addresses interior stairs, decks, porches, balconies and all similar elements that are portions of a means of egress system and as such represent a significant safety concern if left in an unsafe condition. Should any of these elements of a means of egress system become structurally unsound, the building or portions thereof may be regarded as unsafe.

Item 6 addresses foundation systems. Foundation systems are essential to the structural integrity of any building. If any portion of any foundation system is not supported by adequate soil, is not plumb as intended to distribute the loads, has cracks or breaks or is inadequately anchored, the building may be regarded as unsafe.

Exception 1 is to recognize that a qualified entity could substantiate an alternative method or material that meets the purpose and intent of the code. This alternative would need to be approved by the code official. An engineering study that substantiates the structural integrity in a rational analysis may be the basis for accepting a contention that the building is not unsafe.

Exception 2 allows a building owner the option of demolition of an unsafe condition subject to the code official's approval. If the building or structure or portion thereof is demolished, and does not exist, the condition is considered to be resolved.

305.2 Structural members. Structural members shall be maintained structurally sound, and be capable of supporting the imposed loads.

- ❖ Improper original construction, unapproved additions and repairs, water damage, deferred maintenance and overloading of structural members will result in structural damage and failure.

Common construction and repair defects include: undersized structural members that, over time, sag, crack and even collapse; inadequately fastened structural members that loosen and separate from each other; poor-quality construction materials; improperly installed or oversized notches and holes in structural members and poorly installed structural members.

Water is one of the most destructive elements to structures. Water damage most frequently occurs from roof leaks, plumbing leaks in bathrooms and kitchens, and water penetration into basements and crawl spaces. Unrepaired leaks can rot and decay structural members. Areas of concern include the bottom of columns, the outside ends of beams and joists, flooring under bathrooms and kitchens and the underside of roofs. Check all of these for evidence of water penetration and damage.

Deferred maintenance is a problem with all buildings. A structure begins to deteriorate the moment it is completed. Both outside and inside factors affect structures—water, sun and wind on the outside, and furniture, equipment and occupants on the inside. As equipment wears out or malfunctions, it needs to be repaired or replaced.

Structural members must be able to bear the loads imposed upon them. Commercial and industrial buildings present special concerns for the code official. To provide some level of confidence that a structure will safely withstand the anticipated loads, the code official may want to require the owner to provide evidence of the load-bearing capacity of the structure, as determined by a registered architect or engineer.

This information may be useful every time a structure changes occupancy. The code official cannot be sure structural changes have not occurred since the previous calculations were prepared.

305.3 Interior surfaces. Interior surfaces, including windows and doors, shall be maintained in good, clean and sanitary condition. Peeling, chipping, flaking or abraded paint shall be repaired, removed or covered. Cracked or loose plaster, decayed wood and other defective surface conditions shall be corrected.

- ❖ Interior surface damage is frequently the result of tenant abuse or water damage. Water damage results from leaking roofs, plumbing fixtures and water pipes, and also damaged or open windows and doors that permit rain to enter. Any damaged interior surfaces are required to be repaired and the cause of the damage must be corrected.

Interior surfaces that contain lead-based paint may present serious health hazards to occupants, especially children. Lead is a toxic heavy metal that enters the body by inhalation or ingestion of fine particulate. Lead affects many organs as well as the central nervous system, and is particularly toxic to young children because it retards brain and central nervous system development.

HUD estimates that three-quarters of the dwellings built before 1980 contain some lead-based paint. Because the amount of lead in paint was gradually reduced during the 30 years prior to its prohibition in general application in 1978 (lead-based paint is currently produced for specialized industrial applications), dwellings built before 1950 are more likely to contain lead-based paint and paint with higher concentrations of lead. HUD surveys show that 90 percent of dwellings built before 1940, 80 percent of dwellings built between 1940 and 1959 and 62 percent of dwellings built between 1960 and 1979 contain lead-based paint. Lead-based paint is often found under newer layers of paint that is not lead based.

Intact lead-based paint is not an immediate hazard because the predominant route of lead poisoning is through ingestion or inhalation of fine lead particulate found in contaminated dust. The risk of poisoning becomes significant when lead-based paint contaminates dust through peeling, chipping, flaking and abraded conditions identified in the code. Lead contamination may also be caused by lead-based paint that is disturbed during repair and remodeling activities such as scraping, sanding, drilling and cutting.

Lead hazard control is achieved by removing lead-contaminated dust and eliminating the source of contamination. The determination of the type of activities

(abatement, interim controls or repair) needed to correct hazardous conditions depends on the extent of paint deterioration and the occupancy. More protective measures should be taken if children under 6 years of age are likely to occupy the building because they are more sensitive to lead contamination. All activities that disturb lead-based paint can generate significant lead hazards. Precautions should be initiated to protect workers, occupants and the environment. Precautions include selection of procedures that minimize the creation of dust [such as wet sanding, wet scraping, power tools with high-efficiency particulate air (HEPA) filtered vacuum attachments and heat guns less than 1,100°F (593°C)]; containment of dust and debris; covering and securing horizontal surfaces, occupants' furniture and fixtures (if exterior work, the ground and plants) with polyethylene to prevent contamination; thorough cleaning with HEPA-filtered vacuum and detergent; and clearance testing to prove lead concentrations are below hazardous levels before occupancy.

Federal regulations recognize two levels of lead-specific hazard control measures—abatement and interim controls. Abatement is defined as measures designed to last more than 20 years, while less durable measures are considered interim controls. Environmental Protection Agency (EPA) regulations or state regulations approved by the EPA require workers and supervisors to be trained and certified to undertake activities specifically intended to abate or control lead-based paint hazards. The same activities that are undertaken as specific lead abatement or interim controls (demolition, paint removal, door or window replacement, etc.) may be undertaken by non-certified workers and supervisors if they are a part of general repair and remodeling activities.

More detailed information on lead hazard evaluation and control is available from state and local agencies, the National Lead Information Center (800-424-5323) sponsored by the EPA and the HUD Office of Lead Hazard Control. The code official can help protect public health and safety by coordinating code enforcement with enforcement of lead regulations and providing lead hazard awareness and hazard control information to contractors and property owners.

305.4 Stairs and walking surfaces. Every stair, ramp, landing, balcony, porch, deck or other walking surface shall be maintained in sound condition and good repair.

❖ Handrails, treads and risers must be structurally sound, firmly attached to the structure and properly maintained to safely perform their intended functions. All parts of a stair also should be inspected, including stringers, risers, treads, balusters, guards and handrails, and also all walking surfaces such as floors, landings, decks or ramps.

305.5 Handrails and guards. Every handrail and guard shall be firmly fastened and capable of supporting normally imposed loads and shall be maintained in good condition.

❖ This section provides for the safety and maintenance of handrails and guards. Although not mandated,

loads for handrails and guards in the applicable building code can be considered the normally imposed loads.

305.6 Interior doors. Every interior door shall fit reasonably well within its frame and shall be capable of being opened and closed by being properly and securely attached to jambs, headers or tracks as intended by the manufacturer of the attachment hardware.

❖ The ability of a door to function as the manufacturer intended is one of the key elements in being able to properly exit a building. In addition to contributing to building egress, doors are also key elements in providing for security and privacy; therefore, all interior doors should be kept in a state of repair that will allow them to function effectively.

SECTION 306 COMPONENT SERVICEABILITY

306.1 General. The components of a structure and equipment therein shall be maintained in good repair, structurally sound and in a sanitary condition.

❖ Section 306.1 contains a general provision for components and equipment related to a structure to be maintained in sound and sanitary condition, which is the spirit and intent of this code.

306.1.1 Unsafe conditions. Where any of the following conditions cause the component or system to be beyond its limit state, the component or system shall be determined as unsafe and shall be repaired or replaced to comply with the *International Building Code* or the *International Existing Building Code* as required for existing buildings:

1. Soils that have been subjected to any of the following conditions:
 - 1.1. Collapse of footing or foundation system;
 - 1.2. Damage to footing, foundation, concrete or other structural element due to soil expansion;
 - 1.3. Adverse effects to the design strength of footing, foundation, concrete or other structural element due to a chemical reaction from the soil;
 - 1.4. Inadequate soil as determined by a geotechnical investigation;
 - 1.5. Where the allowable bearing capacity of the soil is in doubt; or
 - 1.6. Adverse effects to the footing, foundation, concrete or other structural element due to the ground water table.
2. Concrete that has been subjected to any of the following conditions:
 - 2.1. *Deterioration*;
 - 2.2. *Ultimate deformation*;
 - 2.3. Fractures;
 - 2.4. Fissures;
 - 2.5. Spalling;

- 2.6. Exposed reinforcement; or
- 2.7. *Detached*, dislodged or failing connections.
3. Aluminum that has been subjected to any of the following conditions:
 - 3.1. *Deterioration*;
 - 3.2. Corrosion;
 - 3.3. Elastic deformation;
 - 3.4. *Ultimate deformation*;
 - 3.5. Stress or strain cracks;
 - 3.6. Joint fatigue; or
 - 3.7. *Detached*, dislodged or failing connections.
4. Masonry that has been subjected to any of the following conditions:
 - 4.1. *Deterioration*;
 - 4.2. *Ultimate deformation*;
 - 4.3. Fractures in masonry or mortar joints;
 - 4.4. Fissures in masonry or mortar joints;
 - 4.5. Spalling;
 - 4.6. Exposed reinforcement; or
 - 4.7. *Detached*, dislodged or failing connections.
5. Steel that has been subjected to any of the following conditions:
 - 5.1. *Deterioration*;
 - 5.2. Elastic deformation;
 - 5.3. *Ultimate deformation*;
 - 5.4. Metal fatigue; or
 - 5.5. *Detached*, dislodged or failing connections.
6. Wood that has been subjected to any of the following conditions:
 - 6.1. *Ultimate deformation*;
 - 6.2. *Deterioration*;
 - 6.3. Damage from insects, rodents and other vermin;
 - 6.4. Fire damage beyond charring;
 - 6.5. Significant splits and checks;
 - 6.6. Horizontal shear cracks;
 - 6.7. Vertical shear cracks;
 - 6.8. Inadequate support;
 - 6.9. *Detached*, dislodged or failing connections; or
 - 6.10. Excessive cutting and notching.

Exceptions:

1. Where substantiated otherwise by an *approved* method.
 2. Demolition of unsafe conditions shall be permitted where *approved* by the *code official*.
- ❖ In order to analyze all of the elements of a building, this section ensures that each component of a building

must meet its intended purpose or the building (or portion thereof) can be regarded as unsafe. This provision specifies that each material (such as soil, concrete, masonry, wood, steel, etc.) used to create a building or structure must continue to be viable.

Item 1 delineates some conditions of soil or foundation stability that denote unsafe conditions. Any of these allow the code official to determine that an unsafe condition exists.

Items 2 through 6 delineate some conditions that, if present in structural elements, are sufficient to determine that an unsafe condition exists.

SECTION 307 HANDRAILS AND GUARDRAILS

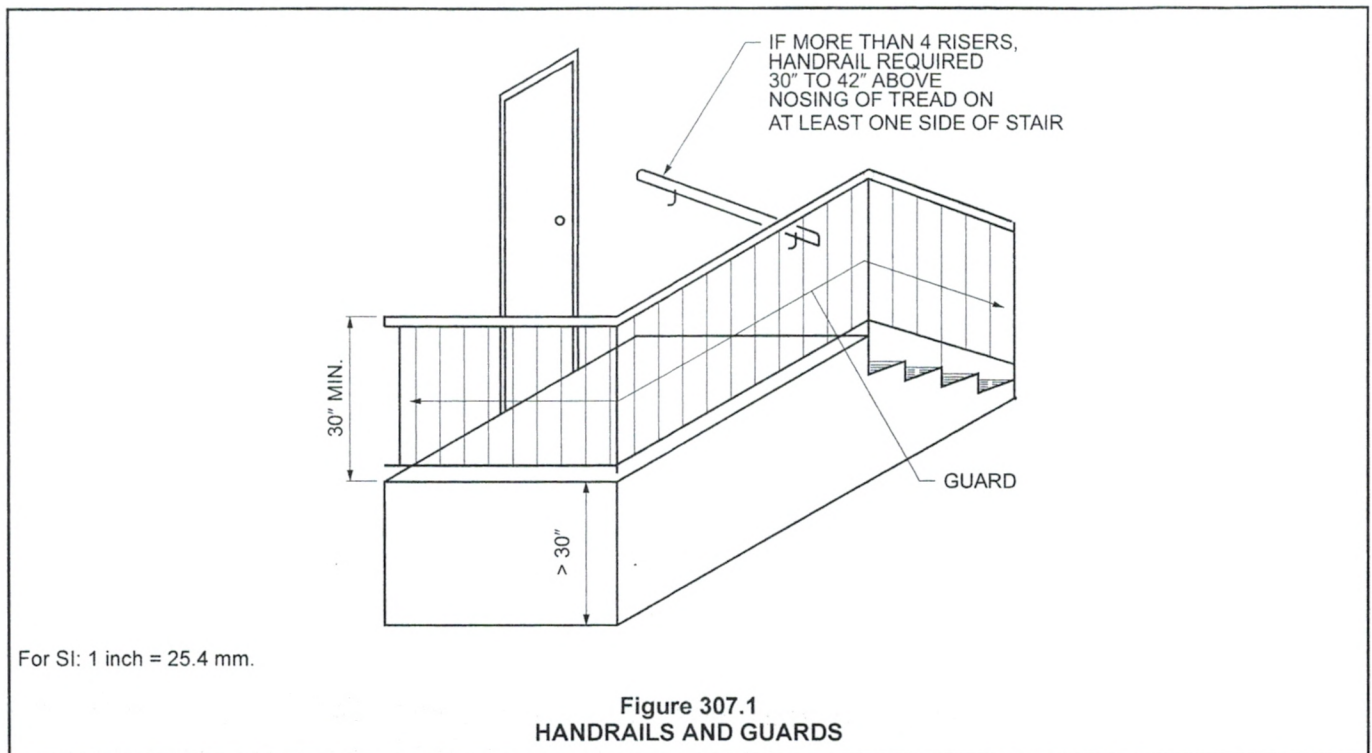
307.1 General. Every exterior and interior flight of stairs having more than four risers shall have a handrail on one side of the stair and every open portion of a stair, landing, balcony, porch, deck, ramp or other walking surface that is more than 30 inches (762 mm) above the floor or grade below shall have *guards*. Handrails shall be not less than 30 inches (762 mm) in height or more than 42 inches (1067 mm) in height measured vertically above the nosing of the tread or above the finished floor of the landing or walking surfaces. *Guards* shall be not less than 30 inches (762 mm) in height above the floor of the landing, balcony, porch, deck, or ramp or other walking surface.

Exception: *Guards* shall not be required where exempted by the adopted building code.

- ❖ Note that this section does not discuss maintenance requirements for handrails and guards. It contains requirements for handrail and guard installations at specific locations in all existing buildings. If these locations are present at an existing building, then the minimum handrail and guard requirements are mandated. Handrails are required on at least one side of all means of egress stairs more than four risers in height. Handrails can neither be less than 30 inches (762 mm) nor more than 42 inches (1067 mm) above the nosing of the tread (see Commentary Figure 307.1).

Guards are required on the open side of all uneven walking surfaces greater than 30 inches (762 mm) in height that include stairs, landings, balconies, porches, decks or ramps. The guard must be at least 30 inches (762 mm) above the floor in all cases. Guards are to contain intermediate rails, balusters or other construction to reduce the chance of an adult or child from falling through the guard. If the guard is missing some intermediate rails or balustrades, it is recommended that it be repaired to its original condition if it will provide protection equivalent to that when originally constructed.

The exception refers to the building code currently adopted by the jurisdiction. If the current adopted building code would not require a guard for a particular location in a new building, then a guard would not be required in accordance with this exception.



SECTION 308 RUBBISH AND GARBAGE

308.1 Accumulation of rubbish or garbage. *Exterior property and premises*, and the interior of every structure, shall be free from any accumulation of *rubbish* or garbage.

❖ Insanitary houses are found in almost every community. The code official may frequently find conditions where occupants fail to properly store and remove their garbage and refuse. Occasionally, the conditions may be so bad that he or she must condemn the structure as unfit for human occupancy in accordance with Section 108.1.3. Emotional, physical and mental problems may be contributing factors. The code official may have to work with health officials, social workers, child protection workers and a host of other social service agencies to obtain a solution to the problem.

Improperly stored garbage and rubbish in public halls and stairways may result in insect and rodent infestations, trip hazards and accidental fires. More importantly, improper storage creates a hazard when the exit must be used in an emergency, such as a fire.

308.2 Disposal of rubbish. Every *occupant* of a structure shall dispose of all *rubbish* in a clean and sanitary manner by placing such *rubbish* in *approved* containers.

❖ Rubbish includes all waste materials except garbage. Occupants are responsible for disposing of their own rubbish in proper containers. Three frequent causes for improper rubbish disposal are:

- The occupants are careless—rubbish is stacked and stored in a haphazard fashion.
- Insufficient containers are provided to handle rubbish.

- The rubbish is not being picked up frequently enough to eliminate the volume being created.

The code official should work with occupants and owners to determine the cause of the problem and then order the owners or occupants to take the appropriate action to resolve it.

308.2.1 Rubbish storage facilities. The *owner* of every occupied *premises* shall supply *approved* covered containers for *rubbish*, and the *owner* of the *premises* shall be responsible for the removal of *rubbish*.

❖ The owner is responsible for the removal of all rubbish. This provision is helpful as an enforcement tool. It eliminates confusion as to whether the tenant, the operator or the owner is responsible.

308.2.2 Refrigerators. Refrigerators and similar equipment not in operation shall not be discarded, abandoned or stored on *premises* without first removing the doors.

❖ Discarded refrigerators pose an attractive nuisance to children. Children often climb into the refrigerator and close the door afterward to create a hiding place. Due to the risk of suffocation from being trapped in the refrigerator, the doors must be removed before it is considered safe to keep it during periods of storage or to properly dispose of the unit.

308.3 Disposal of garbage. Every *occupant* of a structure shall dispose of garbage in a clean and sanitary manner by placing such garbage in an *approved* garbage disposal facility or *approved* garbage containers.

❖ Garbage is the animal and vegetable waste created from the preparation and consumption of food. Occupants are responsible for properly disposing of their garbage by either using a garbage disposal (if avail-

able) or by placing the waste in approved garbage storage containers.

Improper disposal of garbage can attract rodents, insects, animals and vermin, produce noxious odors and create potential health problems. Similar to rubbish disposal, garbage disposal problems can be the result of:

- Careless disposal (not properly wrapped or stored) by the occupants.
- Insufficient containers to handle the regular amount of garbage.
- Garbage not being picked up frequently enough.
- The mechanical garbage disposal not operating.

The health consequences to the occupants and the neighborhood are probably more severe with garbage than rubbish; therefore, the code official must promptly order the correction of this problem and require an ongoing program of garbage disposal.

308.3.1 Garbage facilities. The *owner* of every dwelling shall supply one of the following: an *approved* mechanical food waste grinder in each *dwelling unit*; an *approved* incinerator unit in the structure available to the *occupants* in each *dwelling unit*; or an *approved* leakproof, covered, outside garbage container.

- ❖ The owner of any dwelling must provide a mechanical garbage disposal, an approved incinerator or enough containers to hold all garbage produced.

