TO AMEND CHAPTER 16 OF THE REVISED ORDINANCES OF HONOLULU 1990, AS AMENDED, RELATING TO THE BUILDING CODE.

BE IT ORDAINED by the People of the City and County of Honolulu:

SECTION 1. Purpose.

The purpose of this ordinance is to update Chapter 16 ("Building Code") of the Revised Ordinances of Honolulu 1990, as amended by adopting the State Building Code subject to local amendments herein.

SECTION 2. Title.

Chapter 16 ("Building Code") Article 1 of the Revised Ordinances of Honolulu 1990, is repealed in its entirety.

SECTION 3. Chapter 16, Article 1, Revised Ordinances of Honolulu 1990 is hereby adopted and reads as follows:


The International Building Code, 2012 Edition (Tenth Printing) and the International Residential Code, 2012 Edition (Eighth Printing), published by the International Code Council, Inc., 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001 are adopted by the State of Hawaii and incorporated by reference herein, subject to the following amendments:

SECTION 4. A new Article 1.1 to Chapter 16, Revised Ordinances of Honolulu 1990 is hereby adopted to read as follows:

(1) Subsection 101.1 of the Building Code of the State of Hawaii is amended to read:

101.1 Title. These regulations will be part of the Building Code of the City and County of Honolulu, hereinafter referred to as "this code."

(2) Subsection 101.2 of the Building Code of the State of Hawaii is amended to read:

101.2 Scope. The provisions of this code will apply to the construction, alteration, moving, demolition, replacement, repair, and use of any building or structure within this jurisdiction inland of the shoreline, except
where located primarily in a public way, public utility towers and poles, mechanical equipment not specifically regulated in this code, and hydraulic flood control structures.

Exceptions:

1. Detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than two stories high with separate means of egress and their accessory structures will be permitted to comply with the International Residential Code. Prescriptive framing shall not be applicable for structures designed using Exception 4 in Section 1609.1.2 Protection of Openings of “this code.”

2. Existing buildings undergoing repair, alterations or additions and change of occupancy will be permitted to comply with the International Existing Building Code.

This code is not intended to create a procedure for the regulation of private nuisances by the City. All members of the public will be responsible for resolving disputes arising from private nuisances through the appropriate legal process.

(3) Subsection 101.4 of the Building Code of the State of Hawaii is amended to read:

101.4 Referenced codes. The other codes referenced elsewhere in Sections 101.4.1 through 101.4.7 will be considered part of the requirements of this code to the prescribed extent and scope of each such reference.

101.4.1 Electrical. The provisions of ROH 1990, Chapter 17, Electrical Code will apply.

101.4.3 Plumbing. Whenever the International Plumbing Code is referenced, the provisions of ROH 1990, Chapter 19, Plumbing Code will apply.

101.4.5 Fire prevention. Whenever the provisions of the International Fire Code are referenced, the provisions of the International Fire Code will apply for new construction and will apply to matters affecting or relating to structures, processes and premises from the hazard of fire and explosion arising from the storage, handling or use of structures,
materials or devices; from conditions hazardous to life, property or public welfare in the occupancy of structures or premises; and from the construction, extension, repair, alteration or removal of fire suppression and alarm systems or fire hazards in the structure or on the premises from occupancy or operation. The provisions of ROH 1990, Chapter 20, Fire Code of the City and County of Honolulu will apply to existing construction, and to the extent specifically referenced by the Building Code to new construction. Where differences exist between this code and ROH 1990, Chapter 20, the provisions of this code will apply.

**101.4.6 Energy.** The provisions of ROH 1990, Chapter 32, Building Energy Conservation Code will apply.

**101.4.7 Housing.** The provisions of ROH 1990, Chapter 27, Housing Code will apply.

**101.4.8 Fixed transit and passenger rail systems.** The provisions of the Standard for Fixed Guideway Transit and Passenger Rail Systems, NFPA 130, will apply to fixed guideway transit and passenger rail stations to the prescribed extent of this standard.

**101.4.9 Other Codes.** Other referenced codes not listed in Section 101.4 shall be considered referenced guidelines and not mandatory.

(4) Subsection 102.6 of the Building Code of the State of Hawaii is amended to read:

**102.6 Existing structures.** Buildings in existence at the time of the adoption of this code may have their existing use or occupancy continued if such use or occupancy was legal at the time of the adoption of this code, provided such continued use does not constitute a hazard to the general safety and welfare of the occupants and the public.

(5) Section 103 of the IBC, deleted by the Building Code of the State of Hawaii is amended to read:

**SECTION 103 – ORGANIZATION AND ENFORCEMENT**

**103.1 Building official appointment authority.** In accordance with the prescribed procedures and with the approval of the appointing authority, the building official will have the authority to appoint technical officers, inspectors, plan examiners and other personnel necessary to support this code enforcement agency. The building official may designate such
inspectors or employees as may be necessary to carry out the functions of this code enforcement agency. Such employees will have powers as delegated by the building official.

The building official may deputize volunteers to temporarily carry out functions of the code enforcement agency in the event of a major natural disaster.

(6) Subsection 104.11 of the IBC, adopted by the Building Code of the State of Hawaii, is hereby amended by adding the following:

104.11 Alternative materials, design and methods of construction and equipment.

The building official must be permitted to use the most current code edition of the International Code Council, or the most current standard of the International Code Council or the National Fire Protection Association or other approved national standard as an alternative to meeting the requirements of this code.

(7) Subsections 105.1 of the IBC, deleted by the State Building Code of the State of Hawaii, is amended by adding the following:

105.1 Required.

Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the building official and obtain the required permit. See ROH Chapter 18 for the requirements for the consolidation of the building, electrical, and plumbing permits into one administrative permit.

(8) Subsections 105.2 through 105.7 of the IBC, not adopted by the State Building Code, are hereby deleted.

(9) Subsection 106.1 of the IBC adopted by the Building Code of the State of Hawaii is hereby amended to read:
106.1 Live loads posted. Where the live loads for which each floor or portion thereof of a commercial or industrial building is or has been designed to exceed 100 psf (4.80 kN/m²), such design live loads must be conspicuously posted by the owner in that part of each story in which they apply, using durable signs. It will be unlawful to remove or deface such notices.

(10) Subsection 107.1 of the IBC, deleted by the Building Code of the State of Hawaii, is hereby amended to read:

107.1 General. See ROH Chapter 18.

(11) Subsection 107.2 of the IBC, not adopted by the Building Code of the State of Hawaii, is hereby amended to read:

107.2 Construction documents. Construction documents will be in accordance with Sections 107.2.1 through 107.2.6.

107.2.1 Information on construction documents. Construction documents must be dimensioned and drawn upon suitable material. Electronic media documents are permitted when approved by the building official. Construction documents must be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulation, as determined by the building official.

107.2.1.1 New buildings. For construction of new buildings, the construction documents will include but not limited to, the building occupancy group classification, the building height and area, the classification of buildings as to type of construction and the fire and smoke protection features.

107.2.2 Fire protection. When automatic sprinkler systems are installed, construction drawings must contain all information as required by the referenced installation standards in Chapter 9.

