Flood-Resistant Provisions of the 2024 International Codes®

This document contains excerpts of the flood-resistant provisions from the 2024 editions of the International Codes® (I-Codes®) and was prepared by FEMA with permission from the International Code Council (ICC).

Read I-Codes online: https://codes.iccsafe.org/codes/i-codes

Introduction

This document contains excerpts of the flood-resistant provisions from the 2024 editions of the following I-Codes and a summary of changes made to the flood provisions from the 2021 I-Codes:

- International Building Code® (IBC)
- International Residential Code® (IRC)
- International Existing Building Code® (IEBC)
- International Mechanical Code® (IMC)
- International Plumbing Code® (IPC)
- International Fuel Gas Code® (IFGC)
- International Fire Code® (IFC)
- International Swimming Pool and Spa Code® (ISPSC)
- International Private Sewage Disposal Code® (IPSDC)
- International Code Council Performance Code® (ICCPC)

FEMA

Summary of Changes to Flood Provisions from 2021 to 2024 Editions

INTERNATIONAL BUILDING CODE

- Secs. 110.3.12.1 and 1612.4: Added a requirement to document the elevation of dry floodproofing, if applicable, as part of final inspection documentation.
- Secs. 1612.2 and 3001.6: Clarified that elevators, escalators, and conveying systems in flood hazard areas must comply with all design loading criteria, including ASCE 24 and ASME A17.1/CSA B44.
- Secs. 1612.2, 3103.6.1.3 and 3103.8: Added an exception that temporary structures in flood hazard areas need not be designed for flood loads if controlled occupancy procedures are met.
- Sec. 1612.4: Added alternative expression of breakaway wall loading requirements in terms of resistance to ultimate load.
- Sec. 3114: Eliminated provision that allowed public restroom buildings to be constructed below the minimum elevation requirements in flood hazard areas.
- Appendix G Sec. G109.1: Modified reference point for elevation requirement for manufactured homes in flood hazard areas, changing the reference point from the lowest floor to the top of the foundation.
- Appendix G Sec. G112.1: Added exceptions allowing detached garages and detached accessory storage structures in flood hazard areas to have floors below the elevations required by ASCE 24 provided they meet certain size and use limitations.

INTERNATIONAL RESIDENTIAL CODE

- Secs. R104.3.1 and Ch. 2: Moved definitions of *substantial improvement* and *substantial damage* from the body of the determination requirement to the definitions chapter.
- Secs. R301.2.4 and R306.1: Clarified that substantially improved or substantially damaged dwellings must comply with flood provisions when they are located in whole or in part in flood hazard areas.
- Sec. R306: Section R322 Flood-Resistant Construction was renumbered to Section R306 and references were changed throughout the I-Codes.
- Secs. R306.2.1 and Sec. R306.3.2: Added exceptions allowing detached garages and detached accessory structures in flood hazard areas to have floors below the required flood elevation provided they meet certain size and use limitations and construction requirements.
- Secs. R306.2.2 and R306.3.5: Added exception to allow utility chases and elevator shafts in flood hazard areas to be constructed without flood openings or breakaway walls.

- Sec. R306.3.2: Clarified where to measure the bottom of the lowest horizontal structural member for backfilled stem wall foundations in Coastal A Zones.
- Sec. R306.3.3: Added requirement for pilings and columns to be designed in accordance with ASCE 24 and for flood and wave loads to be determined in accordance with ASCE 7.
- Sec. R306.3.5: Added alternative expression of breakaway wall loading requirements in terms of resistance to ultimate load.
- Sec. P3101.5: Clarified that reference to Sec. R306.3 includes designated Coastal A Zones.
- Appendix BI and Appendix BJ Secs. BI101.2 and BJ101.3: Added references to flood-resistant requirements of Sec. R306 for light straw-clay infill and strawbale walls.

INTERNATIONAL EXISTING BUILDING CODE

- Sec. 109.3.10: Added a requirement to document the elevation of dry floodproofing, if applicable, as part of final inspection documentation.
- Ch. 2: Added the definition of lowest floor.
- Sec. 502.1.2, Sec. 502.2, 1101.2, 1103.3 and 1303.1: Clarified requirement that additions must not create or extend nonconformities of the existing building.
- Secs. 502.2, 1103.3 and 1303.1: Added a requirement that raised or vertically extended foundations must comply with the flood-resistant requirements for new construction, regardless of substantial improvement determination.
- Secs. 502.2, 1103.3 and 1303.1: Added lowest floor elevation requirements for additions that do not constitute substantial improvement.

INTERNATIONAL MECHANICAL CODE

- Secs. 104.2.4.1 and 104.3.1: Added administrative sections that mirror those in the IBC.

INTERNATIONAL PLUMBING CODE

- Secs. 104.2.4.1 and 104.3.1: Added administrative sections that mirror those in the IBC.

INTERNATIONAL FUEL GAS CODE

- Secs. 104.2.4.1 and 104.3.1: Added administrative sections that mirror those in the IBC.

INTERNATIONAL FIRE CODE

- Sec. 104.2.4.2: Added section granting authority to the fire code official to allow conditions that would constitute code violations in order to protect life and property in preparation for, during, and after a natural disaster event.

INTERNATIONAL SWIMMING POOL AND SPA CODE

- Secs. 104.2.4.1 and 104.3.1: Added administrative sections that mirror those in the IBC.
- Sec. 304.4: Added exception to allow pool, spa, and water feature equipment in flood hazard areas to be located below the required elevation, provided the equipment is elevated to the highest extent practical, anchored to resist flood loads, and is watertight.

INTERNATIONAL PRIVATE SEWAGE DISPOSAL CODE

- Secs. 104.2.4.1 and 104.3.1: Added administrative sections that mirror those in the IBC.

2024 International Building Code® (IBC)
Compilation of flood-resistant provisions prepared by FEMA

CHAPTER 1 SCOPE AND ADMINISTRATION

[A] 101.2 Scope. The provisions of this code shall apply to the construction, *alteration*, relocation, enlargement, replacement, *repair*, equipment, use and occupancy, location, maintenance, removal and demolition of every *building* or *structure* or any appurtenances connected or attached to such *buildings* or *structures*.

> **Exception:** Detached one- and two-family *dwellings* and *townhouses* not more than three *stories above grade plane* in height with a separate *means of egress*, and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the *International Residential Code*.

[A] 101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

[A] 104.2.4.1 [Modifications] Flood hazard areas. The *building official* shall not grant modifications to any provision required in *flood hazard areas* as established by Section 1612.3 unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the *site* render the elevation standards of Section 1612 inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the *lot* undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the *flood* hazard.

5. Submission to the applicant of written notice specifying the difference between the *design flood elevation* and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the *design flood elevation* increases risks to life and property.

[A] 104.3.1 [Applications and permits] Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, *repair, alteration, addition* or other improvement of *existing buildings* or *structures* located in *flood hazard areas*, the *building official* shall determine if the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*. Where the *building official* determines that the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*, and where required by this code, the *building official* shall require the building to meet the requirements of Section 1612 or Section R306 of the *International Residential Code*, as applicable.

[A] 104.7 Official records. The *building official* shall keep official records as required by Sections 104.7.1 through 104.7.5. Such official records shall be retained for not less than 5 years or for as long as the building or *structure* to which such records relate remains in existence, unless otherwise provided by other regulations.

[A] 107.2.6 [Construction documents] Site plan. The *construction documents* submitted with the application for *permit* shall be accompanied by a site plan showing to scale the size and location of new construction and *existing structures* on the *site*, distances from *lot lines*, the established street grades and the proposed finished grades and, as applicable, *flood hazard areas*, *floodways*, and *design flood elevations*; and it shall be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan shall show construction to be demolished and the location and size of *existing structures* and construction that are to remain on the *site* or plot. The *building official* is authorized to waive or modify the requirement for a site plan where the application for *permit* is for *alteration* or *repair* or where otherwise warranted.

[A] 107.2.6.1 Design flood elevations. Where *design flood elevations* are not specified, they shall be established in accordance with Section 1612.3.1.

[A] 110.3.3 [Required inspections] Lowest floor elevation. In *flood hazard areas*, upon placement of the *lowest floor*, including the *basement*, and prior to further vertical construction, the elevation certification required in Section 1612.4 or the *International Residential Code*, as applicable, shall be submitted to the *building official*.

[A] 110.3.12.1 [Final inspection] Flood hazard documentation. If located in a *flood hazard area*, documentation of the elevation of the *lowest floor* or the elevation of dry floodproofing, if applicable, as required in Section 1612.4 shall be submitted to the *building official* prior to the final inspection.

SECTION 202 DEFINITIONS

[A] ADDITION. An extension or increase in floor area, number of *stories* or height of a *building* or *structure*.

[A] ALTERATION. Any construction or renovation to an *existing structure* other than *repair* or *addition*.

[BS] BASE FLOOD. The *flood* having a 1-percent chance of being equaled or exceeded in any given year.

[BS] BASE FLOOD ELEVATION. The elevation of the *base flood*, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the *Flood Insurance Rate Map (FIRM).*

[BG] BASEMENT. A *story* that is not a *story above grade plane* (see "*Story above grade plane*"). This definition of "Basement" does not apply to the provisions of Section 1612 for *flood loads*.

[BS] BASEMENT (for flood loads). The portion of a *building* having its floor subgrade (below ground level) on all sides. This definition of "Basement" is limited in application to the provisions of Section 1612.

[A] BUILDING. Any *structure* utilized or intended for supporting or sheltering any occupancy.

[BS] COASTAL A ZONE. Area within a *special flood hazard area*, landward of a V zone or landward of an open coast without mapped *coastal high-hazard areas*. In a *coastal A zone*, the principal source of *flooding* must be astronomical tides, storm surges, seiches or tsunamis, not riverine *flooding*. During the *base flood* conditions, the potential for breaking wave height shall be greater than or equal to 1 ½ feet (457 mm). The inland limit of the *coastal A zone* is (a) the *Limit of Moderate Wave Action* if delineated on a *FIRM*, or (b) designated by the authority having *jurisdiction*.

[BS] COASTAL HIGH-HAZARD AREA. Area within the *special flood hazard area* extending from offshore to the inland limit of a primary dune along an open coast and any other area that is subject to high-velocity wave action from storms or seismic sources, and shown on a *Flood Insurance Rate Map (FIRM)* or other flood hazard map as velocity Zone V, VO, VE or V1-30.

[BS] DANGEROUS. Any *building, structure* or portion thereof that meets any of the conditions described below shall be deemed *dangerous*:

1. The *building* or *structure* has collapsed, has partially collapsed, has moved off its foundation or lacks the necessary support of the ground.
2. There exists a significant risk of collapse, detachment or dislodgment of any portion, member, appurtenance or ornamentation of the building or structure under permanent, routine, or frequent *loads*; under actual loads already in effect; or under snow, wind, rain, *flood*, earthquake aftershock, or other environmental loads when such *loads* are imminent.

[BS] DESIGN FLOOD. The *flood* associated with the greater of the following two areas:

1. Area with a flood plain subject to a 1-percent or greater chance of *flooding* in any year.
2. Area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

[BS] DESIGN FLOOD ELEVATION. The elevation of the "*design flood*," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

[BS] DRY FLOODPROOFING. A combination of design modifications that results in a *building* or *structure*, including the attendant utilities and equipment and sanitary *facilities*, being watertight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist *loads* as identified in ASCE 7.

[BS] ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, tornadoes, snow or earthquakes.

[A] EXISTING BUILDING. A *building* erected prior to the date of adoption of the appropriate code, or one for which a legal building *permit* has been issued.

[BS] EXISTING STRUCTURE. A *structure* erected prior to the date of adoption of the appropriate code, or one for which a legal building *permit* has been issued.

[BS] FLOOD DAMAGE-RESISTANT MATERIALS. Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic *repair*.

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of *flooding* in any year.
2. The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

[BS] FLOOD INSURANCE RATE MAP (FIRM). An official map of a community on which the Federal Emergency Management Agency (FEMA) has delineated both the *special flood hazard areas* and the risk premium zones applicable to the community.

[BS] FLOOD INSURANCE STUDY. The official report provided by the Federal Emergency Management Agency containing the *Flood Insurance Rate Map (FIRM),* the Flood Boundary and *Floodway* Map (FBFM), the water surface elevation of the *base flood* and supporting technical data.

[BS] FLOOD or FLOODING. A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

[BS] FLOODWAY. The channel of the river, creek or other watercourse and the adjacent land areas that must be reserved in order to discharge the *base flood* without cumulatively increasing the water surface elevation more than a designated height.

[A] HISTORIC BUILDINGS. Any *building* or *structure* that is one or more of the following:

1. Listed or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.

3. Certified as a contributing resource within a National Register, state designated or locally designated historic district.

[BS] LIMIT OF MODERATE WAVE ACTION. Line shown on FIRMs to indicate the inland limit of the 1 ½-foot (457 mm) breaking wave height during the *base flood*.

[BS] LOWEST FLOOR. The *lowest floor* of the lowest enclosed area, including *basement*, but excluding any unfinished or flood-resistant enclosure, usable solely for vehicle parking, *building* access or limited storage provided that such enclosure is not built so as to render the *structure* in violation of Section 1612.

[A] REPAIR. The reconstruction, replacement or renewal of any part of an *existing building* for the purpose of its maintenance or to correct damage.

[BS] RISK CATEGORY. A categorization of *buildings* and *other structures* for determination of *flood*, wind, tornado, snow, ice and earthquake *loads* based on the risk associated with unacceptable performance.

[BS] SPECIAL FLOOD HAZARD AREA. The land area subject to flood hazards and shown on a *Flood Insurance Rate Map* or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE or V1-30.

[BS] SUBSTANTIAL DAMAGE. Damage of any origin sustained by a *structure* whereby the cost of restoring the *structure* to its before-damaged condition would equal or exceed 50 percent of the market value of the *structure* before the damage occurred.

[BS] SUBSTANTIAL IMPROVEMENT. Any *repair*, reconstruction, rehabilitation, *alteration*, *addition* or other improvement of a *building* or *structure*, the cost of which equals or exceeds 50 percent of the market value of the *structure* before the improvement or *repair* is started. If the *structure* has sustained *substantial damage*, any *repairs* are considered substantial improvement regardless of the actual *repair* work performed. The term does not, however, include either:

1. Any project for improvement of a *building* required to correct existing health, sanitary or safety code violations identified by the *building official* and that are the minimum necessary to assure safe living conditions.
2. Any *alteration* of a historic *structure* provided that the *alteration* will not preclude the *structure*'s continued designation as a historic *structure*.

[BS] TEMPORARY STRUCTURE. Any *building* or *structure* erected for a period of 180 days or less to support *temporary events*. *Temporary structures* include a range of *structure* types (*public-occupancy temporary structures*, temporary *special event structures*, *tents*, umbrellas and other membrane *structures*, *relocatable buildings*, temporary *bleachers*, etc.) for a range of purposes (storage, equipment protection, dining, workspace, assembly, etc.).

CHAPTER 8 INTERIOR FINISHES

802.4 Applicability. For *buildings* in *flood hazard areas* as established in Section 1612.3, *interior finishes*, *trim* and *decorative materials* below the elevation required by Section 1612 shall be *flood-damage-resistant materials*.

CHAPTER 11 ACCESSIBILITY

1108.7.5 [General exceptions] Flood hazard areas. *Type A units* and *Type B units* shall not be required for *buildings* without elevator service that are located in *flood hazard areas* as established in Section 1612.3, where the minimum required elevation of the *lowest floor* or lowest supporting horizontal structural member, as applicable, results in all of the following:

1. A difference in elevation between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet (15,240 mm) exceeding 30 inches (762 mm).
2. A slope exceeding 10 percent between the minimum required floor elevation at the primary entrances and vehicular and pedestrian arrival points within 50 feet (15,240 mm).

Where such arrival points are not within 50 feet (15,240 mm) of the primary entrances, the closest arrival points shall be used.

CHAPTER 12 INTERIOR ENVIRONMENT

1202.4.4 [Under-floor ventilation] Flood hazard areas. For *buildings* in *flood hazard areas* established in Section 1612.3, the openings for under-floor ventilation shall be deemed as meeting the flood opening requirements of ASCE 24 provided that the ventilation openings are designed and installed in accordance with ASCE 24.

CHAPTER 14 EXTERIOR WALLS

[BS] 1402.9 [Performance Requirements] Flood resistance. For *buildings* in *flood hazard areas* as established in Section 1612.3, *exterior walls* extending below the elevation required by Section 1612 shall be constructed with *flood-damage-resistant materials*.

[BS] 1402.10 [Performance Requirements] Flood resistance for coastal high-hazard areas and coastal A zones. For *buildings* in *coastal high-hazard areas* and *coastal A zones* as established in Section 1612.3, electrical, mechanical and plumbing system components shall not be mounted on or penetrate through *exterior walls* that are designed to break away under *flood loads*.

CHAPTER 16 STRUCTURAL DESIGN REQUIREMENTS

1602.1 Notations. *[partial shown]*

F_a = Flood load in accordance with Chapter 5 of ASCE 7.

1603.1 [Construction Documents] General. *Construction documents* shall show the material, size, section and relative locations of structural members with floor levels, column centers and offsets dimensioned. The design *loads* and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 shall be indicated on the *construction documents*.

> **Exception:** *Construction documents* for *buildings* constructed in accordance with the *conventional light-frame construction* provisions of Section 2308 shall indicate the following structural design information:

1. Floor and roof dead and live loads.
2. Ground snow load, p_g, and *allowable stress design* ground snow load, $p_{g(asd)}$.
3. Basic wind speed, *V*, miles per hour (mph) (m/s) and *allowable stress design* wind speed, V_{asd}, as determined in accordance with Section 1609.3.1 and wind exposure.
4. *Seismic design category* and *site class*.
5. Flood design data, if located in *flood hazard areas* established in Section 1612.3.
6. Design load-bearing values of soils.
7. Rain load data.