The storage of garbage in plastic bags is not allowed. Animals, rodents and vermin can easily open such bags and spread the garbage stored in them. Garbage containers are to be placed outside of the dwelling unit and be constructed of material that is resistant to animals and rodents. The garbage containers are to be covered with lids.

308.3.2 Containers. The *operator* of every establishment producing garbage shall provide, and at all times cause to be utilized, *approved* leakproof containers provided with close-fitting covers for the storage of such materials until removed from the *premises* for disposal.

- ❖ The operators of restaurants and similar establishments that produce garbage are required to provide sufficient numbers of containers to store the garbage properly until such time that it is removed from the premises.

Improper storage of animal and vegetable wastes produces noxious odors and permits rodents and other vermin access to the garbage. It also creates potential health problems.

SECTION 309 PEST ELIMINATION

309.1 Infestation. Structures shall be kept free from insect and rodent *infestation*. Structures in which insects or rodents are found shall be promptly exterminated by *approved* processes that will not be injurious to human health. After pest

elimination, proper precautions shall be taken to prevent reinfestation.

- ❖ There are two basic types of insect infestations: nuisance and wood destroying. Nuisance insects include flies, fleas, bees, cockroaches and silverfish. Wood-destroying insects include termites, powder-post beetles and carpenter ants.

Nuisance insects are usually found near food sources and in damp areas.

Wood-destroying insects are sometimes difficult to find. The code official or a professional exterminator may probe wood members for evidence of infestation. Concrete in contact with the soil should be visually checked for evidence of termite tubes leading from the soil to wood members. Wood infested with powder-post beetles frequently has the appearance of having been penetrated by shotgun pellets. A large powder-post beetle infestation leaves many small holes in the wood. Additionally, active beetles leave a fine wood powder called "frass" on the wood.

Eliminating nuisance insects may require treating the building with insect spray on a regular basis. Eliminating wood-destroying insects may require poisoning the soil around the building. Severe insect infestations may necessitate replacement of structural members.

Evidence of a rodent infestation can include droppings, gnaw marks and oily rub stains (imprints left where the rodent's body rubbed against the structure). Such infestations should be ordered exterminated. Additionally, corrective measures must be taken to reduce the possibility of a reinfestation.

309.2 Owner. The *owner* of any structure shall be responsible for pest elimination within the structure prior to renting or leasing the structure.

- ❖ The owner must eliminate all rodents and insects before a building or portion of a building can be rented or leased. Although it would appear easy to enforce this provision, the reality is that a new occupant may not notice any insect or rodent problems until after the building has been occupied. It may be difficult and even impossible to determine if an infestation existed before the new occupants moved in. One practical way to resolve this problem is to require the owner to have the building inspected for infestations before occupancy.

309.3 Single occupant. The *occupant* of a one-family dwelling or of a single-tenant nonresidential structure shall be responsible for pest elimination on the *premises*.

- ❖ In a single-family dwelling or a single-tenant nonresidential unit, the occupant of the unit—not the owner—is responsible for maintaining the property free of infestation. Accordingly, the code official should cite the occupant for rodent or insect infestations.

309.4 Multiple occupancy. The *owner* of a structure containing two or more *dwelling units*, a multiple *occupancy*, a *rooming house* or a nonresidential structure shall be responsible for pest elimination in the public or shared areas of the

structure and *exterior property*. If *infestation* is caused by failure of an *occupant* to prevent such *infestation* in the area occupied, the *occupant* and *owner* shall be responsible for pest elimination.

- ❖ The owners of public or shared areas in multiunit residential and nonresidential buildings must eliminate rodents and insects from the public or shared areas of the structure and exterior property. If a single unit in one of these buildings is infested, it is the owner and occupant's responsibility to provide for the extermination.

309.5 Occupant. The *occupant* of any structure shall be responsible for the continued rodent and pest-free condition of the structure.

Exception: Where the *infestations* are caused by defects in the structure, the *owner* shall be responsible for pest elimination.

- ❖ Occupants must maintain their units in a clean and sanitary manner, free of rodents. If the occupants fail to maintain their unit, then they are responsible for all pest elimination costs.

From a practical point of view, this section is difficult to enforce. Occupants who are going to be charged pest elimination fees may move out before paying such a fee. Unfortunately, once the unit is vacant the owner becomes responsible for the pest elimination. Because the owner is responsible for correcting any defects in the structure (see Section 301.2), he or she is then responsible for any infestation caused by these defects.

Bibliography

The following resource materials were used in the preparation of the commentary for this chapter of the code:

IBC-2015, *International Building Code*. Washington, D.C.: International Code Council, 2014.

IRC-2015, *International Residential Code*. Washington, D.C.: International Code Council, 2014.

Chapter 4:

Light, Ventilation and Occupancy Limitations

General Comments

Chapter 4 establishes the minimum criteria for light and ventilation and identifies occupancy limitations.

Section 401 outlines the scope of Chapter 4 (i.e., minimum light, ventilation and space requirements). This section also establishes who is responsible for complying with the provisions of the chapter, permits alternative arrangements of windows and other devices to comply with the requirements for light and ventilation and prohibits certain room arrangements and occupancy uses.

Requirements for light, ventilation and space have not always been incorporated in construction and occupancy codes. In the United States, one of the first attempts to establish criteria for light and ventilation occurred with the passage of the 1867 Tenement Housing Act in New York City. A principal feature of the act required sleeping rooms to communicate directly with external air, or to have a ventilating window or transom connected to a neighboring room or hall.

In 1879, New York City passed a second Tenement Housing Act, which expanded the light and ventilation requirements of the 1867 law by mandating that windows have an opening of at least 12 square feet (1.1 m²) in every room. Finally, New York City passed the Tenement Housing Act of 1901, which required owners to provide additional lighting and ventilation to all tenements. Many other provisions also contributed to the health, safety and welfare of the occupants.

Light, ventilation and space requirements relate to basic human needs. In its Basic Principles of Healthful Housing, the Committee on the Hygiene of Housing of the American Public Health Association (APHA) established several principles regarding the relationship of housing to health. These basic principles include several that relate specifically to the need for adequate light, ventilation and space, including physiological needs, psychological needs and protection against disease and accidents:

Fundamental physiological needs:

- An atmosphere of reasonable chemical purity (proper ventilation removes chemicals from the home and work environment).
- Adequate daylight illumination and avoidance of undue daylight glare.
- Direct sunlight (the sun's rays assist in killing germs).
- Adequate artificial illumination and avoidance of glare.

- Adequate space for exercise and for the play of children.

Fundamental psychological needs:

- Adequate privacy for the individual.
- Facilities that make possible the performance of household tasks without undue physical and mental fatigue (adequate space and sufficient ceiling heights reduce physical and mental fatigue).
- Protection against contagion.
- Sufficient space in sleeping rooms to minimize the danger of contact infection.

Protection against accidents:

- Adequate facilities for escape in case of fire.

Protection against overcrowding:

- Population controls can maintain neighborhood density, which can avoid overtaxing public facilities such as parks and schools, and avoid accelerated wear of dwellings.

Habitable rooms require adequate light to assist occupants in providing for proper cleanliness and sanitation, and to reduce trip hazards. Well-lighted rooms have a positive impact on mental health, while dark, dingy rooms can have the opposite effect.

Ventilation is defined as "the natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space." Ventilating air into a space serves three functions:

- Combustion and makeup air for fuel-burning appliances is provided.
- Air being exhausted from the building through mechanical or natural means is replaced.
- Air movement within the structure is enhanced.

Ventilation air exhausting from a structure also serves three functions:

- Excess moisture is eliminated.
- Unpleasant odors, toxic fumes, dirt, dust and other particulate matter are removed.
- Air movement within the structure is enhanced.

Oversized or improperly installed mechanical ventilation can cause fuel-burning appliances to backdraft into the structure and may cause toxic materials to be exhausted into inappropriate locations.

Adequate space provides for the physical and mental health of occupants. Crowded conditions have a negative impact on occupants by preventing easy movement

throughout the dwelling. Crowded conditions may also lead to accidents and injuries. Additionally, occupants are subjected to an increase in the spread of disease and germs through sneezing and coughing.

Overcrowding may also have a negative effect on mental health.

SECTION 401 GENERAL

401.1 Scope. The provisions of this chapter shall govern the minimum conditions and standards for light, *ventilation* and space for occupying a structure.

❖ Buildings must comply with minimum criteria and conditions for light, ventilation and space. Specific requirements are outlined in this chapter.

401.2 Responsibility. The *owner* of the structure shall provide and maintain light, *ventilation* and space conditions in compliance with these requirements. A person shall not occupy as *owner-occupant*, or permit another person to occupy, any *premises* that do not comply with the requirements of this chapter.

❖ The owner is responsible for complying with all light, ventilation and space requirements established in this chapter. A noncomplying structure cannot be occupied until it is brought into compliance with the criteria.

401.3 Alternative devices. In lieu of the means for natural light and *ventilation* herein prescribed, artificial light or mechanical *ventilation* complying with the *International Building Code* shall be permitted.

❖ Light and ventilation by artificial methods are permitted, such as electric lighting instead of natural light and mechanical ventilation instead of natural ventilation. Electric lighting is permitted to replace the natural light requirements of Section 402. Mechanical ventilation is permitted to replace the natural ventilation requirements of Section 403. Any alternative method approved by the code official must also comply with the installation and performance requirements of the building code.

SECTION 402 LIGHT

402.1 Habitable spaces. Every *habitable space* shall have not less than one window of *approved* size facing directly to the outdoors or to a court. The minimum total glazed area for every *habitable space* shall be 8 percent of the floor area of such room. Wherever walls or other portions of a structure face a window of any room and such obstructions are located less than 3 feet (914 mm) from the window and extend to a level above that of the ceiling of the room, such window shall not be deemed to face directly to the outdoors nor to a court and shall not be included as contributing to the required minimum total window area for the room.

Purpose

Minimum light, ventilation and space requirements are based on the physiological and psychological impact of these factors on building occupants. The purpose of Chapter 4 is to set forth these requirements in the code and to establish the minimum environment for occupiable and habitable buildings.

Exception: Where natural light for rooms or spaces without exterior glazing areas is provided through an adjoining room, the unobstructed opening to the adjoining room shall be not less than 8 percent of the floor area of the interior room or space, but a minimum of 25 square feet (2.33 m²). The exterior glazing area shall be based on the total floor area being served.

❖ "Habitable space" is defined in Chapter 2. Habitable spaces are those spaces that are normally considered "inhabited" in the course of residential living and provide the four basic characteristics of living, sleeping, eating and cooking. Other spaces, such as halls or utility rooms, are not considered habitable, but would in many instances be considered occupiable.

As stated in Section 401.3, the natural lighting requirements of this section are not required if artificial light is provided. Electric lighting is almost always provided. Where electric lighting is provided instead of natural lighting, the code official must rely on a light meter to assess whether the illumination provided meets the criteria in the referenced building code.

All habitable spaces must have one or more windows and the total glazed area must equal at least 8 percent of the floor area of the room served [see Commentary Figure 402.1(1)].

Windows must face directly to the outdoors or to a court. Any window that faces a wall or other obstruction that is less than 3 feet (914 mm) from the window and higher than the ceiling of the room cannot be included in calculating the minimum total window area needed for the room it serves [see Commentary Figure 402.1(2)].

The exception addresses a case where a space (or room) has no glazed area open to the required courts or yards but is adjacent to one that does. The internal room may "borrow" natural lighting from the adjacent space if the opening in the wall between the two spaces is at least 8 percent of the floor area of the interior room but not less than 25 square feet (2.3 m²). The required glazed area facing the required court or yard is to be based on the total floor area of all rooms served [see Commentary Figure 402.1(3)].

In Commentary Figure 402.1(3), the glazed area opening onto a court or yard in the space provided with the openings must be greater than 8 percent of the total floor areas served; therefore, in Commentary Figure 402.1(3), the glazed area in Space B is required to be equal to or greater than 0.08 (floor area of Space A + floor area of Space B).

The next step is to require the opening between the adjacent spaces to be a minimum of 25 square feet (2.3 m²), but not less than 0.08 multiplied by the floor area of Space A.

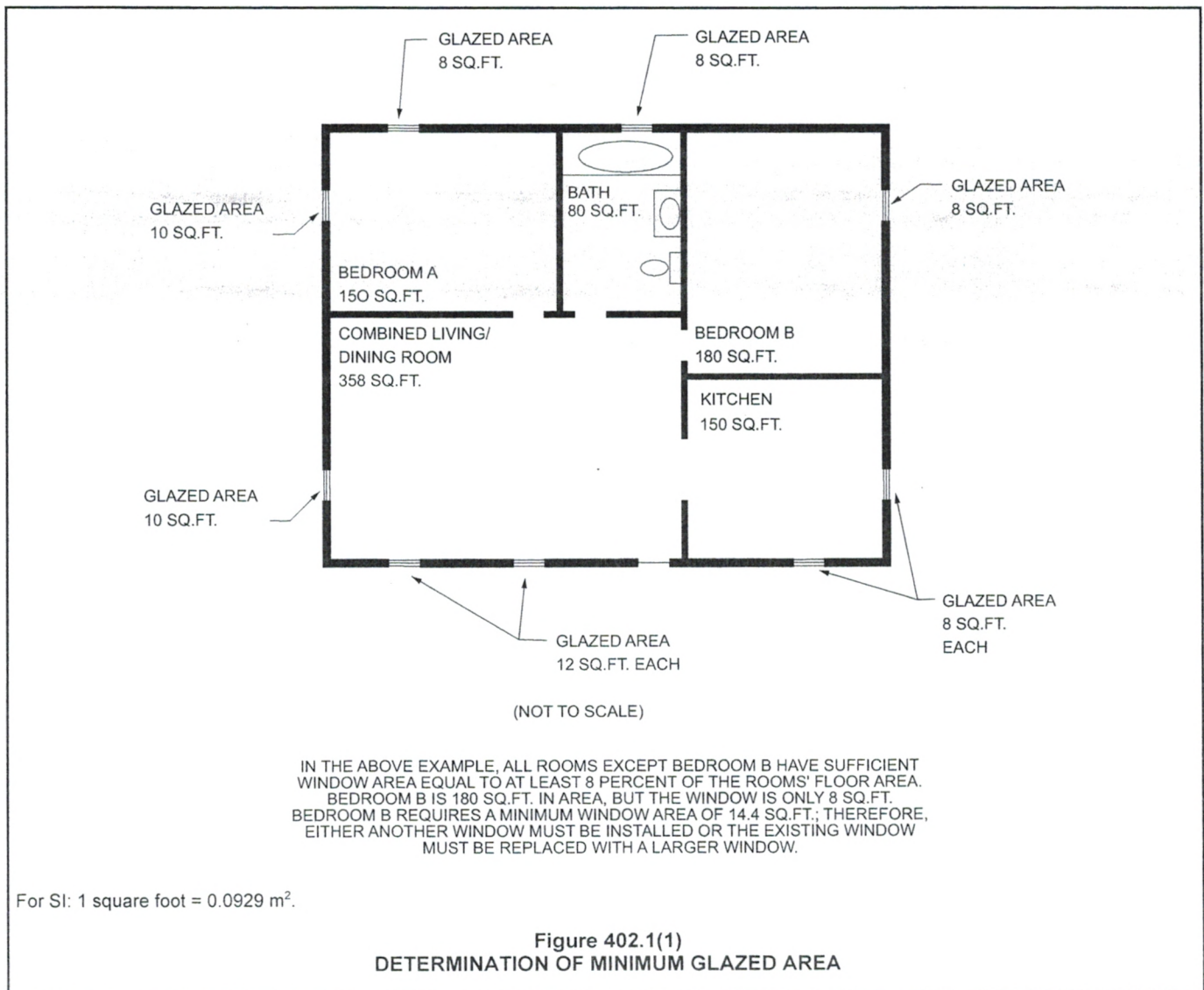
402.2 Common halls and stairways. Every common hall and stairway in residential occupancies, other than in one- and two-family dwellings, shall be lighted at all times with not less than a 60-watt standard incandescent light bulb for each 200 square feet (19 m²) of floor area or equivalent illumination, provided that the spacing between lights shall not be greater than 30 feet (9144 mm). In other than residential occupancies, means of egress, including exterior means of egress, stairways shall be illuminated at all times the building space served by the means of egress is occupied with not less than 1 footcandle (11 lux) at floors, landings and treads.

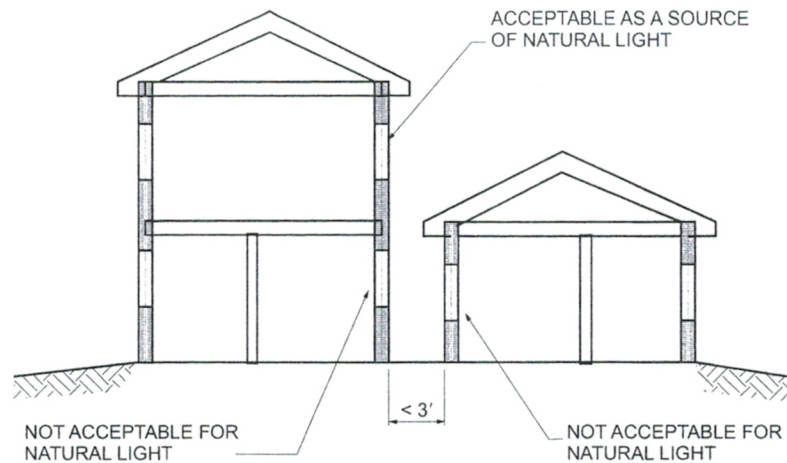
❖ The intent of this section is to establish a minimum level of lighting in common halls and stairs of residential occupancies, such as apartment buildings. Adequate lighting in hallways and stairs is essential for safe exiting in a fire emergency, reduces the chance of

injury due to falls during normal use and helps deter crime.

This section contains a prescriptive requirement [60-watt lightbulbs for every 200 square feet (19 m²)] for ease of application and enforcement (see Commentary Figure 402.2). It assumes a typical ceiling height of no more than 10 feet (3048 mm). Equivalent illumination by means other than 60-watt incandescent bulbs is explicitly permitted, and the code official would establish equivalency by judgment or by actually measuring with a light meter. This lighting is required to be provided at all times, since residential buildings are typically occupied at all times.

In all occupancy groups other than residential, a lower, minimum level of lighting [1 footcandle (11 lux)] is required at all times when the building is occupied. The [1 footcandle (11 lux)] threshold is consistent with the *International Fire Code*® (IFC®) and the *International Building Code*® (IBC®) for acceptable lighting in means of egress components.





IN THE DIAGRAM ABOVE, THE FIRST-FLOOR WINDOWS FACING EACH OTHER ARE NOT ACCEPTABLE FOR PROVIDING NATURAL LIGHT TO THEIR ROOMS. THE WINDOWS MUST FACE AN OPEN SPACE AT LEAST 3 FEET AWAY FROM THE WINDOW. OTHER METHODS OF ACCOMMODATING NATURAL LIGHT REQUIREMENTS MUST BE CONSIDERED. PERHAPS AN INTERIOR WALL CAN BE REMOVED TO COMBINE TWO ROOMS OR A WINDOW MAY BE RELOCATED TO ANOTHER LOCATION THAT PROVIDES UNOBSTRUCTED LIGHT.