For new installations, the construction drawings must include but not limited to, the spacing, location, and position of all fire sprinklers heads, the sprinkler system monitoring and alarm system information, the system riser and fire department connection details with their location.
For existing construction, the construction drawings must include but not limited to, the locations of the existing and final fire sprinkler heads affected by the proposed work.

107.2.2.1 Fire protection system working drawings. Will be required for new installations, and to include but limited to, existing systems which; increase the coverage areas, change the hazard classification, provide in-rack sprinkler systems, and any storage in excess of 12 feet in height. Working drawings for the fire protection system(s) must be submitted to indicate conformance with this code and the construction documents and must be submitted by the fire protection special inspector in accordance to Section 916.1.2.

107.2.3 Means of egress. The construction documents will show in sufficient detail the location, construction, size and character of all portions of the means of egress in compliance with the provisions of this code. In other than occupancies in Groups R-2, R-3, and I-1, the construction documents must designate the number of occupants to be accommodated on every floor, and in all rooms and spaces.

107.2.4 Exterior wall envelope. Construction documents for all buildings must describe the exterior wall envelope in sufficient detail to determine compliance with this code. The construction documents must provide details of the exterior wall envelope as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistant membrane and details around openings.

The construction documents will include manufacturer’s installations instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the weather resistance of the exterior wall envelope. The supporting documentation must fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used.

107.2.5 Site plan. In addition to the plot plan required in ROH Chapter 18, the construction documents submitted with the application for permit must be accompanied by a site plan showing to scale; the size and location of new construction and any existing structures on the site, distances from lot lines, the established street grades and the existing and proposed finished grades and as applicable, location of fire hydrants, fire department apparatus roads, flood hazard areas, floodways, design flood
elevations; and it must be drawn in accordance with an accurate boundary line survey. In the case of demolition, the site plan must show construction to be demolished and location and size of existing structures and construction that are to remain on the site or plot.

107.2.5.1 Special flood hazard areas. Where base flood elevations are not specified, they will be established in accordance with ROH Chapter 21A.

107.2.5.2 Topographic survey. For new or additions to structures and buildings there will be provided a topographic survey of the existing lot.

107.2.6 Erosion and sediment control measures. For construction requiring an approved National Pollutant Discharge Elimination System (NPDES) permit from the State of Hawaii, the (NPDES) permit issued by the State of Hawaii, Department of Health, must be provided.

(12) Subsection 107.3.1 of the IBC, deleted by the Building Code of the State of Hawaii, is hereby amended to read:

107.3.1 Approval of construction documents. See ROH Chapter 18.

(13) Subsection 107.3.4 of the IBC, deleted by Building Code of the State of Hawaii, is hereby amended to read:

107.3.4 Design professional in responsible charge. All plans and specifications relating to work which affects the public safety or health and for which a building permit is required must be prepared by or under the supervision of a duly licensed professional engineer or architect, construction must be under the observation of a duly licensed professional engineer or architect, as required by HRS Chapter 464.

Where special inspection is required by this code, all special inspection will be provided on the submitted plans as a condition for permit issuance. For special inspections, see Sections 110, 916, 1704, and 1707.

(14) Subsection 107.3.4.1 of the IBC, deleted by Building Code of the State of Hawaii, is amended to read:

107.3.4.1 Deferred submittals. For the purposes of this section, deferred submittals are defined as those portions of the design that are not
submitted at the time of the application and that are to be submitted to the building official within a specific period.

Deferral of any submittal items must have the prior approval of the building official. The design professional in responsible charge will list the deferred submittals on the construction documents for review by the building official.

Documents for deferred submittal items must be submitted to the registered design professional in responsible charge who will review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design.

(15) Subsection 107.4 of the IBC, deleted by the Building Code of the State of Hawaii, is amended to read:

107.4 Amended construction document. The building official will be permitted to require amended construction documents when changes made during construction that are not in compliance with the approved construction documents.

(16) Subsection 108.1 of the IBC, deleted by the Building Code of the State of Hawaii, is amended by adding an exemption to read:

108.1 General. The building official is authorized to issue a permit for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The building official is authorized to grant extensions for demonstrated cause.

Exemption: See ROH Section 18.3.4.

(17) Subsection 109.1 of the IBC, deleted by the Building Code of the State of Hawaii, is hereby amended to read:

109.1 General. See ROH Chapter 18.

(18) Subsection 110.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:
110.3 Required inspections. The building official, upon notification, shall make the inspections set forth in Sections 110.3.1 through 110.3.4.

110.3.3 Lowest floor elevation. In flood hazard areas, upon placement of the lowest floor, including the basement, and prior to further vertical construction, an elevation certification required in Section 1612.5 must be submitted to the building official.

110.3.5 Lath and/or gypsum board inspection. To be made after all lathing and gypsum board, interior and exterior, in construction required to be fire-resistive, is in place but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.

Exception: Lath and gypsum board installed in Group U Occupancies.

110.3.8 Other inspections. In addition to the inspections specified in Sections 110.3.1 through 110.3.3, the building official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by this code.

110.3.9 Special inspections. The submitted plans shall have all special inspections listed as a condition for permit issuance. For special inspections, see Chapters 9, 12 and 17

110.3.10 Final inspection. To be made after all construction is completed and prior to final occupancy.

(19) Subsection 111.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by added the following Exceptions to read:

Exceptions: The provisions of Section 111.1 are not applicable to the following:

1. For R-3 Occupancies, see Residential Code Section R110.1.
2. Group U Occupancies.
3. For work exempted from permits.

(20) Section 113 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

SECTION 113 – BOARD OF APPEALS
113.1 Creation of Board of Appeals. There shall be and is hereby created a board of appeals consisting of nine members who shall be qualified by experience and training to pass upon matters pertaining to building construction and fire safety and who shall be appointed by the mayor with the approval of the council. Four members must be currently licensed as engineers or architects with the State of Hawaii board of registration of professional engineers, architects, land surveyors, and landscape architects. One member shall be qualified by experience and training to pass on matters pertaining to electrical work. One member shall be qualified by experience and training to pass on matters pertaining to plumbing work. Two members shall be qualified by experience and training to pass on matters pertaining to fire safety. One member shall be a general contractor licensed under HRS Chapter 444. The members of the board shall serve for terms of five years and until their successors have been appointed and qualified. Any vacancy occurring other than by expiration of a term of office shall be filled for the remainder of such unexpired term in the same manner as for an original appointment. The board will select a chair and vice-chair annually.

113.2 Board action. All board action requires an affirmative vote of five or more board members.

113.3 Power and duties. The board shall:

113.3.1 Hear and determine appeals from the decisions of the building official in the administration of the Building Code, Electrical Code, Plumbing Code, Housing Code, Energy Code, Building Energy Efficiency Standards, and ROH Chapter 18, including, but not limited to, matters involving any approval or denial, the use of new or alternate materials, types of construction, equipment, devices or appliances, administrative enforcement, and the issuance, suspension or revocation of permits issued under ROH Chapter 18.