1603.1.7 [Construction Documents] Flood design data. For *building*s located in whole or in part in *flood hazard areas* as established in Section 1612.3, the documentation pertaining to design, if required in Section 1612.4, shall be included and the following information, referenced to the datum on the community's *Flood Insurance Rate Map (FIRM)*, shall be shown, regardless of whether *flood load*s govern the design of the *building*:

1. *Flood design* class assigned according to ASCE 24.
2. In *flood hazard areas* other than *coastal high hazard areas* or *coastal A zone*s, the elevation of the proposed *lowest floor*, including the basement.
3. In *flood hazard areas* other than *coastal hazard areas* or *coastal A zone*s, the elevation to which any nonresidential *building* will be dry floodproofed.
4. In *coastal high hazard areas* and *coastal A zone*s, the proposed elevation of the bottom of the lowest horizontal structural member of the *lowest floor*, including the basement.

1605.1 [Load Combinations] General.

*Building*s and *other structure*s and portions thereof shall be designed to resist the strength load combinations specified in ASCE 7, Section 2.3, the *allowable stress design* load combinations specified in ASCE 7, Section 2.4, or the alternative *allowable stress design* load combinations of Section 1605.2.

Exceptions:

1. The modifications to load combinations of ASCE 7 Section 2.3, ASCE 7 Section 2.4, and Section 1605.2 specified in ASCE 7 Chapters 18 and 19 shall apply.
2. Where the *allowable stress design* load combinations of ASCE 7 Section 2.4 are used, flat roof snow *load*s of 45 pounds per square foot (2.15 kN/m^2) and *roof live load*s of 30 pounds per square foot (1.44 kN/m^2) or less need not be combined with seismic load. Where flat roof snow *load*s exceed 45 pounds per square foot (2.15 kN/m^2), 15 percent shall be combined with seismic loads.
3. Where the *allowable stress design* load combinations of ASCE 7 Section 2.4 are used, crane hook loads need not be combined with *roof live load*s or with more than three-fourths of the snow load or one-half of the wind loads.

4. Where design for tornado loads is required, the alternative *allowable stress design* load combinations of Section 1605.2 shall not apply when tornado loads govern the design.

1610.2 [Soil loads and hydrostatic pressure] Uplift loads on floor and foundations. Basement floors, slabs on ground, foundations, and similar approximately horizontal elements below grade shall be designed to resist uplift *load*s where applicable. The upward pressure of water shall be taken as the full hydrostatic pressure applied over the entire area. The hydrostatic *load* shall be measured from the underside of the element being evaluated. The design for upward *load*s caused by expansive soils shall comply with Section 1808.6.

SECTION 1612 FLOOD LOADS

1612.1 General. Within *flood hazard area*s as established in Section 1612.3, all new construction of *building*s, *structure*s and portions of *building*s and *structure*s, including *substantial improvement* and restoration of *substantial damage* to *building*s and *structure*s, shall be designed and constructed to resist the effects of flood hazards and *flood load*s. For *building*s that are located in more than one *flood hazard area*, the provisions associated with the most restrictive *flood hazard area* shall apply.

1612.2 Design and construction. The design and construction of *building*s and *structure*s located in *flood hazard area*s, including *coastal high hazard area*s and *coastal A zone*s, shall be in accordance with Chapter 5 of ASCE 7 and ASCE 24. Elevators, escalators, conveying systems and their components shall conform to ASCE 24 and ASME A17.1/CSA B44 as applicable.

Exception: *Temporary structure*s complying with Section 3103.6.1.3.

1612.3 Establishment of flood hazard areas. To establish *flood hazard area*s, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The *Flood Insurance Study* for **[INSERT NAME OF JURISDICTION]**," dated **[INSERT DATE OF ISSUANCE]**, as amended or revised with the accompanying *Flood Insurance Rate Map (FIRM)* and Flood Boundary and *Floodway* Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

1612.3.1 Design flood elevations. Where *design flood elevation*s are not included in the *flood hazard area*s established in Section 1612.3, or where *floodway*s are not designated, the *building official* is authorized to require the applicant to do one of the following:

1. Obtain and reasonably utilize any *design flood elevation* and *floodway* data available from a federal, state or other source.
2. Determine the *design flood elevation* or *floodway* in accordance with accepted hydrologic and hydraulic engineering practices used to define *special flood hazard area*s. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice.

1612.3.2 Determination of impacts. In riverine *flood hazard area*s where *design flood elevation*s are specified but *floodway*s have not been designated, the applicant shall provide a *floodway* analysis that demonstrates that the

proposed work will not increase the *design flood elevation* more than 1 foot (305 mm) at any point within the *jurisdiction* of the applicable governing authority.

1612.4 Flood hazard documentation. The following documentation shall be prepared and sealed by a *registered design professional* and submitted to the *building official*:

1. For construction in *flood hazard areas* other than *coastal high hazard areas* or *coastal A zones*:
    1.1 The elevation of the *lowest floor*, including the basement, as required by the *lowest floor* elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.12.1.
    1.2 For fully enclosed areas below the *design flood elevation* where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.7.2.1 of ASCE 24, *construction documents* shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.7.2.2 of ASCE 24.
    1.3 For *dry floodproofed* nonresidential *buildings*, *construction documents* shall include a statement that the *dry floodproofing* is designed in accordance with ASCE 24 and shall include the *flood* emergency plan specified in Chapter 6 of ASCE 24.
    1.4 For dry floodproofed nonresidential buildings, the elevation to which the building is dry floodproofed as required for the final inspection in Section 110.3.12.1.
2. For construction in *coastal high hazard areas* and *coastal A zones*:
    2.1 The elevation of the bottom of the lowest horizontal structural member as required by the *lowest floor* elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.12.1.
    2.2 *Construction documents* shall include a statement that the *building* is designed in accordance with ASCE 24, including that the pile or column foundation and *building* or *structure* to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and *flood loads* acting simultaneously on all building components, and other *load* requirements of Chapter 16.
    2.3 For breakaway walls designed to have a resistance of more than 20 psf (0.96 kN/m^2) determined using *allowable stress design* or a resistance to an ultimate load of more than 33 pounds per square foot (1.58 kN/m^2), *construction documents* shall include a statement that the breakaway wall is designed in accordance with ASCE 24.
    2.4 For breakaway walls where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.7.2.1 of ASCE 24, *construction documents* shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.7.2.2 of ASCE 24.

CHAPTER 18 SOILS AND FOUNDATIONS

1801.1 Scope. The provisions of this chapter shall apply to *building* and foundation systems.

1804.4 [Excavation, Grading and Fill] Site grading. The ground immediately adjacent to the foundation shall be sloped away from the *building* at a slope of not less than one unit vertical in 20 units horizontal (5-percent slope) for

a minimum distance of 10 feet (3048 mm) measured perpendicular to the face of the wall. If physical obstructions or *lot lines* prohibit 10 feet (3048 mm) of horizontal distance, a 5-percent slope shall be provided to an *approved* alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped not less than 2 percent where located within 10 feet (3048 mm) of the *building* foundation. Impervious surfaces within 10 feet (3048 mm) of the *building* foundation shall be sloped not less than 2 percent away from the *building*.

Exceptions:

1. Where climatic or soil conditions warrant, the slope of the ground away from the *building* foundation shall be permitted to be reduced to not less than one unit vertical in 48 units horizontal (2-percent slope).
2. Impervious surfaces shall be permitted to be sloped less than 2 percent where the surface is a door landing or ramp that is required to comply with Section 1010.1.4, 1012.3 or 1012.6.1.

The procedure used to establish the final ground level adjacent to the foundation shall account for additional settlement of the backfill.

1804.5 [Excavation, Grading and Fill] Grading and fill in flood hazard areas. In *flood hazard areas* established in Section 1612.3, grading, fill, or both, shall not be *approved*:

1. Unless such fill is placed, compacted and sloped to minimize shifting, slumping and erosion during the rise and fall of *flood* water and, as applicable, wave action.
2. In *floodways*, unless it has been demonstrated through hydrologic and hydraulic analyses performed by a *registered design professional* in accordance with standard engineering practice that the proposed grading or fill, or both, will not result in any increase in *flood* levels during the occurrence of the *design flood*.
3. In *coastal high hazard areas*, unless such fill is conducted or placed to avoid diversion of water and waves toward any *building* or *structure*.
4. Where *design flood elevations* are specified but *floodways* have not been designated, unless it has been demonstrated that the cumulative effect of the proposed *flood hazard area* encroachment, when combined with all other existing and anticipated *flood hazard area* encroachment, will not increase the *design flood elevation* more than 1 foot (305 mm) at any point.

1805.1.2.1 [Under-floor space] Flood hazard areas. For *buildings* and *structures* in *flood hazard areas* as established in Section 1612.3, the finished ground level of an under-floor space such as a crawl space shall be equal to or higher than the outside finished ground level on one side or more.

Exception: Under-floor spaces of Group R-3 *buildings* that meet the requirements of FEMA TB 11.

CHAPTER 27 ELECTRICAL

[F] 2702.1.8 Group I-2 Occupancies. In Group I-2 occupancies located in *flood hazard areas* established in Section 1612.3, where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

CHAPTER 30 ELEVATORS AND CONVEYING SYSTEMS

3001.3 Referenced standards. The design, construction, installation, *alteration*, *repair* and maintenance of elevators and conveying systems and their components shall conform to the applicable standard specified in Table 3001.3 and Section 3001.6.

3001.6 Structural Design. All interior and exterior elevators, escalators, and other conveying systems and their components shall comply with all applicable design loading criteria in Chapter 16, including wind, flood and seismic loads established in Sections 1609, 1612 and 1613.

CHAPTER 31 SPECIAL CONSTRUCTION

3102.7 [Membrane Structures] Engineering design. The *structure* shall be designed and constructed to sustain *dead loads*; *loads* due to tension or inflation; *live loads* including wind, snow or *flood* and seismic loads and in accordance with Chapter 16.

3103.6.1.3 [Temporary Structures] Flood loads. *Public-occupancy temporary structures* need not be designed for flood loads specified in Section 1612. Controlled occupancy procedures in accordance with Section 3103.8 shall be implemented.

3103.8 Controlled occupancy procedures. Where controlled occupancy procedures are required to be implemented for *public-occupancy temporary structures* in Section 3103.6.1, the procedures shall comply with this section and ANSI ES1.7. An operations management plan in accordance with ANSI E1.21 shall be submitted to the *building official* for approval as a part of the *permit* documents. In addition, the operations management plan shall include an emergency action plan that documents the following information, where applicable: *[partial shown]*

1. Criteria for initiating occupant evacuation procedures for *flood* and tsunami events.
2. Occupant evacuation procedures shall be specified for each environmental hazard where the occupant management plan specifies the *public-occupancy temporary structure* is to be evacuated.
3. Procedures for anchoring or removal of the *public-occupancy temporary structure*, or other additional measures or procedures to be implemented to mitigate hazards in snow, wind, *flood*, ice or tsunami events.

3109.1 [Swimming Pools, Spas and Hot Tubs] General. The design and construction of *swimming pools*, spas and hot tubs shall comply with the *International Swimming Pool and Spa Code*.

~~SECTION 3114 PUBLIC USE RESTROOM BUILDINGS IN FLOOD HAZARD AREAS~~

FEMA Note: Section 3114 was deleted from the 2024 Edition.

CHAPTER 34 RESERVED

Action taken during the 2012 Code Development Process removed Chapter 34, Existing Structure, from the IBC. The provisions of this chapter are contained in the IEBC. See Section 101.4.7.

CHAPTER 35 REFERENCED STANDARDS

ASCE/SEI 7-22. Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASCE/SEI 24-14 Flood Resistant Design and Construction. 1202.4.4; 1603.1.7, 1612.2; 1612.4; 2702.1.8

FEMA-TB-11-01. Crawlspace Construction for Buildings Located in Special Flood Hazard Areas. 1805.1.2.1

APPENDIX G FLOOD-RESISTANT CONSTRUCTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User notes:

About this appendix: Appendix G is intended to provide the additional flood-plain management and administrative requirements of the National Flood Insurance Program (NFIP) that are not included in the code. Communities that adopt the International Building Code® and Appendix G will meet the minimum requirements of the NFIP as set forth in Title 44 of the Code of Federal Regulations.

Code development reminder: Code change proposals to this appendix will be considered by the IBC-Structural Code Development Committee during the 2025 (Group B) Code Development Cycle.

SECTION G101 ADMINISTRATION

G101.1 Purpose. The purpose of this appendix is to promote the public health, safety and general welfare and to minimize public and private losses due to *flood* conditions in specific *flood hazard areas* through the establishment of comprehensive regulations for management of *flood hazard areas* designed to:

1. Prevent unnecessary disruption of commerce, access and public service during times of *flooding*.
2. Manage the alteration of natural flood plains, stream channels and shorelines.
3. Manage filling, grading, dredging and other *development* that may increase flood damage or erosion potential.
4. Prevent or regulate the construction of flood barriers that will divert floodwaters or that can increase flood hazards.
5. Contribute to improved construction techniques in the flood plain.

G101.2 Objectives. The objectives of this appendix are to protect human life, minimize the expenditure of public money for flood control projects, minimize the need for rescue and relief efforts associated with *flooding*, minimize prolonged business interruption, minimize damage to public *facilities* and utilities, help maintain a stable tax base by providing for the sound use and *development* of flood-prone areas, contribute to improved construction techniques in the flood plain and ensure that potential *owners* and occupants are notified that property is within *flood hazard areas*.

G101.3 Scope. The provisions of this appendix shall apply to all proposed *development* in a *flood hazard area* established in Section 1612 of this code, including certain building work exempt from *permit* under Section 105.2.

G101.4 Violations. Any *violation* of a provision of this appendix, or failure to comply with a *permit* or *variance* issued pursuant to this appendix or any requirement of this appendix, shall be handled in accordance with Section 114.

G101.5 Designation of floodplain administrator. The **[INSERT JURISDICTION'S SELECTED POSITION TITLE]** is designated as the floodplain administrator and is authorized and directed to enforce the provisions of this appendix.

The floodplain administrator is authorized to delegate performance of certain duties to other employees of the jurisdiction. Such designation shall not alter any duties and powers of the *building official*.

SECTION G102 DEFINITIONS

G102.1 General. The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.

DEVELOPMENT. Any man-made change to improved or unimproved real estate, including but not limited to, buildings or *other structures*, *temporary structures*, temporary or permanent storage of materials, mining, dredging, filling, grading, paving, excavations, operations and other land-disturbing activities.

FUNCTIONALLY DEPENDENT FACILITY. A facility that cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities necessary for the loading or unloading of cargo or passengers, and shipbuilding and ship repair facilities. The term does not include long-term storage, manufacture, sales or service facilities.

MANUFACTURED HOME. A *structure* that is transportable in one or more sections, built on a permanent chassis, designed for use with or without a permanent foundation when attached to the required utilities, and constructed to the Federal Manufactured Home Construction and Safety Standards and rules and regulations promulgated by the U.S. Department of Housing and Urban Development. The term also includes mobile homes, park trailers, travel trailers and similar transportable *structures* that are placed on a *site* for 180 consecutive days or longer.

MANUFACTURED HOME PARK OR SUBDIVISION. A parcel (or contiguous parcels) of land divided into two or more manufactured home *lots* for rent or sale.

RECREATIONAL VEHICLE. A vehicle that is built on a single chassis, 400 square feet (37.16 m^2) or less when measured at the largest horizontal projection, designed to be self-propelled or permanently towable by a light-duty truck, and designed primarily not for use as a permanent *dwelling* but as temporary living quarters for recreational, camping, travel or seasonal use. A recreational vehicle is ready for highway use if it is on its wheels or jacking system, is attached to the *site* only by quick disconnect-type utilities and security devices and has no permanently attached additions.

VARIANCE. A grant of relief from the requirements of this section that permits construction in a manner otherwise prohibited by this section where specific enforcement would result in unnecessary hardship.

VIOLATION. A development that is not fully compliant with this appendix or Section 1612, as applicable.

SECTION G103 APPLICABILITY

G103.1 General. This appendix, in conjunction with this code, provides minimum requirements for *development* located in *flood hazard areas*, including:

1. The subdivision of land.
2. Site improvements and installation of utilities.

3. Placement and replacement of *manufactured homes*.
4. Placement of *recreational vehicles*.
5. New construction and *repair*, reconstruction, rehabilitation or *additions* to new construction.
6. *Substantial improvement* of *existing buildings* and *structures*, including restoration after damage.
7. Installation of tanks.
8. *Temporary structures*.
9. Temporary or permanent storage, utility and miscellaneous Group U *buildings* and *structures*.
10. Certain building work exempt from *permit* under Section 105.2 and other *buildings* and *development* activities.

G103.2 Establishment of flood hazard areas. *Flood hazard areas* are established in Section 1612.3 of this code, adopted by the applicable governing authority on **[INSERT DATE].**

SECTION G104 POWERS AND DUTIES

G104.1 Permit applications. All applications for *permits* shall comply with the following:

1. The floodplain administrator shall review all *permit* applications to determine whether proposed *development* is located in *flood hazard areas* established in Section G103.2.
2. Where a proposed *development* site is in a *flood hazard area*, all *development* to which this appendix is applicable as specified in Section G103.1 shall be designed and constructed with methods, practices and materials that minimize *flood* damage and that are in accordance with this code and ASCE 24.

G104.2 Other permits. It shall be the responsibility of the floodplain administrator to ensure that approval of a proposed *development* shall not be given until proof that necessary *permits* have been granted by federal or state agencies having *jurisdiction* over such *development*.

G104.3 Determination of design flood elevations. If *design flood elevations* are not specified, the floodplain administrator is authorized to require the applicant to meet one of the following:

1. Obtain, review and reasonably utilize data available from a federal, state or other source.
2. Determine the *design flood elevation* in accordance with accepted hydrologic and hydraulic engineering techniques. Such analyses shall be performed and sealed by a *registered design professional*. Studies, analyses and computations shall be submitted in sufficient detail to allow review and approval by the floodplain administrator. The accuracy of data submitted for such determination shall be the responsibility of the applicant.

G104.4 Activities in riverine flood hazard areas. In riverine *flood hazard areas* where *design flood elevations* are specified but *floodways* have not been designated, the floodplain administrator shall not permit any new construction, *substantial improvement* or other *development*, including fill, unless the applicant submits an engineering analysis prepared by a *registered design professional*, demonstrating that the cumulative effect of the proposed *development*, when combined with all other existing and anticipated *flood hazard area* encroachment, will not increase the *design flood elevation* more than 1 foot (305 mm) at any point within the community.