For SI: 1 foot = 304.8 mm.

Figure 402.1(2)
DETERMINATION OF NATURAL LIGHT SOURCES

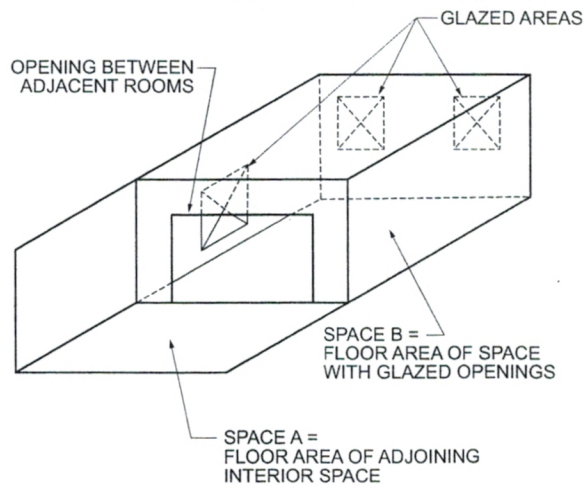
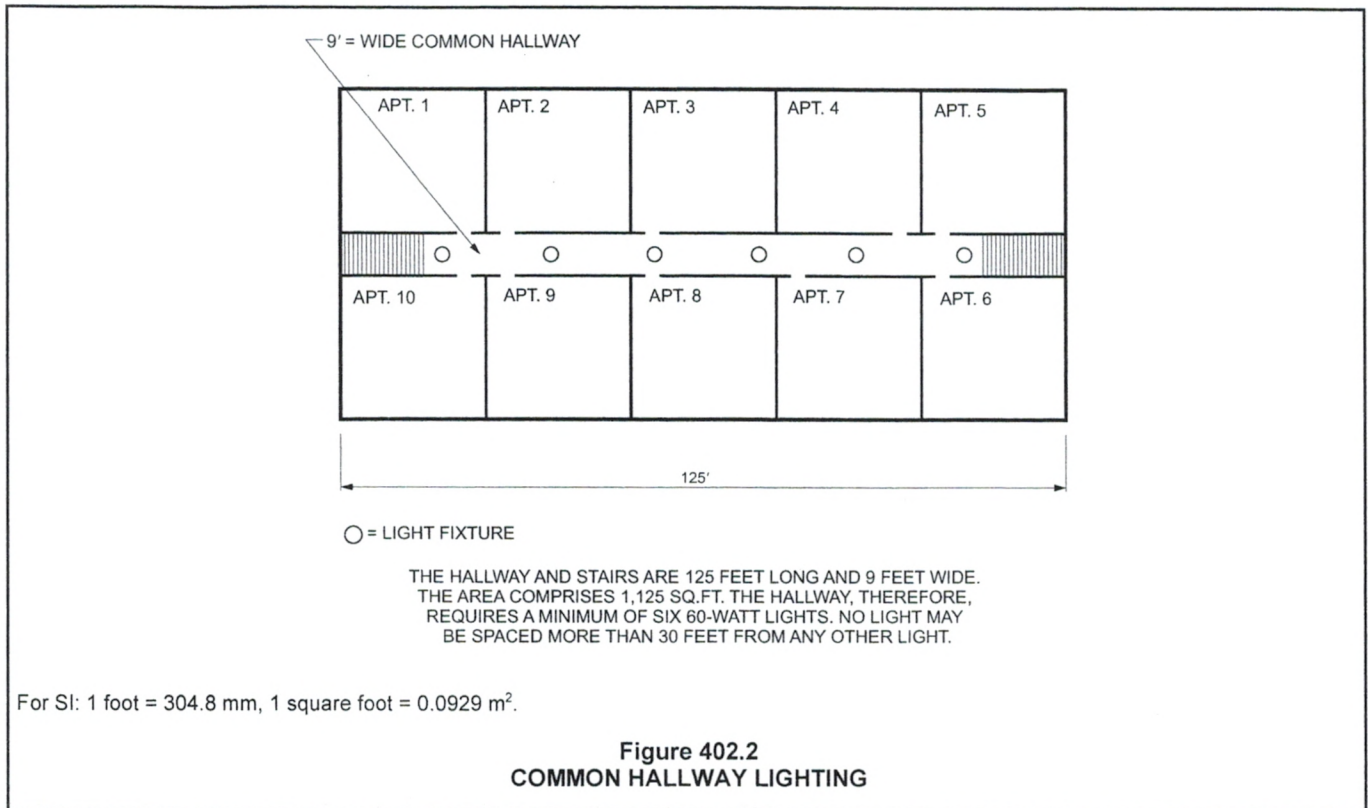


Figure 402.1(3)
NATURAL LIGHT FROM ADJACENT SPACE

402.3 Other spaces. All other spaces shall be provided with natural or artificial light sufficient to permit the maintenance of sanitary conditions, and the safe *occupancy* of the space and utilization of the appliances, equipment and fixtures.

- ❖ No specific criteria for minimum light and ventilation are established for other spaces, such as storage and

utility rooms, closets and mud rooms. All spaces, however, must have enough light to maintain their cleanliness and to allow for the safe use of appliances, equipment and fixtures located within them.



SECTION 403 VENTILATION

403.1 Habitable spaces. Every *habitable space* shall have not less than one openable window. The total openable area of the window in every room shall be equal to not less than 45 percent of the minimum glazed area required in Section 402.1.

Exception: Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the unobstructed opening to the adjoining room shall be not less than 8 percent of the floor area of the interior room or space, but not less than 25 square feet (2.33 m²). The *ventilation* openings to the outdoors shall be based on a total floor area being ventilated.

- ❖ As stated in Section 401.3, mechanical ventilation is an acceptable alternative to the natural ventilation requirements in this section. Most detached single-family dwellings utilize natural ventilation. Every habitable room (see the definition of "Habitable space" in Chapter 2) must have one window that can be easily opened to provide natural ventilation. In order to supply adequate natural ventilation, workable windows must be capable of opening to at least 45 percent of the minimum glazed area required for natural light, as established in Section 403.1 (see the definition of "Openable area" in Chapter 2). The openable area should be measured when the window or door is in its full, open position. When determining openable area, only the space between stops or between stops and

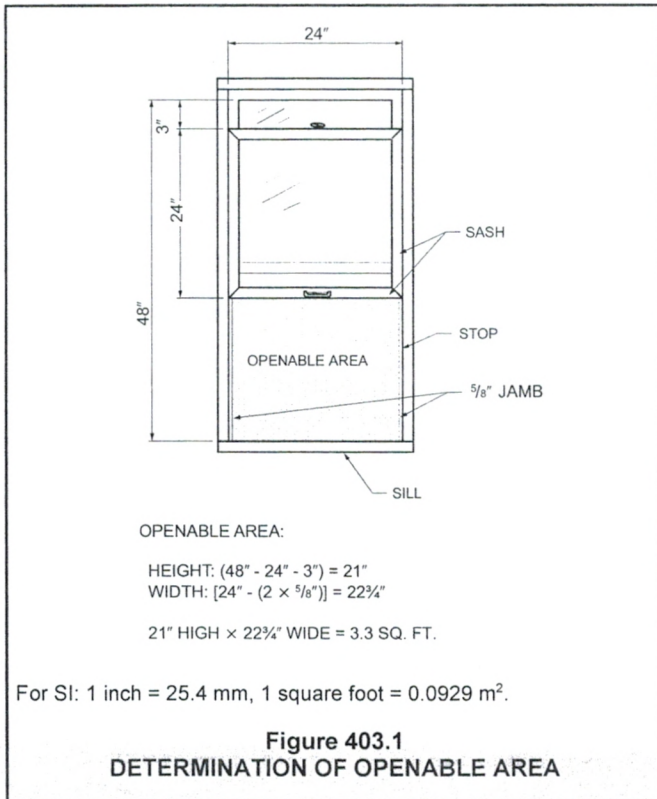
sash is to be measured. The area of sashes, meeting rails, mullions and muntins is to be deducted (see Commentary Figure 403.1).

The exception allows for rooms to "share" required ventilation openings, as long as there are substantial interior openings between the rooms. The example given in the commentary to Section 402.1 is applicable here.

403.2 Bathrooms and toilet rooms. Every *bathroom* and *toilet room* shall comply with the *ventilation* requirements for *habitable spaces* as required by Section 403.1, except that a window shall not be required in such spaces equipped with a mechanical *ventilation* system. Air exhausted by a mechanical *ventilation* system from a *bathroom* or *toilet room* shall discharge to the outdoors and shall not be recirculated.

- ❖ All bathrooms and toilet rooms must have windows that conform to the requirements of Section 402.1 for natural light and Section 403.1 for natural ventilation. If a window is not provided or not large enough to comply with the light and ventilation requirements of these two sections, then an approved mechanical vent may be used.

Mechanical ventilation in dwelling unit bathrooms and toilet rooms is required to exhaust moisture-laden air to the exterior. The vent must not terminate in any attic or other closed space (see Commentary Figure 403.2), which would allow moisture to condense on the building structure and lead to deterioration of the structure.



403.3 Cooking facilities: Unless *approved* through the certificate of *occupancy*, cooking shall not be permitted in any *rooming unit* or dormitory unit, and a cooking facility or appliance shall not be permitted to be present in the *rooming unit* or dormitory unit.

Exceptions:

1. Where specifically *approved* in writing by the *code official*.

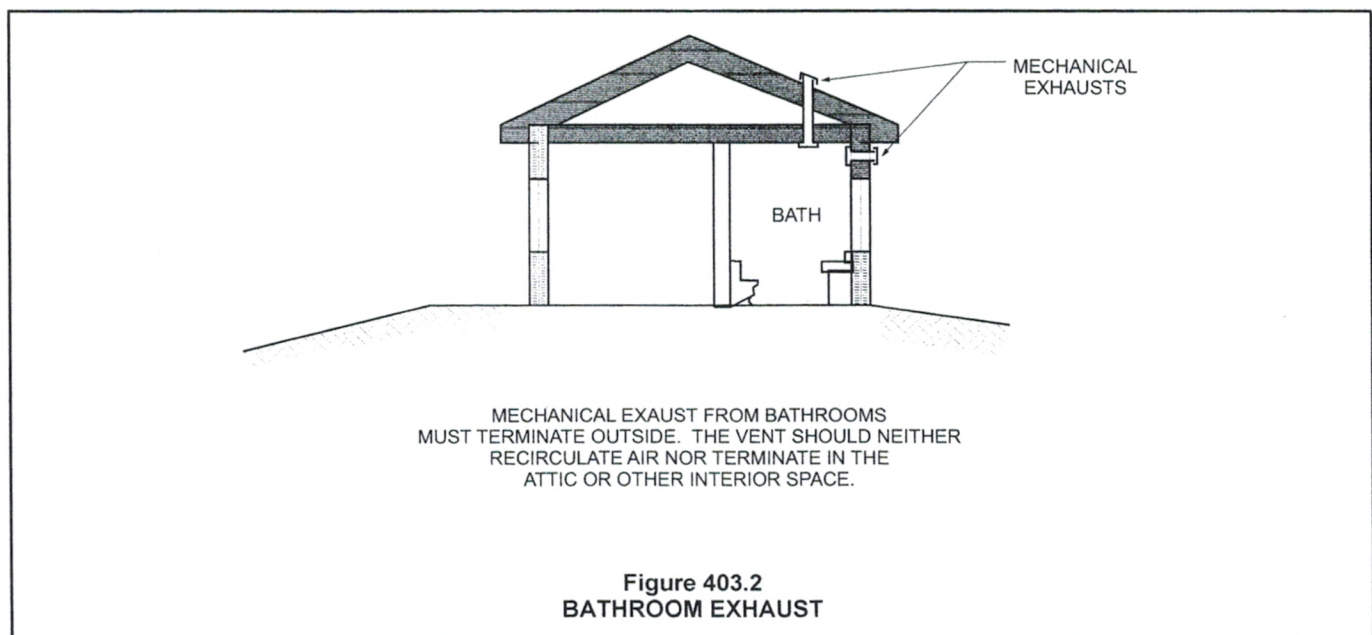
2. Devices such as coffee pots and microwave ovens shall not be considered cooking appliances.

❖ Unless approval has been granted through a certificate of occupancy, cooking is prohibited in dormitory or rooming units (see the definition of "Rooming unit" in Chapter 2). Cooking equipment is prohibited in these types of rooms, since cooking in sleeping areas may create fire and health hazards, as well as odor and moisture problems.

Exception 1 provides for the allowance of cooking in a rooming unit or a dormitory unit based on written approval as granted by the code official. Such an allowance should take into consideration the types of food to be cooked and the heat source and conditions under which the cooking will be done. Requiring approval in writing verifies that there will be a traceable, verifiable record of the conditions of approval. Such a record is useful in enforcing the conditions of the approval. Exception 2 allows the use of coffee pots and microwave ovens in rooming units and dormitory units. These types of appliances are typically used for short periods of time, and are currently used in hotel and motel units without significant problems.

403.4 Process ventilation. Where injurious, toxic, irritating or noxious fumes, gases, dusts or mists are generated, a local exhaust *ventilation* system shall be provided to remove the contaminating agent at the source. Air shall be exhausted to the exterior and not be recirculated to any space.

❖ A mechanical vent, hood or cabinet is required when any process creates potentially hazardous fumes, gases or dust. The ventilation has to be located at the source of the contamination and must exhaust directly to the exterior. The criteria for new exhaust systems are found in the *International Mechanical Code*® (IMC®). If the exhausted air contains dust, dirt, chemicals or other contaminants, the exhaust may require



additional treatment to prevent contamination of the exterior air (see Commentary Figure 403.4).

403.5 Clothes dryer exhaust. Clothes dryer exhaust systems shall be independent of all other systems and shall be exhausted outside the structure in accordance with the manufacturer's instructions.

Exception: Listed and labeled condensing (ductless) clothes dryers.

- ❖ Clothes dryers are prohibited from exhausting into other ventilation or exhaust systems. Clothes dryers create large volumes of lint, dust and moisture that will clog or corrode any system not designed for this type of exhaust. Additionally, the exhaust gases are hot and may contain combustion products. Improper or inadequate provisions for exhaust may create a fire and health hazard.

Manufacturers' installation instructions must be followed when exhausting clothes dryers. The exception recognizes condensing ductless clothes dryers. Typically, in a condenser dryer, there are two separate loops. The inside loop of air that is sealed from the outside loop of environment air from within the drum is heated, then blown through the tumbling clothes, then the moisture-laden air is passed through a heat exchanger, where the water recondenses. The same dry air is then reheated, where it is again blown through the drum and clothes, and the cycle begins again.

The outside loop in a condenser dryer consists of either air or water. Some condenser dryer models are air-cooled, and use the ambient room air as a heat sink by blowing it across the outside of the heat exchanger. These dryers will tend to heat the indoor air in one's laundry room significantly. Note, however, that only

heat is released, and all moisture is contained within the unit. The condensed water can be either pumped away to a drain line or stored in a container within the dryer to be emptied later.

SECTION 404 OCCUPANCY LIMITATIONS

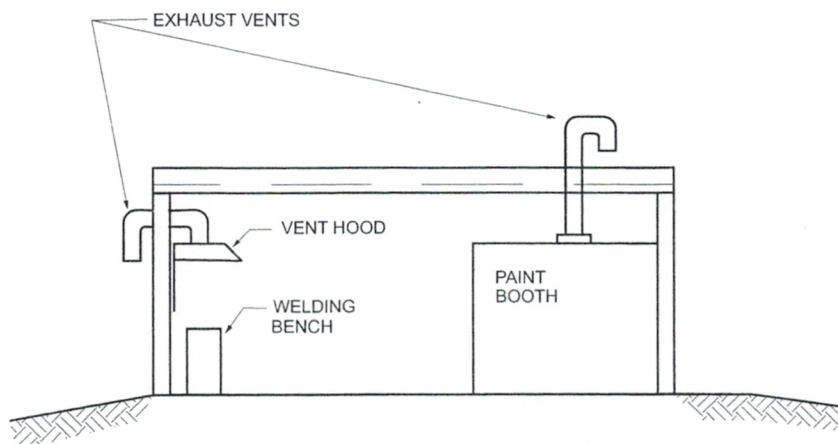
404.1 Privacy. *Dwelling units, hotel units, housekeeping units, rooming units and dormitory units* shall be arranged to provide privacy and be separate from other adjoining spaces.

- ❖ Privacy is a fundamental psychological need. Every person needs a space to relax, sleep and dress that is separate from public or common rooms. Walls, corridors and doors should be arranged to offer the occupants their own private space.

404.2 Minimum room widths. A habitable room, other than a kitchen, shall be not less than 7 feet (2134 mm) in any plan dimension. Kitchens shall have a minimum clear passageway of 3 feet (914 mm) between counterfronts and appliances or counterfronts and walls.

- ❖ To prevent the use of inadequately sized rooms for living space, the code establishes a minimum dimension of 7 feet (2134 mm) at the narrowest width of all habitable rooms, except kitchens. Narrow rooms do not allow for the installation of furniture without unduly obstructing passageways through the rooms.

Kitchens require only 3 feet (914 mm) of clearance between countertops and appliances or countertops and walls. Kitchens are not expected to be occupied for long periods of time, nor is it expected that kitchens will be occupied by a large number of persons at any one time.



PROCESS VENTILATION MUST BE LOCATED IN A POSITION TO PREVENT FUMES FROM PERMEATING THE GENERAL ATMOSPHERE OF THE INTERIOR SPACES.

Figure 403.4
PROCESS VENTILATION

404.3 Minimum ceiling heights. *Habitable spaces*, hallways, corridors, laundry areas, *bathrooms*, *toilet rooms* and *habitable basement* areas shall have a minimum clear ceiling height of 7 feet (2134 mm).

Exceptions:

1. In one- and two-family dwellings, beams or girders spaced not less than 4 feet (1219 mm) on center and projecting a maximum of 6 inches (152 mm) below the required ceiling height.
2. *Basement* rooms in one- and two-family dwellings occupied exclusively for laundry, study or recreation purposes, having a minimum ceiling height of 6 feet 8 inches (2033 mm) with a minimum clear height of 6 feet 4 inches (1932 mm) under beams, girders, ducts and similar obstructions.
3. Rooms occupied exclusively for sleeping, study or similar purposes and having a sloped ceiling over all or part of the room, with a minimum clear ceiling height of 7 feet (2134 mm) over not less than one-third of the required minimum floor area. In calculating the floor area of such rooms, only those portions of the floor area with a minimum clear ceiling height of 5 feet (1524 mm) shall be included.

❖ Sufficient ceiling heights are necessary to provide an adequate volume of air for occupants in closed spaces and to provide for their psychological well-being. The height requirements are established by this section.

To accommodate various conditions, the code establishes exceptions that permit a reduction in ceiling height within limited conditions. These exceptions include the following:

Exception 1 makes provisions for beams and girders to extend into the required minimum height. This is consistent with the IBC and the *International Residential Code*® (IRC®) requirements, which allow this type of projection to accommodate structural members.

Exception 2 is included to permit the use of existing basements with low headroom. It is anticipated that these rooms will be used only occasionally and will not adversely affect the occupants' health or safety.

Exception 3 is included to accommodate the many 1½-story houses that have the sloped attic area finished into bedrooms and similar uses.