In the case of any denial of the use of new or alternative materials, types of construction, equipment, devices or appliances, an appeal may be sustained if the record shows that: (1) the new or alternate materials, types of construction, equipment, devices or appliances meet the required standards established by the codes being appealed from; (2) permitting the use thereof will not jeopardize life, limb or property, and; (3) the use will not be contrary to the intent and purpose of the code being appealed
from. The appellant must pay all expenses necessary for tests that may be ordered by the board.

In all cases not involving the use of new or alternate materials, an appeal shall only be sustained if the record shows that the decision of the building official is based on an erroneous finding of material fact, arbitrary or capricious decision making, or a manifest abuse of discretion. The board may reverse, affirm or modify, in whole or in part, the decision appealed from.

113.3.2 The board of appeals shall hear and determine appeals from the decisions of the fire official in the administration of the Fire Code, including the suspension or revocation of permits issued pursuant to the Fire Code, and any denial of the use of new or alternate materials, types of construction, equipment, devices or appliances. The standard of review for the use of new or alternate materials, types of construction, equipment, devices or appliance will be the same as for Section 113.3.1.

113.3.3 The board of appeals shall hear and determine petitions for varying the application of the Building Code, Electrical Code, Plumbing Code, Fire Code, or Building Energy Efficiency Standards. A variance may be granted if the board finds: (1) that the strict application, operation or enforcement of the code provision or provisions being appealed from would result in practical difficulty or unnecessary hardship to the applicant; (2) that safety to life, limb, and property will not be jeopardized, and; (3) that the granting of a variance would not be injurious to the adjoining lots and the building thereon, would not create additional fire hazards and would not be contrary to the purposes of the code and public interest. In making its determination, the board will take into account the character, use, and type of occupancy and construction of adjoining buildings, buildings on adjoining lots and the building involved.

113.3.4 The board of appeals will hear and determine appeals from the decisions of the building official in the administration enforcement of ROH Chapter 29, Article 4. An appeal will only be sustained if the record shows that the decision of the building official is based on an erroneous finding of material fact, arbitrary or capricious decision making, or a manifest abuse of discretion. The board may reverse, affirm or modify, in whole or in part, the decision appealed from.

113.3.5 The board of appeals will hear and determine appeals concerning the summary removal of unlawful signs pursuant to ROH Chapter 29,
Article 14. Such appeals shall be limited to a determination of whether a sign was properly removed pursuant to the provisions of that article. An appeal shall only be sustained if the record shows that the decision of the building official is based on an erroneous finding of material fact, arbitrary or capricious decision making, or a manifest abuse of discretion. The board may reverse, affirm or modify, in whole or in part, the decision appealed from.

113.3.6 Appeals from the decisions of the building official to issue, suspend, or revoke permits shall be in writing and filed with the board within ten (10) working days of the permittee’s receipt of the notice of issuance, suspension, or revocation. In all other cases, appeals from the decisions of the building official and fire official must be in writing and filed within thirty (30) calendar days of the decision appealed from.

113.4 Compensation. Each member of the board shall be compensated at the rate of $20 per day for each day’s actual attendance at a meeting, but such compensation will not exceed, in the aggregate, $60 in any one month.

113.5 Procedure. The proceedings of the board shall be subject to the provisions of HRS Chapter 91. The board shall adopt reasonable rules and regulations for conducting its meetings, hearings, and investigations in conformity therewith and may impose reasonable fees to cover the costs of such proceedings.

113.6 Fees. The filing fee for a petition for appeal from a decision of the Authority Having Jurisdiction in the administration of the Building Code, Electrical Code, Fire Code, Plumbing Code, Housing Code, ROH Chapter 29, Article 4, ROH Chapter 18 and the Building Energy Efficiency Standard or an application for varying the application of the Building Code, Electrical Code, Plumbing Code, Fire Code, or Building Energy Efficiency Standards, shall be $200.00. No petition for appeal shall be filed without payment of said fee.

(21) Section 114 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

SECTION 114 – VIOLATIONS AND PENALTIES.

For violation and penalty provisions, see ROH Chapter 16, Article 10.
(22) Section 115 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

SECTION 115 – STOP WORK ORDER

See ROH Chapter 18, Section 18-7.5.

(23) Section 116 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

SECTION 116 – UNSAFE BUILDINGS

116.1 General. All buildings or structures which are structurally unsafe or not provided with adequate egress, or which constitute a fire hazard, or are otherwise dangerous to human life, or which in relation to existing use constitute a hazard to safety, health or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard or abandonment, as specified in this code or any other effective ordinance are, for the purpose of this section, unsafe buildings. An unsafe building will also include a dangerous building as defined by Chapter 2 of the International Existing Building Code. All such unsafe buildings or structures are hereby declared to be public nuisances and must be abated by repair, rehabilitation, demolition, removal, or other methods approved by the building official in accordance with the procedure specified in Sections 116.2, 116.3, and 116.4.

116.2 Notice to owner. The building official will examine or cause to be examined every building or structure or portion thereof reported as dangerous or damaged and, if such is found to be an unsafe building as defined in this section, the building official will give to the owner of such building or structure a written notice of violation stating the defects thereof. This notice may require the owner or person in charge of the building or premises, within 48 hours, to commence either the required repairs or improvements or demolition and removal of the building or structure or portions thereof, and all such work must be completed within 90 days from the date of notice, unless otherwise required by the building official. If necessary, such notice also require the building, structure or portion thereof to be vacated forthwith and not reoccupied until the required repairs and improvements are completed, inspected, and approved by the building official.
Proper service of such notice of violation must be by personal service or certified mail upon the owner of record, provided that if such notice is returned as undeliverable after mailing by certified mail, service may be by publication or posting a copy of the notice upon the property. The designated periods within which the owner or person in charge is required to comply with the order of the building official will begin as of the date the owner or person in charge receives the notice of violation, in person or by certified mail, or, the date on which the notice is published or posted upon the property.

116.3 Posting of signs. The building official will cause to be posted at each entrance to buildings ordered vacated a notice to read: DO NOT ENTER. UNSAFE TO OCCUPY. DEPARTMENT OF PLANNING AND PERMITTING, CITY AND COUNTY OF HONOLULU. Such notice must remain posted until the required repairs, demolition or removal is completed. Such notice must not be removed without written permission of the building official, and no person will enter the building except for the purpose of making the required repairs or of demolishing the building.

In the event of a major disaster, the building official may post "RESTRICTED USE" or "UNSAFE" placards at each entrance to a building or portion of a building if an inspection warrants such posting. Entry or occupancy in a building or portion of a building posted with "RESTRICTED USE" placard will be limited to the restrictions stated on the placard. No entry is permitted in a building or portion of a building posted "UNSAFE." Placards must not be removed or altered unless authorized by the building official.

116.4 Action upon noncompliance. Where the owner of an unsafe structure fails, neglects or refuses to comply with a notice of violation requiring the repair, rehabilitation or demolition and removal of an unsafe building or structure, or, portions thereof, the building official may serve the owner of the building a notice of order in accordance with Article 10 of the Chapter and repair, rehabilitate or to demolish and remove the building or structure or portion thereof and to recover the cost of such work from the owner. Costs incurred by the building official in the repair, demolition, and removal of such buildings or structures will be considered civil fines that may be attached as a lien upon real property.