G104.5 Floodway encroachment. Prior to issuing a *permit* for any *floodway* encroachment, including fill, new construction, *substantial improvements* and other *development* or land-disturbing activity, the floodplain administrator shall require submission of a certification, prepared by a *registered design professional*, along with supporting technical data, demonstrating that such *development* will not cause any increase of the *base flood* level.

G104.5.1 Floodway revisions. A *floodway* encroachment that increases the level of the *base flood* is authorized if the applicant has applied for a conditional *Flood Insurance Rate Map* (FIRM) revision and has received approval of the Federal Emergency Management Agency (FEMA).

G104.6 Watercourse alteration. Prior to issuing a *permit* for any alteration or relocation of any watercourse, the floodplain administrator shall require the applicant to provide notification of the proposal to the appropriate authorities of all adjacent government *jurisdictions*, as well as appropriate state agencies. A copy of the notification shall be maintained in the *permit* records and submitted to FEMA.

G104.6.1 Engineering analysis. The floodplain administrator shall require submission of an engineering analysis, prepared by a *registered design professional*, demonstrating that the flood-carrying capacity of the altered or relocated portion of the watercourse will not be decreased. Such watercourses shall be maintained in a manner that preserves the channel's flood-carrying capacity.

G104.7 Alterations in coastal areas. Prior to issuing a *permit* for any alteration of sand dunes and mangrove stands in *coastal high-hazard areas* and coastal A zones, the floodplain administrator shall require submission of an engineering analysis, prepared by a *registered design professional*, demonstrating that the proposed alteration will not increase the potential for flood damage.

G104.8 Records. The floodplain administrator shall maintain a permanent record of all *permits* issued in *flood hazard areas*, including supporting certifications and documentation required by this appendix and copies of inspection reports, design certifications and documentation of elevations required in Section 1612 of this code and Section R306 of the *International Residential Code*.

G104.9 Inspections. *Development* for which a *permit* under this appendix is required shall be subject to inspection. The floodplain administrator or the floodplain administrator's designee shall make, or cause to be made, inspections of all development in *flood hazard areas* authorized by issuance of a *permit* under this appendix.

G104.10 Use of changed technical data. The floodplain administrator and the applicant shall not use changed *flood hazard area* boundaries or *base flood elevations* for proposed *buildings* or *development* unless the floodplain administrator or applicant has applied for a conditional *Flood Insurance Rate Map* (FIRM) revision and has received the approval of the Federal Emergency Management Agency (FEMA).

SECTION G105 PERMITS

G105.1 Required. Any *person*, *owner* or *owner's* authorized agent who intends to conduct any development in a *flood hazard area* shall first make application to the floodplain administrator and shall obtain the required *permit*.

G105.2 Application for permit. The applicant shall file an application in writing on a form furnished by the floodplain administrator. Such application shall:

1. Identify and describe the *development* to be covered by the *permit*.
2. Describe the land on which the proposed *development* is to be conducted by legal description, street address or similar description that will readily identify and definitely locate the *site*.
3. Include a site plan showing the delineation of *flood hazard areas*, *floodway* boundaries, *flood* zones, *design flood elevations*, ground elevations, proposed fill and excavation and drainage patterns and *facilities*.
4. Include in subdivision proposals and other proposed *developments* with more than 50 *lots* or larger than 5 acres (20 234 m^2), *base flood elevation* data in accordance with Section 1612.3.1 if such data are not identified for the *flood hazard areas* established in Section G103.2.
5. Indicate the use and occupancy for which the proposed *development* is intended.
6. Be accompanied by *construction documents*, grading and filling plans and other information deemed appropriate by the floodplain administrator.
7. State the valuation of the proposed work.
8. Be signed by the applicant or the applicant's authorized agent.

G105.3 Validity of permit. The issuance of a *permit* under this appendix shall not be construed to be a *permit* for, or approval of, any *violation* of this appendix or any other ordinance of the *jurisdiction*. The issuance of a *permit* based on submitted documents and information shall not prevent the floodplain administrator from requiring the correction of errors. The floodplain administrator is authorized to prevent occupancy or use of a structure or *site* that is in *violation* of this appendix or other ordinances of this *jurisdiction*.

G105.4 Expiration. A *permit* shall become invalid if the proposed *development* is not commenced within 180 days after its issuance, or if the work authorized is suspended or abandoned for a period of 180 days after the work commences. Extensions shall be requested in writing and justifiable cause demonstrated. The floodplain administrator is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each.

G105.5 Suspension or revocation. The floodplain administrator is authorized to suspend or revoke a *permit* issued under this appendix wherever the *permit* is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or code of this *jurisdiction*.

SECTION G106 VARIANCES

G106.1 General. The *board of appeals* established pursuant to Section 113, or other established or designated board, shall hear and decide requests for *variances*. The board shall base its determination on technical justifications, and has the right to attach such conditions to *variances* as it deems necessary to further the purposes and objectives of this appendix and Section 1612.

G106.2 Records. The floodplain administrator shall maintain a permanent record of all *variance* actions, including justification for their issuance.

G106.3 Historic structures. A *variance* is authorized to be issued for the *repair* or rehabilitation of a historic *structure* upon a determination that the proposed *repair* or rehabilitation will not preclude the *structure*'s continued

designation as a historic *structure*, and the *variance* is the minimum necessary to preserve the historic character and design of the *structure*.

Exception: Within *flood hazard areas*, historic *structures* that do not meet one or more of the following designations:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
3. Designated as *historic* under a state or local historic preservation program that is *approved* by the Department of Interior.

G106.4 Functionally dependent facilities. A *variance* is authorized to be issued for the construction or *substantial improvement* of a *functionally dependent facility* provided the criteria in Section 1612.1 are met and the *variance* is the minimum necessary to allow the construction or *substantial improvement*, and that all due consideration has been given to methods and materials that minimize *flood* damages during the *design flood* and do not create additional threats to public safety.

G106.5 Restrictions. The board shall not issue a *variance* for any proposed *development* in a *floodway* if any increase in flood levels would result during the *base flood* discharge.

G106.6 Considerations. In reviewing applications for *variances*, the board shall consider all technical evaluations, all relevant factors, all other portions of this appendix and the following:

1. The danger that materials and debris may be swept onto other lands resulting in further injury or damage.
2. The danger to life and property due to *flooding* or erosion damage.
3. The susceptibility of the proposed *development*, including contents, to *flood* damage and the effect of such damage on current and future *owners*.
4. The importance of the services provided by the proposed *development* to the community.
5. The availability of alternate locations for the proposed *development* that are not subject to *flooding* or erosion.
6. The compatibility of the proposed *development* with existing and anticipated *development*.
7. The relationship of the proposed *development* to the comprehensive plan and flood plain management program for that area.
8. The safety of access to the property in times of *flood* for ordinary and emergency vehicles.
9. The expected heights, velocity, duration, rate of rise and debris and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the *site*.
10. The costs of providing governmental services during and after *flood* conditions including maintenance and repair of public utilities and *facilities* such as sewer, gas, electrical and water systems, streets and bridges.

G106.7 Conditions for issuance. *Variances* shall only be issued by the board where all of the following criteria are met:

1. A technical showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the *site* renders the elevation standards inappropriate.
2. A determination that failure to grant the *variance* would result in exceptional hardship by rendering the *lot* undevelopable.
3. A determination that the granting of a *variance* will not result in increased *flood* heights, additional threats to public safety, extraordinary public expense, nor create nuisances, cause fraud on or victimization of the public or conflict with existing local laws or ordinances.
4. A determination that the *variance* is the minimum necessary, considering the *flood* hazard, to afford relief.
5. Notification to the applicant in writing over the signature of the floodplain administrator that the issuance of a *variance* to construct a *structure* below the *base flood* level will result in increased premium rates for flood insurance up to amounts as high as $25 for $100 of insurance coverage, and that such construction below the *base flood* level increases risks to life and property.

SECTION G107 SUBDIVISIONS

G107.1 General. Any subdivision proposal, including proposals for manufactured home parks and subdivisions, or other proposed new *development* in a *flood hazard area* shall be reviewed to verify all of the following:

1. Such proposals are consistent with the need to minimize *flood* damage.
2. Public utilities and *facilities*, such as sewer, gas, electric and water systems, are located and constructed to minimize or eliminate *flood* damage.
3. Adequate drainage is provided to reduce exposure to *flood* hazards.

G107.2 Subdivision requirements. The following requirements shall apply in the case of any proposed subdivision, including proposals for manufactured home parks and subdivisions, any portion of which lies within a *flood hazard area*:

1. The *flood hazard area*, including *floodways*, and *coastal high-hazard areas* and coastal A zones, as appropriate, shall be delineated on tentative and final subdivision plats.
2. *Design flood elevations* shall be shown on tentative and final subdivision plats.
3. Residential *building lots* shall be provided with adequate buildable area outside the *floodway*.
4. The design criteria for utilities and *facilities* set forth in this appendix and appropriate International Codes shall be met.

SECTION G108 SITE IMPROVEMENT

G108.1 Development in floodways. *Development* or land-disturbing activity shall not be authorized in the *floodway* unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard

engineering practice, and prepared by a *registered design professional*, that the proposed encroachment will not result in any increase in the *base flood* level.

G108.2 Coastal high-hazard areas and coastal A zones. In *coastal high-hazard areas* and coastal A zones:

1. New *building*s and *building*s that are substantially improved shall only be authorized landward of the reach of mean high tide.
2. The use of fill for structural support of *building*s is prohibited.

G108.3 Sewer facilities. All new or replaced sanitary sewer *facilities*, private sewage treatment plants (including all pumping stations and collector systems) and on-site waste disposal systems shall be designed in accordance with Chapter 7, ASCE 24, to minimize or eliminate infiltration of floodwaters into the *facilities* and discharge from the *facilities* into floodwaters, or impairment of the *facilities* and systems.

G108.4 Water facilities. All new or replacement water *facilities* shall be designed in accordance with the provisions of Chapter 7, ASCE 24, to minimize or eliminate infiltration of floodwaters into the systems.

G108.5 Storm drainage. Storm drainage shall be designed to convey the flow of surface waters to minimize or eliminate damage to *persons* or property.

G108.6 Streets and sidewalks. Streets and sidewalks shall be designed to minimize potential for increasing or aggravating *flood* levels.

SECTION G109 MANUFACTURED HOMES

G109.1 Elevation. All new and replacement *manufactured homes* to be placed or substantially improved in a *flood hazard area* shall be elevated such that the top of the foundation for the *manufactured home* is at or above the *design flood elevation*.

G109.2 Foundations. All new and replacement *manufactured homes*, including *substantial improvement* of existing *manufactured homes*, shall be placed on a permanent, reinforced foundation that is designed in accordance with Section R306 of the *International Residential Code*.

G109.3 Anchoring. All new and replacement *manufactured homes* to be placed or substantially improved in a *flood hazard area* shall be installed using methods and practices that minimize *flood* damage. *Manufactured homes* shall be securely anchored to an adequately anchored foundation system to resist flotation, collapse and lateral movement. Methods of anchoring are authorized to include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

G109.4 Protection of mechanical equipment and outside appliances. Mechanical equipment and outside appliances shall be elevated to or above the *design flood elevation*.

Exception: Where such equipment and appliances are designed and installed to prevent water from entering or accumulating within their components and the systems are constructed to resist hydrostatic and hydrodynamic

loads and stresses, including the effects of buoyancy, during the occurrence of *flooding* up to the elevation required by Section R306 of the *International Residential Code*, the systems and equipment shall be permitted to be located below the elevation required by Section R306 of the *International Residential Code*. Electrical wiring systems shall be permitted below the *design flood elevation* provided that they conform to the provisions of NFPA 70.

G109.5 Enclosures. Fully enclosed areas below elevated *manufactured homes* shall comply with the requirements of Section R306 of the *International Residential Code*.

SECTION G110 RECREATIONAL VEHICLES

G110.1 Placement prohibited. The placement of *recreational vehicles* shall not be authorized in *coastal high-hazard areas* and in *floodways*.

G110.2 Temporary placement. *Recreational vehicles* in *flood hazard areas* shall be fully licensed and ready for highway use, or shall be placed on a site for less than 180 consecutive days.

G110.3 Permanent placement. *Recreational vehicles* that are not fully licensed and ready for highway use, or that are to be placed on a *site* for more than 180 consecutive days, shall meet the requirements of Section G109 for *manufactured homes*.

SECTION G111 TANKS

G111.1 Tanks. Underground and above-ground tanks shall be designed, constructed, installed and anchored in accordance with ASCE 24.

SECTION G112 OTHER BUILDING WORK

G112.1 Garages and accessory structures. Garages and accessory *structures* shall be designed and constructed in accordance with ASCE 24, subject to the following limitations:

1. In *flood hazard areas* other than *coastal high-hazard areas* and coastal A Zones, the floors of detached garages and detached accessory storage *structures* are permitted below the elevations specified in ASCE 24, provided that such *structures* are used solely for parking or storage, are one *story* and not larger than 600 square feet (55.75 m^2).
2. In *coastal high-hazard areas* and coastal A Zones, the floors of detached garages and detached accessory storage *structures* are permitted below the elevations specified in ASCE 24, provided that such *structures* are used solely for parking or storage, are one *story* and are not larger than 100 square feet (9.29 m^2). Such *structures* shall not be required to have breakaway walls or flood openings.

G112.2 Fences. Fences in *floodways* that have the potential to block the passage of floodwaters, such as stockade fences and wire mesh fences, shall meet the requirement of Section G104.5.

G112.3 Oil derricks. Oil derricks located in *flood hazard areas* shall be designed in conformance with the *flood loads* in Sections 1603.1.7 and 1612.

G112.4 Retaining walls, sidewalks and driveways. Retaining walls, sidewalks and driveways shall meet the requirements of Section 1804.5.

G112.5 Swimming pools. *Swimming pool*s shall be designed and constructed in accordance with ASCE 24. Above-ground *swimming pool*s, on-ground *swimming pool*s and in-ground *swimming pool*s that involve placement of fill in *floodway*s shall also meet the requirements of Section G104.5.

G112.6 Decks, porches, and patios. Decks, porches and patios shall be designed and constructed in accordance with ASCE 24.

G112.7 Nonstructural concrete slabs in coastal high-hazard areas and coastal A zones. In *coastal high-hazard area*s and coastal A zones*, nonstructural concrete* slabs used as parking pads, enclosure floors, landings, decks, walkways, patios and similar nonstructural uses are permitted beneath or adjacent to *building*s and *structure*s provided that the concrete slabs shall be constructed in accordance with ASCE 24.

G112.8 Roads and watercourse crossings in regulated floodways. Roads and watercourse crossings that encroach into regulated *floodway*s, including roads, bridges, culverts, low-water crossings and similar means for vehicles or pedestrians to travel from one side of a watercourse to the other, shall meet the requirement of Section G104.5.

SECTION G113 TEMPORARY STRUCTURES AND TEMPORARY STORAGE

G113.1 Temporary structures. *Temporary structure*s shall be erected for a period of less than 180 days. *Temporary structure*s shall be anchored to prevent flotation, collapse or lateral movement resulting from hydrostatic *load*s, including the effects of buoyancy, during conditions of the *design flood*. Fully enclosed *temporary structure*s shall have flood openings that are in accordance with ASCE 24 to allow for the automatic entry and exit of floodwaters.

G113.2 Temporary storage. Temporary storage includes storage of goods and materials for a period of less than 180 days. Stored materials shall not include *hazardous material*s.

G113.3 Floodway encroachment. *Temporary structure*s and temporary storage in *floodway*s shall meet the requirements of G104.5.

SECTION G114 UTILITY AND MISCELLANEOUS GROUP U

G114.1 Utility and miscellaneous Group U. Utility and miscellaneous Group U includes *building*s that are accessory in character and miscellaneous *structure*s not classified in any specific occupancy in this code, including, but not limited to, *agricultural building*s, aircraft hangars (accessory to a one- or two-family residence), barns, carports, fences more than 6 feet (1829 mm) high, grain silos (accessory to a residential occupancy), *greenhouse*s, livestock shelters, *private garage*s, retaining walls, sheds, stables and towers.

G114.2 Flood loads. Utility and miscellaneous Group U *building*s and *structure*s, including *substantial improvement* of such *building*s and *structure*s, shall be anchored to prevent flotation, collapse or lateral movement resulting from *flood load*s, including the effect of buoyancy, during conditions of the *design flood*.

G114.3 Elevation. Utility and miscellaneous Group U *buildings* and *structures*, including *substantial improvement* of such *buildings* and *structures*, shall be elevated such that the *lowest floor*, including *basement*, is elevated to or above the *design flood elevation* in accordance with Section 1612 of this code.

G114.4 Enclosures below design flood elevation. Fully enclosed areas below the *design flood elevation* shall be constructed in accordance with ASCE 24.

G114.5 Flood-damage-resistant materials. *Flood-damage-resistant materials* shall be used below the *design flood elevation*.

G114.6 Protection of mechanical, plumbing and electrical systems. Mechanical, plumbing and electrical systems, including plumbing fixtures, shall be elevated to or above the *design flood elevation*.

> **Exception:** Electrical systems, equipment and components; heating, ventilating, air conditioning and plumbing appliances; plumbing fixtures, duct systems and other service equipment shall be permitted to be located below the *design flood elevation* provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic *loads* and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation* in compliance with the flood-resistant construction requirements of this code. Electrical wiring systems shall be permitted to be located below the *design flood elevation* provided they conform to the provisions of NFPA 70.

SECTION G115 REFERENCED STANDARDS

G115.1 General. See Table G115.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix referenced in the standard.

Table G115.1 REFERENCED STANDARDS

Standard Acronym	Standard Name	Sections Herein Referenced
ASCE 24—14	*Flood Resistant Design and Construction*	G104.1, G108.3, G108.4, G111.1, G112.1, G112.5, G112.6, G112.7, G113.1, G114.4
HUD 24 CFR Part 3285 (2008)	*Manufactured Home Construction and Safety Standards*	G102
IBC—24	*International Building Code®*	G103.2, G114.1, G114.3
IRC—24	*International Residential Code®*	G109.2, G109.4, G109.5
NFPA 70—23	*National Electrical Code®*	G109.4, G114.6

APPENDIX J GRADING

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

J101.2 Flood hazard areas. Unless the applicant has submitted an engineering analysis, prepared in accordance with standard engineering practice by a *registered design professional*, that demonstrates the proposed work will not result in any increase in the level of the *base flood*, *grading*, *excavation* and earthwork construction, including fills and embankments, shall not be permitted in *floodways* that are in *flood hazard areas* established in Section 1612.3 or in *flood hazard areas* where *design flood elevations* are specified but *floodways* have not been designated.