Similar to the previous exception, the 7-foot-high (2134 mm) ceiling must extend over one-third of the required area established in Section 404.4.1. Thus, if a room is larger than the minimum required size for its use, the 7-foot-high (2134 mm) portion may be less than one-third of the room's actual floor area.

Example: A bedroom of 175 square feet (16.3 m²) would be required to have a 7-foot-high (2134 mm) ceiling over no less than 23.3 square feet (2.2 m²) of the room area. The minimum required area of a bedroom is 70 square feet (6.5 m²) (see Section 404.4.1); one-third of the required 70 square feet (6.5 m²) is 23.3 square feet (2.2 m²).

404.4 Bedroom and living room requirements. Every *bedroom* and *living room* shall comply with the requirements of Sections 404.4.1 through 404.4.5.

❖ The size of bedrooms and living rooms in a dwelling unit are determining factors in the comfort and safety of occupants. As such, the code establishes minimum sizes and restricts certain configurations in regard to *bathrooms*, means of egress and other *habitable rooms*.

404.4.1 Room area. Every *living room* shall contain not less than 120 square feet (11.2 m²) and every *bedroom* shall contain not less than 70 square feet (6.5 m²) and every *bedroom* occupied by more than one person shall contain not less than 50 square feet (4.6 m²) of floor area for each occupant thereof.

❖ The smallest *living room* allowed is 120 square feet (11.1 m²). Utilizing the minimum room width of 7 feet (2134 mm) would result in a *living room* size of approximately 7 feet by 17 feet (2134 mm by 5182 mm). A more functional room size would perhaps be 10 feet by 12 feet (3048 mm by 3658 mm). The smallest *bedroom* allowed is 70 square feet (6.5 m²). This is barely enough space for a regular-sized (twin) bed and dresser. If a *bedroom* is intended to accommodate more than one person, the room must have at least 50 square feet (4.6 m²) per person. A sleeping room for two people must contain at least 100 square feet (9.3 m²), for three, 150 square feet (13.9 m²) and so on. Inadequate sleeping space may increase the spread of communicable diseases, reduce privacy and provide insufficient space for clothes, furniture and other personal belongings. See the commentary to Section 404.5 for examples of the application of the requirements of this section.

404.4.2 Access from bedrooms. *Bedrooms* shall not constitute the only means of access to other *bedrooms* or *habitable spaces* and shall not serve as the only means of egress from other *habitable spaces*.

Exception: Units that contain fewer than two *bedrooms*.

❖ Every occupant must be provided with privacy in his or her sleeping room. The need for privacy may lead occupants to lock or barricade doors in certain situations; therefore, if the only access to other *habitable spaces* or the means of egress is through a *bedroom*, there is a possibility that the only way out of a dwelling unit may be blocked in an emergency situation. Even without an emergency, occupants may be seriously inconvenienced in their movement about the dwelling unit. *Bedrooms*, therefore, must be arranged so that other occupants and guests do not have to pass through one *bedroom* to get to another *bedroom* or other *habitable spaces* (see Commentary Figure 404.4.2). Additionally, dwelling units must be configured such that occupants can egress from any *habitable room* in the dwelling unit without passing through a *bedroom*. The exception would permit a dwelling unit with only one *bedroom* to have an arrangement where the only access to *habitable rooms* or the means of

egress is through the bedroom. It is assumed in this case that only the occupants of the bedroom will require access to other rooms or the means of egress.

404.4.3 Water closet accessibility. Every *bedroom* shall have access to not less than one water closet and one lavatory without passing through another *bedroom*. Every *bedroom* in a *dwelling unit* shall have access to not less than one water closet and lavatory located in the same story as the *bedroom* or an adjacent story.

❖ Every occupant of a bedroom must have access to a water closet without having to pass through another room used as a bedroom. Readily accessible water closets are important for privacy. Occupants should be able to use bathroom facilities without compromising their modesty or the privacy of the occupants in a bedroom. The requirement that every bedroom be served by a water closet and lavatory on the same floor level or on an adjacent level is considered an acceptable minimum standard for the convenience of occupants.

404.4.4 Prohibited occupancy. Kitchens and nonhabitable spaces shall not be used for sleeping purposes.

❖ The code prohibits kitchens, interior public areas and nonhabitable spaces from being used as bedrooms. These spaces provide neither privacy nor safety. Such rooms may also lack adequate light, ventilation, fire exits and sufficient habitable space.

This section provides the code official with another tool to control overcrowding problems.

404.4.5 Other requirements. *Bedrooms* shall comply with the applicable provisions of this code including, but not limited to, the light, *ventilation*, room area, ceiling height and room width requirements of this chapter; the plumbing facilities and water-heating facilities requirements of Chapter 5; the heating facilities and electrical receptacle requirements of Chapter 6; and the smoke detector and emergency escape requirements of Chapter 7.

❖ Sections 404.4.1 through 404.4.5 do not contain all the code requirements that pertain to bedrooms. Bedrooms are habitable rooms (see the definition and commentary for "Habitable room" in Chapter 2) and as such are subject to all the code requirements that apply to habitable rooms. The purpose of this section is to alert the code user to requirements for bedrooms that are located in other sections and chapters of the code. In particular, see the following sections of the code and the associated commentary:

- Section 402.1 for minimum light requirements.
- Section 403.1 for minimum ventilation requirements.
- Section 404.2 for minimum room width.
- Section 404.3 for minimum ceiling height.



- Section 503.2, which prohibits a toilet room from being the only passageway to a hall or other space from a bedroom.
- Section 505.4, which requires a provision for combustion air in bedrooms that contain a fuel-burning water heater.
- Sections 602.2 and 602.5 for minimum heat required in a bedroom.
- Section 605.2, which requires at least two separate and remote receptacle outlets in each bedroom.
- Section 702.4 for required emergency escape windows and doors in bedrooms.
- Section 704 for required smoke detectors in the vicinity of the bedrooms.

404.5 Overcrowding. Dwelling units shall not be occupied by more occupants than permitted by the minimum area requirements of Table 404.5.

❖ Overcrowding is often a problem in rental properties and in small, single-family dwellings. It can create serious problems; for example, disease spreads more easily, privacy is lost, mental health is affected and buildings are subject to more abuse and wear. Overcrowding can have a destructive effect on a whole neighborhood if it takes place in several houses on the same block or in several units in the same apartment building. Reducing overcrowding will reduce related health and safety hazards.

The code requires all types of dwelling units to comply with occupancy area requirements. There is no exception for owner-occupied houses; however, overcrowding of owner-occupied, single-family residences requires the careful thought and judgement of the code official to determine an appropriate course of action.

Proving that a building is overcrowded may be difficult. Tenants may lie about the number of occupants in their unit to avoid eviction. To determine the number of occupants, the code official may try to count beds or the names on mailboxes. Neighbors may also provide valuable information about the number of occupants and may be able to tell when the occupants are most likely to be home. It may be necessary to conduct inspections during evening hours in order to find an adult occupant at home. School enrollment records can also provide information on overcrowding.

Some communities have laws requiring an occupancy permit to be issued before a dwelling unit can be occupied. This allows the number of occupants shown on the application to be checked against the maximum occupancy of the dwelling unit as determined by an inspection [see Commentary Figure 404.5(1)].

Some floor plan arrangements would allow the dining and living room areas to be considered as combined dining/living/sleeping rooms. To illustrate the alternative analytical approach for the maximum number of occupants, consider the following example in which two analyses will be made: the first assumes only the three bedrooms are used for sleeping pur-

poses; the second assumes the living/dining area is to be counted as providing sleeping space [see Commentary Figure 404.5(2) for an example of an arrangement where the access to the kitchen is not through the dining/living room]. The requirement of Section 404.4.2, therefore, would be met and the maximum occupant load would be the highest of the following two analyses.

ANALYSIS 1 OCCUPANT LOAD ANALYSIS WITH NO COMBINED SLEEPING ROOM USAGE

1. Sleeping space: Section 404.4.1 indicates that 70 square feet (6.5 m²) is required for a room occupied by one person and 50 square feet (4.6 m²) per person is required for a room occupied by more than one person. In this example, we arrive at the following:

SLEEPING AREAS	ACTUAL AREA (SQUARE FEET)	ALLOWABLE NO. OF OCCUPANTS
Bedroom 1	113	2
Bedroom 2	127	2
Bedroom 3	92	1

For SI: 1 square foot = 0.0929 m².

At this point the maximum possible occupant load is five. It can be no higher due to lack of additional sleeping space.

2. Living, dining and kitchen space: Table 404.5 establishes the minimum required areas that will accommodate various numbers of occupants. By using Table 404.5, the following is derived:

SPACE	ACTUAL AREA (SQUARE FEET)	ALLOWABLE NO. OF OCCUPANTS
Living room	220	6 or more
Dining room	100	6 or more

For SI: 1 square foot = 0.0929 m².

3. Maximum allowable number of occupants: The actual living, dining and kitchen areas provide the maximum required space for six or more occupants; therefore, the maximum allowable number of occupants based on this analysis, which is five occupants, is governed by the sleeping space provided.

In this case, the living, dining and kitchen areas provide the minimum required space for any number of occupants. As such, if Bedroom 3 were 100 square feet (9.3 m²) rather than 90 square feet (8.4 m²), the maximum allowable occupant load would be six, rather than five, because Bedroom 3 would provide adequate sleeping space for two occupants.

ANALYSIS 2 OCCUPANT LOAD ANALYSIS WITH COMBINED LIVING/DINING/SLEEPING SPACE

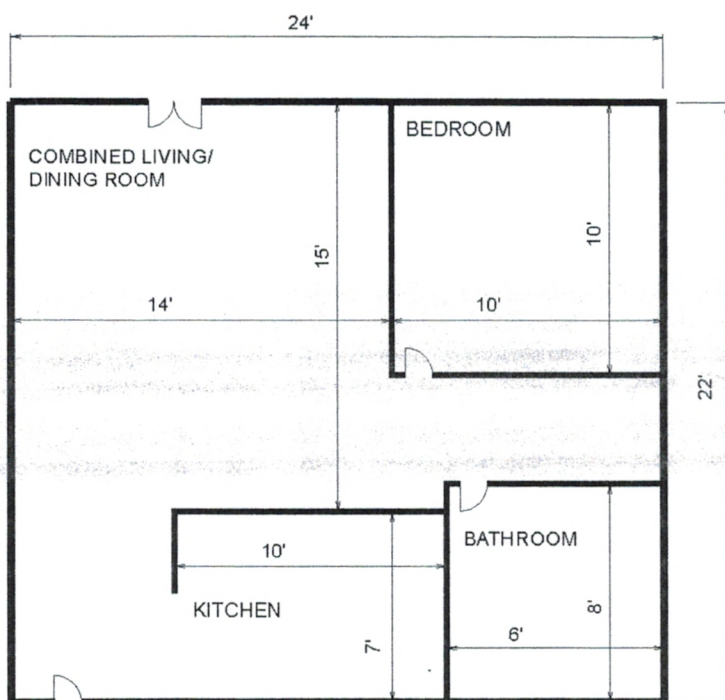
It was previously determined that the bedrooms provide sleeping space for five occupants and the living, dining and kitchen areas are adequate for any

number of occupants; however, the code does not prohibit the dual use of a room as living/sleeping or living/dining/sleeping, as long as the room meets the requirements for each intended use. In this example, the living/dining room could be considered a combined living/dining/sleeping room.

When determining the maximum occupant load for a combined living/sleeping or living/dining/sleeping room, Section 404.5.1 mandates that the minimum areas required by Table 404.5 are not to be included as sleeping areas; therefore, if the combined living/dining/sleeping room were used by one person for sleeping, at least 70 square feet (6.5 m²) is necessary (Section 404.4.1), leaving 250 square feet (23.2 m²) available for combined living/dining purposes [320 square feet (29.7 m²) total minus 70

square feet (6.5 m²) equals 250 square feet (23.2 m²)]. Table 404.5 and Section 404.5.2 would allow a combined living/dining room of 250 square feet (23.2 m²) to accommodate any number of occupants (six or more), which is the same as the first example. The total number of occupants for which a sleeping area is provided is now a maximum of six (the bedrooms accommodate five and the combined living/dining/sleeping room accommodates one); therefore, the maximum allowable occupant load based on this analysis would be six.

In this example the combined living/dining/sleeping room would be subject to all requirements for sleeping areas, including emergency escape windows (Section 702.4) and smoke detectors (Section 704).



MAXIMUM OCCUPANCY ALLOWED:

1. COMBINED LIVING/DINING ROOM = 210 SQ.FT.
THIS SPACE WOULD ACCOMMODATE NO MORE THAN FIVE OCCUPANTS IN ACCORDANCE WITH TABLE 404.5 AND SECTION 404.5.2.
2. KITCHEN = 70 SQ.FT.
THIS SPACE WOULD ACCOMMODATE AN UNLIMITED NUMBER OF OCCUPANTS IN ACCORDANCE WITH TABLE 404.5.
3. BEDROOM = 100 SQ.FT.
THIS SPACE WOULD ACCOMMODATE ONE OR TWO OCCUPANTS IN ACCORDANCE WITH TABLE 404.5.

BECAUSE THE BEDROOM WILL ONLY PERMIT A MAXIMUM OCCUPANCY OF TWO, THAT IS THE MAXIMUM OCCUPANCY FOR THIS ENTIRE UNIT. THE OCCUPANCY IS LIMITED TO THE MAXIMUM PERMITTED BY THE LEAST AREA PROVIDED IN ONE OF THE CATEGORIES IN TABLE 404.5.

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m².

Figure 404.5(1)
MAXIMUM OCCUPANCY LOAD IN DWELLINGS

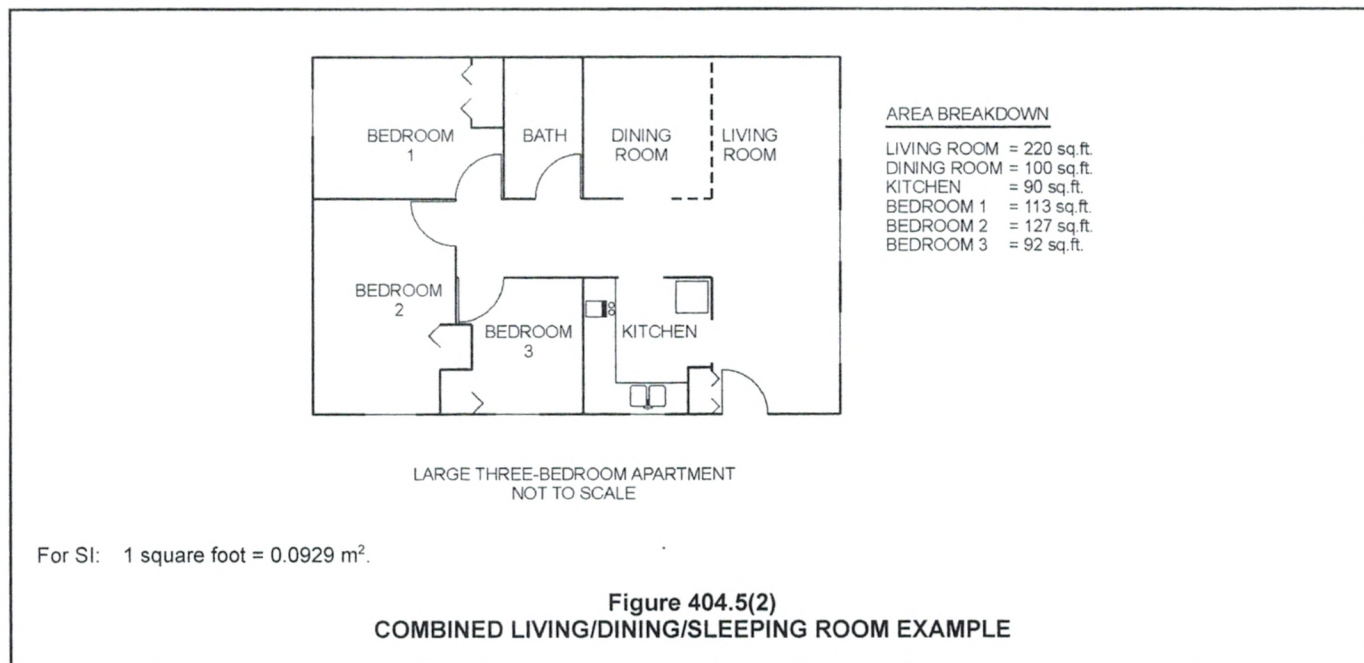


TABLE 404.5
MINIMUM AREA REQUIREMENTS

SPACE	MINIMUM AREA IN SQUARE FEET		
	1-2 occupants	3-5 occupants	6 or more occupants
Living room ^{a, b}	120	120	150
Dining room ^{a, b}	No requirement	80	100
Bedrooms	Shall comply with Section 404.4.1		

For SI: 1 square foot = 0.0929 m².

a. See Section 404.5.2 for combined living room/dining room spaces.

b. See Section 404.5.1 for limitations on determining the minimum occupancy area for sleeping purposes.

❖ Table 404.5 establishes the minimum room sizes and the maximum occupant loads for living spaces. The code official is to use this table to determine if a residence is overcrowded. See the commentary to Section 404.5 for examples of the application of this table.

404.5.1 Sleeping area. The minimum occupancy area required by Table 404.5 shall not be included as a sleeping area in determining the minimum occupancy area for sleeping purposes. Sleeping areas shall comply with Section 404.4.

❖ The purpose of this section is to prohibit the dual use of dining rooms and living rooms as sleeping rooms, unless they are of sufficient size to incorporate the minimum required space for the dining or living room areas listed in Table 404.5. For example, if a dwelling is occupied by five people and one person is using the living room as a sleeping area, the minimum required size of the living room would be 190 square feet (17.7 m²). This is based on 120 square feet (11.1 m²) for the living room, in accordance with Table 404.5, and 70 square feet (6.5 m²) for the single-occupant sleeping area, in accordance with Section 404.4.1.

The code does not prohibit a living or dining room from serving a dual purpose as a sleeping area; however, the room must be sized to accommodate both functions. See the commentary to Section 404.5 for additional examples of calculating the maximum allowable occupant load in dwellings where certain rooms are used for dual purposes.

404.5.2 Combined spaces. Combined living room and dining room spaces shall comply with the requirements of Table 404.5 if the total area is equal to that required for separate rooms and if the space is located so as to function as a combination living room/dining room.

❖ When a living room and a dining room are combined into one room, the combined area must equal the sum of the minimum required area of each separate room established by Table 404.5. See Analysis 2 in the commentary to Section 404.5 for further illustration.

404.6 Efficiency unit. Nothing in this section shall prohibit an efficiency living unit from meeting the following requirements:

1. A unit occupied by not more than one occupant shall have a minimum clear floor area of 120 square feet (11.2 m²). A unit occupied by not more than two occupants shall have a minimum clear floor area of 220 square feet (20.4 m²). A unit occupied by three occupants shall have a minimum clear floor area of 320 square feet (29.7 m²). These required areas shall be exclusive of the areas required by Items 2 and 3.
2. The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities, each having a minimum clear working space of 30 inches (762 mm) in front. Light and ventilation conforming to this code shall be provided.