To the extent that repairs, alterations or additions are made or a change of occupancy occurs during the restoration of the structure, such repairs,
alterations, additions or change of occupancy must comply with the requirements of this code and ROH, Chapter 18, Article 3.

(24) Section 202 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

a. By adding the following definition immediately before the definition of “ACCREDITATION BODY”:

ACCESSORY DWELLING UNIT (ADU). ADU will mean a second dwelling unit, including separate kitchen, bedroom and bathroom facilities, attached or detached from the primary dwelling unit on the zoning lot.

b. By adding the following definition immediately before the definition of “ATRIUM”:

ASSISTED LIVING FACILITIES. Building or part thereof housing persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment which provides personal care services and are licensed by the State.

c. By amending the definition of "BUILDING" to read:

BUILDING. Any structure used or intended for supporting any use or occupancy. The term will include but not be limited to any structure mounted on wheels such as a trailer, wagon or vehicle which is parked and stationary for any 24-hour period, and is used for business or living quarters; provided, however, that the term will not include the push wagon which is readily movable and which does not exceed 25 square feet in area, nor will the term include a vehicle, used exclusively for the purpose of selling any commercial product there from, which holds a vehicle license and actually travels on public or private streets.

d. By adding the following definition immediately before the definition of "BUILDING HEIGHT”:


e. By amending the definition of "BUILDING OFFICIAL" to read:
BUILDING OFFICIAL. The director of planning and permitting of the city or the director's authorized representative.

f. By adding the following definition immediately before the definition of "CAST STONE":

CARPORT. A private garage which is at least 100 percent open on one side and with 50 percent net openings on another side or which is provided with an equivalent of such openings on two or more sides.

A private garage which is 100 percent open on one side and 25 percent open on another side with the latter opening so located to provide adequate cross ventilation may be considered a carport when approved by the building official.

g. By adding the following definition immediately before the definition of "CLEAN AGENT":

CITY. Refers to the City and County of Honolulu.

h. By amending the definition of "DWELLING UNIT" to read:

DWELLING UNIT. A building or portion thereof that contains living facilities, including permanent provisions for living, sleeping, eating, cooking and sanitation, as required by this code, for not more than one family, or a congregate residence for 16 or fewer persons.

i. By adding the following definition immediately before the definition of "EMERGENCY ALARM SYSTEM":

ELECTRICAL CODE. Electrical standards as specified in Chapter 17, ROH (1990) as amended.

j. By adding the following definition immediately before the definition of "EXISTING CONSTRUCTION" to read:

EXISTING BUILDING. A building for which a legal building permit has been issued and complies with the Building Code in effect prior to the effective date of this ordinance.

k. By adding the following definition immediately before the definition of "FIBER CEMENT SIDING":
FAMILY. As defined in the Land Use Ordinance, except that the number of residents in a licensed health adult residential care home, a licensed health special treatment facility, or other similar licensed health facility will be limited to six persons in order for the residents of the facility to be considered a family under this code. For the purpose of this definition, "licensed" refers to licensure or certification by the State of Hawaii.

l. By adding the following definition immediately before the definition of “FIRE AREA”:

**FIRE APPARATUS ACCESS ROAD.** A road that provides fire apparatus access from a fire station to a facility, building or portion thereof with access to a fire hydrant. This is a general term inclusive of all other terms such as fire lane, public street, private street, parking lot lane and access roadway.

m. By adding the following definitions immediately before the definition of “FIRE COMMAND CENTER”:

**FIRE CODE.** Wherever specific reference is made to Fire Code, Fire Code will be Chapter 20, ROH (1990) as amended.

**FIRE CODE OFFICIAL.** The fire chief or other designated authority charged with the administration and enforcement of the fire code, or a duly authorized representative.

n. By amending the definition of “FIRE SEPARATION DISTANCE” to read:

**FIRE SEPARATION DISTANCE.** The distance measured from the building face to the closest *lot line*, to the centerline of a street, alley or public way, or to an imaginary line between two buildings on the property. For the purposes of this section, *lot lines* established within a joint, cluster, or similar development under the Land Use Ordinance, boundary lines established for condominium ownership purposes only and development under the jurisdiction of the State of Hawaii, will not be considered as boundary lines. The distance must be measured at right angles from the face of the wall.

o. By adding the following definition immediately before the definition of "HPM FLAMMABLE LIQUID":

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HOUSING CODE. Housing standards as specified in Chapter 27, ROH (1990) as amended.

p. By adding the following definition immediately before the definition of "LIGHT-DIFFUSING SYSTEM":

LAND USE ORDINANCE. Land Use standards as specified in Chapter 21, ROH (1990) as amended.

q. By adding the following definition after "NUISANCE ALARM":

NUISANCE IN FACT. An otherwise lawful use or condition on property that unreasonably interferes with the use of private or public property for its intended purposes.

r. By amending the definition of “PERSONAL CARE SERVICE” to read:

PERSONAL CARE SERVICE. The care of residents who do not require chronic or convalescent, health, medical or nursing care. Personal care involves responsibility for fire safety of the resident while inside the building. The types of facilities providing personal care services will include, but not be limited to, the following: assisted living facilities, residential care facilities, halfway houses, group homes, congregate care facilities, social rehabilitation facilities, alcohol and drug abuse centers and convalescent facilities.

s. By adding the following definition immediately before the definition of "POSITIVE ROOF DRAINAGE":

PLUMBING CODE. Plumbing standards as specified in Chapter 19, ROH (1990) as amended.

t. By adding the following definition immediately after the definition of “PRISM":

PRIVATE NUISANCE. A nuisance in fact that does not affect the health, safety, or welfare of the general public.

u. By amending the definition of “STRUCTURAL OBSERVATION” to read:

STRUCTURAL OBSERVATION. Structural observation is equivalent to “observation of construction” of the structural system, as defined in
Chapter 16-115, Hawaii Administrative Rules, implementing Chapter 464, Hawaii Revised Statutes. Structural observation does not include or waive the responsibility for the inspection required by Section 110, 1704 or other sections of this code.

v. By amending the definition of “WIND-BORNE DEBRIS REGION” to read:

WIND-BORNE DEBRIS REGION. Areas in Hawaii where the effective ultimate design wind speed is 130 mph (63 m/s) or greater. For Risk Category II buildings and structures and Risk Category III buildings and structures, except health care facilities, the wind-borne debris region will be based on Fig. 1609.3.2.2. For Risk Category III health care facilities and Risk Category IV buildings and structures and Risk Category III health care facilities, the windborne debris region will be based on Fig. 1609.3.2.3. For Exceptions, see Appendix “W” of the Building Code of the State of Hawaii.

(25) Subsection 303.2.1 is added to the IBC, adopted by the Building Code of the State of Hawaii. Subsection 303.2.1 is added to read:

303.2.1 Sanitation. In a building or portion of a building containing a new Group A Occupancy such as an entertainment center, movie theatre, sports area, or other similar occupancy, the number of water closets available to females who are not employed in that building or portion must be at least twice the number available to males who are not employed in that building or portion.