2024 International Residential Code® (IRC) Compilation of flood-resistant provisions prepared by FEMA

CHAPTER 1 SCOPE AND ADMINISTRATION

R101.2 Scope. The provisions of this code shall apply to the construction, *alteration*, movement, enlargement, replacement, *repair*, equipment, use and occupancy, location, removal and demolition of detached one- and two-family *dwellings* and *townhouses* not more than three *stories* above *grade plane* in height with a separate means of egress and their *accessory structures* not more than three *stories* above *grade plane* in height.

Exception: The following shall be permitted to be constructed in accordance with this code where provided with an automatic sprinkler system complying with Section P2904:

1. Live/work units located in *townhouses* and complying with the requirements of Section 508.5 of the *International Building Code*.
2. *Owner*-occupied *lodging houses* with five or fewer *guestrooms*.
3. A care facility with five or fewer persons receiving custodial care within a *dwelling unit*.
4. A care facility with five or fewer persons receiving medical care within a *dwelling unit*.
5. A day care facility for five or fewer persons of any age receiving care that are within a *dwelling unit*.

R102.6.1 [Existing structures] Additions, alterations, change of use or repairs. *Additions*, *alterations* or repairs to any *structure* shall conform to the requirements for a new structure without requiring the existing *structure* to comply with the requirements of this code, unless otherwise stated. *Additions*, *alterations*, *repairs* and relocations shall not cause an existing structure to become less compliant with the provisions of this code than the *existing building* or structure was prior to the *addition*, *alteration* or *repair*. An existing building together with its *additions* shall comply with the height limits of this code. Where additions, *alterations* or changes of use to an existing structure result in a use, occupancy, height or means of egress outside the scope of this code, the building shall comply with the *International Existing Building Code.*

R104.2.3.1 [Modifications] Flood hazard areas. The *building official* shall not grant modifications to any provisions required in flood hazard areas as established by Table R301.2 unless a determination has been made that:

1. There is good and sufficient cause showing that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section R306 inappropriate.
2. Failure to grant the modification would result in exceptional hardship by rendering the lot undevelopable.
3. The granting of modification will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. The modification is the minimum necessary to afford relief, considering the flood hazard.
5. Written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation and stating that construction below the design flood elevation increases risks to life and property, has been submitted to the applicant.

R104.3.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, *addition*, *alteration*, *repair* or other improvement of *existing buildings* or structures located in a flood hazard area as established by Table R301.2, the *building official* shall examine or cause to be examined the *construction documents* and shall make a determination with regard to the value of the proposed work. For *buildings* that have sustained damage of any origin, the value of the proposed work shall include the cost to *repair* the *building* or structure to its predamaged condition. If the *building official* finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a *substantial improvement* or *repair* of *substantial damage* and the *building official* shall require existing portions of the entire building or structure to meet the requirements of Section R306.

R104.7 Official records. The *building official* shall keep official records as required in Sections R104.7.1 through R104.7.5. Such official records shall be retained for not less than 5 years or for as long as the building or structure to which such records relate remains in existence, unless otherwise provided by other regulations.

R104.7.1 Approvals. A record of approvals shall be maintained by the *building official* and shall be available for public inspection during business hours in accordance with applicable laws.

R105.2 Work exempt from permit. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*. *Permits* shall not be required for the following: *[partial shown]*

Building:

1. Other than *storm shelters*, one-*story* detached *accessory structures*, provided that the floor area does not exceed 200 square feet (18.58 m^2).
2. Fences not over 7 feet (2134 mm) high.

3. *Retaining walls* that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.

   …

10. Decks not exceeding 200 square feet (18.58 m^2) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a dwelling or townhouse do not serve the exit door required by Section R311.4.

R106.1.4 Information for construction in flood hazard areas. For *buildings* and structures located in whole or in part in flood hazard areas as established by Table R301.2, *construction documents* shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate.
2. The elevation of the proposed lowest floor, including *basement*; in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including *basement*, above the highest adjacent *grade*.
3. The elevation of the bottom of the lowest horizontal structural member in coastal high-hazard areas (V Zone) and in Coastal A Zones where such zones are delineated on flood hazard maps identified in Table R301.2 or otherwise delineated by the *jurisdiction*.
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the *building official* and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

R106.2 Site plan or plot plan. The *construction documents* submitted with the application for *permit* shall be accompanied by a site plan showing the size and location of new construction and existing structures on the site and distances from *lot lines*. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The *building official* is authorized to waive or modify the requirement for a site plan where the application for *permit* is for *alteration* or repair or where otherwise warranted.

R107.2 [Temporary Structures and Uses] Conformance. Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, *ventilation* and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

R109.1.3 Floodplain inspections. For construction in flood hazard areas as established by Table R301.2, upon placement of the lowest floor, including *basement*, and prior to further vertical construction, the *building official* shall require submission of documentation, prepared and sealed by a *registered design professional*, of the elevation of the lowest floor, including *basement*, required in Section R306.

R109.1.6.1 [Final Inspection] Elevation documentation. If located in a flood hazard area, the documentation of elevations required in Section R306.1.10 shall be submitted to the *building official* prior to the final inspection.

CHAPTER 2 DEFINITIONS

[RB] ACCESSORY STRUCTURE. A structure that is accessory to and incidental to that of the *dwelling(s)* or *townhouse(s)* and that is located on the same *lot*.

[RB] ADDITION. An extension or increase in floor area, number of *stories* or height of a *building* or structure. For the definition applicable in Chapter 11, see Section N1101.6.

[RB] ALTERATION. Any construction, retrofit or renovation to an existing structure other than *repair* or *addition* that requires a *permit*. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, *addition* or change to the arrangement, type or purpose of the original installation that requires a *permit*. For the definition applicable in Chapter 11, see Section N1101.6.

[RB] BUILDING. Any one- or two-family dwelling or *townhouse*, or portion thereof, used or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, or any *accessory structure*. For the definition applicable in Chapter 11, see Section N1101.6.

[MP] DESIGN FLOOD ELEVATION. * For the definition applicable in Chapter 24, see Section G2403.

[RB] CRAWL SPACE. An underfloor space that is not a *basement*.

[RB] EXISTING BUILDING. *Existing building* is a building erected prior to the adoption of this code, or one for which a legal *building permit* has been issued. For the definition applicable in Chapter 11, see Section N1101.6.

[MP] FLOOD HAZARD AREA.* For the definition applicable in Chapter 24, see Section G2403.

[RB] REPAIR. The reconstruction, replacement or renewal of any part of an *existing building* for the purpose of its maintenance or to correct damage. For the definition applicable in Chapter 11, see Section N1101.6.

[RB] SUBSTANTIAL DAMAGE. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

[RB] SUBSTANTIAL IMPROVEMENT. Any *repair*, reconstruction, rehabilitation, *alteration*, *addition* or other improvement of a *building* or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or *repair* is started. If the structure has sustained *substantial damage*, any *repairs* are considered *substantial improvement* regardless of the actual *repair* work performed. The term does not, however, include either:

* See Section R306.1.4, which establishes design flood elevations and flood hazard areas.

1. Any project for improvement of a *building* required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to assure safe living conditions.
2. Any alteration of a historic structure provided that the *alteration* will not preclude the structure's continued designation as a historic structure. For the purposes of this exclusion, a historic building shall be any of the following:
   2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
   2.2. Determined by the Secretary of the US Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
   2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

For the definition applicable in Chapter 11, see Section N1101.6.

CHAPTER 3 BUILDING PLANNING

R301.1 Application. *Building*s and structures, and parts thereof, shall be constructed to safely support all loads, including *dead loads*, *live loads*, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of *building*s and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets the requirements for the transfer of loads from their point of origin through the load-resisting elements to the foundation. *Building*s and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

R301.2 Climatic and geographic design criteria. *Building*s shall be constructed in accordance with the provisions of this code as limited by the provisions of this section. Additional criteria shall be established by the local *jurisdiction* and set forth in Table R301.2.

Table R301.2 Climatic and Geographic Design Criteria *[partial shown]*

	Wind Design					Subject To Damage From						
Ground Snow Load[o]	Speed[d] (mph)	Topo-raphic effects[k]	Special wind region[l]	Windborne debris zone[m]	Seismic Design Category[f]	Weathering[a]	Frost line depth[b]	Termite[c]	Ice barrier under-layment Required[h]	Flood Hazards[g]	Air Freezing Index[i]	Mean Annual Temp[j]

[partial shown] [Footnote] g. The jurisdiction shall fill in this part of the table with: the date of the jurisdiction's entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas); and the title and date of the currently effective Flood Insurance Study or other flood hazard study and maps adopted by the authority having jurisdiction, as amended.

R301.2.4 Floodplain construction. *Building*s and structures constructed in whole or in part in flood hazard areas as established in Table R301.2, and *substantial improvement* and *repair* of *substantial damage* of buildings and structures located in whole or in part in flood hazard areas, shall be designed and constructed in accordance with Section R306. *Building*s and structures that are located in more than one flood hazard area, including A Zones, Coastal A Zones and V Zones, shall comply with the provisions associated with the most restrictive flood hazard

area. *Building*s and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R301.2.4.1 Alternative provisions. As an alternative to the requirements in Section R306, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

SECTION R306 FLOOD-RESISTANT CONSTRUCTION

R306.1 General. *Building*s and structures constructed in whole or in part in flood hazard areas established in Table R301.2, and *substantial improvement* and *repair* of *substantial damage* of *building*s and structures located in whole or in part in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section. *Building*s and structures that are located in more than one flood hazard area, including A Zones, Coastal A Zones and V Zones, shall comply with the provisions associated with the most restrictive flood hazard area. *Building*s and structures located in whole or in part in identified floodways shall be designed and constructed in accordance with ASCE 24.

R306.1.1 Alternative provisions. As an alternative to the requirements in Section R306, ASCE 24 is permitted subject to the limitations of this code and the limitations therein.

R306.1.2 Structural systems. Structural systems of *building*s and structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement due to structural loads and stresses from flooding equal to the design flood elevation.

R306.1.3 Flood-resistant construction. *Building*s and structures erected in areas prone to flooding shall be constructed by methods and practices that minimize flood damage.

R306.1.4 Establishing the design flood elevation. The design flood elevation shall be used to define flood hazard areas. At a minimum, the design flood elevation shall be the higher of the following:

1. The base flood elevation at the depth of peak elevation of flooding, including wave height, that has a 1-percent (100-year flood) or greater chance of being equaled or exceeded in any given year.
2. The elevation of the design flood associated with the area designated on a flood hazard map adopted by the community, or otherwise legally designated.

R306.1.4.1 Determination of design flood elevations. If design flood elevations are not specified, the *building official* is authorized to require the applicant to comply with either of the following:

1. Obtain and reasonably use data available from a federal, state or other source.
2. Determine the design flood elevation in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice. Studies, analyses and computations shall be submitted in sufficient detail to allow thorough review and *approval*.

R306.1.4.2 Determination of impacts. In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall demonstrate that the effect of the proposed *building*s and structures on design flood elevations, including fill, when combined with other existing and anticipated flood hazard area encroachments, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the *jurisdiction*.

R306.1.5 Lowest floor. The lowest floor shall be the lowest floor of the lowest enclosed area, including *basement*, and excluding any unfinished flood-resistant enclosure that is useable solely for vehicle parking, *building* access or limited storage provided that such enclosure is not built so as to render the *building* or structure in violation of this section.

R306.1.6 Protection of mechanical, plumbing and electrical systems. Electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliance*s and plumbing fixtures; *duct systems*; and other service *equipment* shall be located at or above the elevation required in Section R306.2 or R306.3. If replaced as part of a *substantial improvement*, electrical systems, *equipment* and components; heating, ventilating, air-conditioning and plumbing *appliance*s and plumbing fixtures; *duct systems*; and other service *equipment* shall meet the requirements of this section. Systems, fixtures, and *equipment* and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

> **Exception:** Locating electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliance*s and plumbing fixtures; *duct systems*; and other service *equipment* is permitted below the elevation required in Section R306.2 or R306.3 provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the required elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided that they conform to the provisions of the electrical part of this code for wet locations.

R306.1.7 Protection of water supply and sanitary sewage systems. New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the systems in accordance with the plumbing provisions of this code. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into systems and discharges from systems into floodwaters in accordance with the plumbing provisions of this code and Chapter 3 of the *International Private Sewage Disposal Code*.

R306.1.8 Flood-resistant materials. Building materials and installation methods used for flooring and interior and exterior walls and wall coverings below the elevation required in Section R306.2 or R306.3 shall be flood damage-resistant materials that conform to the provisions of FEMA TB-2.

R306.1.9 Manufactured homes. The bottom of the frame of new and replacement *manufactured home*s on foundations that conform to the requirements of Section R306.2 or R306.3, as applicable, shall be elevated to or above the elevations specified in Section R306.2 (flood hazard areas including A Zones) or R306.3 in coastal high-hazard areas (V Zones and Coastal A Zones). The anchor and tie-down requirements of the applicable state or federal requirements shall apply. The foundation and anchorage of *manufactured home*s to be located in identified floodways shall be designed and constructed in accordance with ASCE 24.

R306.1.10 As-built elevation documentation. A *registered design professional* shall prepare and seal documentation of the elevations specified in Section R306.2 or R306.3.

R306.2 Flood hazard areas (including A Zones). Areas that have been determined to be prone to flooding and that are not subject to high-velocity wave action shall be designated as flood hazard areas. Flood hazard areas that have been delineated as subject to wave heights between 1 ½ feet (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones and are subject to the requirements of Section R306.3. *Building*s and structures constructed in whole or in part in flood hazard areas shall be designed and constructed in accordance with Sections R306.2.1 through R306.2.4.

R306.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, not including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), *building*s and structures shall have the lowest floor (including *basement*) elevated to a height above the highest adjacent *grade* of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.
3. *Basement* floors that are below *grade* on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
4. Attached garages and carports shall comply with one of the following:
    4.1. The floors shall be elevated to or above the elevations required in Item 1 or Item 2, as applicable.
    4.2. The floors shall be at or above *grade* on not less than one side. Where an attached garage or carport is enclosed by walls, the walls shall have flood openings that comply with Section R306.2.2 and the attached garage or carport shall be used solely for parking, building access or storage.
5. Detached *accessory structures* and detached garages shall comply with one of the following:
    5.1. The floors shall be elevated to or above the elevations required in Item 1 or Item 2, as applicable.
    5.2. Floors below the elevations required in Item 1 or 2, as applicable, must be:
        5.2.1. Used only for parking or storage.
        5.2.2. One story and not larger than 600 square feet (55.75 m^2).
        5.2.3. Anchored to resist flotation, collapse or lateral movement resulting from design flood loads.
        5.2.4. Equipped with flood openings that comply with Section R306.2.2.
        5.2.5. Constructed of flood damage-resistant materials that comply with Section R306.1.8.
        5.2.6. Have mechanical, plumbing and electrical systems, if applicable, that comply with Section R306.1.6.

Exception: Enclosed areas below the elevation required in this section, including *basements* with floors that are not below *grade* on all sides, shall meet the requirements of Section R306.2.2.

R306.2.2 Enclosed area below required elevation. Enclosed areas, including *crawl spaces*, that are below the elevation required in Section R306.2.1 shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R306.2.2.1:
   2.1 The total net area of nonengineered openings shall be not less than 1 square inch (645 mm^2) for each square foot (0.093 m^2) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the *construction documents* shall include a statement by a *registered design professional* that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.7.2.2 of ASCE 24.
   2.2 Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
   2.3 The presence of louvers, blades, screens and faceplates or other covers and devices shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area.

   Exceptions: The following shall not be required to comply with this section:

   1. Elevator shafts.
   2. Utility chases that protect utility lines from freezing, provided that the utility chases are the minimum size necessary to protect the utility lines and do not provide access for a *person* to enter the space.

R306.2.2.1 Installation of openings. The walls of enclosed areas shall have openings installed such that:

1. There shall be not less than two openings on different sides of each enclosed area; if a *building* has more than one enclosed area, each area shall have openings.
2. The bottom of each opening shall be not more than 1 foot (305 mm) above the higher of the final interior grade or floor and the finished exterior *grade* immediately under each opening.
3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

R306.2.3 Foundation design and construction. Foundation walls for *buildings* and structures erected in flood hazard areas shall meet the requirements of Chapter 4.

Exception: Unless designed in accordance with Section R404:

1. The unsupported height of 6-inch (152 mm) plain masonry walls shall be not more than 3 feet (914 mm).
2. The unsupported height of 8-inch (203 mm) plain masonry walls shall be not more than 4 feet (1219 mm).
3. The unsupported height of 8-inch (203 mm) reinforced masonry walls shall be not more than 8 feet (2438 mm).

For the purpose of this exception, unsupported height is the distance from the finished *grade* of the under-floor space to the top of the wall.

R306.2.4 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R306.2.1 or shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood.

R306.3 Coastal high-hazard areas (including V Zones and Coastal A Zones, where designated). Areas that have been determined to be subject to wave heights in excess of 3 feet (914 mm) or subject to high-velocity wave action or wave-induced erosion shall be designated as coastal high-hazard areas. Flood hazard areas that have been designated as subject to wave heights between 1 ½ (457 mm) and 3 feet (914 mm) or otherwise designated by the *jurisdiction* shall be designated as Coastal A Zones. Buildings and structures constructed in whole or in part in coastal high-hazard areas and Coastal A Zones, where designated, shall be designed and constructed in accordance with Sections R306.3.1 through R306.3.10.

R306.3.1 Location and site preparation.

1. New *building*s and *building*s that are determined to be substantially improved pursuant to Section R104.3.1 shall be located landward of the reach of mean high tide.
2. For any alteration of sand dunes and mangrove stands, the *building official* shall require submission of an engineering analysis that demonstrates that the proposed *alteration* will not increase the potential for flood damage.