3. The unit shall be provided with a separate *bathroom* containing a water closet, lavatory and bathtub or shower.

4. The maximum number of *occupants* shall be three.

- ❖ Efficiency units are typically very small apartments consisting of one or two rooms and a bathroom. Efficiency units that comply with this section are not required to comply with the minimum area requirements for bedrooms in Section 404.4. The total allowable number of occupants in the dwelling, however, is limited to two or three, depending on the area of the unit. The purpose of efficiency units and this section is to provide for combined use of spaces in an economical or "efficient" manner without jeopardizing health or comfort. This is possible because of the limit of total occupants to two or three persons.

Item 1 establishes the minimum required area based on the number of occupants. The item states that these areas are exclusive of the areas required by Items 2 and 3. For example, Item 2 requires that the kitchen be provided with (at minimum) a sink, cooking appliance and refrigerator. It further requires that each of these have a 30-inch (762 mm) clear working space in front of the fixture or appliance. The space taken up by the appliance and the required clear working space of 30 inches (762 mm) in front of each appliance cannot be included in the minimum required floor space in Item 1 (see the last sentence of Item 1). Similarly, the floor area of the bathroom required in Item 3 is not included in the minimum required floor space in Item 1. Lastly, Item 4 establishes the maximum occupant load as three.

There are no minimum floor areas required in the kitchen or bathroom. Having enough space for the required fixtures, appliances and working spaces is considered sufficient to provide functional floor area.

404.7 Food preparation. All spaces to be occupied for food preparation purposes shall contain suitable space and equipment to store, prepare and serve foods in a sanitary manner. There shall be adequate facilities and services for the sanitary disposal of food wastes and refuse, including facilities for temporary storage.

- ❖ Kitchens must be provided with stoves, ovens, refrigerators, freezers, cabinets, countertops and drawers in sufficient quantity and in a condition that the occupants can store their food safely and at appropriate temperatures to protect the food. All equipment must be constructed and maintained so that it can be cleaned.

Food preparation areas must also be provided with garbage disposals or containers that permit the safe temporary storage of garbage and refuse. Containers should be constructed and maintained to prevent insect and rat infestations.

Bibliography

The following resource materials were used in the preparation of the commentary for this chapter of the code:

Basic Principles of Healthful Housing. New York: American Public Health Association, Committee on the Hygiene of Housing, 1939.

IBC-2015, *International Building Code.* Washington, D.C.: International Code Council, 2014.

IFC-2015, *International Fire Code.* Washington, D.C.: International Code Council, 2014.

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Chapter 5:

Plumbing Facilities and Fixture Requirements

General Comments

Chapter 5 establishes the minimum criteria for the installation, maintenance and location of plumbing systems and facilities, including water supply systems, water-heating appliances, sewage disposal systems and related plumbing fixtures. Existing plumbing installations may present unique inspection problems for the code official. Almost all installations are concealed by finished walls, ceilings and floors. The code official must inspect the visible portions of the system and assess the acceptability of the whole installation. To help the code official make suitable judgments, a foundation of basic principles may aid in the enforcement process. The following is a listing of 23 basic principles of environmental sanitation and safety for the design, installation and maintenance of plumbing systems, which establish the fundamental concepts behind health and safety regulations for plumbing systems. Knowing these principles aids in understanding the code requirements, which leads to more effective code enforcement.

Principle No. 1: All Occupied Premises Shall Have Potable Water

All buildings, structures and premises intended for human habitation, occupancy, use or employment, or the preparation or processing of food, drinks or other materials for human consumption shall be provided with an adequate, safe and potable water supply through a safe system of piping to all fixtures, appliances and appurtenances. Such a water supply must not be connected to an unsafe water source, nor shall it be subjected to the hazards of backflow.

Principle No. 2: Adequate Water Required

Plumbing fixtures, devices and appurtenances shall be supplied with water in sufficient volume and at pressures adequate to enable them to function properly and without undue noise under normal conditions of use.

Principle No. 3: Hot Water Required

Hot water shall be supplied to all plumbing fixtures that normally need or require hot water for their proper use and function.

Principle No. 4: Water Conservation

Plumbing shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

Principle No. 5: Dangers of Explosion or Overheating

Devices for heating and storing water shall be designed and installed so as to guard against dangers from explosion or overheating.

Principle No. 6: Use Public Water and Sewers Where Available

Every building with installed plumbing fixtures intended for human habitation, occupancy or use and located where there is a public water supply and sewer service shall have a connection with the water supply and sewer.

Principle No. 7: Required Plumbing Fixtures

Each family dwelling unit shall have at least one water closet, one lavatory, one kitchen-type sink and one bathtub or shower to meet the basic requirements of sanitation and personal hygiene. All other structures for human occupancy or use shall be equipped with sufficient sanitary facilities as prescribed in the code, but with no less than one water closet and lavatory.

Principle No. 8: Smooth Surfaces Required

Plumbing fixtures shall be made of durable, smooth, nonabsorbent and corrosion-resistant material and shall be free from concealed fouling surfaces.

Principle No. 9: Drainage System of Adequate Size

The drainage system shall be designed, constructed and maintained to guard against fouling, deposit of solids and clogging, and with adequate cleanouts arranged so that the pipes may be readily cleaned.

Principle No. 10: Durable Materials and Good Workmanship

The piping of the plumbing system shall be of durable material, free from defective workmanship and designed and constructed so as to give satisfactory service for its reasonably expected life.

Principle No. 11: Liquid Seal Traps Required

Each fixture directly connected to the drainage system shall be equipped with a liquid seal trap.

Principle No. 12: Trap Seals Must Be Protected

The drainage system shall be designed to provide adequate circulation of air in all pipes without danger of siphonage, aspiration or forcing of trap seals under conditions of ordinary use.

Principle No. 13: Exhaust Foul Air to Outside

Each open vent terminal shall be extended to the outdoors, and be installed so as to minimize the possibilities of clogging and the return of foul air to the building. Note that the *International Plumbing Code*® (IPC®) and the *International Residential Code*® (IRC®) allow for the use of air admittance valves for vent terminals. However, each plumbing drain system must have not less than one vent terminal open to the outdoors.

Principle No. 14: Test the Plumbing System

The plumbing system shall be subjected to tests that will effectively disclose all leaks and defects in the work or material.

Principle No. 15: Exclude Certain Substances from the Plumbing System

Storm, surface or ground water or any substance that will clog or accentuate clogging of pipes, produce explosive mixtures, destroy the pipes or their joints or interfere unduly with the sewage disposal process shall not be allowed to enter the building drainage system.

Principle No. 16: Prevent Contamination

Proper protection shall be provided to prevent contamination of food, water, sterile goods and similar materials from backflow of sewage. When necessary, the fixture, device or appliance shall be connected indirectly with the building drainage system.

Principle No. 17: Light, Heat and Ventilation

A water closet, urinal, lavatory, bathtub or shower shall not be located in a room or compartment that is not properly lighted, heated and ventilated in accordance with accepted practice.

Principle No. 18: Individual Sewage Disposal Systems

If water closets or other plumbing fixtures are installed in buildings where there is not a public

sewer, provisions shall be made for disposing of the building sewage by an approved method of treatment and disposal.

Principle No. 19: Prevent Sewer Flooding

Where a plumbing drainage system is subject to backflow of sewage from the public sewer, provisions shall be made to prevent its overflow into the building.

Principle No. 20: Proper Maintenance

Plumbing systems shall be maintained in a safe and serviceable condition from the standpoints of both mechanics and health.

Principle No. 21: Fixtures Shall Be Accessible

All plumbing fixtures shall be installed with regard to spacing so access is provided for their intended use and for cleansing.

Principle No. 22: Structural Safety

Plumbing shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls and other surfaces through fixture usage.

Principle No. 23: Protect Ground and Surface Water

Sewage or other waste shall not be discharged into surface or subsurface water unless it has first been subjected to an approved form of treatment.

Purpose

Sanitary and clean conditions in occupied buildings are dependent upon certain basic plumbing principles, including providing potable water to a building, providing fixtures to utilize that water and removing waste from the building. Chapter 5 establishes the minimum criteria to verify that these principles are maintained throughout the life of a building.

SECTION 501

GENERAL

501.1 Scope. The provisions of this chapter shall govern the minimum plumbing systems, facilities and plumbing fixtures to be provided.

- ❖ Buildings must comply with the minimum criteria for the provisions of plumbing systems, facilities and fixtures established by this chapter. Any structure that does not conform to these criteria is in violation of the code and is subject to all penalties established by the jurisdiction as indicated in Section 106.

501.2 Responsibility. The *owner* of the structure shall provide and maintain such plumbing facilities and plumbing fixtures in compliance with these requirements. A person shall not occupy as *owner-occupant* or permit another person to occupy any structure or *premises* that does not comply with the requirements of this chapter.

- ❖ The owner is responsible for complying with the requirements of this chapter. A structure must not be occupied if the plumbing systems or facilities do not conform to the minimum code requirements.

SECTION 502 REQUIRED FACILITIES

[P] 502.1 Dwelling units. Every *dwelling unit* shall contain its own bathtub or shower, lavatory, water closet and kitchen sink that shall be maintained in a sanitary, safe working condition. The lavatory shall be placed in the same room as the water closet or located in close proximity to the door leading directly into the room in which such water closet is located. A kitchen sink shall not be used as a substitute for the required lavatory.

- ❖ Every dwelling unit is to have at least one water closet, one lavatory, one kitchen-type sink and one bathtub or shower to meet the basic requirements for sanitation and personal hygiene.

The lavatory must be located in the same room as or near the door that leads to the water closet. This requirement makes it convenient for occupants to wash their hands after using the water closet, which is good practice for personal hygiene and greatly reduces the spread of germs and bacteria.

The required kitchen sink is intended to provide separate facilities for food preparation and dishwashing and is not intended for hand cleansing after using the toilet facilities, thus reducing the likelihood of contamination of surfaces that are subject to contact with food.

[P] 502.2 Rooming houses. Not less than one water closet, lavatory and bathtub or shower shall be supplied for each four *rooming units*.

- ❖ Rooming houses with shared bathroom and toilet facilities must conform to the following minimum number of fixtures: one water closet, one lavatory and one bathtub or shower (i.e., one bathroom group) for each four rooming units, or portion thereof.

For example, a house with 22 rooming units requires at least six bathroom groups of plumbing fixtures ($22 \div 4 = 5.5$; rounded up to 6).

[P] 502.3 Hotels. Where private water closets, lavatories and baths are not provided, one water closet, one lavatory and one bathtub or shower having access from a public hallway shall be provided for each 10 *occupants*.

- ❖ Hotels with guestrooms that share bathroom and toilet facilities must conform to the following minimum number of fixtures: one water closet, one lavatory and one bathtub or shower for each 10 occupants, or portion thereof.

For example, a hotel with 22 occupants requires a minimum of three water closets, three lavatories and three bathtubs or showers, or a combination of three bathtubs and showers ($22 \div 10 = 2.2$; rounded up to 3).

[P] 502.4 Employees' facilities. Not less than one water closet, one lavatory and one drinking facility shall be available to employees.

- ❖ To provide employees with sufficient sanitary facilities, every place of employment is to have at least one water closet, one lavatory and one drinking facility.

This is a minimum requirement that provides the employees with at least one toilet room for their use. Obviously, the number of employees working for a company will affect the adequacy of providing only one water closet and one hand sink. When economically and physically practical, the code official should encourage a place of employment to install the minimum number of plumbing facilities established in the IPC.

[P] 502.4.1 Drinking facilities. Drinking facilities shall be a drinking fountain, water cooler, bottled water cooler or disposable cups next to a sink or water dispenser. Drinking facilities shall not be located in *toilet rooms* or *bathrooms*.

- ❖ To reduce the potential of contaminating the water, drinking facilities must be separate from toilet rooms or bathrooms. Water shall be provided by a drinking fountain, water cooler, bottled water cooler or disposable cups located next to a sink or water dispenser.

The requirement for disposable cups should be monitored, as many diseases are transmitted through shared, unwashed or unsanitized eating and drinking utensils.

[P] 502.5 Public toilet facilities. Public toilet facilities shall be maintained in a safe, sanitary and working condition in accordance with the *International Plumbing Code*. Except for periodic maintenance or cleaning, public access and use shall be provided to the toilet facilities at all times during *occupancy* of the *premises*.

- ❖ The purposes of this section are to establish minimum maintenance provisions for public toilet facilities and to ensure the availability of these facilities to the public at all times the building is occupied.

SECTION 503 TOILET ROOMS

[P] 503.1 Privacy. *Toilet rooms* and *bathrooms* shall provide privacy and shall not constitute the only passageway to a hall or other space, or to the exterior. A door and interior locking device shall be provided for all common or shared *bathrooms* and *toilet rooms* in a multiple dwelling.

- ❖ To protect human dignity and modesty, all toilet rooms and bathrooms must afford privacy. Where toilet rooms or bathrooms are shared by building occupants in dormitories or boarding houses, there is to be a door with a locking device either for each water closet compartment in a toilet room/bathroom or that controls access to the toilet room/bathroom.

Passage through bathrooms and toilet rooms to get to other rooms, spaces, corridors or the exterior is inconvenient and could also jeopardize the means of egress because of locked doors, wet floors and obstructions.

[P] 503.2 Location. *Toilet rooms* and *bathrooms* serving hotel units, *rooming units* or dormitory units or *housekeeping units*, shall have access by traversing not more than one flight

of stairs and shall have access from a common hall or passageway.

- ❖ Occupants of hotel units, rooming units, dormitory units or housekeeping units should not have to travel beyond the next adjacent story or pass through another occupant's unit to gain access to a bathroom or toilet facility. Convenient access to facilities is a basic necessity for their use and maintenance.

[P] 503.3 Location of employee toilet facilities. Toilet facilities shall have access from within the employees' working area. The required toilet facilities shall be located not more than one story above or below the employees' working area and the path of travel to such facilities shall not exceed a distance of 500 feet (152 m). Employee facilities shall either be separate facilities or combined employee and public facilities.

Exception: Facilities that are required for employees in storage structures or kiosks, which are located in adjacent structures under the same ownership, lease or control, shall not exceed a travel distance of 500 feet (152 m) from the employees' regular working area to the facilities.

- ❖ Employers are required to provide toilet facilities for employees within the employees' regular work areas. Employees should not have to travel more than 500 feet (152 m) or beyond the next adjacent story to reach the toilet room.

Employee toilet facilities can be for employees' use only or they can share customer facilities.

If toilet rooms are inconvenient or located too far from the work area, they create a physical hardship for employees.

This section does not require storage buildings and kiosks to contain toilet facilities, as long as there are toilet facilities in an adjacent building such that the distance from the work area to the toilet facilities does not exceed 500 feet (152 m). The building with the toilet facilities must be under the same ownership, lease or control as the storage area. Employers cannot expect their employees to depend upon neighborhood gas stations, stores or other businesses to provide access to toilet facilities.

[P] 503.4 Floor surface. In other than *dwelling units*, every *toilet room* floor shall be maintained to be a smooth, hard, nonabsorbent surface to permit such floor to be easily kept in a clean and sanitary condition.

- ❖ A toilet room floor is much easier to maintain if the surface is smooth, hard and nonabsorbent. In areas such as toilet rooms where the public is likely to enter a facility, the primary concern remains keeping the floor area as clean as possible to safeguard against the spread of disease.

SECTION 504 PLUMBING SYSTEMS AND FIXTURES

[P] 504.1 General. Plumbing fixtures shall be properly installed and maintained in working order, and shall be kept free from obstructions, leaks and defects and be capable of performing the function for which such plumbing fixtures are

designed. Plumbing fixtures shall be maintained in a safe, sanitary and functional condition.

- ❖ All plumbing fixtures must operate adequately and perform their intended functions. Fixtures must drain quickly without permitting sewer gases to enter the structure. Fixtures are not to leak from either the water supply piping or the waste discharge piping.

Fixtures must not be worn or deteriorated so that they cannot be adequately cleaned. Kitchen sinks and lavatories that have defects that prevent them from being kept clean increase the likelihood that disease-causing organisms can be spread to food sources or from person to person. Fixtures with structural cracks can fail suddenly, possibly causing personal injury and further property damage.

[P] 504.2 Fixture clearances. Plumbing fixtures shall have adequate clearances for usage and cleaning.

- ❖ Inadequate clearance between fixtures and adjacent surfaces can create confined spaces that allow disease and odor-causing bacteria to multiply. For proper sanitation, the fixture must have sufficient clearances for proper use and cleaning.

Although the code does not specify exact clearances between fixtures and adjacent surfaces, the code official must use good judgment and must review the required clearances for compliance with the IPC.

[P] 504.3 Plumbing system hazards. Where it is found that a plumbing system in a structure constitutes a hazard to the occupants or the structure by reason of inadequate service, inadequate venting, cross connection, backsiphonage, improper installation, *deterioration* or damage or for similar reasons, the *code official* shall require the defects to be corrected to eliminate the hazard.

- ❖ Any plumbing system having a deficiency or condition that is deemed by the code official as hazardous to the occupants or to the structure must be repaired or altered to eliminate the hazard. Hazards in a plumbing system include, but are not limited to, the following:

- Undersized piping.
- Inadequate venting.
- Cross connections.
- Lack of backflow prevention means.
- Lack of sufficient fixtures.
- Improperly installed piping, fixtures or fittings.
- Deteriorated, damaged, worn or otherwise defective piping, fixtures or fittings.
- Inadequately supported fixtures or piping.
- Inadequate water pressure or volume.

One of the most commonly encountered hazards is a submerged outlet in older-style fixtures in water closets, bathtubs, lavatories, laundry tubs and water softeners. Cross connections and improperly protected outlets greatly increase the likelihood that contaminated water will be introduced into the potable water supply.

SECTION 505 WATER SYSTEM

505.1 General. Every sink, lavatory, bathtub or shower, drinking fountain, water closet or other plumbing fixture shall be properly connected to either a public water system or to an *approved* private water system. Kitchen sinks, lavatories, laundry facilities, bathtubs and showers shall be supplied with hot or tempered and cold running water in accordance with the *International Plumbing Code*.

- ❖ The water for all plumbing fixtures must be properly connected to either a public or an approved private water system. If there is any question about the quality of the private water source, the code official should require that the water be tested and approved by either a private testing service or a local health department. A plumbing system cannot be considered adequate if the water entering the system is contaminated or otherwise unfit for human consumption and use.

The desired qualities for safe water are:

- Free of pathogenic organisms.
- Free of toxic chemicals.
- Free of odor, taste, color and turbidity.
- Free of excessive minerals.
- Relatively noncorrosive.
- Adequate in quantity and pressure.

All sinks, lavatories, bathtubs and showers must be supplied with cold and hot or tempered running water as regulated by the IPC. Heated water is a basic necessity for all cleansing and bathing needs. It should be noted that the IPC only allows tempered water [water that is 85°F (29°C) to 110°F (43°C)] to be used for bathing and washing in nonresidential occupancies. The IPC requires tempered water to be supplied to hand-washing fixtures located in public toilet facilities.

[P] 505.2 Contamination. The water supply shall be maintained free from contamination, and all water inlets for plumbing fixtures shall be located above the flood-level rim of the fixture. Shampoo basin faucets, janitor sink faucets and other hose bibs or faucets to which hoses are attached and left in place, shall be protected by an approved atmospheric-type vacuum breaker or an approved permanently attached hose connection vacuum breaker.