This section will further apply to any bathroom open to the general public in any specified place of public assembly that is altered where the cost of making alterations in any twelve-month period will exceed $500,000.

The cost of making alterations and the value of the building or space will be determined by the building official.

Where urinals are permitted, urinals may be provided in bathrooms in lieu of water closets, but the number or urinals must not exceed fifty percent of the required number of water closets.

(26) Subsection 310.5 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:
310.5 Residential Group R-3. Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, including:

Assisted living facilities that provide accommodations for five or fewer persons receiving care
Buildings that do not contain more than two dwelling units
Boarding houses (non-transient) with 16 or fewer occupants
Boarding houses (transient) with 10 or fewer occupants
Congregate living facilities (non-transient) with 16 or fewer occupants
Congregate living facilities (transient) with 10 or fewer occupants

(27) Subsection 310.6 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a new section 310.6.1 to read:

310.6.1 Assisted living facilities within a dwelling. Assisted living facilities for more than five but not more than 16 occupants, excluding staff, receiving care that are within a single-family dwelling are permitted to comply with the International Residential Code provided an automatic sprinkler system is installed in accordance with Section 903.3.1.3 or with Section P2904 of the International Residential Code. Residents must meet the ability to evacuate requirements and other limitations as required in Group I-1.

(28) Subsection 403.4.5 of the IBC, adopted by the Building Code of the State of Hawaii is amended as follows:

403.4.5 Emergency responder radio coverage. Emergency responder radio coverage shall be provided in accordance with "Section 11.10 of the Fire Code."

(29) Subsection 403.4.6 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

403.4.6 Fire command. Fire command stations will comply with Section 11.9 of the Fire Code.

(30) Subsection 403.5.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

403.5.4 Smoke-proof enclosures. Every interior exit stairway provided, serving floors more than 75 feet (22 860 mm) above the lowest level of fire
department vehicle access must be a *smoke-proof enclosure* in accordance with Sections 909.20 and 1022.10.

**Exception:** When the required exit stairways are exterior exit stairways and ramps, the exterior stairways and ramps must have natural ventilation in accordance with Section 909.20.3.

(31) Subsection 404.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

404.2 Use. The floor of the atrium shall not be used for other than low fire hazard uses and only approved materials and decorations in accordance with Chapter 20 ROH, 1990, as amended (*Fire Code*).

(32) Subsection 406.4.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

406.4.3 Vehicle barriers. Vehicle barriers not less than 2 feet 9 inches (835 mm) in height must be placed where the vertical distance from the floor to the ground or surface directly below is greater than 1 foot (305 mm) from the floor of a drive lane or parking spaces adjacent to exterior walls.

**Exception:** Vehicle barriers are not required in vehicle storage compartments in a mechanical access parking garage.

(33) Subsection 406.7 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Sections 406.7.3 and 406.7.4 to read:

406.7 Motor fuel-dispensing facilities. Motor fuel-dispensing facilities will comply with Sections 406.7.1 through 406.7.4. Fuel-dispensing areas within buildings will conform to Section 30.1.6 of the *Fire Code*.

406.7.3 Location of dispensing devices. Dispensing devices will be located as follows:

1. Ten feet (3048 mm) or more from *lot lines*.

2. Ten feet (3048 mm) or more from buildings having combustible exterior wall surfaces or buildings having noncombustible exterior wall surfaces that are not part of a 1-hour fire-resistance-rated assembly or buildings having combustible overhangs.
Exception: Canopies constructed in accordance with the *International Building Code* providing weather protection for the fuel islands.

3. Such that all portions of the vehicle being fueled will be on the premises of the motor fuel-dispensing facility.

4. Such that the nozzle, when the hose is fully extended, will not reach within 5 feet (1524 mm) of building openings.

5. Twenty feet (6096 mm) or more from fixed sources of ignition.

406.7.4 Operational requirements. Fuel-dispensing operations will be in accordance to Chapter 42 of the *Fire Code*.

(34) Subsection 406.8 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Sections 406.8.1 through 406.8.13 to read:

406.8 Repair garages. Repair garages will be constructed in accordance with Sections 406.8.1 through 406.8.13.

406.8.3.1 Below-grade areas. Pits and below-grade work areas in repair garages will comply with Sections 406.8.3.1.1 through 406.8.3.1.3.

406.8.3.1.1 Construction. Construction must be of concrete, masonry, steel or similar noncombustible materials.

406.8.3.1.2 Means of egress. Pits and below-grade work areas will be provided means of egress in accordance with Chapter 10 of the IBC.

406.8.3.1.3 Ventilation. Where Class I liquids of LP-gas are stored or used within a building having a basement or pit wherein flammable vapors could accumulate, the basement or pit must be provided with mechanical ventilation in accordance with the International Mechanical Code, at a minimum rate of 1½ cubic feet per minute per square foot (cfm/ft²) [0.008 m³/s•m²] to prevent the accumulation of flammable vapors.

406.8.7 Fire extinguishers. Fire extinguishers will be provided in accordance to Chapter 906.

406.8.8 Drainage and disposal of liquids and oil-soaked waste. Garage floor drains, where provided, must drain to approved oil
separators or traps discharging to a sewer in accordance with the Plumbing Code. Contents of oil separators, traps and floor drainage systems must be collected at sufficiently frequent intervals and removed from the premises to prevent oil from being carried into the sewers.

406.8.8.1 Disposal of liquids. Crankcase draining and liquids will not be dumped into sewers, streams, the City’s storm drainage system, or on the ground but will be stored in approved tanks or containers in accordance to Chapters 4 and 5 of NFPA 30A, until removed from the premises.

406.8.9 Sources of ignition. Sources of ignition must not be located within 18 inches (457 mm) of the floor.

406.8.9.1 Equipment. Appliances and equipment installed in a repair garage must comply with the provisions of the International Mechanical Code and NFPA 70.

406.8.10 Operational requirements. Dispensing of flammable and combustible liquids will be in accordance to Section 30.3 of the Fire Code.

406.8.11 General. Repair garages will comply with this section. Repair garages for vehicles that use more than one type of fuel will comply with the applicable provisions of this section for each type of fuel used.

Where a repair garage also includes a motor fuel-dispensing facility, the fuel-dispensing operation must comply with the requirements of this chapter for motor fuel-dispensing facilities.

406.8.11.1 Repair garages for vehicles fueled by lighter-than-air fuels. Repair garages for the conversion and repair of vehicles which use CNG, liquefied natural gas (LNG), hydrogen or other lighter-than-air motor fuels will be in accordance with Sections 406.8.11.1.1 through 406.8.13.3.

406.8.11.1.1 Ventilation. Repair garages used for the repair of natural gas- or hydrogen-fueled vehicles must be provided with an approved mechanical ventilation system. The mechanical ventilation system must be in accordance with the International Mechanical Code and Sections 406.8.11.1.1 and 406.8.11.1.1.2.