R306.3.2 Elevation requirements.

1. *Building*s and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structure members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher. Where stem wall foundations are permitted in Coastal A Zones in accordance with Section R306.3.3, the bottom of the lowest horizontal structural member supporting the lowest floor is the top of the foundation wall, or top of the portion of the foundation wall, supporting the slab.
2. *Basement* floors that are below *grade* on all sides are prohibited.
3. Attached garages used only for parking, building access or storage, and carports shall comply with Item 1 or shall be at or above *grade* on not less than one side and, if enclosed with walls, such walls shall comply with Item 7.
4. Detached *accessory structures* and detached garages shall comply with either of the following:
    - 4.1 The bottom of the lowest horizontal structural member supporting the floors shall be elevated to or above the elevation required in Item 1.
    - 4.2 Floors below the elevations required in Item 1 must be:
        - 4.2.1 Used only for parking or storage.

4.2.2 One *story* and not larger than 100 square feet (9.29 m^2).

4.2.3 Anchored to resist flotation, collapse or lateral movement resulting from design flood loads.

4.2.4 Constructed of flood damage-resistant materials that comply with Section R306.1.8.

4.2.5 Equipped with mechanical, plumbing and electrical systems, if applicable, that comply with Section R306.1.6.

5. The use of fill for structural support is prohibited.
6. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
7. Walls and partitions enclosing areas below the elevation required in this section shall meet the requirements of Sections R306.3.5 and R306.3.6.

R306.3.3 Foundations. *Building*s and structures erected in coastal high-hazard areas and Coastal A Zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns and shall comply with the following:

1. The space below the elevated building shall be either free of obstruction or, if enclosed with walls, the walls shall meet the requirements of Section R306.3.5.
2. Pilings shall be designed in accordance with ASCE 24 to have adequate soil penetrations to resist the combined wave and wind loads (lateral and uplift) and pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling.
3. Columns and their supporting foundations shall be designed in accordance with ASCE 24 to resist combined wave and wind loads, lateral and uplift, and shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the columns. Spread footing, mat, raft or other foundations that support columns shall not be permitted where soil investigations that are required in accordance with Section R401.4 indicate that soil material under the spread footing, mat, raft or other foundation is subject to scour or erosion from wave-velocity flow conditions. If permitted, spread footing, mat, raft or other foundations that support columns shall be designed in accordance with ASCE 24.
4. Flood and wave loads shall be determined in accordance with ASCE 7 and shall include loads associated with the design flood. Wind loads shall be those required by this code.
5. Foundation designs and *construction documents* shall be prepared and sealed in accordance with Section R306.3.9.

Exception: In Coastal A Zones, stem wall foundations supporting a floor system above and backfilled with soil or gravel to the underside of the floor system shall be permitted provided the foundations are designed to account for wave action, debris impact, erosion and local scour. Where soils are susceptible to erosion and local scour, stem wall foundations shall have deep footings to account for the loss of soil.

R306.3.4 Concrete slabs. Concrete slabs used for parking, floors of enclosures, landings, decks, walkways, patios and similar uses that are located beneath structures, or slabs that are located such that if undermined or displaced during base flood conditions could cause structural damage to the *building* foundation, shall be designed and constructed in accordance with one of the following:

1. To be structurally independent of the foundation system of the structure, to not transfer flood loads to the main structure, and to be frangible and break away under flood conditions prior to base flood conditions. Slabs shall be a maximum of 4 inches (102 mm) thick, shall not have turned-down edges, shall not contain reinforcing, shall have isolation joints at pilings and columns, and shall have control or construction joints in both directions spaced not more than 4 feet (1219 mm) apart.
2. To be self-supporting, structural slabs capable of remaining intact and functional under base flood conditions, including erosion and local scour, and the main structure shall be capable of resisting any added flood loads and effects of local scour caused by the presence of the slabs.

R306.3.5 Walls below required elevation. Walls and partitions are permitted below the elevation required in Section R306.3.2, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a resistance of not less than 10 (479 Pa) and not more than 20 pounds per square foot (958 Pa) as determined using allowable stress design, or a resistance to an ultimate load of not less than 17 and not more than 33 pounds per square foot (814 and 1580 Pa); or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), as determined using allowable stress design or an ultimate load of 33 pounds per square foot (1580 Pa), the *construction documents* shall include documentation prepared and sealed by a registered *design professional* that:
   4.1 The walls and partitions below the required elevation have been designed to collapse from a water load less than that which would occur during the base flood.
   4.2 The elevated portion of the *building* and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on structural and nonstructural *building* components. Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.
5. Walls intended to break away under flood loads as specified in Item 3 or 4 have flood openings that meet the criteria in Section R306.2.2, Item 2.

Exceptions: The following shall not be required to comply with this section:

1. Elevator shafts.
2. Utility chases that protect utility lines from freezing, provided the utility chases are the minimum size necessary to protect the utility lines and do not provide access for a *person* to enter the space.

R306.3.6 Enclosed areas below required elevation. Enclosed areas below the elevation required in Section R306.3.2 shall be used solely for parking vehicles, building access or storage.

R306.3.6.1 Protection of building envelope. An exterior door that meets the requirements of Section R609 shall be installed at the top of *stairs* that provide access to the *building* and that are enclosed with walls designed to break away in accordance with Section R306.3.5.

R306.3.7 Stairways and ramps. *Stairways* and *ramps* that are located below the lowest floor elevations specified in Section R306.3.2 shall comply with one or more of the following:

1. Be designed and constructed with open or partially open *risers* and *guards*.
2. *Stairways* and *ramps* not part of the required means of egress shall be designed and constructed to break away during design flood conditions without causing damage to the building or structure, including foundation.
3. Be retractable, or able to be raised to or above the lowest floor elevation, provided that the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code.
4. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the *building* or structure, including foundation.

Areas below *stairways* and *ramps* shall not be enclosed with walls below the elevation required in Section R306.3.2 unless such walls are constructed in accordance with Section R306.3.5.

R306.3.8 Decks and porches. Attached decks and porches shall meet the elevation requirements of Section R306.3.2 and shall either meet the foundation requirements of this section or shall be cantilevered from or knee braced to the *building* or structure. Self-supporting decks and porches that are below the elevation required in Section R306.3.2 shall not be enclosed by solid, rigid walls, including walls designed to break away. Self-supporting decks and porches shall be designed and constructed to remain in place during base flood conditions or shall be frangible and break away under base flood conditions.

R306.3.9 Construction documents. The *construction documents* shall include documentation that is prepared and sealed by a *registered design professional* that the design and methods of construction to be used meet the applicable criteria of this section.

R306.3.10 Tanks. Underground tanks shall be anchored to prevent flotation, collapse and lateral movement under conditions of the base flood. Above-ground tanks shall be installed at or above the elevation required in Section R306.3.2. Where elevated on platforms, the platforms shall be cantilevered from or knee braced to the *building* or shall be supported on foundations that conform to the requirements of Section R306.3.

SECTION R317 GARAGES AND CARPORTS

R317.3 Flood hazard areas. Garages and carports located in flood hazard areas as established by Table R301.2 shall be constructed in accordance with Section R306.

SECTION R328 SWIMMING POOLS, SPAS AND HOT TUBS

R327.1 General. The design and construction of pools and spas shall comply with the *International Swimming Pool and Spa Code*.

CHAPTER 4 FOUNDATIONS

R401.1 [Foundations] Application. The provisions of this chapter shall control the design and construction of the foundation and foundation spaces for *building*s. In addition to the provisions of this chapter, the design and construction of foundations in flood hazard areas as established by Table R301.2 shall meet the provisions of Section R306. Wood foundations shall be designed and installed in accordance with AWC PWF.

Exception: The provisions of this chapter shall be permitted to be used for wood foundations only in the following situations:

1. In *building*s that have not more than two floors and a roof.
2. Where interior *basement* and foundation walls are constructed at intervals not exceeding 50 feet (15 240 mm).

Wood foundations in Seismic Design Category D_0, D_1 or D_2 shall be designed in accordance with accepted engineering practice.

R401.2 [Foundations] Requirements. Foundation construction shall be capable of accommodating all loads in accordance with Section R301 and of transmitting the resulting loads to the supporting soil. Fill soils that support footings and foundations shall be designed, installed and tested in accordance with accepted engineering practice.

R401.3 [Foundations] Drainage. Surface drainage shall be diverted to a storm sewer conveyance or other *approved* point of collection that does not create a hazard. *Lot*s shall be graded to drain surface water away from foundation walls. The *grade* shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048 mm).

Exception: Where *lot line*s, walls, slopes or other physical barriers prohibit 6 inches (152 mm) of fall within 10 feet (3048 mm), drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet (3048 mm) of the building foundation shall be sloped a minimum of 2 percent away from the *building*.

R404.1.9.5 [Isolated masonry piers] Masonry piers in flood hazard areas. Masonry piers for *dwelling*s in flood hazard areas shall be designed in accordance with Section R306.

R408.6 [Under-Floor Space] Finished grade. The finished *grade* of under-floor surface shall be permitted to be located at the bottom of the footings; however, where there is evidence that the groundwater table can rise to within 6 inches (152 mm) of the finished floor at the building perimeter or where there is evidence that the surface water does not readily drain from the building site, the *grade* in the under-floor space shall be as high as the outside finished *grade*, unless an *approved* drainage system is provided.

R408.7 [Under-Floor Space] Flood resistance. For *building*s located in flood hazard areas as established in Table R301.2:

1. Walls enclosing the under-floor space shall be provided with flood openings in accordance with Section R306.2.2.

2. The finished ground level of the under-floor space shall be equal to or higher than the outside finished ground level on at least one side.

Exception: Under-floor spaces that meet the requirements of FEMA TB 11.

SECTION R506 CONCRETE FLOORS (ON GROUND)

R506.3.1 Fill. Fill material shall be free of vegetation and foreign material. The fill shall be compacted to ensure uniform support of the slab, and except where *approved*, the fill depths shall not exceed 24 inches (610 mm) for clean sand or gravel and 8 inches (203 mm) for earth.

PART V – MECHANICAL

M1301.1.1 [General Mechanical System Requirements] Flood-resistant installation. In flood hazard areas as established by Table R301.2, mechanical *appliances*, *equipment* and systems shall be located or installed in accordance with Section R306.1.6.

M1401.5 [Heating and Cooling Equipment and Appliances] Flood hazard. In flood hazard areas as established by Table R301.2, heating and cooling *equipment* and *appliances* shall be located or installed in accordance with Section R306.1.6.

M1601.4.10 [Duct Construction] Flood hazard areas. In flood hazard areas as established by Table R301.2, *duct systems* shall be located or installed in accordance with Section R306.1.6.

M1701.2 [Combustion Air] Opening location. In flood hazard areas as established in Table R301.2, *combustion air* openings shall be located at or above the elevation required in Section R306.2.1 or R306.3.2.

M2001.4 [Boilers and Water Heaters] Flood-resistant installation. In flood hazard areas established in Table R301.2, boilers, water heaters and their control systems shall be located or installed in accordance with Section R306.1.6.

M2101.29.1 [Hydronic Piping] Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the design flood elevation.

M2201.6 [Special Piping and Storage Systems – Oil Tanks] Flood-resistant installation. In flood hazard areas as established by Table R301.2, tanks shall be installed in accordance with Section R306.2.4 or R306.3.10.

SECTION G2404 (301) [FUEL GAS] GENERAL

G2404.7 (301.11) [Fuel Gas] Flood hazard. For structures located in *flood hazard areas*, the *appliance*, *equipment* and system installations regulated by this code shall be located at or above the elevation required by Section R306 for utilities and attendant equipment.

> **Exception:** The *appliance*, *equipment* and system installations regulated by this code are permitted to be located below the elevation required by Section R306 for utilities and attendant equipment provided that they are

designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.

PART VII – PLUMBING

P2601.3 [General Plumbing Requirements] Flood hazard areas. In flood hazard areas as established by Table R301.2, plumbing fixtures, drains, and *appliances* shall be located or installed in accordance with Section R306.1.6.

P2602.2 [Individual Water Supply and Sewage Disposal] Flood-resistant installation. In flood hazard areas as established by Table R301.2:

1. Water supply systems shall be designed and constructed to prevent infiltration of floodwaters.
2. Pipes for sewage disposal systems shall be designed and constructed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

P2705.1 [Plumbing Fixtures – Installation] General. The installation of fixtures shall conform to the following: *[partial shown]*

7. In flood hazard areas as established by Table R301.2, plumbing fixtures shall be located or installed in accordance with Section R306.1.6.

P3001.3 [Sanitary Drainage] Flood-resistant installation. In flood hazard areas as established by Table R301.2, drainage, waste and vent systems shall be located and installed to prevent infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

P3101.5 [Vent Systems] Flood resistance. In flood hazard areas as established by Table R301.2, vents shall be located at or above the elevation required in Section R306.2 (flood hazard areas including A Zones) or R306.3 (coastal high-hazard areas including V Zones and Coastal A Zones, where designated).

CHAPTER 44 REFERENCED STANDARDS

ASCE/SEI 7-2022 Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASCE/SEI 24-14 Flood Resistant Design and Construction

ANSI/AWC PWF-2021 Permanent Wood Foundation Design Specification

FEMA-TB-2—08 Flood Damage-Resistant Materials Requirements

FEMA-TB-11—01 Crawlspace Construction for Buildings Located in Special Flood Hazard Area

APPENDIX BA MANUFACTURED HOUSING USED AS DWELLINGS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

BA101.1 General. These provisions shall be applicable only to a *manufactured home* used as a single *dwelling unit* installed on privately owned (nonrental) lots and shall apply to the following:

1. Construction, *alteration* and *repair* of any foundation system that is necessary to provide for the installation of a *manufactured home* unit.
2. Construction, installation, *addition*, *alteration*, *repair* or maintenance of the *building service equipment* that is necessary for connecting *manufactured homes* to water, fuel, or power supplies and sewage systems.
3. *Alterations*, *additions* or *repairs* to existing *manufactured homes*. The construction, *alteration*, moving, demolition, *repair* and use of *accessory buildings* and structures, and their *building service equipment*, shall comply with the requirements of the codes adopted by this *jurisdiction*.

These provisions shall not be applicable to the design and construction of *manufactured homes* and shall not be deemed to authorize either modifications or *additions* to *manufactured homes* where otherwise prohibited.

BA101.2 Flood hazard areas. New and replacement *manufactured homes* to be installed in flood hazard areas as established in Table R301.2 shall meet the applicable requirements of Section R306.

BA114.3 Footings and foundations. Footings and foundations, unless otherwise specifically provided, shall be constructed of materials specified by this code for the intended use and in all cases shall extend below the frost line. Footings of concrete and masonry shall be of solid material. Foundations supporting untreated wood shall extend not less than 8 inches (203 mm) above the adjacent finish *grade*. Footings shall have a minimum depth below finished *grade* of 12 inches (305 mm) unless a greater depth is recommended by a foundation investigation.

Piers and bearing walls shall be supported on masonry or concrete foundations or piles, or other *approved* foundation systems which shall be of sufficient capacity to support all loads.

BA114.4 Foundation design. Where a design is provided, the foundation system shall be designed in accordance with the applicable structural provisions of this code and shall be designed to minimize differential settlement. Where a design is not provided, the minimum foundation requirements shall be as set forth in this code.

APPENDIX BI LIGHT STRAW-CLAY CONSTRUCTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

BI101.2 Flood hazard areas. In flood hazard areas established in Table R301.2, *buildings* using *light* straw-clay *infill* shall meet the requirements of Section R306.

APPENDIX BJ STRAWBALE CONSTRUCTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

BJ101.3 Flood hazard areas. In flood hazard areas established in Table R301.2, *buildings* using *strawbale* wall systems shall meet the requirements of Section R306.

APPENDIX BO EXISTING BUILDINGS AND STRUCTURES

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.

User notes:

About this appendix: *Appendix BO regulates the repair, alteration, additions, and relocation of existing buildings that are within the scope of this code. It is intended encourage the continued safe use of existing buildings and ensure that new work conforms to the intent of the code and that existing conditions remain at their current level of compliance or are improved.*

BO101.1 [Purpose and Intent] General. The purpose of these provisions is to encourage the continued use or reuse of legally existing buildings and structures. Structural elements and systems shall comply with Section R102.6.1 and the provisions of this appendix. *Repairs*, *alterations*, *additions* and relocation of existing buildings and structures shall comply with the provisions of this code for new construction, except as modified by this appendix.

BO102.1 [Compliance] General. The work shall not cause the *building* or structure to become unsafe or adversely affect the performance of the *building*; shall not cause an existing mechanical or plumbing system to become unsafe, hazardous, insanitary or overloaded; and unless expressly permitted by these provisions, shall not make the *building* any less compliant with this code or to any previously *approved* alternative arrangements than it was before the work was undertaken.

BO102.7 [Compliance] Flood hazard areas. Work performed in existing buildings located in a flood hazard area as established by Table R301.2 shall be subject to the provisions of Section R104.3.1.

BO104.1 [Repairs] General. Repairs shall comply with the applicable provisions of this code for new construction or as permitted by this appendix.

BO105.1 [Alterations] General. *Alterations* to existing buildings shall comply with the provisions of this code for new construction, except as permitted by Sections BO105.2 through BO105.8. Engineered design in accordance with Section R301.1.3 shall be permitted to meet the requirements of this section. *Alterations* shall not cause the existing building to become less compliant with the provisions of this code for new construction than the existing building was prior to the work.

BO106.1 [Addition] General. Where existing buildings with the *addition* are within the scope of this code, *additions* shall comply with this section and other applicable provisions of this code for new construction or as permitted by this appendix. Engineered design in accordance with Section R301.1.3 shall be permitted to meet the requirements of this section.

BO106.2 Structure for horizontal additions. Where an *addition* involves new construction attached to an existing building, the new construction shall meet all of the structural requirements of this code for new construction. *Alterations* to the existing building shall comply with the requirements governing *alterations* within this code. In wood light-frame *additions*, connection of the structural components shall be permitted to be provided using wall top

plates and *addition* studs that abut the existing building. Wall top plates shall be lapped and spliced in accordance with Section R602.3.2. Abutting studs shall be fastened in accordance with Table R602.3(1).

> **Exception:** The *addition* structure shall be permitted to be connected to the existing building in accordance with accepted engineering practice.