- ❖ Cross connections and unprotected outlets are the most common sources of contamination in potable water systems. The IPC defines a cross connection as any physical connection or arrangement between two otherwise separate piping systems—one of which contains potable water and the other water of either unknown or questionable safety, steam, gas or chemical—whereby there exists the possibility for flow from one system to the other, with the direction of flow depending on the pressure differential between the two systems.

The code official might not always be able to discover all cross connections and unprotected outlets in a building, but should become familiar with the loca-

tions where such usually occur. Many older-style plumbing fixtures were designed or installed with built-in submerged water supply outlets. A few of the more common fixtures and appliances that might have unprotected outlets include: water closets, bathtubs, lavatories, laundry tubs and hose bibbs (sill cocks). Water softener drains are often improperly connected to the drainage system, thereby creating cross connections [see Commentary Figure 505.2(1)].

There are two basic methods of preventing contamination of the potable water supply. The first is to provide an air gap between the water outlet and the flood level rim of the fixture. The second is to install backflow prevention devices in the water supply line.

An air gap is the ideal solution because it does not rely on the performance of mechanical devices to prevent backflow into the water supply. Typically, an air gap must be twice the diameter of the supply pipe to the fixture, but never less than 1 inch (25 mm) above the flood level rim. The requirements for air gap protection of fixtures are found in Table 608.15.1 of the IPC.

An example of an unprotected outlet is identified in Commentary Figure 505.2(2) when the following conditions exist:

- The third-floor water closet has the ball cock (fill valve) submerged in the water of the water closet tank.
- The water pressure within the building is low because of corrosion buildup in the water pipes or simultaneous usage of fixtures.
- The third-floor water closet is flushed, thereby opening the ball cock.
- Contaminated water can be drawn from the water closet tank into the supply pipes.

In such circumstances when the sink is filling, the pressure can be reduced to less than atmospheric at the water closet fill valve. This creates a siphon action in the water closet tank. A potentially hazardous event has occurred that could introduce contaminated water into the potable water supply.

The solution to this problem is fairly simple. The water closet fill valve (ball cock) needs to be replaced with an antisiphon fill valve that extends a minimum of 1 inch (25 mm) above the overflow tube in the water closet tank. Additionally, the water pressure throughout the building should be increased by replacing or upsizing the water supply piping.

Another common backflow hazard can result from hoses being attached to threaded outlets. Backflow can occur when the open end of the hose is submerged in any liquid. For example, the possibility of backflow exists when a homeowner uses a hose to spread chemical fertilizers, herbicides or insecticides. If negative pressure should occur in the water supply piping, the water and chemicals from the hose could be siphoned into the water supply.

The solution to this problem is to install a hose-connection-type vacuum breaker on the water supply outlet fitting. When a negative pressure occurs in the

water supply, the vacuum breaker opens to the atmosphere allowing air to enter the piping system, thus "breaking" the vacuum.

A type of cross connection occurs when a water supply is connected directly to an appliance or a piece of equipment. Some examples are water supplies to hot water and steam boilers; lawn irrigation systems; fire suppression systems; carbonated beverage machines and equipment used for various industrial applications, such as manufacturing. These items are typically not able to function with an air gap between the supply pipe and the appliance or fixture. Consequently, some type of backflow preventer device must be installed in the water supply line to prevent the water flow from reversing direction. Common types of protection are pressure-type vacuum breakers, barometric loops and reduced pressure principle backflow preventers.

Any time there is not an obvious air gap or visible backflow preventer device in a water supply line, the code official should attempt to determine if a hazard exists.

Cross connections between a private water supply

(typically a well system) and a potable public water supply are not permitted under any circumstance. If the ground water becomes contaminated, a cross connection could affect the entire public water supply system.

The code official should work with local plumbing inspectors or water departments to identify and eliminate all cross connections and unprotected potable water outlets.

505.3 Supply. The water supply system shall be installed and maintained to provide a supply of water to plumbing fixtures, devices and appurtenances in sufficient volume and at pressures adequate to enable the fixtures to function properly, safely, and free from defects and leaks.

❖ Inadequate water pressure or insufficient volume can cause plumbing fixtures, washing machines, dishwashers and other appliances to operate improperly. Inadequate water pressure can restrict the flow of water into bathtubs, showers and sinks to the point that the fixtures are not usable. The code requires enough pressure and volume so that all fixtures and appliances are functional and free of undue hazards.

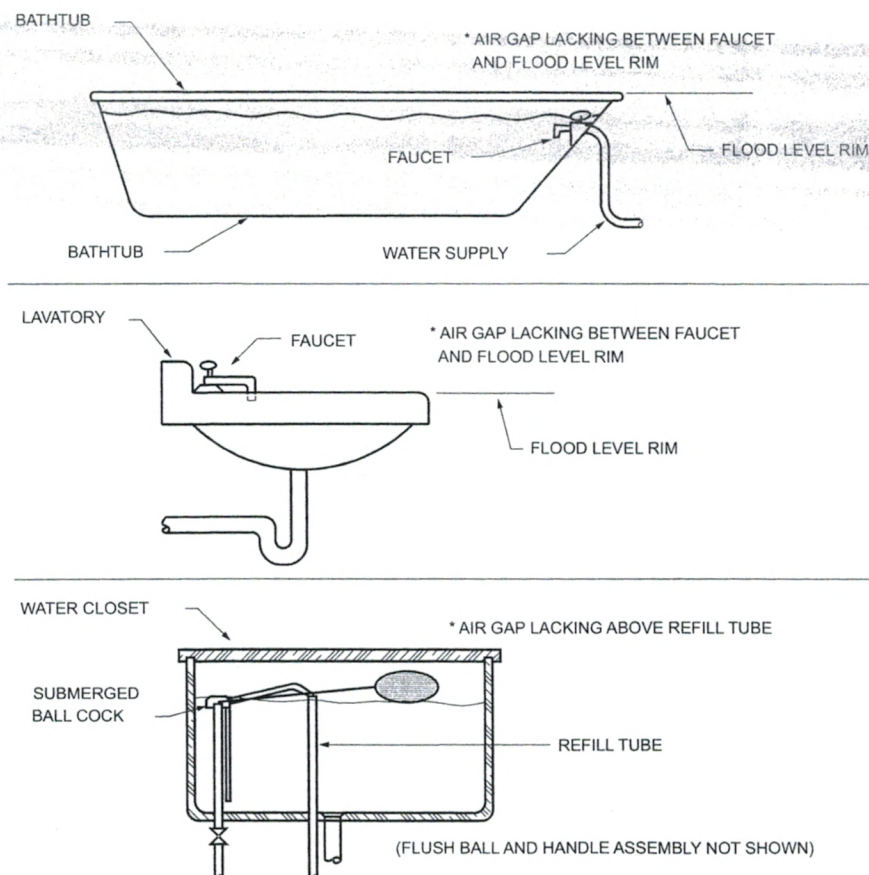
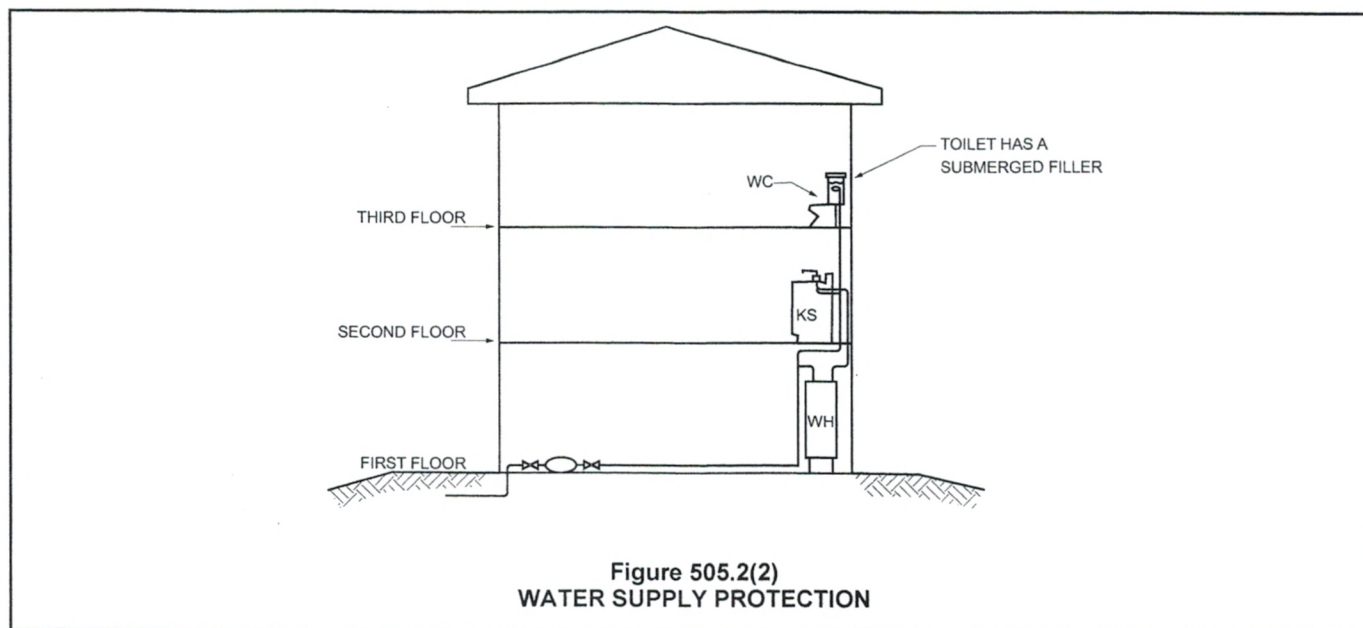


Figure 505.2(1)
COMMON CROSS CONNECTIONS



There are many causes of inadequate water pressure and lack of sufficient volume. A few of the common causes include:

- Private wells.
- Inadequate ground-water supply.
- Defective pump or a pump that has lost its prime.
- Storage tank that has lost its air cushion.
- Sand or silt plugging the well point.

Municipal systems:

- Inadequate pressure in the public water main.
- Sudden loss of pressure in an area caused by the use of a nearby fire hydrant, a broken main water line, etc.

Quite frequently, an inadequate water supply is the result of problems within a building. A few examples include clogged or corroded pipes, undersized piping, crimped or bent pipes and a system that is inadequately designed. A change in occupancy of a building might create demands that exceed the original water piping capacity.

505.4 Water heating facilities. Water heating facilities shall be properly installed, maintained and capable of providing an adequate amount of water to be drawn at every required sink, lavatory, bathtub, shower and laundry facility at a minimum temperature of 110°F (43°C). A gas-burning water heater shall not be located in any *bathroom, toilet room, bedroom* or other occupied room normally kept closed, unless adequate combustion air is provided. An *approved* combination temperature and pressure-relief valve and relief valve discharge pipe shall be properly installed and maintained on water heaters.

❖ A water heater can be dangerous if it is not properly installed and maintained. A water heater is a closed vessel that can be subjected to high temperature and

pressure. Under the right conditions, a water heater can explode violently and cause extensive structural damage to buildings and personal injury or death. As such, water heaters should be thoroughly inspected. The following is a guide for the inspection of water heater systems.

1. Electric water heaters:

- Is the electric service for the house adequate to supply the normal demands of the house as well as the increased demands of a water heater?
- Is the electric wiring for the water heater of adequate size and properly installed in accordance with the electrical code?
- Are all conductors properly installed and protected against physical damage?

2. Fuel-burning water heaters:

- Which fuel is being used? Commonly used fuels include natural gas, propane gas and fuel oil.
- Is the fuel piping constructed from approved materials, properly connected and adequately supported?
- Is there a readily accessible, properly installed shutoff valve to stop the fuel supply?

3. Safety controls (electric and fuel-burning):

- Do the safety controls and devices appear to be in good condition without evidence of tampering or modification?
- Is the thermostat (temperature control) operational and in good condition?
- Does the water heater have a temperature and a pressure relief valve or a combination temperature and pressure relief valve? These safety valves are necessary to relieve excessive pressures, thereby preventing an explosion of

the water heater. The temperature and pressure relief valves or combination temperature and pressure relief valve must be rated for a pressure not higher than the working pressure rating of the water heater, and in no case higher than 150 pounds per square inch (psi) (1034 kPa).

- Is the temperature relief-valve-sensing element located in the top 6 inches (152 mm) of the water heater tank? This is the hottest water in the tank.
- Is the relief valve in good condition and free of corrosion or leakage?
- Is the relief valve rating equal to or greater than the British thermal unit per hour (Btu/h) input rating of the water heater? An undersized safety relief valve does not offer adequate protection.
- Does the relief valve have a discharge pipe to divert heated water toward the floor and to a point where it will not cause damage to the structure? The discharge pipe must be rigid piping of the same diameter as the relief valve outlet. The lower end of the discharge pipe must not be closed or plugged and is not to have a threaded end that would invite closure. The relief valve discharge pipe must not be located where it would be subject to freezing, as this could result in a complete blockage of the pipe.

4. Venting:

- Do all fuel-burning water heaters vent the combustion products to an approved chimney or venting system?
- Does the vent have adequate clearance from combustible materials (wood, paper, cloth, etc.)?

- Are the vent or chimney connectors constructed of approved materials? They should be constructed from corrosion-resistant materials such as aluminum, galvanized steel and stainless steel. The joints should be fastened with sheet metal screws, rivets or other approved means.
- Does the chimney, vent or connector show signs of deterioration, corrosion or condensation?
- Is the vent/chimney connector properly supported and connected to the vent or chimney?

If there is a doubt or question about a particular installation (see Commentary Figure 505.4), plumbing inspectors or water department officials should be consulted.

Fuel-burning water heaters must not be installed in bathrooms, toilet rooms, bedrooms or any other rooms that are normally kept closed when in use, unless combustion air is brought directly to the appliance from outside of the room. Adequate combustion air must always be provided regardless of the appliance location. The *International Mechanical Code*® (IMC®) prohibits the installation of fuel-fired water heaters in such rooms in all cases, except where the water heater is a direct-vent type or is placed in a dedicated enclosure completely isolated from the occupied room. Asphyxiation of the room occupants could possibly result from inadequate combustion air, venting system failure or appliance malfunction (see Section 603.2).

The code official must also be sure that the water heater is able to provide water of at least 110°F (43°C) to every fixture requiring hot water (see Section 505.1).

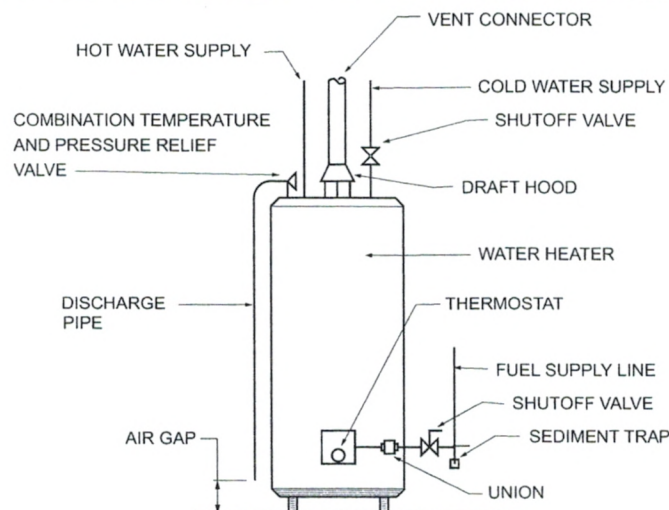


Figure 505.4
WATER HEATER INSTALLATION REQUIREMENTS

Temperature and pressure relief valves are absolutely necessary to prevent the possibility of water heater explosion resulting from overheating.

SECTION 506 SANITARY DRAINAGE SYSTEM

[P] 506.1 General. Plumbing fixtures shall be properly connected to either a public sewer system or to an *approved* private sewage disposal system.

❖ Plumbing fixtures must be connected to an approved public or private sewer system. Private systems that should not be approved would include pit privies, cesspools or any system that discharges to storm drains, ponds, lakes, streams or rivers.

[P] 506.2 Maintenance. Every plumbing stack, vent, waste and sewer line shall function properly and be kept free from obstructions, leaks and defects.

❖ All waste, soil, sewer and vent piping must be installed and maintained so as to function properly. Obstructions or defects that present health hazards must be corrected. Leaking pipes or joints must be replaced or repaired. All repairs and new installations must be in accordance with the IPC.

A thorough and accurate inspection of the plumbing system requires knowledge of plumbing systems; however, with training and experience, the code official can identify typical problems and improper installations. In broad terms, he or she should inspect the following elements of a plumbing system: fixtures; sanitary drainage systems; vents and venting; traps; drainage cleanouts; and hangers and supports.

1. Sanitary drainage system: The system must be free of leaks. Leaking drain pipes can cause structural damage and spread illness from the pathogenic organisms in the waste water.

The code official should inspect all visible drainpipes for any improper connections or installations. A few frequently encountered problems include the following:

- a. Improperly installed materials: Materials not designed or approved for plumbing applications are often used for repairs and modifications in plumbing systems. The improper use of fittings, joining means and connectors is common in existing structures. Drainage piping with no slope or reverse slope can promote blockages.
- b. Joints and pipes that have been "patched" with tape, putty, caulking or tar thus indicating past or current leakage in the drainage system.
- c. Unworkmanlike installation: This often indicates that an untrained handyman has made repairs.

The code official should check the entire system for any indications of unvented fixtures, improper materials or other typical violations. Additionally, it should be determined whether permits were obtained to install the work.

2. Vents and venting: Plumbing systems are designed with an integral venting system to prevent loss of the water seals in fixture traps. Fixture vents must be provided and maintained where necessary to protect traps from pressure fluctuations and siphon action that cause loss of the water seal.
3. Traps: Each plumbing fixture must have a trap at the connection to the sanitary drainage system. A trap creates a water seal that prevents sewer gas from entering the structure. Sewer gases can be toxic and carry bacteria-laden aerosols. Some types of sewer gases are even explosive.
4. Hangers and supports: Improperly or inadequately supported waste and vent piping frequently indicates a nonprofessional installation. All piping is required to be adequately supported to maintain pitch and alignment and prevent strain on connections and joints.

In general, the code official should inspect the entire visible plumbing system for: leakage; the presence of fixture, standpipe and floor drain traps; approved materials (with approved connections) and an acceptable venting system.

[P] 506.3 Grease interceptors. Grease interceptors and automatic grease removal devices shall be maintained in accordance with this code and the manufacturer's installation instructions. Grease interceptors and automatic grease removal devices shall be regularly serviced and cleaned to prevent the discharge of oil, grease, and other substances harmful or hazardous to the building drainage system, the public sewer, the private sewage disposal system or the sewage treatment plant or processes. Records of maintenance, cleaning and repairs shall be available for inspection by the code official.

❖ This section clarifies that grease interceptors and automatic grease removal devices require ongoing, routine maintenance in order to perform their intended functions. Any such maintenance should be in accordance with the manufacturer's maintenance criteria. The language is coordinated with the provisions of Section 1003.1 of the IPC, which establishes when these devices are required to be installed. Failure to maintain these devices results in public health risks via sanitary sewer overflows into buildings, roads and streams and premature deterioration and failure of public and private sewage systems.

SECTION 507 STORM DRAINAGE

[P] **507.1 General.** Drainage of roofs and paved areas, yards and courts, and other open areas on the *premises* shall not be discharged in a manner that creates a public nuisance.