Exception: Repair garages with natural ventilation when approved.
406.8.11.1.1.1 Design. Indoor locations must be ventilated utilizing air supply inlets and exhaust outlets arranged to provide uniform air movement to the extent practical. Inlets will be uniformly arranged on exterior walls near floor level. Outlets must be located at the high point of the room in exterior walls or the roof.

Ventilation must be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system or, for hydrogen, a continuously monitoring flammable gas detection system, each activating at a gas concentration of not more than 25 percent of the lower flammable limit (LFL). In all cases, the system will shut down the fueling system in the event of failure of the ventilation system.

The ventilation rate must be at least 1 cubic foot per minute per 12 cubic feet \([0.00139 \text{ m}^3 \times (\text{s} \cdot \text{m}^3)]\) of room volume.

406.8.11.1.2 Operation. The mechanical ventilation system must operate continuously.

Exceptions:

1. Mechanical ventilation systems that are interlocked with a gas detection system designed in accordance with Sections 406.8.12 through 406.9.2.3.

2. Mechanical ventilation systems in repair garages that are used only for repair of vehicles fueled by liquid fuels or odorized gases, such as CNG, where the ventilation system is electrically interlocked with the lighting circuit.

406.8.12 Gas detection system. Repair garages used for repair of vehicles fueled by non-odorized gases, such as hydrogen and non-odorized LNG, must be provided with a flammable gas detection system.

406.8.12.1 System design. The flammable gas detection system will be \textit{listed or approved} and must be calibrated to the types of fuels or gases used by vehicles to be repaired. The gas detection system will be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL). Gas detection will also be provided in lubrication or chassis service pits of repair garages used for repairing non-odorized LNG-fueled vehicles.
406.8.12.1.1 **Gas detection system components.** Gas detection system control units must be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors must be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.

406.8.12.2 **Operation.** Activation of the gas detection system will result in all the following:

1. Initiation of distinct audible and visual alarm signals in the repair garage.
2. Deactivation of all heating systems located in the repair garage.
3. Activation of the mechanical ventilation system, when the system is interlocked with gas detection.

406.8.12.3 **Failure of the gas detection system.** Failure of the gas detection system will result in the deactivation of the heating system, activation of the mechanical ventilation system and where the system is interlocked with gas detection and causes a trouble signal to sound in an approved location.

406.8.13 **Defueling of hydrogen from motor vehicle fuel storage containers.** The discharge or defueling of hydrogen from motor vehicle fuel storage tanks for the purpose of maintenance, cylinder certification, calibration of dispensers or other activities will be in accordance with 406.8.13.1 through 406.8.13.1.2.4.

406.8.13.1 **Methods of discharge.** The discharge of hydrogen from motor vehicle fuel storage tanks will be accomplished through a closed transfer system in accordance with Section 406.8.13.1.1 or an approved method of atmospheric venting in accordance with Section 406.8.13.1.2.

406.8.13.1.1 **Closed transfer system.** A documented procedure that explains the logic sequence for discharging the storage tank must be provided to the fire code official for review and approval. The procedure must include what actions the operator is required to take in the event of a low-pressure or high-pressure hydrogen release during discharging activity. Schematic design documents must be provided illustrating the arrangement of piping, regulators and equipment settings.
The construction documents must illustrate the piping and regulator arrangement and must be shown in spatial relation to the location of the compressor, storage vessels and emergency shutdown devices.

406.8.13.1.2 Atmospheric venting of hydrogen from motor vehicle fuel storage containers. When atmospheric venting is used for the discharge of hydrogen from motor vehicle fuel storage tanks, such venting must be in accordance with Sections 406.8.13.1.2.1 through 406.8.13.1.2.4.

406.8.13.1.2.1 Defueling equipment required at vehicle maintenance and repair facilities. All facilities for repairing hydrogen systems on hydrogen-fueled vehicles will have equipment to defuel vehicle storage tanks. Equipment used for defueling must be listed and labeled for the intended use.

406.8.13.1.2.1.1 Manufacturer’s equipment required. Equipment supplied by the vehicle manufacturer will be used to connect the vehicle storage tanks to be defueled to the vent pipe system.

406.8.13.1.2.1.2 Vent pipe maximum diameter. Defueling vent pipes must have a maximum inside diameter of 1 inch (25 mm).

406.8.13.1.2.1.3 Maximum flow rate. The maximum rate of hydrogen flow through the vent pipe system must not exceed 1,000 cfm at NTP (0.47 m³/s) and will be controlled by means of the manufacturer’s equipment, at low pressure and without adjustment.

406.8.13.1.2.1.4 Isolated use. The vent pipe used for defueling must not be connected to another venting system used for any other purpose.

406.8.13.1.2.2 Construction documents. Construction documents will be provided illustrating the defueling system to be utilized. Plan details must be of sufficient detail and clarity to allow for evaluation of the piping and control systems to be utilized and include the method of support for cylinders, containers or tanks to be used as part of a closed transfer system, the method of grounding and bonding, and other requirements specified herein.

406.8.13.1.2.3 Stability of cylinders, containers and tanks. A method of rigidly supporting cylinders, containers or tanks used during the closed transfer system discharge or defueling of hydrogen must be provided.
The method must provide not less than two points of support and will be designed to resist lateral movement of the receiving cylinder, container or tank. The system will be designed to resist movement of the receiver based on the highest gas-release velocity through valve orifices at the receiver’s rated service pressure and volume. Supporting structure or appurtenance used to support receivers must be constructed of noncombustible materials in accordance with the International Building Code.

406.8.13.1.2.4 Grounding and bonding. Cylinders, containers or tanks and piping systems used for defueling must be bonded and grounded. Structures or appurtenances used for supporting the cylinders, containers or tanks must be grounded in accordance with NFPA 70. The valve of the vehicle storage tank must be bonded with the defueling system prior to the commencement of discharge or defueling operations.

406.8.13.1.3 Repair of hydrogen piping. Piping systems containing hydrogen must not be opened to the atmosphere for repair without first purging the piping with an inert gas to achieve 1 percent hydrogen or less by volume. Defueling operations and exiting purge flow must be vented in accordance with Section 406.8.13.1.2.

406.8.13.1.3.1 Purging. Each individual manufactured component of a hydrogen generating, compression, storage or dispensing system will have a label affixed as well as a description in the installation and owner’s manuals describing the procedure for purging air from the system during startup, regular maintenance and for purging hydrogen from the system prior to disassembly (to admit air).

For the interconnecting piping between the individual manufactured components, the pressure rating must be at least 20 times the absolute pressure present in the piping when any hydrogen meets any air.

406.8.13.1.3.2 System purge required. After installation, repair or maintenance, the hydrogen piping system will be purged of air in accordance with the manufacturer’s procedure for purging air from the system.