B0106.3 Structure for vertical additions. Where an *addition* involves new construction that adds a *story* to any part of the existing building or vertically increase the height of any part of the existing building, the new construction and the existing building together shall be shown to comply with, or altered to comply with, all of the structural requirements of this code for new construction.

> **Exception:** Where the new structure and the existing structure together are evaluated in accordance with accepted engineering practice and are shown to be sufficient to support the combined loads from the new structure and existing structure, no structural *alterations* are required.

B0107.1 [Relocated Buildings] General. Residential buildings or structures moved into or within the *jurisdiction* are not required to comply with the requirements for new construction under the International Residential Code provided they comply with all of the following conditions:

1. The *building* shall be safe for human occupancy as determined by the International Fire Code and the International Property Maintenance Code.
2. Any *repair*, *alteration* or change of use undertaken within the relocated structure shall comply with the requirements of this code applicable to the work being performed.
3. Any field fabricated elements shall comply with the applicable requirements of this code.

2024 International Existing Building Code® (IEBC) Compilation of flood-resistant provisions prepared by FEMA

CHAPTER 1 SCOPE AND ADMINISTRATION

[A] 101.2 Scope. The provisions of this code shall apply to the *repair*, *alteration*, *change of occupancy*, *addition* to and relocation of *existing buildings*.

> **Exception:** Detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the *International Residential Code*.

[A] 101.3 Purpose. The intent of this code is to provide flexibility to permit the use of alternative approaches to achieve compliance with minimum requirements provide a reasonable level of safety, health, property protection and general welfare insofar as they are affected by the *repair*, *alteration*, *change of occupancy*, *addition* and relocation of *existing buildings*.

SECTION 104 DUTIES AND POWERS OF CODE OFFICIAL

[A] 104.2.4 Modifications. Where there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases, provided that the *code official* shall first find that one or more special individual reasons makes the strict letter of this code impractical, and that the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of the written request for and action granting modifications shall be recorded and entered in the files of the department of building safety.

[A] 104.2.4.1 Flood hazard areas. For *existing buildings* located in *flood hazard areas* for which *repairs*, *alterations* and *additions* constitute *substantial improvement*, the *code official* shall not grant modifications to provisions related to flood resistance unless a determination is made that:

1. The applicant has presented good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render compliance with the flood-resistant construction provisions inappropriate.
2. Failure to grant the modification would result in exceptional hardship.

3. The granting of the modification will not result in increased flood heights, additional threats to public safety or extraordinary public expense; create nuisances; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. The modification is the minimum necessary to afford relief, considering the flood hazard.
5. A written notice will be provided to the applicant specifying, if applicable, the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation and that construction below the design flood elevation increases risks to life and property.

[A] 104.3.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, *repair*, *alteration*, *addition* or other improvement of *existing building*s or structures located in *flood hazard area*s, the *code official* shall determine where the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*. Where the *code official* determines that the proposed work constitutes *substantial improvement* or *repair* of *substantial damage*, and where required by this code, the *code official* shall require the building to meet the requirements of Section 1612 of the *International Building Code,* or Section R306 of the *International Residential Code*, as applicable.

[A] 109.3.3 [Inspections] Lowest floor elevation. For *additions* and *substantial improvements* to *existing building*s in *flood hazard areas*, on placement of the *lowest floor*, including basement, and prior to further vertical construction, the elevation documentation required in the *International Building Code* or the *International Residential Code*, as applicable, shall be submitted to the *code official*.

[A] 109.3.10 [Inspections] Flood hazard documentation. Where a building is located in a *flood hazard area*, documentation of the elevation of the *lowest floor* or the elevation of dry floodproofing, if applicable, as required in the International Building Code or the International Residential Code, as applicable, shall be submitted to the *code official* prior to the final inspection.

CHAPTER 2 DEFINITIONS

[A] ADDITION. An extension or increase in floor area, number of stories, or height of a building or structure.

[A] ALTERATION. Any construction of renovation to an *existing structure* other than a *repair* or *addition*.

[BS] DANGEROUS. Any building, structure or portion thereof that meets any of the conditions described below shall be deemed dangerous:

1. The building or structure has collapsed, has partially collapsed, has moved off its foundation or lacks the necessary support of the ground.
2. There exists a significant risk of collapse, detachment or dislodgment of any portion, member, appurtenance or ornamentation of the building or structure under permanent, routine, or frequent loads; under actual loads already in effect; or under snow, wind, rain, flood, earthquake aftershock or other environmental loads when such loads are imminent.

[A] EXISTING BUILDING. A building erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

[A] EXISTING STRUCTURE. A structure erected prior to the date of adoption of the appropriate code, or one for which a legal building permit has been issued.

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

[A] HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing, by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.
3. Certified as a contributing resource within a National Register, state designated or locally designated historic district.

[BS] LOWEST FLOOR. The lowest floor of the lowest enclosed area, including basement, but excluding any unfinished or flood-resistant enclosure, usable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the structure in violation of Section 1612 of the *International Building Code* or Section R306 of the *International Residential Code*, as applicable.

[A] REPAIR. The reconstruction, replacement or renewal of any part of an *existing building* for the purpose of its maintenance or to correct damage.

[BS] SUBSTANTIAL DAMAGE. For the purpose of determining compliance with the flood provisions of this code, damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

[BS] SUBSTANTIAL IMPROVEMENT. For the purpose of determining compliance with the flood provisions of this code, any *repair*, *alteration*, *addition*, or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure, before the improvement or *repair* is started. If the structure has sustained *substantial damage*, any *repairs* are considered *substantial improvement* regardless of the actual *repair* work performed. The term does not, however, include either of the following:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the *code official* and that is the minimum necessary to ensure safe living conditions.
2. Any *alteration* of a historic structure, provided that the *alteration* will not preclude the structure's continued designation as a historic structure.

CHAPTER 3 PROVISIONS FOR ALL COMPLIANCE METHODS

301.1 Applicability. The *repair*, *alteration*, *change of occupancy*, *addition* or relocation of all *existing buildings* shall comply with Section 301.2, 301.3, or 301.4. The provisions of Sections 302 through 309 shall apply to all *alterations*, *repairs*, *additions*, relocation of structures and *changes of occupancy* regardless of compliance method.

301.2 Repairs. *Repairs* shall comply with the requirements of Chapter 4.

301.3 Alteration, addition or change of occupancy. The *alteration*, *addition* or *change of occupancy* of all *existing buildings* shall comply with one of the methods listed in Section 301.3.1, 301.3.2 or 301.3.3 as selected by the applicant. Section 301.3.1 through 301.3.3 shall not be applied in combination with each other.

> **Exception:** Subject to the approval of the *code official*, *alterations* complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code. New structural members added as part of the *alteration* shall comply with the *International Building Code*. This exception shall not apply to the following:
>
> 1. *Alterations* for accessibility required by Section 306.
> 2. *Alterations* that constitute *substantial improvement* in *flood hazard areas*, which shall comply with Section 503.2, 701.3, or 1303.1.3.
> 3. Structural provisions of Section 304, Chapter 5 or to the structural provisions of Sections 706, 806 and 906.

301.3.1 Prescriptive compliance method. *Alterations*, *additions* and *changes of occupancy* complying with Chapter 5 of this code in buildings complying with the *International Fire Code* shall be considered in compliance with the provisions of this code.

301.3.2 Work area compliance method. *Alterations*, *additions* and *changes of occupancy* complying with the applicable requirements of Chapters 6 through 12 of this code shall be considered in compliance with the provisions of this code.

301.3.3 Performance compliance method. *Alterations*, *additions* and *changes of occupancy* complying with Chapter 13 of this code shall be considered in compliance with the provisions of this code.

301.4 Relocated buildings. Relocated buildings shall comply with the requirements of Chapter 14.

CHAPTER 4 REPAIRS

[BS] 401.3 Flood hazard areas. In flood hazard areas, *repairs* that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

[BS] 405.2.6 [Structural] Flood hazard areas. In *flood hazard* areas, buildings that have sustained *substantial damage* shall be brought into compliance with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

CHAPTER 5 PRESCRIPTIVE COMPLIANCE METHOD

502.1.2 Creation or extension of nonconformity. An *addition* shall not create or extend any nonconformity in the *existing building* to which the *addition* is being made with regard to accessibility, structural strength, supports and attachments for nonstructural components, fire safety, means of egress or the capacity of mechanical, plumbing or electrical systems.

> **Exception:** Nonconforming supports and attachments for nonstructural components that serve the *addition* from within the *existing building* need not be altered to comply with *International Building Code* Section 1613 unless the components are part of the *addition*'s life safety system or are required to serve an *addition* assigned to *Risk Category IV*.

[BS] 502.2 [Additions] Flood hazard areas. For buildings and structures in *flood hazard* areas established in Section 1612.3 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable, any *addition* that constitutes *substantial improvement* of the *existing structure* shall comply with the flood design requirements for new construction, and all aspects of the *existing structure* shall be brought into compliance with the requirements for new construction for flood design. For new foundations, foundations raised or extended upward, and replacement foundations, the foundations shall be in compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable, any *additions* that do not constitute *substantial improvement* of the *existing structure* are not required to comply with the flood design requirements for new construction, provided that both of the following apply:

1. The *addition* shall not create or extend a nonconformity of the *existing building* or structure with the flood-resistant construction requirements.
2. The *lowest floor* of the *addition* shall be at or above the lower of the *lowest floor* of the *existing building* or structure or the *lowest floor* elevation required in Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

[BS] 503.2 [Alterations] Flood hazard areas. For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable, any *alteration* that constitutes *substantial improvement* of the *existing structure* shall comply with the flood design requirements for new construction, and all aspects of the *existing structure* shall be brought into compliance with the requirements for new construction for flood design.

For buildings and structures in *flood hazard areas* established in Section 1612.3 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable, any *alterations* that do not constitute *substantial improvement* of the *existing structure* are not required to comply with the flood design requirements for new construction.

[BS] 507.3 [Historic Buildings] Flood hazard areas. Within flood *hazard areas* established in accordance with Section 1612.3 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable, where the work proposed constitutes *substantial improvement,* the *existing structure* shall be brought

into compliance with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

Exception: *Historic building*s meeting any of the following criteria need not be brought into compliance:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the US Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

CHAPTER 7 ALTERATIONS – LEVEL 1

701.2 Conformance. An *existing building* or portion thereof shall not be altered such that the building becomes less safe than its existing condition.

Exception: Where the current level of safety or sanitation is proposed to be reduced, the portion altered shall conform to the requirements of the *International Building Code*.

[BS] 701.3 Flood hazard areas. In *flood hazard areas*, *alterations* that constitute *substantial improvement* shall require that the building comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

CHAPTER 8 ALTERATIONS – LEVEL 2

801.2 Alteration level 1 compliance. In addition to the requirements of this chapter, all work shall comply with the requirements of Chapter 7.

CHAPTER 9 ALTERATIONS – LEVEL 3

901.2 Compliance. In addition to the provisions of this chapter, work shall comply with all of the requirements of Chapters 7 and 8. The requirements of Sections 802, 803, 804 and 805 shall apply within all *work areas* whether or not they include exits and corridors shared by more than one tenant and regardless of the occupant load.

Exception: Buildings in which the reconfiguration of space affecting exits or shared egress access is exclusively the result of compliance with the accessibility requirements of Section 306.7.1 shall not be required to comply with this chapter.

CHAPTER 10 CHANGE OF OCCUPANCY

1001.1 Scope. The provisions of this chapter shall apply where a *change of occupancy* occurs, as defined in Section 202.

CHAPTER 11 ADDITIONS

1101.1 Scope. An *addition* to a building or structure shall comply with the International Codes as adopted for new construction without requiring the *existing building* or structure to comply with any requirements of those codes or of these provisions, except as required by this chapter. Where an *addition* impacts the *existing building* or structure, that portion shall comply with this code.

1101.2 Creation or extension of nonconformity. An *addition* shall not create or extend any nonconformity in the *existing building* to which the *addition* is being made with regard to accessibility, structural strength, supports and attachments for nonstructural components, fire safety, means of egress or the capacity of mechanical, plumbing or electrical systems.

> **Exception:** Nonconforming supports and attachments for nonstructural components that serve the *addition* from within the *existing building* need not be altered to comply with *International Building Code* Section 1613 unless the components are part of the *addition*'s life safety system or are required to serve an *addition* assigned to *Risk Category IV*.

1101.4 Other work. Any *repair* or *alteration* work within an *existing building* to which an *addition* is being made shall comply with the applicable requirements for work as classified in Chapter 6.

[BS] 1103.3 Flood hazard areas. *Additions* and *foundations* in *flood hazard areas* shall comply with the following requirements:

1. For horizontal *additions* that are structurally interconnected to the *existing building*:
   - 1.1 If the *addition* and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.
   - 1.2 If the *addition* constitutes *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.
   - 1.3 If the *addition* does not constitute *substantial improvement,* the *addition* is not required to comply with the flood design requirements for new construction provided that both of the following apply:
     - 1.3.1 The *addition* shall not create or extend any nonconformity of the *existing building* with the flood resistant construction requirements.
     - 1.3.2 The *lowest floor* of the *addition* shall be at or above the lower of the *lowest floor* of the *existing building* or the *lowest floor* elevation required in Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.
2. For horizontal *additions* that are not structurally interconnected to the *existing building*:
   - 2.1 The *addition* shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

2.2 If the *addition* and all other proposed work, when combined, constitute *substantial improvement*, the *existing building* and the *addition* shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

3. For vertical *additions* and all other proposed work that, when combined, constitute *substantial improvement*, the *existing building* shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

4. For a new foundation, replacement foundation or a foundation raised or extended upward, the foundation shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

CHAPTER 12 HISTORIC BUILDINGS

[BS] 1201.4 Flood hazard areas. In *flood hazard areas*, if all proposed work, including *repairs*, work required because of a *change of occupancy*, and *alterations*, constitutes *substantial improvement*, then the *existing building* shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

Exception: If a *historic building* will continue to be a *historic building* after the proposed work is completed, then the proposed work is not considered a *substantial improvement*. For the purposes of this exception, a *historic building* is any of the following:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the US Department of Interior to contribute to the historical significance of a registered historic district or a district preliminarily determined to qualify as a historic district.
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

1206.1 Relocated buildings. Foundations of relocated *historic buildings* and structures shall comply with the *International Building Code*. Relocated *historic buildings* shall otherwise be considered a *historic building* for the purposes of this code. Relocated *historic buildings* and structures shall be sited so that exterior wall and opening requirements comply with the *International Building Code* or with the compliance alternatives of this code.

CHAPTER 13 PERFORMANCE COMPLIANCE METHOD

1301.1 Scope. The provisions of this chapter shall apply to the *alteration*, *addition* and *change of occupancy* of *existing structures*, including historic structures, as referenced in Section 301.3.3. The provisions of this chapter are intended to maintain or increase the current degree of public safety, health and general welfare in *existing buildings* while permitting, *alteration*, *addition* and *change of occupancy* without requiring full compliance with Chapters 6 through 12, except where compliance with the prescriptive method of Chapter 5 or the work area method of other provisions of this code is specifically required in this chapter.

[BS] 1303.1.3 Compliance with flood hazard provisions. In *flood hazard areas*, buildings that are evaluated in accordance with this section shall comply with Section 1612 of the *International Building Code*, or Section R306 of

the *International Residential Code*, as applicable, if the work covered by this section constitutes s*ubstantial improvement*. If the work covered by this section is a structurally connected horizontal *addition* that does not constitute *substantial improvement*, the *addition* is not required to comply with the flood design requirements for new construction provided that both of the following apply.

1. The *addition* shall not create or extend any nonconformity of the *existing building* with the flood-resistant construction requirements.
2. The *lowest floor* of the *addition* shall be at or above the lower of the *lowest floor* of the *existing building* or the *lowest floor* elevation required in Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

CHAPTER 14 RELOCATED OR MOVED BUILDINGS

[BS] 1402.6 Flood hazard areas. If relocated or moved into a *flood hazard area*, structures shall comply with Section 1612 of the *International Building Code*, or Section R306 of the *International Residential Code*, as applicable.

2024 International Mechanical Code® (IMC)
Compilation of flood-resistant provisions prepared by FEMA

SECTION 101 SCOPE AND GENERAL REQUIREMENTS

[A] 101.2 Scope. This code shall regulate the design, installation, maintenance, *alteration* and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings. This code shall also regulate those mechanical systems, system components, *equipment* and appliances specifically addressed herein. The installation of fuel gas distribution piping and *equipment*, fuel gas-fired appliances and fuel gas-fired *appliance* venting systems shall be regulated by the *International Fuel Gas Code*.

> **Exception:** Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories above grade plane in height with a separate means of egress and their accessory structures not more than three stories above grade plane in height shall comply with this code or the *International Residential Code*.

[A] 102.4 Additions, alterations or repairs. Additions, *alterations*, renovations or repairs to a mechanical system shall conform to that required for a new mechanical system without requiring the existing mechanical system to comply with all of the requirements of this code. Additions, *alterations* or repairs shall not cause an existing mechanical system to become unsafe, hazardous or overloaded.

Minor additions, *alterations*, renovations and repairs to existing mechanical systems shall meet the provisions or new construction, unless such work is done in the same manner and arrangement as was in the existing system, is not hazardous and is approved.

[A] 104.2.4.1 [Modifications] Flood hazard areas. The code official shall not grant modifications to any provision required in flood hazard areas, as established by Section 1612.3 of the *International Building Code*, unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 1612 of the *International Building Code* inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.

3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the *building* is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

[A] 104.3.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, repair, *alteration*, addition or other improvement of existing *building*s or structures located in flood hazard areas, the code official shall determine if the proposed work constitutes substantial improvement or repair of substantial damage. Where the code official determines that the proposed work constitutes substantial improvement or repair of substantial damage, and where required by this code, the code official shall require the building to meet the requirements of Section 1612 of the *International Building Code* or Section R306 of the *International Residential Code*, as applicable.

SECTION 202 GENERAL DEFINITIONS

[BS] DESIGN FLOOD ELEVATION. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard area map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the *building*'s perimeter plus the depth number, in feet (mm), specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

SECTION 301 [GENERAL REGULATIONS] GENERAL

[BS] 301.16 Flood hazard. For structures located in flood hazard areas, mechanical systems, *equipment* and *appliance*s shall be located at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant *equipment*.