- ❖ Storm water must be discharged so that it does not pond in paved areas, yards, courts or open areas. Standing water can freeze in cold climates, thereby causing a slip hazard. In warm weather, standing water can create an insect breeding ground.

Roof gutters and downspouts are not required, provided that storm water is discharged in such a manner that it does not create a public nuisance.

The code official should also check local ordinances to determine if run-off storm drainage water and sump pumps can be allowed to enter the sanitary sewer system. Most communities are now requiring all storm drainage water to be separated from the sanitary sewer system. Disconnecting the storm water from the sanitary sewer system can reduce the costs of sewage treatment and eliminate an overload of the treatment facility.

The emphasis in storm drainage is to remove the water quickly without creating hazards to pedestrians or causing damage to any structures on the same or neighboring property.

Bibliography

The following resource materials were used in the preparation of the commentary for this chapter of the code:

IFGC-2015, *International Fuel Gas Code*. Washington, D.C.: International Code Council, 2014.

IMC-2015, *International Mechanical Code*. Washington, D.C.: International Code Council, 2014.

IPC-2015, *International Plumbing Code*. Washington, D.C.: International Code Council, 2014.

Chapter 6:

Mechanical and Electrical Requirements

General Comments

Chapter 6 establishes minimum criteria for the installation and maintenance of the following: heating and air-conditioning equipment, appliances and systems; water-heating equipment, appliances and systems; cooking equipment and appliances; ventilation and exhaust equipment; gas and liquid fuel distribution piping and components; fireplaces and solid fuel-burning appliances; chimneys and vents; electrical services; lighting fixtures; electrical receptacle outlets; electrical distribution system equipment, devices and wiring; and elevators, escalators and dumbwaiters.

The primary objectives of mechanical and heating equipment inspections are to detect, identify and abate any condition that is a potential fire or explosion hazard; is a potential cause of asphyxiation or carbon monoxide poisoning; poses the risk of physical injury to an occupant; prevents the equipment from adequately performing its intended function; or that otherwise endangers the occupants or the structure.

The primary objectives of electrical equipment and system inspections are to detect, identify and abate any condition that is a potential fire hazard or electrical shock hazard. Any condition that inadequately provides for the supply and distribution of electrical power

throughout the structure must also be detected, identified and abated.

All mechanical and electrical facilities must be capable of providing the minimum levels of safety, illumination, comfort, utility and convenience as prescribed in this chapter.

Purpose

All mechanical and electrical equipment, appliances and systems must be properly installed to serve the intended purpose. Proper installation, however, does not in itself guarantee safety or performance. In addition to proper installation, all such equipment, appliances and systems must be maintained, as they are subject to deterioration, wear and aging, and may require cleaning, lubrication, adjustment, etc. All materials and components used to construct mechanical and electrical systems have a limited life span, and require repair or replacement at various time intervals that are specific to the material or component.

The purpose of Chapter 6 is to establish minimum performance requirements for electrical and mechanical facilities and to establish minimum standards for the safety of such facilities.

SECTION 601 GENERAL

601.1 Scope. The provisions of this chapter shall govern the minimum mechanical and electrical facilities and equipment to be provided.

❖ Minimum performance guidelines for mechanical and electrical facilities and equipment are established in this chapter. Installations that do not conform to these minimum criteria are unacceptable.

601.2 Responsibility. The *owner* of the structure shall provide and maintain mechanical and electrical facilities and equipment in compliance with these requirements. A person shall not occupy as *owner-occupant* or permit another person to occupy any *premises* that does not comply with the requirements of this chapter.

❖ It is the responsibility of the owner of the structure to provide and maintain the required electrical and mechanical facilities. An owner must not occupy or allow any other person to occupy a structure that is not in compliance with this chapter; thus, the requirements of this chapter are the minimum necessary to make a structure occupiable.

SECTION 602 HEATING FACILITIES

602.1 Facilities required. Heating facilities shall be provided in structures as required by this section.

❖ This section establishes the scope of requirements in Section 602 [see the *International Mechanical Code*® (IMC®) for space-heating requirements for new structures].

602.2 Residential occupancies. Dwellings shall be provided with heating facilities capable of maintaining a room temperature of 68°F (20°C) in all habitable rooms, *bathrooms* and *toilet rooms* based on the winter outdoor design temperature for the locality indicated in Appendix D of the *International Plumbing Code*. Cooking appliances shall not be used, nor shall portable unvented fuel-burning space heaters be used, as a means to provide required heating.

Exception: In areas where the average monthly temperature is above 30°F (-1°C), a minimum temperature of 65°F (18°C) shall be maintained.

❖ This section establishes the following minimum requirements for space heating in residential structures.

Adequate heat is required for human health and comfort. The elderly, infirm and very young are most susceptible to illness and death from inadequate space heating.

Heating equipment must be provided and maintained by the owner and must be able to heat all habitable rooms, bathrooms and toilet rooms to at least 68°F (20°C) based on the outside design temperature established for each locality adopting the code. This 68°F (20°C) standard is believed to be the minimum indoor temperature at which people can be reasonably comfortable and can maintain healthy living. This is intended as an absolute minimum since most dwelling occupants will seek indoor temperatures 5°F to 10°F (-15°C to -12°C) higher than this.

The outdoor design temperatures are listed in Appendix D of the *International Plumbing Code*® (IPC®). Outdoor design temperatures provide a baseline from which heat load calculations are made. Heating system capacity is dependent on the predicted outdoor temperatures during the heating season. As the outdoor temperature falls, the heat input to a building must increase to offset the increasing heat losses through the building envelope. Heating systems are designed to have the capacity to maintain the desired indoor temperature when the outdoor temperature is at or above the outdoor design temperature. When the outdoor temperatures are below the outdoor design temperature, the heating system will not be able to maintain a desired indoor temperature. It would be impractical, for example, to design a heating system based on the assumption that someday it might be -20°F (-29°C) outdoors if the outdoor temperature in that region rarely, if ever, dropped that low. In such a case, the heating system would be oversized and, thereby, less efficient and economical.

The winter outdoor design temperature is defined as follows: For 97.5 percent of the total hours in the northern hemisphere heating season, from December through February, the predicted outdoor temperatures will be at or above the values given in Appendix D of the IPC. It would be unreasonable to expect any heating system to maintain a desired indoor temperature when the outdoor temperature is below the design temperature. When the 97.5 percent column in Appendix D of the IPC is used, it can be assumed that the actual outdoor temperature will be at or below the design temperature for roughly 54 hours of the total of 2,160 hours in the months of December through February ($2\frac{1}{2}\%$ of 2,160 = 2,160 hours \times 0.025 = 54).

The lack of adequate space-heating systems can result in the misuse of cooking appliances. It is not uncommon for occupants to use fuel-fired ovens and cooktop burners to supply space heating when the minimum required indoor temperature cannot be maintained, and unfortunately, the typical occupant is not aware of the danger in doing so. Fuel-fired cooking appliances in almost all occupancies are unvented and, therefore, discharge all products of combustion

directly to the occupied space. Prolonged use of such appliances can produce dangerously high levels of carbon monoxide and other contaminants, especially considering that the occupants will not be opening windows or operating exhaust systems in an effort to conserve heat.

Also, cooking appliances are not designed for the purpose of space heating, and like all appliances, could be dangerous if used in any way other than intended by the manufacturer. Cooking appliances are not designed for continuous or unattended use, and open flames, heat radiation and high surface temperatures pose a significant fire hazard when the appliance is misused.

This section also prohibits the use of fuel-burning, unvented space heaters as a means to provide any portion of the heating that is required for residential occupancies. Similar to cooking appliances, fuel-burning, portable unvented space heaters can be dangerous, especially when used as one of the essential means of providing the required heat. Occupants are likely to locate portable space heaters in rooms where they should not be and also locate such heaters too close to combustible materials and furnishings.

The exception recognizes that in warmer portions of the country, where the average monthly temperature meets or exceeds 30°F (1°C), the minimum inside temperature can be 65°F (18°C). As a result of this code requirement, the occupants are ensured of having a comfortable interior environment.

602.3 Heat supply. Every owner and operator of any building who rents, leases or lets one or more dwelling units or sleeping units on terms, either expressed or implied, to furnish heat to the occupants thereof shall supply heat during the period from [DATE] to [DATE] to maintain a minimum temperature of 68°F (20°C) in all habitable rooms, bathrooms and toilet rooms.

Exceptions:

1. When the outdoor temperature is below the winter outdoor design temperature for the locality, maintenance of the minimum room temperature shall not be required provided that the heating system is operating at its full design capacity. The winter outdoor design temperature for the locality shall be as indicated in Appendix D of the *International Plumbing Code*.
 2. In areas where the average monthly temperature is above 30°F (-1°C), a minimum temperature of 65°F (18°C) shall be maintained.
- ❖ The owner or operator of a rental residential property who agrees to provide heat by express agreement or implication must provide it to all habitable rooms, bathrooms and toilet rooms. The heat supply must be capable of maintaining a temperature of at least 68°F (20°C), 24 hours per day. The occupants could set the temperature in the space under their control at a lower temperature if desired, but 68°F (20°C) must be attainable. Based on local climatic conditions, each commu-

nity needs to establish the period of the year during which heating equipment must be in operation in order to maintain the required temperatures. The intent of this section is to protect tenants from being subjected to uncomfortable and unhealthy conditions created by undersized, malfunctioning, defective or otherwise inadequate space-heating systems. Having adequate space heating also helps eliminate the need for auxiliary room/space heaters, as well as the unsafe use of cooking appliances for space heating (see Section 602.2). When tenants are forced to use room/space heaters, the risk of fire and asphyxiation increases because of improper use, contact with or close proximity to combustible materials; overloaded wiring and extension cords; lack of ventilation and the user's typical lack of understanding of the potential hazards.

Exception 1 recognizes the limitations of all heating systems that operate when the outdoor temperature is below the design temperature. This exception states that the minimum indoor temperature requirement of 68°F (20°C) does not apply when the outdoor temperature is below the design temperature for the heating system. The exception addresses only the circumstance where the heating system cannot keep up because the outdoor conditions exceed that for which it was designed (see Section 602.2). The exception applies only to heating systems that are operating at their full design capacity (heat output). It does not apply to improperly designed systems, undersized systems or any system operating at less than its full output for whatever reason. On those rare days when the outdoor temperature is lower than what the heating system was designed to handle, it is anticipated that the indoor temperature might not be attainable. Heating systems that were sized based on outdoor temperatures above the actual outdoor design temperature for the locality in which they are installed are improperly designed, and as such, do not comply with the intent of the exception (see commentary, Section 602.2).

Exception 2 is the same as the exception to Section 602.2.

602.4 Occupiable work spaces. Indoor occupiable work spaces shall be supplied with heat during the period from [DATE] to [DATE] to maintain a minimum temperature of 65°F (18°C) during the period the spaces are occupied.

Exceptions:

1. Processing, storage and operation areas that require cooling or special temperature conditions.
 2. Areas in which persons are primarily engaged in vigorous physical activities.
- ❖ Mercantile, business, factory and similar occupancies in which people are employed must be kept at a temperature of at least 65°F (18°C) during the hours that employees are working. People cannot be expected to work productively and remain in good health if their workplace is uncomfortable. The 65°F (18°C) minimum is lower than required for residential occupan-

cies and is intended to apply to the typical workplace having sedentary employee activities.

Exception 1 recognizes that some occupancies have operations and processes that require temperatures lower than 65°F (18°C), including meat-packing plants, canneries and manufacturing facilities.

Exception 2 recognizes that a minimum temperature of 65°F (18°C) is not necessary where employees are engaged in physical activities such as construction, fabrication and loading in factories.

The period of the year during which structures must comply with this section is to be established by each locality based on local climatic conditions.

602.5 Room temperature measurement. The required room temperatures shall be measured 3 feet (914 mm) above the floor near the center of the room and 2 feet (610 mm) inward from the center of each exterior wall.

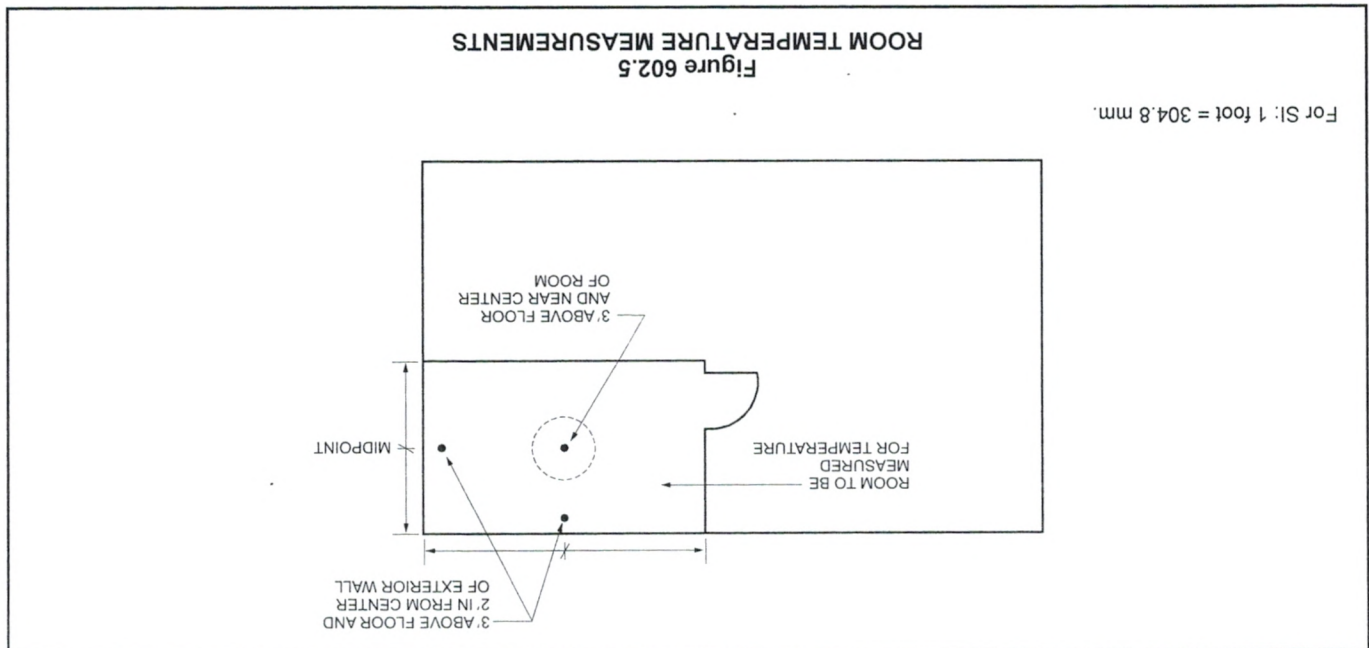
- ❖ To determine compliance with Section 602, temperature measurements are required to be taken at multiple locations. For example, in a room with two exterior walls, a total of three measurements is required. The room temperature requirements of Section 602 must be met in all of the measurement locations. The intent is to make sure that the required temperature will be uniformly reached throughout the occupiable portions of the room or space. The coldest part of a room during the heating season will typically be at the floor level by an outside wall. The measurements are taken at points that are expected to be occupied and that do not reflect the potential temperature extremes in a space (see Commentary Figure 602.5).

Any space that cannot maintain the minimum indoor temperatures as established in Section 602 when the outdoor temperature is at or above the design temperature for the locality should be posted as unfit for human occupancy until enough heat can be supplied.

SECTION 603 MECHANICAL EQUIPMENT

603.1 Mechanical appliances. Mechanical appliances, fireplaces, solid fuel-burning appliances, cooking appliances and water heating appliances shall be properly installed and maintained in a safe working condition, and shall be capable of performing the intended function.

- ❖ Because appliances, mechanical equipment and fireplaces are subject to aging, wear and deterioration, periodic inspection and servicing is required to maintain performance and to verify continued safe operation. Fireplaces and solid fuel-burning appliances must be properly installed, inspected and maintained. They require frequent inspection and maintenance because of the extreme temperatures and corrosive flue gases to which they are subjected. Routine cleaning is required to remove the highly flammable creosote deposits found in chimneys and connectors. Inspections should include such related items as chimney flues, chimney caps, dampers, doors,



screens, connectors, hearth extensions and clearances to combustibles.

Appliances located in buildings that are not owner-occupied are less likely to receive attention or be neglected. Appliances of concern include water heaters, furnaces, boilers, room heaters, clothes dryers and cooking appliances.

be installed and maintained in accordance with the IMC.

The appliance manufacturer's installation instructions and the IMC, *International Fuel Gas Code* (IFGC®) and IPC should be consulted in determining if an appliance or mechanical equipment is installed properly.

603.2 Removal of combustion products. Fuel-burning equipment and appliances shall be connected to an *approved* chimney or vent.

Exception: Fuel-burning equipment and appliances that are *labeled* for unvented operation.

❖ All fuel-burning appliances are required to discharge the products of combustion (flue gases) to an approved chimney or vent (see exception). Chimneys and vents must be capable of creating sufficient draft to properly vent the appliances served. Appliances that are listed and labeled for unvented operation such as domestic cooking appliances, room heaters and gas-fired refrigerators are exempt from this requirement.

Some components of the combustion products produced by fuel-burning appliances are toxic to humans and animals and can cause illness and death. The most harmful component of combustion products is

carbon monoxide (CO). Typical symptoms of CO poisoning are nausea, headache, dizziness, disorientation, confusion, rapid breathing, fatigue, flu-like symptoms and loss of consciousness. Exposure to CO is detrimental to health in all cases and can be lethal depending upon its concentration, the duration of exposure and the condition of the occupants. Combustion products must not be allowed to enter or leak into any occupiable or habitable space.

Chimneys and vents should be periodically inspected for deterioration or blockage that could impair their operation or allow combustion products to leak into the building. The appliance and equipment connections to a chimney or vent should also be inspected for deterioration, blockage or separation of connections.

Evidence of chimney or vent connector decay or rusting generally indicates improper draft. A venting system that creates insufficient draft or that is subject to backdraft (reverse flow) will experience accelerated deterioration because of the corrosive effect of the combustion products (flue gases). "Draft" is the pressure differential necessary to cause the flow of flue gases from the appliance or equipment to the chimney or vent and up to the outdoor atmosphere. Proper draft should be verified by a trained heating technician and should be checked each time the appliance or equipment is serviced.

The exception recognizes that a chimney or vent is not required for fuel-burning appliances listed and labeled for unvented operation. It is imperative that unvented appliances be operated and maintained in strict accordance with the manufacturer's instructions (see the IFGC for additional requirements for unvented room heaters).

603.3 Clearances. Required clearances to combustible materials shall be maintained.

- ❖ Proper clearances must be maintained between combustible materials and all heat-producing appliances and equipment. Adequate clearances are necessary to prevent the possible ignition of combustibles. The required clearances for the labeled appliances and equipment must be maintained in accordance with the manufacturer's requirements. Clearances for chimneys, vents and their connectors are also specified in the IMC and IFGC.

Frequently, an inspector will encounter combustible materials that have been placed too close to heat-producing appliances and equipment after the initial installation. Combustible storage, furnishings and remodeling are typical examples of such encounters. Most occupants are unaware of the hazard created when they store combustibles near or in contact with heat-producing appliances.

It is imperative that adequate clearances be maintained to avoid a potential fire hazard.