(35) Subsection 410.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:
410.4 Platform construction. Permanent platforms shall be constructed of materials as required for the type of construction of the building in which the permanent platform is located. Permanent platforms are permitted to be constructed of fire-retardant-treated wood for Types I, II, and IV construction where the platforms are not more than 30 inches (762 mm) above the main floor, and not more than one-third of the room floor area and not more than 3,000 square feet (279 square meters) in area. Where the space beneath the permanent platform is used for storage or any purpose other than equipment, wiring or plumbing, the floor assembly will be not less than 1-hour fire resistance-rated construction or of heavy timber floor construction. Where the space beneath the permanent platform is used for equipment, wiring or plumbing, the underside of the permanent platform need not be protected.

(36) Subsection 413.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Sections 413.1.1 through 413.1.14 to read:

413.1 General. Fire protection and life-safety features for high-piled areas will be in accordance with Sections 413.1.1 through 413.1.13.

413.1.1 Extent and type of protection. When required, fire detection systems, smoke and heat removal, draft curtains and automatic sprinkler design density must extend the lesser of 15 feet (4572 mm) beyond the high-piled storage area or to a permanent partition. Where portions of high-piled storage areas have different fire protection requirements because of commodity, method of storage or storage height, the fire protection features will be based on the most restrictive design method.

413.1.2 Separation of high-piled storage areas. High-piled storage areas will be separated from other portions of the building where required by Sections 413.1.2.1 through 413.1.2.2.

413.1.2.1 Separation from other uses. Mixed occupancies will be separated in accordance with Sections 508 and 509.

413.1.2.2 Multiple high-piled storage areas. Multiple high-piled storage areas will be in accordance with Section 413.1.2.2.1 or 413.1.2.2.2.

413.1.2.2.1 Aggregate area. The aggregate area of all high-piled storage areas within a building, unless such areas are separated from each other by 1-hour fire barriers constructed in accordance with Section 707.
Openings in such fire barriers must be protected by opening protectives having a 1-hour fire protection rating.

413.1.2.2 Multiclass high-piled storage areas. High-piled storage areas classified as Class I through IV not separated from high-piled storage areas classified as high hazard will utilize the aggregate of all high-piled storage areas as high hazard. To be considered as separated, 1-hour fire barriers will be constructed in accordance with Section 707. Openings in such fire barriers must have a 1-hour fire protection rating.

Exception: Designation based on engineering analysis.

413.1.3 Automatic sprinklers. Automatic sprinkler systems will be provided as required by Table 413.1.

Exception: High–expansion foam extinguishing systems installed in addition to automatic sprinkler systems must comply with Section 904.7.

413.1.4 Fire detection. Where fire detection is required by Table 413.1, an approved automatic fire detection system must be installed throughout the high-piled storage area. The system will be monitored and be in accordance with Section 907.

413.1.5 Smoke and heat removal. Where smoke and heat removal are required by Section 910, smoke and heat vents must be provided.

### TABLE 413.1

**GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS**

<table>
<thead>
<tr>
<th>COMMODITY CLASS</th>
<th>SIZE OF HIGH-PILED AREA (square feet)</th>
<th>ALL STORAGE AREA</th>
<th>SOLID-PILED STORAGE SHELF STORAGE AND PALLETTIZED STORAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Automatic fire extinguishing system</td>
<td>Fire detection system</td>
</tr>
<tr>
<td>I - IVa</td>
<td>2,501–12,000 Public access</td>
<td>Yes</td>
<td>Not required</td>
</tr>
<tr>
<td></td>
<td>2,501–12,000</td>
<td>Yes</td>
<td>Not required</td>
</tr>
</tbody>
</table>

a. Commodity classification I-IV will be defined in the Fire Code.
b. High Hazard will be defined in Section 415.
413.1.6 Building access. Fire apparatus access roads will be provided within 150 feet of all portions of the exterior wall of buildings used for high-piled storage in which the aggregate area of all high-piled storage areas within a building are greater than 12,000 square feet. Aggregate areas of high-piled storage areas will be permitted to be separated by 1-hour fire barriers constructed in accordance with Section 707.

413.1.7 Access doors. Fire department access doors will be provided in accordance with this section. Access doors will be accessible without the use of a ladder.

413.1.8 Number of doors required. A minimum of one access door will be provided in each 100 linear feet (30 480 mm), or fraction thereof, of the exterior walls that face required fire apparatus access road. The required access doors will be distributed such that the linear distance between adjacent access doors does not exceed 100 feet (30 480 mm).

413.1.9 Door size and type. Access doors must not be less than 3 feet (914 mm) in width and 6 feet 8 inches (2032 mm) in height. Access doors must be of the pivoted or side-hinged swinging type.

413.1.10 Designation of storage heights. A visual method of indicating the maximum allowable storage height will be provided within stock or storage areas.


**413.1.11 Aisles.** Aisles providing access to exits and fire department access doors will be provided in high-piled storage areas exceeding 500 square feet (46 m²), in accordance with Sections 413.1.11.1.1 to 413.1.11.1.2. Aisles separating storage piles or racks will comply with NFPA 13. Aisles must also comply with Chapter 10.

**413.1.11.1 Width.** Aisle width must be in accordance with Sections 413.1.11.1.1 and 413.1.11.1.2.

Exceptions:

1. Aisles crossing rack structures or storage piles, which are used only for employee access, must be a minimum of 24 inches (610 mm) wide.

2. Aisles separating shelves classified as shelf storage must be a minimum of 30 inches (762 mm) wide.

**413.1.11.1.1 Sprinklered buildings.** Aisles in sprinklered buildings will be not less than 44 inches (1118 mm) wide. Aisles will be not less than 96 inches (2438 mm) wide in high-piled storage areas exceeding 2,500 square feet (232 m²) in area that are accessible to the public and designated to contain high-hazard commodities.

Exception: Aisles in high-piled storage areas exceeding 2,500 square feet (232 m²) in area, that are accessible to the public and designated to contain high-hazard commodities, are protected by a sprinkler system designed for multiple-row racks of high-hazard commodities must be a minimum of 44 inches (1118 mm) wide.

**413.1.11.2 Nonsprinklered buildings.** Aisles in nonsprinklered buildings must be a minimum of 96 inches (2438 mm) wide.

**413.1.11.2 Clear height.** The required aisle width will extend from floor to ceiling. Rack structural supports and catwalks are allowed to cross aisles at a minimum height of 6 feet 8 inches (2032 mm) above the finished floor level, provided that such supports do not interfere with fire department hose stream trajectory.

**413.1.11.3 Dead ends.** Dead-end sides will be in accordance to Chapter 10 of the IBC.
413.1.12 Portable fire extinguishers. Portable fire extinguishers will be provided in accordance to Section 906.

413.1.13 Housekeeping and maintenance.

413.1.13.1 Rack structures. The structural integrity of racks will be maintained.

413.1.13.2 Ignition sources. Hot ashes, cinders, smoldering coals or greasy or oily materials subject to spontaneous ignition must not be deposited in a combustible receptacle, within 10 feet (3048 mm) of other combustible material including combustible walls and partitions or within 2 feet (610 mm) of openings to buildings.

413.1.13.3 Smoking. Smoking will be prohibited. Approved "No Smoking" signs must be conspicuously posted throughout the high-piled storage areas.