> **Exception:** Mechanical systems, *equipment* and *appliance*s are permitted to be located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant *equipment* provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

[BS] 301.16.1 Coastal high-hazard areas and coastal A zones. In coastal high-hazard areas and coastal A zones, mechanical systems and *equipment* shall not be mounted on or penetrate walls intended to break away under flood loads.

SECTION 401 [VENTILATION] GENERAL

401.4 Intake opening location. Air intake openings shall comply with all of the following:

[only item 4 shown]

4. Intake openings on structures in flood hazard areas shall be at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

SECTION 501 [EXHAUST SYSTEMS] GENERAL

501.3.1 Location of exhaust outlets. The termination point of exhaust outlets and ducts discharging to the outdoors shall be located with the following minimum distances:

[only item 4 shown]

4. Exhaust outlets serving structures in flood hazard areas shall be installed at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

CHAPTER 6 DUCT SYSTEMS

[BS] 602.4 [Plenums] Flood hazard. For structures located in flood hazard areas, *plenum* spaces shall be located above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant *equipment* or shall be designed and constructed to prevent water from entering or accumulating within the plenum spaces during floods up to such elevation. If the *plenum* spaces are located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment, they shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

[BS] 603.13 [Duct Construction and Installation] Flood hazard areas. For structures in flood hazard areas, ducts shall be located above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant *equipment* or shall be designed and constructed to prevent water from entering or accumulating within the ducts during floods up to such elevation. If the ducts are located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment, the ducts shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

CHAPTER 12 HYDRONIC PIPING

1206.9.1 [Piping Installation] Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

1210.8.6 [Plastic Pipe Ground-Source Heat Pump Loop Systems] Flood hazard. Piping located in a flood hazard area shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the *design flood elevation*.

SECTION 1305 FUEL OIL SYSTEM INSTALLATION

1305.2.1 Flood hazard. Fuel oil pipe, *equipment* and *appliances* located in flood hazard areas shall be located above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment or shall be capable of resisting hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

2024 International Plumbing Code® (IPC)
Compilation of flood-resistant provisions prepared by FEMA

SECTION 101 SCOPE AND GENERAL REQUIREMENTS

[A] 101.2 Scope. The provisions of this code shall apply to the erection, installation, alteration, repairs, relocation, replacement, addition to, use or maintenance of plumbing systems within this jurisdiction. This code shall regulate nonflammable medical gas, inhalation anesthetic, vacuum piping, nonmedical oxygen systems and sanitary and condensate vacuum collection systems. The installation of fuel gas distribution piping and equipment, fuel-gas-fired water heaters and water heater venting systems shall be regulated by the *International Fuel Gas Code*.

> **Exception:** Detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress, and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the *International Residential Code*.

[A] 104.2.4.1 [Modifications] Flood hazard areas. The code official shall not grant modifications to any provision required in flood hazard areas as established by Section 1612.3 of the *International Building Code* unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 1612 of the *International Building Code* inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

[A] 104.3.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, repair, alteration, addition or other improvement of existing buildings or structures located in flood hazard areas, the code official shall determine if the

proposed work constitutes substantial improvement or repair of substantial damage. Where the code official determines that the proposed work constitutes substantial improvement or repair of substantial damage, and where required by this code, the code official shall require the building to meet the requirements of Section 1612 of the *International Building Code* or Section R306 of the International Residential Code, as applicable.

SECTION 202 GENERAL DEFINITIONS

[BS] BASE FLOOD ELEVATION. A reference point, determined in accordance with the building code, based on the depth or peak elevation of flooding, including wave height, which has a 1-percent (100-year flood) or greater chance of occurring in any given year.

[BS] DESIGN FLOOD ELEVATION. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) (mm) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any given year.
2. The area designated as a *flood hazard area* on a community's flood hazard map or as otherwise legally designated.

SECTION 309 FLOOD HAZARD RESISTANCE

309.1 General. Plumbing systems and equipment in structures erected in *flood hazard areas* shall be constructed in accordance with the requirements of this section and the *International Building Code*.

[BS] 309.2 Flood hazard. For structures located in *flood hazard areas*, the following systems and equipment shall be located and installed as required by Section 1612 of the *International Building Code*.

1. Water service pipes.
2. Pump seals in individual water supply systems where the pump is located below the *design flood elevation*.
3. Covers on potable water wells shall be sealed, except where the top of the casing well or pipe sleeve is elevated to not less than 1 foot (305 mm) above the *design flood elevation*.
4. Sanitary drainage piping.
5. Storm drainage piping.
6. Manhole covers shall be sealed, except where elevated to or above the *design flood elevation*.
7. Other plumbing fixtures, faucets, fixture fittings, piping systems and equipment.
8. Water heaters.
9. Vents and vent systems.

Exception: The systems listed in this section are permitted to be located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment, provided that the systems are designed and installed to prevent water from entering or accumulating within their components and the systems are constructed to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding up to such elevation.

[BS] 309.3 Coastal high-hazard areas and coastal A zones. Structures located in coastal high-hazard areas and coastal A zones shall meet the requirements of Section 309.2. The plumbing systems, pipes and fixtures shall not be mounted on or penetrate through walls intended to break away under flood loads.

2024 International Fuel Gas Code® (IFGC)
Compilation of flood-resistant provisions prepared by FEMA

SECTION 101 (IFGC) SCOPE AND GENERAL REQUIREMENTS

[A] 101.2 Scope. This code shall apply to the installation of fuel-gas *piping* systems, *fuel gas appliances*, *gaseous hydrogen systems* and related accessories in accordance with Sections 101.2.2 through 101.2.6.

> **Exception:** Detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with separate means of egress and their accessory structures not more than three stories above grade plane in height, shall comply with this code or the *International Residential Code*.

[A] 104.2.4.1 [Modifications] Flood hazard areas. The *code official* shall not grant modifications to any provision required in *flood hazard areas* as established by Section 1612.3 of the *International Building Code* unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 1612 of the *International Building Code* inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

[A] 104.3.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, repair, *alteration*, addition or other improvement of existing buildings or structures located in *flood hazard areas*, the *code official* shall determine if the proposed work constitutes substantial improvement or repair of substantial damage. Where the *code official* determines that the proposed work constitutes substantial improvement or repair of substantial damage, and where

required by this code, the *code official* shall require the building to meet the requirements of Section 1612 of the *International Building Code* or Section R306 of the *International Residential Code*, as applicable.

SECTION 202 (IFGC) GENERAL DEFINITIONS

[BS] DESIGN FLOOD ELEVATION. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the *building*'s perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a floodplain subject to a 1 percent or greater chance of flooding in any given year.
2. This area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

CHAPTER 3 GENERAL REGULATIONS

[BS] 301.11 Flood hazard. For structures located in *flood hazard areas*, the *appliance*, *equipment* and system installations regulated by this code shall be located at or above the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment.

> **Exception:** The *appliance*, *equipment* and system installations regulated by this code are permitted to be located below the elevation required by Section 1612 of the *International Building Code* for utilities and attendant equipment provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to such elevation.

2024 International Fire Code® (IFC)
Compilation of flood-resistant provisions prepared by FEMA

SECTION 101 SCOPE AND GENERAL REQUIREMENTS

[A] 101.2 Scope. This code establishes regulations affecting or relating to structures, processes, premises and safeguards regarding all of the following:

1. The hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices.
2. Conditions hazardous to life, property or public welfare in the occupancy of structures or premises.
3. Fire hazards in the structure or on the premises from occupancy or operation.
4. Matters related to the construction, extension, repair, *alteration* or removal of fire protection systems.
5. Conditions affecting the safety of fire fighters and emergency responders during emergency operations.

104.2.4.1 [Modifications] Individual cases. The *fire code official* shall have the authority to grant modifications for individual cases, provided that the *fire code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the code compliance agency.

104.2.4.2 [Modifications] Natural disasters. In preparation for, during and after a natural disaster event, as determined by the *fire code official*, the *fire code official* shall have the authority to issue written policies, procedures or rules that modify this code as necessary to protect life and property. Such policies, procedures or rules shall be made available to the public and shall include start and end dates, which can be extended at the *fire code official's* discretion.

SECTION 913 FIRE PUMPS

913.2 Protection against interruption of service. The fire pump, driver and controller shall be protected in accordance with NFPA 20 against possible interruption of service through damage caused by explosion, fire, flood, earthquake, rodents, insects, windstorm, freezing, vandalism and other adverse conditions.

SECTION 1203 EMERGENCY AND STANDBY POWER SYSTEMS

1203.1 General. Emergency power systems and standby power systems required by this code or the *International Building Code* shall comply with Sections 1203.1.1 through 1203.1.9.

1203.1.3 Installation. Emergency power systems and standby power systems shall be installed in accordance with the *International Building Code*, NFPA 70, NFPA 110 and NFPA 111.

1203.1.8 Group I-2 occupancies. In Group I-2 occupancies located in flood hazard areas established in Section 1612.3 of the *International Building Code* where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hook up of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

SECTION 5303 [COMPRESSED GASSES] GENERAL REQUIREMENTS

5303.16 Vaults. Generation, compression, storage and dispensing equipment for *compressed gases* shall be allowed to be located in either above- or below-grade vaults complying with Sections 5303.16.1 through 5303.16.14.

5303.16.1 Listing required. Vaults shall be *listed* by a nationally recognized testing laboratory.

> **Exception:** Where *approved* by the *fire code official*, below-grade vaults are allowed to be constructed on site, provided that the design is in accordance with the *International Building Code* and that special inspections are conducted to verify structural strength and compliance of the installation with the *approved* design in accordance with Section 1707 of the *International Building Code*. Installation plans for below-grade vaults that are constructed on site shall be prepared by, and the design shall bear the stamp of, a professional engineer. Consideration shall be given to soil and hydrostatic loading on the floors, walls and lid; anticipated seismic forces; uplifting by ground water or flooding; and to loads imposed from above, such as traffic and equipment loading on the vault lid.

5303.16.2 Design and construction. *[partial shown]* The walls and floor of a vault installed below grade shall be designed to withstand anticipated soil and hydrostatic loading. Vaults shall be designed to be wind and earthquake resistant, in accordance with the *International Building Code*.

5303.16.5 Anchoring. Vaults and equipment contained therein shall be suitably anchored to withstand uplifting by groundwater or flooding. The design shall verify that uplifting is prevented even where equipment within the vault is empty.

SECTION 5504 [CRYOGENIC FLUIDS] STORAGE

5504.3.1.1.4 [Outdoor storage] Areas subject to flooding. Stationary containers located in areas subject to flooding shall be securely anchored or elevated to prevent the containers from separating from foundations or supports.

CHAPTER 57 FLAMMABLE AND COMBUSTIBLE LIQUIDS

5704.2.7 Design, fabrication and construction requirements for tanks. The design, fabrication and construction of tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design.

5704.2.7.8 Locations subject to flooding. Where a tank is located in an area where it is subject to buoyancy because of a rise in the water table, flooding or accumulation of water from fire suppression operations, uplift protection shall be provided in accordance with Sections 22.14 and 23.14 of NFPA 30.

5704.2.7.9 Corrosion protection. Where subject to external corrosion, tanks shall be fabricated from corrosion-resistant materials, coated or provided with corrosion protection in accordance with Section 23.3.5 of NFPA 30.

5704.2.8 Vaults. Vaults shall be allowed to be either above or below grade and shall comply with Sections 5704.2.8.1 through 5704.2.8.18.

5704.2.8.1 Listing required. Vaults shall be *listed* in accordance with UL 2245.

> **Exception:** Where *approved* by the *fire code official*, below-grade vaults are allowed to be constructed on site, provided that the design is in accordance with the *International Building Code* and that special inspections are conducted to verify structural strength and compliance of the installation with the *approved* design in accordance with Section 1707 of the *International Building Code*. Installation plans for below-grade vaults that are constructed on site shall be prepared by, and the design shall bear the stamp of, a professional engineer. Consideration shall be given to soil and hydrostatic loading on the floors, walls and lid; anticipated seismic forces; uplifting by groundwater or flooding; and to loads imposed from above such as traffic and equipment loading on the vault lid.

5704.2.8.5 Anchoring. Vaults and their tanks shall be suitably anchored to withstand uplifting by ground water or flooding, including when the tank is empty.

5706.3 Well drilling and operating. Wells for oil and natural gas shall be drilled and operated in accordance with Sections 5706.3.1 through 5706.3.8.

5706.3.2 Waste control. Control of waste materials associated with wells shall comply with Sections 5706.3.2.1 and 5706.3.2.2.

5706.3.2.1 Discharge on a street or water channel. Liquids containing crude petroleum or its products shall not be discharged into or on streets, highways, drainage canals or ditches, storm drains or flood control channels.

SECTION 6104 LOCATION OF LP-GAS CONTAINERS

6104.3 Container location. LP-gas containers shall be located with respect to buildings and *lot line*s of adjoining property that can be built upon, in accordance with Table 6104.3.

6104.3.2 Special hazards. LP-gas containers shall be located with respect to special hazards including, but not limited to, above-ground *flammable* or *combustible liquid* tanks, oxygen or gaseous hydrogen containers, flooding or electric power lines as specified in Section 6.5.3 of NFPA 58.

2024 International Swimming Pool and Spa Code® (ISPSC) Compilation of flood-resistant provisions prepared by FEMA

SECTION 101 SCOPE AND GENERAL REQUIREMENTS

[A] 101.2 Scope. The provisions of this code shall apply to the construction, *alteration*, movement, renovation, replacement, repair and maintenance of aquatic recreation facilities, pools and spas. The pools and spas covered by this code are either permanent or temporary, and shall be only those that are designed and manufactured to be connected to a circulation system and that are intended for swimming, bathing or wading.

[A] 104.2.4.1 [Modifications] Flood hazard areas. The code official shall not grant modifications to any provision required in flood hazard areas as established by Section 1612.3 of the *International Building Code* unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 1612 of the *International Building Code* inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; cause fraud on or victimization of the public; or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

[A] 104.3.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, repair, alteration, addition or other improvement of existing buildings or structures located in flood hazard areas, the code official shall determine if the proposed work constitutes substantial improvement or repair of substantial damage. Where the code official determines that the proposed work constitutes substantial improvement or repair of substantial damage, and where required by this code, the code official shall require the building to meet the requirements of Section 1612 of the *International Building Code* or Section R306 of the International Residential Code, as applicable.

SECTION 202 DEFINITIONS

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any year.
2. The area designated as a *flood hazard area* on a community's flood hazard map, or otherwise legally designated.

SECTION 304 FLOOD HAZARD AREAS

304.1 General. The provisions of Section 304 shall control the design and construction of pools and spas installed in *flood hazard areas*.

[BS] 304.2 Determination of impacts based on location. Pools and spas located in *flood hazard areas* indicated within the *International Building Code* or the *International Residential Code* shall comply with Section 304.2.1 or 304.2.2.

> **Exception:** Pools and spas located in riverine *flood hazard areas* that are outside of designated floodways and pools and spas located in *flood hazard areas* where the source of flooding is tides, storm surges or coastal storms.

[BS] 304.2.1 Pools and spas located in designated floodways. Where pools and spas are located in designated floodways, documentation shall be submitted to the *code official* that demonstrates that the construction of the pools and spas will not increase the design flood elevation at any point within the jurisdiction.

[BS] 304.2.2 Pools and spas located where floodways have not been designated. Where pools and spas are located where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed pool or spa and any associated grading and filling, will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction.

[BS] 304.3 Pools and spas in coastal high-hazard areas and coastal A zones. Pools and spas installed in coastal high-hazard areas and coastal A zones shall be designed and constructed in accordance with ASCE 24.

[BS] 304.4 Protection of equipment. Equipment shall be elevated to or above the design flood elevation.

> **Exception:** Equipment for pools, spas and water features shall be permitted below the required elevation provided the equipment is elevated to the highest extent practical, is anchored to prevent flotation and resist flood forces, and is protected to prevent water from entering or accumulating within the components during conditions of flooding.

304.5 GFCI protection. Electrical equipment installed below the design flood elevation shall be supplied by branch circuits that have ground-fault circuit interrupter protection for personnel.

2024 International Private Sewage Disposal Code® (IPSDC) Compilation of flood-resistant provisions prepared by FEMA

CHAPTER 1 SCOPE AND ADMINISTRATION

[A] 101.2 Scope. Septic tank and effluent absorption systems or other treatment tank and effluent disposal systems shall be permitted where a public sewer is not available to the property served. Unless specifically approved, the *private sewage disposal system* of each building shall be entirely separate from and independent of any other building. The use of a common system or a system on a parcel other than the parcel where the structure is located shall be subject to the full requirements of this code as for systems serving public buildings.

[A] 104.2.4.1 [Modifications] Flood hazard areas. The code official shall not grant modifications to any provision required in flood hazard areas as established by Section 1612.3 of the *International Building Code* unless a determination has been made that:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards of Section 1612 of the *International Building Code* inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the lot undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risk to life and property.

[A] 104.3.1 Determination of substantially improved or substantially damaged existing buildings and structures in flood hazard areas. For applications for reconstruction, rehabilitation, repair, alteration, addition or other improvement of existing buildings or structures located in flood hazard areas, the code official shall determine if the proposed work constitutes substantial improvement or substantial damage. Where the code official determines that the proposed work constitutes substantial improvement or repair of substantial damage, and where required by this code, the code official shall require the building to meet the requirements of Section 1612 of the *International Building Code* or Section R306 of the International Residential Code, as applicable.

[A] 105.2.5 Site plan. A site plan shall be filed showing to scale the location of all septic tanks, holding tanks or other treatment tanks; building sewers; wells; water mains; water service; streams and lakes; *flood hazard areas*; dosing or pumping chambers; distribution boxes; effluent systems; dual disposal systems; replacement system areas; and the location of all buildings or structures. Separating distances and dimensions shall be shown, including any distance to adjoining property. A vertical elevation reference point and a horizontal reference point shall be indicated. For other than single-family dwellings, grade slope with contours shall be shown for the grade elevation of the entire area of the soil absorption system and the area on all sides for a distance of 25 feet (7620 mm).