603.4 Safety controls. Safety controls for fuel-burning equipment shall be maintained in effective operation.

- ❖ All appliances and heating equipment are equipped with safety controls and devices intended to prevent fire or explosion in the event of equipment malfunction or abnormal operation. Typical controls and devices are as follows: temperature limit switches; pressure limit switches; pressure relief valves; low-water cut-offs; stack controls; pilot safety controls; draft monitoring controls and flame supervision controls. These controls are designed to prevent such conditions as overheating, excessive pressures, loss of heat transfer medium, loss of ignition source, loss of venting means and loss of main flame, among others.

All such safety controls must be periodically tested and inspected to verify their proper functioning and assess their reliability. Such testing and inspection should be performed by trained technicians when the appliances are serviced and cleaned.

An inoperative or otherwise malfunctioning safety control or device could create an extreme life safety hazard.

603.5 Combustion air. A supply of air for complete combustion of the fuel and for *ventilation* of the space containing the fuel-burning equipment shall be provided for the fuel-burning equipment.

- ❖ Combustion air includes the air necessary for complete combustion of the fuel, the air required for draft hood dilution and the air necessary for ventilation of the enclosure in which the appliance is located. A lack of combustion air will result in the incomplete combustion of fuel that, in turn, causes soot production, increased CO production, serious appliance malfunction and the risk of fire or explosion. The lack of draft hood dilution air will result in improper draft and appliance venting. The incomplete combustion of fuel and improper draft and venting compound each other and

greatly increase the risk of CO poisoning. The lack of ventilation air can result in excessive temperatures in the appliance enclosure, thereby introducing the risk of overheating the appliance and the risk of fire.

In existing structures, adequate combustion air provisions are often lacking or have been blocked, covered or otherwise defeated. Looking for proper combustion air supply is an important part of any inspection.

Fuel-burning equipment must be provided with combustion air in accordance with the IMC and IFGC.

603.6 Energy conservation devices. Devices intended to reduce fuel consumption by attachment to a fuel-burning appliance, to the fuel supply line thereto, or to the vent outlet or vent piping therefrom, shall not be installed unless *labeled* for such purpose and the installation is specifically *approved*.

- ❖ Energy-saving devices are required to bear the label of an approved testing agency, must be installed in accordance with the manufacturer's installation instructions and must be installed with the specific approval of the code official.

Improperly installed or applied energy-saving devices can adversely affect the operation of an appliance and cause it to become unsafe. A common example would be the improper installation of a flue damper or restrictor device in the chimney or vent connector of a fuel-burning appliance. The resultant installation could cause vent failure and subject the occupants to CO poisoning.

The installation of such devices would require a permit under the IFGC or IMC.

SECTION 604 ELECTRICAL FACILITIES

604.1 Facilities required. Every occupied building shall be provided with an electrical system in compliance with the requirements of this section and Section 605.

- ❖ This section prescribes the minimum electrical facilities that must be installed and maintained in all buildings used for human occupancy.

604.2 Service. The size and usage of appliances and equipment shall serve as a basis for determining the need for additional facilities in accordance with NFPA 70. *Dwelling units* shall be served by a three-wire, 120/240 volt, single-phase electrical service having a minimum rating of 60 amperes.

- ❖ This section prescribes the minimum size of the electrical service that must be provided for all structures. The electrical service consists of the service entrance conductors, metering devices, service grounding means, main disconnect, main overcurrent device and, typically, the distribution panelboard and all overcurrent devices. The size of the service is dependent upon the size of the load (demand). The total electrical usage or load must be determined as prescribed in NFPA 70. For dwelling units, the IRC also provides load calculation methods.

If the actual load exceeds the capacity of the service, this section is intended to prompt added capacity. In no case is the service for a dwelling unit permitted to be less than 60 amperes. Additionally, all dwelling unit services are to be 120/240 volt (three wire). The electrical usage in a typical dwelling unit today requires a service of at least a 60-ampere capacity to meet the occupants' needs. The requirement for a three-wire (120/240 volt) service is intended to allow the use of 240-volt appliances, such as clothes dryers, air conditioners and ranges. Additionally, appliances that operate at 240 volts consume less current, thereby conserving the remaining capacity of the service.

Overloading or constant loading to capacity subjects the service to excessive heating and component stress. Not only does this invite failure, but it also increases the risk of fire and creates the inconveniences of a nuisance circuit breaker tripping or fuse blowing. Nuisance fuse blowing, in turn, encourages the dangerous practice of replacing blown fuses with fuses of larger size. Overfusing is one of the largest potential causes of fire in any electrical system.

An inadequately sized service could also restrict the occupants' use of appliances by imposing nonsimultaneous use to avoid overloading the service.

A service determined to be undersized in accordance with this section and the requirements of NFPA 70 or the IRC should be enlarged as necessary.

604.3 Electrical system hazards. Where it is found that the electrical system in a structure constitutes a hazard to the *occupants* or the structure by reason of inadequate service, improper fusing, insufficient receptacle and lighting outlets, improper wiring or installation, *deterioration* or damage, or for similar reasons, the *code official* shall require the defects to be corrected to eliminate the hazard.

❖ Any electrical system deficiency or condition that is deemed hazardous to the occupants or to the structure must be abated to eliminate the hazard. Electrical system hazards include, but are not limited to, the following:

- Inadequate (undersized) service.
- Improper fusing and overcurrent protection.
- Insufficient receptacle distribution.
- Lack of sufficient lighting fixtures.
- Deteriorated, damaged, worn or otherwise defective wiring, equipment and appliances.
- Improperly installed or protected wiring methods.
- Lack of proper service or equipment grounding.
- Open splices in wiring.
- Inadequately supported devices, wiring or equipment.
- Any exposed conductors or components constituting a shock hazard.
- Missing or damaged device cover plates.
- Excessive use of extension cords.
- Overloaded receptacles or circuitry.

- Lack of ground fault circuit interrupter (GFCI) protection.

The most common hazard is improper overcurrent protection of conductors. Fuses and circuit breakers are devices designed to limit current flow to the maximum safe current-carrying capacity (ampacity) of a conductor. With rare exception, the conductor's current-carrying capacity (ampacity) must be greater than or at least equal to the ampere rating of the overcurrent device that supplies it. If a fuse or circuit breaker has a larger ampere-rating capacity than the conductors it is intended to protect, the device will permit the conductors to carry currents in excess of the conductors' capacity. The resultant overload will cause conductor heating, insulation deterioration and, possibly, a fire. The typical scenario involves an occupant who thinks he or she has "cured" a fuse-blowing problem by substituting fuses that are larger in size. In actuality, an extreme fire hazard has been created by eliminating the circuit conductor overcurrent protection. Type S tamper-proof fuses and adapters can be installed to prevent the occupants from installing the wrong size fuses.

604.3.1 Abatement of electrical hazards associated with water exposure. The provisions of this section shall govern the repair and replacement of electrical systems and equipment that have been exposed to water.

❖ The purpose of this section is to provide enforceable provisions to the code official that address hazards in electrical equipment that has been exposed to water. These provisions are derived from "Guidelines for Handling Water-damaged Electrical Equipment," published by the National Electrical Manufacturers Association (NEMA).

Section 604.3.1 defines the scope of the section as pertaining to electrical equipment and systems that have been exposed to water.

604.3.1.1 Electrical equipment. Electrical distribution equipment, motor circuits, power equipment, transformers, wire, cable, flexible cords, wiring devices, ground fault circuit interrupters, surge protectors, molded case circuit breakers, low-voltage fuses, luminaires, ballasts, motors and electronic control, signaling and communication equipment that have been exposed to water shall be replaced in accordance with the provisions of the *International Building Code*.

Exception: The following equipment shall be allowed to be repaired where an inspection report from the equipment manufacturer or *approved* manufacturer's representative indicates that the equipment has not sustained damage that requires replacement:

1. Enclosed switches, rated a maximum of 600 volts or less;
2. Busway, rated a maximum of 600 volts;
3. Panelboards, rated a maximum of 600 volts;
4. Switchboards, rated a maximum of 600 volts;
5. Fire pump controllers, rated a maximum of 600 volts;

6. Manual and magnetic motor controllers;
7. Motor control centers;
8. Alternating current high-voltage circuit breakers;
9. Low-voltage power circuit breakers;
10. Protective relays, meters and current transformers;
11. Low- and medium-voltage switchgear;
12. Liquid-filled transformers;
13. Cast-resin transformers;
14. Wire or cable that is suitable for wet locations and whose ends have not been exposed to water;
15. Wire or cable, not containing fillers, that is suitable for wet locations and whose ends have not been exposed to water;
16. Luminaires that are listed as submersible;
17. Motors;
18. Electronic control, signaling and communication equipment.

❖ Listed in this section are certain types of electrical equipment that, if exposed to conditions such as submersion in floodwater or inundation by fire sprinkler discharge, must be replaced. Protective components, such as circuit breakers, overload relays, low voltage or medium voltage protective devices within a switchgear assembly, and fuses are necessary for the safe operation of the distribution circuits and should be replaced when exposed to water. The ability of a transformer to operate as intended can be impaired by corrosion to the transformer core, flood debris deposited inside the transformer, or contamination of the transformer fluid. The exception to this section allows for repair of certain components of an electrical distribution system and certain electrical equipment provided that an inspection report from the equipment manufacturer or approved manufacturer's representative is submitted to the code official indicating that the level of damage to the equipment does not warrant replacement. Note that panelboards and switchboards listed in the exception refer to the boards, busses and related hardware, not the circuit breakers that they hold.

604.3.2 Abatement of electrical hazards associated with fire exposure. The provisions of this section shall govern the repair and replacement of electrical systems and equipment that have been exposed to fire.

❖ This section defines the scope of the section as pertaining to electrical equipment and systems that have been exposed to fire.

604.3.2.1 Electrical equipment. Electrical switches, receptacles and fixtures, including furnace, water heating, security system and power distribution circuits, that have been exposed to fire, shall be replaced in accordance with the provisions of the *International Building Code*.

Exception: Electrical switches, receptacles and fixtures that shall be allowed to be repaired where an inspection report from the equipment manufacturer or *approved*

manufacturer's representative indicates that the equipment has not sustained damage that requires replacement.

❖ This section lists the type of electrical components and equipment that must be replaced, where they have been exposed to fire. Note that the code does not elaborate on what is meant by "exposed to fire," but the assumption is that the equipment and components have been subjected to heat, smoke and/or direct flame impingement. The ability of electrical switches, receptacles and fixtures—including furnace, water heating, security system and power distribution circuits—to operate as intended can be impaired by exposure to fire. The exception to this section allows for repair of these components provided that an inspection report from the equipment manufacturer or approved manufacturer's representative is submitted to the code official indicating that the level of damage to the equipment does not warrant replacement.

SECTION 605 ELECTRICAL EQUIPMENT

605.1 Installation. Electrical equipment, wiring and appliances shall be properly installed and maintained in a safe and *approved* manner.

❖ This section provides necessary safety requirements for electrical equipment, wiring and appliances.

All electrical equipment, wiring and appliances must be properly installed and maintained in accordance with this code and NFPA 70 or the *International Residential Code*® (IRC®). It is the responsibility of the building owner or operator to provide and safely maintain the electrical facilities required herein.

605.2 Receptacles. Every *habitable space* in a dwelling shall contain not less than two separate and remote receptacle outlets. Every laundry area shall contain not less than one grounding-type receptacle or a receptacle with a ground fault circuit interrupter. Every *bathroom* shall contain not less than one receptacle. Any new *bathroom* receptacle outlet shall have ground fault circuit interrupter protection. All receptacle outlets shall have the appropriate faceplate cover for the location.

❖ Every room or space in a dwelling unit that is used for living, sleeping, eating or cooking must be provided with at least two separate receptacle outlets. Such outlets must be as remote from each other as practicable. The quantity of receptacles required by this section is far less than that required by NFPA 70 and the IRC for new construction, but is considered to be a reasonable compromise for existing structures.

This provision is intended to minimize or eliminate the use of extension cords. The amount of electrical current that any extension cord can safely conduct is limited by the size of its conductors. This principle is not understood by much of the general population. As a result, extension cords are commonly overloaded by the connection of either too many appliances or any loads in excess of the cord's capacity. Overloading

extension cords causes an increase in the conductor's temperature. This increase can exceed the temperature rating of the conductor's insulation, causing it to melt, decompose or burn. The burning insulation can easily start a fire, and the resultant loss of conductor insulation can cause a short circuit or ground fault that can also act as a source of ignition. The buildup of heat in an extension cord is often made worse by excessive cord length and by the insulating effect of rugs that often cover these cords. Extension cords are much more susceptible to physical damage than permanent wiring methods. Damage to cords increases the likelihood of shorts, ground faults and poor connections, all of which can cause a fire. In addition to the fire hazard, extension cords pose a tripping hazard to the occupants and, when damaged, pose an electric shock hazard.

Every laundry room is required to have at least one grounded-type receptacle outlet. Appliances typically used in a laundry room require a grounding conductor for safe operation. Grounding appliances reduces the risk of electrical shock, which can occur when an occupant comes in contact with a defective appliance. This section appears to allow a GFCI-protected receptacle outlet in lieu of a grounded-type receptacle; however, this is only allowed for very limited circumstances by NFPA 70. As a general rule, GFCI protection is not a substitute for grounding-type receptacles. Where grounding-type receptacles cannot be installed, a GFCI receptacle offers a measure of protection from electrical shock. Adding GFCI protection to existing receptacle outlets is generally simple and inexpensive. Where existing boxes are small or crowded, surface extension boxes can be added to make room or GFCI circuit breakers can be used for the branch circuit.

Every bathroom must have at least one receptacle outlet to accommodate the many grooming and personal hygiene appliances that are commonly used in bathrooms. This requirement also applies to toilet rooms with lavatories that do not contain bathing fixtures, as they could also be used for grooming and personal hygiene purposes. If a bathroom receptacle outlet has to be installed in order to achieve compliance with this section, this code, NFPA 70 and the IRC, all would require GFCI protection for such outlet.

To protect occupants from accidental contact with electrical wiring or components, appropriate faceplates are required for all receptacles.

The installation of a receptacle where one previously did not exist is considered new work and must comply with the provisions of NFPA 70 or the IRC.

605.3 Luminaires. Every public hall, interior stairway, *toilet room*, kitchen, *bathroom*, laundry room, boiler room and furnace room shall contain not less than one electric luminaire. Pool and spa luminaires over 15 V shall have ground fault circuit interrupter protection.

- ❖ Permanent lighting outlets must be provided to illuminate hallways, stairways, kitchens, bathrooms and

laundry, toilet, furnace and boiler rooms. The activities in such spaces are not compatible with portable lighting such as floor or table lamps; therefore, permanent lighting outlets (fixtures/luminaires) are required. In all other spaces, it is assumed that the occupants will provide lamps or other portable fixtures to meet their artificial lighting needs when natural lighting does not exist. Adequate lighting is necessary for occupants to traverse stairs and corridors without undue hazard, to allow for the proper use of plumbing fixtures and appliances, and to allow for inspection and servicing of appliances.

Furnace and boiler rooms are defined terms in the IMC, and the term "furnace room" also applies to a room containing a water heater.

Lighting related to pools and spas is required to be protected with GFCIs when it is over 15 volts. Providing this protection in these wet locations results in safer conditions for the users.

605.4 Wiring. Flexible cords shall not be used for permanent wiring, or for running through doors, windows, or cabinets, or concealed within walls, floors, or ceilings.

- ❖ The use of flexible cords in place of permanent fixed wiring is typically an indication of inadequate electrical wiring capacity or incompatible demands. Physical damage to flexible cords caused by concealment or improper or inadequate maintenance could result in localized resistance heating, shorts and ground faults.

The amount of electrical current that any flexible cord can safely conduct is limited by the size of its conductor, its insulation type and its environment. This principle is often not understood by the general public. As a result, extension cords are commonly overloaded by connecting appliances and other loads in excess of the cord's capacity.

Overloading of flexible cords causes an increase in the conductor's temperature. This increase in temperature can exceed the temperature rating of the conductor insulation, causing it to melt, decompose or burn. The burning insulation can ignite other combustible materials. The resulting loss of conductor insulation can also cause a short circuit or ground fault that can act as a source of ignition. The buildup of heat in an extension cord is often made worse by excessive cord length and by the insulating effect of rugs that often cover extension cords. Flexible cords are much more susceptible to physical damage than permanent wiring. Damage to flexible cords increases the likelihood of shorts and poor connections, both of which can cause a fire.

In addition to the fire hazard, extension cords pose a tripping hazard to the occupants and, when damaged, can pose an electrical shock hazard. Securing flexible cords to a wall baseboard, door jambs, etc., with nails, staples or other fasteners to eliminate tripping hazards can create another dangerous condition by pinching or piercing the cord and causing shorts or faults that could lead to ignition.

SECTION 606

ELEVATORS, ESCALATORS AND DUMBWAITERS

606.1 General. Elevators, dumbwaiters and escalators shall be maintained in compliance with ASME A17.1. The most current certificate of inspection shall be on display at all times within the elevator or attached to the escalator or dumbwaiter, be available for public inspection in the office of the building operator or be posted in a publicly conspicuous location approved by the code official. The inspection and tests shall be performed at not less than the periodic intervals listed in ASME A17.1, Appendix N, except where otherwise specified by the authority having jurisdiction.

- ❖ Elevators, escalators and dumbwaiters must be maintained in compliance with ASME A17.1, *Safety Code for Elevators and Escalators*. ASME A17.1 contains requirements for periodic inspection and testing that are necessary to detect any possible defects. The safety of the occupants is dependent upon routine safety checks performed by competent elevator service technicians.

Displaying the certificate of inspection is an aid to building inspectors and provides the users of the machinery with some confidence in its safety. This requirement will also encourage the owner to obtain the required inspections. Additionally, the option to post the certificate in a publicly conspicuous location approved by the code official allows a building operator to request that the certificate be placed in a location other than in the elevator or on the escalator or dumbwaiter, provided that location is publicly conspicuous and approved by the code official.

606.2 Elevators. In buildings equipped with passenger elevators, not less than one elevator shall be maintained in operation at all times when the building is occupied.

Exception: Buildings equipped with only one elevator shall be permitted to have the elevator temporarily out of service for testing or servicing.

- ❖ If a building has more than one passenger elevator, at least one such elevator must be kept operational during all periods of building occupancy. As indicated in the exception, a building with only one elevator is allowed to have its elevator temporarily out of service only for the purpose of maintenance, repair or testing.

SECTION 607
DUCT SYSTEMS

607.1 General. Duct systems shall be maintained free of obstructions and shall be capable of performing the required function.

- ❖ Exhaust ducts for toilet rooms, bathrooms, kitchens and clothes dryers require maintenance to prevent blockages and obstructions that can cause appliance/equipment malfunction, poor performance and potential fire hazards. Heating, cooling and ventilation ducts also need to be maintained to allow proper airflow, to maintain proper HVAC equipment operation and to help eliminate air-borne contaminants that could cause

health hazards. Ducts can collect hazardous quantities of grease, lint, dust and debris that could be potential fire hazards. Duct systems of all types are typically ignored by building owners and occupants and thus receive little or no maintenance.

Bibliography

The following resource materials were used in the preparation of the commentary for this chapter of the code:

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- NFPA 70-14, *National Electrical Code*. Quincy, MA: National Fire Protection Association, 2013.