[A] 113.6 Unsafe systems. Any *private sewage disposal system* regulated by this code that is unsafe or constitutes a health hazard, insanitary condition or is otherwise dangerous to human life is hereby declared unsafe. Any use of *private sewage disposal systems* regulated by this code constituting a hazard to safety, health or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, disaster, damage or abandonment is hereby declared an unsafe use. Any such unsafe equipment is hereby declared to be a public *nuisance* and shall be abated by repair, rehabilitation, demolition or removal.

SECTION 202 GENERAL DEFINITIONS

[BS] DESIGN FLOOD ELEVATION. The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the *design flood elevation* shall be the elevation of the highest existing grade of the *building*'s perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where a depth number is not specified on the map, the depth number shall be taken as being equal to 2 feet (610 mm).

[BS] FLOOD HAZARD AREA. The greater of the following two areas:

1. The area within a flood plain subject to a 1-percent or greater chance of flooding in any given year.
2. The area designated as a flood hazard area on a community's flood hazard map or as otherwise legally designated.

CHAPTER 3 GENERAL REGULATIONS

301.1 [General] Scope. The provisions of this chapter shall govern the general regulations of *private sewage disposal systems*, including specific limitations and *flood hazard areas.*

[BS] 303.1 [Flood Hazard Areas] General. Soil absorption systems shall be located outside of *flood hazard areas*.

> **Exception:** Where suitable soil absorption sites outside of the *flood hazard area* are not available, the soil absorption site is permitted to be located within the *flood hazard area*. The soil absorption site shall be located to minimize the effects of inundation under conditions of the design flood.

[BS] 303.2 Tanks. In *flood hazard areas*, tanks shall be anchored to counter buoyant forces during condition of the design flood. The vent termination and service manhole of the tank shall be not less than 2 feet (610 mm) above the *design flood elevation* or fitted with covers designed to prevent the inflow of floodwater or outflow of the contents of the tanks during conditions of the design flood.

[BS] 303.3 Mound systems. Mound systems shall be prohibited in *flood hazard areas*.

CHAPTER 4 SITE EVALUATION AND REQUIREMENTS

401.2 [General] Site evaluation. Site evaluation shall include soil conditions, properties and permeability, depth to zones of soil saturation, depth to bedrock, slope, landscape position, all setback requirements and the presence of *flood hazard areas*. Soil test data shall relate to the undisturbed elevations, and a vertical elevation reference point or benchmark shall be established. Evaluation data shall be reported on approved forms. Reports shall be filed within 30 days of the completion of testing for all sites investigated.

403.4 [Soil Borings and Evaluation] Alluvial and colluvial deposits. Subsurface soil absorption systems shall not be placed in alluvial and colluvial deposits with shallow depths, extended periods of saturation or possible flooding.

406.1 [Site Requirements] Soil absorption site location. The surface grade of all soil absorption systems shall be located at a point lower than the surface grade of any nearby water well or reservoir on the same or adjoining property. Where this is not possible, the site shall be located so surface water drainage from the site is not directed toward a well or reservoir. The soil absorption system shall be located with a minimum horizontal distance between various elements as indicated in Table 406.1. *Private sewage disposal systems* in compacted areas, such as parking lots and driveways, are prohibited. Surface water shall be diverted away from any soil absorption site on the same or neighboring lots.

Table 406.1 Minimum horizontal separation distances for soil absorption systems

ELEMENT	DISTANCE (feet)
Cistern	50
Habitable building, below-grade foundation	25
Habitable building, slab-on-grade	15
Lake, high-water mark	50
Lot line	5
Reservoir	50
Roadway ditches	10
Spring	100
Streams or watercourses	50
Swimming pool	15
Uninhabited building	10
Water main	50

ELEMENT	DISTANCE (feet)
Water service	10
Water well	50

For SI: 1 foot=304.8 mm.

406.1.1 Flood hazard areas. The site shall be located outside of *flood hazard areas*.

Exception: Where suitable sites outside of the *flood hazard area* are not available, it is permitted for the site to be located within the *flood hazard area*. The site shall be located to minimize the effects of inundation under conditions of the design flood.

SECTION 902 [MOUND SYSTEMS] SOIL AND SITE REQUIREMENTS

902.2 Prohibited locations. A mound system shall be prohibited on sites not having the minimum depths of soil specified in Table 902.2. The installation of a mound in a filled area shall be prohibited. A mound shall not be installed in a compacted area or over a failing conventional system.

Table 902.2 Minimum soil depths for mound system installation

RESTRICTING FACTOR	MINIMUM SOIL DEPTH TO RESTRICTION (inches)
High ground water	24
Impermeable rock strata	60
Pervious rock	24
Rock fragments (50-percent volume)	24

For SI: 1 inch=25.4 mm.

2024 International Code Council Performance Code® (ICCPC) Compilation of flood-resistant provisions prepared by FEMA

CHAPTER 1 SCOPE AND ADMINISTRATION

[A] 101.2 Purpose. To provide appropriate health, safety, welfare, and social and economic value, while promoting innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources.

[A] 101.3 Scope. This code provides requirements for buildings and structures and includes provisions for structural strength, stability, sanitation, means of access and egress, light and ventilation, safety to life and protection of property from fire and, in general, to secure life and property from other hazards affecting the built environment. This code includes: provisions for the use and occupancy of buildings, structures, facilities and premises; their alteration, repair, maintenance, removal, and demolition; the installation and maintenance of amenities including, but not limited to, such services as the electrical, gas, mechanical, plumbing, energy conservation and building transportation systems; and for the storage, handling and use of explosive, flammable and combustible materials, hazardous materials and dangerous operations and processes.

[A] 101.4 Intent. The purpose of this code is to provide an acceptable level of health, safety, and general welfare and to limit damage to property from events that are expected to impact buildings, structures, facilities, equipment and processes. Accordingly, Part II of this code intends buildings and structures to provide for the following:

1. An environment free of unreasonable risk of death and injury from fires, explosions or dangerous conditions.
2. A structure that will withstand loads associated with normal use and of the severity associated with the location in which the structure is constructed.
3. Means of egress and access for normal and emergency circumstances.
4. Limited spread of fire both within the building and to adjacent properties.
5. Ventilation and sanitation facilities to maintain the health of the occupants.
6. Natural light, heating, cooking and other amenities necessary for the well-being of the occupants.
7. Efficient use of energy.

8. Safety to firefighters and emergency responders during emergency operations.

[A] 102.3.4.2.2 Design report. The design report shall document the steps taken in the design analysis, clearly identifying the criteria, parameters, inputs, assumptions, sensitivities and limitations involved in the analysis. The design report shall clearly identify *bounding conditions*, assumptions and sensitivities that clarify the expected uses and limitations of the performance analysis. This report shall verify that the design approach is in compliance with the applicable codes and *acceptable methods* and shall be submitted for concurrence by the code official prior to the *construction documents* being completed. The report shall document the design features to be incorporated based on the analysis. The design report shall address but not be limited to the following:

1. Project scope.
2. Goals and objectives.
3. Performance criteria.
4. Hazard scenarios.
5. Design fire loads and hazards.
6. Final design.
7. Evaluation and peer review.
8. *Bounding conditions* and critical design assumptions.
9. Critical design features.
10. System design and operational requirements.
11. Operational and maintenance requirements.
12. *Commissioning* testing requirements and acceptance criteria.
13. Frequency of certificate renewal.
14. Supporting documents and references.
15. Preliminary site and floor plans.

[A] 102.3.11.4 Additions, renovations and related construction changes. Construction activities in existing buildings, facilities, premises or processes shall be evaluated by a *registered design professional* and documented in a written report, which shall be submitted for review and approval in conjunction with the permit request. The report shall identify whether or not the proposed construction exceeds the *bounding conditions*, which will result in an increase in hazard or risk beyond that expected in the approved original *construction document*. Where *bounding conditions* are not exceeded, the original construction document need not be revised. Where bounding conditions are exceeded, the original *construction document* shall be revised so that compliance with this code is perpetuated.

SECTION 202 DEFINED TERMS

[BS] ESSENTIAL FACILITIES. Buildings and other structures that are intended to remain operational in the event of extreme environmental loading from flood, wind, snow or earthquake.

CHAPTER 3 DESIGN PERFORMANCE LEVELS

[BG] 302.4 Risk factors. In determining the hazard-related risk(s) to users of buildings and other structures, the following risk factors shall be considered:

[BG] 302.4.1 Nature of the hazard. The nature of the hazard, whether it is likely to originate internal or external to the building or other structure, and how it may impact the occupants, the building or other structure, and the contents.

[BG] 303.3 Magnitudes of event and level of damage. Performance groups identify the minimum required performance of buildings or other structures through a relationship of the magnitude of an event to the maximum level of impact or damage to be tolerated shown in Table 303.3. The use of Table 303.3 shall be an iterative process. It shall be used to determine the acceptable impact of certain events based on their magnitude, and then used iteratively to evaluate various designed mitigation features. The use of Table 303.3 shall consider, explicitly or implicitly, all four design event magnitudes for the assigned performance group. Assignment of performance groups is accomplished through consideration of building or other structure uses, building or other structure risk factors, and the importance of a building or other structure to a community.

[BG] Table 303.3 Maximum level of impact or damage to be tolerated based on performance groups and design event magnitudes

		Increasing Level of Performance -> **Performance Groups**			
		Performance Group I	Performance Group II	Performance Group III	Performance Group IV
Magnitude of Design Event	VERY LARGE (Very Rare)	SEVERE	SEVERE	HIGH	MODERATE
	LARGE (Rare)	SEVERE	HIGH	MODERATE	MILD
	MEDIUM (Less Frequent)	HIGH	MODERATE	MILD	MILD
	SMALL (Frequent)	MODERATE	MILD	MILD	MILD

SECTION 304 MAXIMUM LEVEL OF IMPACT OR DAMAGE TO BE TOLERATED

[BG] 304.1 General. Design performance levels establish how a building or other structure is expected to perform, in terms of tolerable limits, under varying load conditions. For each magnitude of event (small to very large), considered as a design load, based on realistic event scenarios, the design shall provide high confidence that the corresponding maximum level of damage to be tolerated for the appropriate performance group will be met. This relationship is illustrated in Table 303.3.

[BG] 304.2 Level of impact or damage. There are four design performance levels defined in terms of tolerable limits of impact or damage to the building or other structures, its contents and its occupants: mild, moderate, high and severe.

[BG] 304.2.1 Mild impact or damage. The tolerable impacts of the design loads are assumed as follows:

304.2.1.1 Structural damage. The building or other structure does not have structural damage and is safe to occupy.

304.2.1.2 Nonstructural systems. Nonstructural systems needed for normal building or other structure use and emergency operations are fully operational.

[BG] 304.2.1.3 Occupant hazards. Injuries to building or other structure occupants from hazard-related applied loads are minimal in numbers and minor in nature. There is a very low likelihood of single or multiple life loss. The nature of the applied load, such as fire hazards, may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.1.4 Overall extent of damage. Damage to building or other structure contents from hazard-related applied loads is minimal in extent and minor in cost.

[BG] 304.2.1.5 Hazardous materials. There is no significant release of hazardous materials outside of the building or facility. The risk to the community is minimal, and an emergency relocation or shelter in place order is not necessary.

[BG] 304.2.2 Moderate impact or damage. The tolerable impacts of the design loads are assumed as follows:

[BG] 304.2.2.1 Structural damage. There is moderate structural damage, which is repairable; some delay in reoccupancy can be expected.

[BG] 304.2.2.2 Nonstructural systems. Nonstructural systems needed for normal building or other structure use are fully operational, although some cleanup and repair may be needed. Emergency systems remain fully operational.

[BG] 304.2.2.3 Occupant hazards. Injuries to building or other structure occupants from hazard-related applied loads may be locally significant, but generally moderate in numbers and in nature. There is a low likelihood of single life loss with a very low likelihood of multiple life loss. The nature of the applied load, such as fire hazards, may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.2.4 Overall extent of damage. Damage to building or other structure contents from hazard-related applied loads may be locally significant, but is generally moderate in extent and cost. The nature of the applied load, such as fire hazards, may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.2.5 Hazardous materials. There is no significant release of hazardous materials outside of the building or other structure. The risk to the community is minimal and an emergency relocation or shelter in place order is not necessary.

[BG] 304.2.3 High impact or damage. The tolerable impacts of the design loads are assumed as follows:

[BG] 304.2.3.1 Structural damage. There is significant damage to structural elements but there is not large falling debris; repair is possible. Significant delays in reoccupancy can be expected.

[BG] 304.2.3.2 Nonstructural systems. Nonstructural systems needed for normal building or other structure use are significantly damaged and inoperable; egress routes may be impaired by light debris; emergency systems may be significantly damaged, but remain operational.

[BG] 304.2.3.3 Occupant hazards. Injuries to building or other structure occupants from hazard-related applied loads may be locally significant with a high risk to life, but are generally moderate in numbers and in nature. There is a moderate likelihood of single life loss, with a low probability of multiple life loss. The nature of the applied load, such as fire hazards, may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.3.4 Overall extent of damage. Damage to building or other structure contents from hazard-related applied loads may be locally total and generally significant. The nature of the applied load, such as fire hazards, may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.3.5 Hazardous materials. There is no major release of hazardous materials outside of the facility. The risk to the community is minimal, and an emergency relocation or shelter in place order is not necessary.

[BG] 304.2.4 Severe impact or damage. The tolerable impacts of the design loads are assumed as follows:

[BG] 304.2.4.1 Structural damage. There is substantial structural damage, but all significant components continue to carry gravity load demands. Repair may not be technically possible. The building or other structure is not safe for reoccupancy, as application of loads could cause collapse.

[BG] 304.2.4.2 Nonstructural systems. Nonstructural systems for normal building or other structure use may be completely nonfunctional. Egress routes may be impaired; emergency systems may be substantially damaged and nonfunctional.

[BG] 304.2.4.3 Occupant hazards. Injuries to building or other structure occupants from hazard-related applied loads may be high in numbers and significant in nature. Significant risk to life may exist. There is a high likelihood of single life loss and a moderate likelihood of multiple life loss. The nature of the applied load, such as fire hazards, may result in higher levels of expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.4.4 Overall extent of damage. Damage to building or other structure contents from hazard-related applied loads may be total. The nature of the applied load, such as fire hazards, may result in higher levels of

expected injuries and damage in localized areas, whereas the balance of the areas may sustain fewer injuries and less damage.

[BG] 304.2.4.5 Hazardous materials. Hazardous materials are released outside of the building or facility and an emergency relocation or shelter in place order may be needed.

SECTION 305 MAGNITUDES OF EVENT

[BG] 305.1 General. Magnitude of event encompasses all loads that can be reasonably expected to impact on a building or other structure, its users and its contents, during construction and throughout its intended life. This includes building and facility-related and occupancy-related loads, as well as loads resulting from natural and technological hazards.

Determination of magnitude of event shall take into account the design performance levels established by this code, the risk factors identified in Section 302.4 and specific performance criteria established by relevant *authoritative documents*.

[BG] 305.1.1 Natural hazards. The types of loads affecting main-force-resisting systems, components and contents that may be reasonably expected to impact on the building or other structure, its users and its contents during its intended life are provided in Chapter 5 of this code.

[BG] 305.2 Definition of magnitude of event. Magnitude of event can be defined, quantified and expressed either deterministically or probabilistically in accordance with the best current practice of the relevant profession as published in recognized *authoritative documents*. In some *authoritative documents*, magnitude of event may be expressed only for a single performance group. In other cases, magnitude of event may be provided for all performance levels such as seismic provisions. In all cases, it is the responsibility of the design *engineer* to demonstrate that the design performance levels are met for the loads anticipated.

[BG] 305.2.1 Classification of event magnitude. For the purpose of this code, the magnitude of event shall be classified as: small, medium, large and very large. Where *authoritative documents* do not present magnitude of event in this format, it will be the responsibility of the designer to relate the loads to this format and to demonstrate that the minimum design performance levels will be met by the proposed design.

SECTION 501 STRUCTURAL FORCES

[BS] 501.3 Performance requirements. Performance of the structure shall be determined based on loads derived to satisfy the requirements of this section. Where the provisions of this section are not used to develop loads, loads shall be determined in accordance with Chapter 16 of the *International Building Code*.

[BS] 501.3.4 Expected loads. Structures, or portions thereof, shall be designed and constructed taking into account expected loads, and combination of loads, associated with the event(s) magnitude(s) that would affect their performance, including, but not limited to:

1. Dead loads.
2. Live loads.

3. Impact loads.
4. Explosion loads.
5. Soil and hydrostatic pressure loads.
6. Flood loads (mean return period).
    6.1 Small: 100 years.
    6.2 Medium: 500 years.
    6.3 Large: Determined on a site-specific basis.
    6.4 Very Large: Determined on a site-specific basis.
7. Wind loads (mean return period).
    7.1 Small: 300 years.
    7.2 Medium: 700 years.
    7.3 Large: 1,700 years.
    7.4 Very Large: 3,000 years.
8. Windborne debris loads.
9. Snow loads (mean return period).
    9.1 Small: 25 years.
    9.2 Medium: 50 years.
    9.3 Large: 100 years.
    9.4 Very Large: 500 years.
    9.5 Snow loads shall include but not be limited to consideration for drifting, unbalanced loads, sliding snow loads and ice damming.
10. Rain loads. See Table 501.3.4.
11. Earthquake loads.
    11.1 Small: 43 years (mean return period).
    11.2 Medium: 72 years (mean return period).
    11.3 Large: Two-thirds of the intensity of very large loads.
    11.4 Very large: The Risk-Targeted Maximum Considered Earthquake defined in Chapter 21 of ASCE 7.
12. Ice loads, atmospheric icing (mean return period).
    12.1 Small: 25 years.
    12.2 Medium: 50 years.
    12.3 Large: 100 years.

12.4 Very Large: 200 years.

13. Hail loads.

14. Thermal loads.

15. Loads due to Tsunamis.

15.1 Very Large: The Maximum Considered Tsunami Defined in Chapter 6 of ASCE 7.

SECTION 703 CONSTRUCTION AND DEMOLITION HAZARDS

[BG] 703.3.2 Protection from natural hazards. The structure under construction shall be protected from damage due to wind, rain or other natural hazards likely to occur during construction.