413.1.13.4 Aisle maintenance. When restocking is not being conducted, aisles must be kept clear of storage, waste material and debris. Fire department access doors, aisles and exit doors will not be obstructed. During restocking operations using manual stocking methods, a minimum unobstructed aisle width of 24 inches (610 mm) will be maintained in 48-inch (1219 mm) or smaller aisles, and a minimum unobstructed aisle width of one-half of the required aisle width must be maintained in aisles greater than 48 inches (1219 mm). During mechanical stocking operations, a minimum unobstructed aisle width of 44 inches (1118 mm) must be maintained in accordance with Section 413.1.11.

413.1.13.5 Pile dimension and height limitations. Pile dimensions and height limitations will comply with Table 413.1.

413.1.13.6 Array. Where an automatic sprinkler system design utilizes protection based on a closed array, array clearances will be provided and maintained as specified by the standard used.

413.1.13.7 Flue spaces. Flue spaces will be provided in accordance with Table 413.2. Required flue spaces must be maintained.
### TABLE 413.2
**REQUIRED FLUE SPACES FOR RACK STORAGE**

<table>
<thead>
<tr>
<th>RACK CONFIGURATION</th>
<th>AUTOMATIC SPRINKLER PROTECTION</th>
<th>SPRINKLER AT THE CEILING WITH OR WITHOUT MINIMUM IN-RACK SPRINKLERS</th>
<th>IN-RACK SPRINKLERS AT EVERY TIER</th>
<th>NON - SPRINKLERED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤ 25 feet</td>
<td>&gt; 25 feet</td>
<td>Any height</td>
</tr>
<tr>
<td></td>
<td>Storage height</td>
<td>Option 1</td>
<td>Option 2</td>
<td></td>
</tr>
<tr>
<td>Single-row rack</td>
<td>Transverse flue space</td>
<td>Size(^b) 3 inches</td>
<td>Not Applicable</td>
<td>3 inches</td>
</tr>
<tr>
<td></td>
<td>Vertically aligned</td>
<td>Not Required</td>
<td>Not Applicable</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Longitudinal flue space</td>
<td>Not Required</td>
<td>Not Applicable</td>
<td>Not Required</td>
</tr>
<tr>
<td>Double-row rack</td>
<td>Transverse flue space</td>
<td>Size(^b) 6 inches(^a)</td>
<td>3 inches</td>
<td>3 inches</td>
</tr>
<tr>
<td></td>
<td>Vertically aligned</td>
<td>Not Required</td>
<td>Not Required</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Longitudinal flue space</td>
<td>Not Required</td>
<td>6 inches</td>
<td>6 inches</td>
</tr>
<tr>
<td>Multi-row rack</td>
<td>Transverse flue space</td>
<td>Size(^b) 6 inches</td>
<td>Not Applicable</td>
<td>6 inches</td>
</tr>
<tr>
<td></td>
<td>Vertically aligned</td>
<td>Not Required</td>
<td>Not Applicable</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Longitudinal flue space</td>
<td>Not Required</td>
<td>Not Applicable</td>
<td>Not Required</td>
</tr>
</tbody>
</table>

Flue spaces will comply with 413.1.13.7.

**413.1.14 Storage arrangement.** Storage arrangement will be in accordance to Sections 34.7.3.1, 34.7.3.2 of ROH Chapter 20, Fire Code.

(37) Subsection 420.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding the following exception:

**Exception:** Accessory Dwelling Unit (ADU) will be permitted to be separated from the primary dwelling unit with single layer of 5/8-inch Type X gypsum board or the equivalent fire resistive construction on the walls and ceilings of the ADU portion.

(38) Subsection 423.1 of the Building Code of the State of Hawaii, Appendix “U” is amended to read:
423.1 **General.** In addition to other applicable requirements in this code, storm shelters will be constructed in accordance with ICC-500, ROH Chapter 16, Articles 13 and 14.

(39) Section 425 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 425 is added to read:

**SECTION 425 - FENCES**

425.1 **General.** Fences must be constructed in accordance with this code, the Land Use Ordinance and ROH Chapter 15, Article 24, Section 15.24.6. In areas where fence height is not regulated under the Land Use Ordinance, fences over 6 feet (1829 mm) in height will be subject to the approval of the fire department as to access.

425.2 **Barbed or razor wire fences.** Barbed or razor wire must not be used for construction of any fence.

1. Barbed or razor wire may be used in fences enclosing the following premises, provided that barbed or razor wire will be placed along or above the height of 6 feet from the ground, subject to the approval of the fire department:

   1.1 Any "public utility" as defined in HRS Section 269.1;

   1.2 Premises in industrial zoned districts and used for storage or handling of hazardous materials, and premises zoned I-2 or I-3, intensive or waterfront industrial districts which are used for industrial purposes and are not adjacent to premises used for other purposes;

   1.3 Zoos for keeping animals and birds for public view or exhibition; and

   1.4 Jails, prisons, reformatories, and other institutions which are involved in law enforcement or military activities where security against entry is an important factor.

2. Barbed wire may be used in fences enclosing premises used for pasturing cattle or raising swine.
(40) Section 426 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 426 is added to read:

SECTION 426 - AGRICULTURAL BUILDINGS

426.1 Appendix C. Appendix C, Group U – Agricultural Buildings is by reference incorporated herein and made a part of this code.

(41) Section 427 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 427 is added to read:

SECTION 427 – PASSENGER RAIL STATIONS AND BUILDINGS

427.1 Applicability. The provisions of this section will apply to buildings which connect to passenger rail stations constructed in accordance to NFPA 130.

427.1.1 Passenger rail station fire separation line. For the purpose of this section, a passenger rail station fire separation line will be established. The passenger rail station fire separation line must define the extent of the passenger rail station. Buildings and parking structures must be outside of the passenger rail station fire separation line and are not considered as part of the passenger rail station. Where a building is above or below a passenger rail station, the building must be of Type I or II construction, and there will be a minimum 2-hour fire resistance rated horizontal assembly constructed in accordance with Section 711.

427.1.2 Fire-resistance-rated separation. A building must be separated from the passenger rail station by a fire wall complying with Section 706.

Exception: The exterior walls of a building separated from a passenger rail station which complies with Table 602.

427.1.3 Openings between passenger stations and buildings. Except for the separation between Group R sleeping units and the passenger rail stations, openings between passenger rail stations and buildings of Type I or II construction need not be protected.

427.1.4 Parking garages. An attached garage for the storage of passenger vehicles having a capacity of not more than nine persons and open parking garages must be separated from the passenger rail station by not less than 2-hour fire barrier constructed in accordance with Section...
707 or horizontal assemblies constructed in accordance with Section 711 or both.

Openings between the passenger rail station and an attached garage will not be required to be protected with fire protection rated openings provided that all of following conditions are met:

1. The openings do not exceed 25 percent of the area of the fire barrier in which they are located.

2. Means are provided to prevent spilled fuel from accumulating adjacent to the openings and entering the passenger rail station.

3. Physical means are provided to prevent vehicles from being parked or driven within 10 feet (3050 mm) of the openings.

Parking garages, open or enclosed, which are separated from the passenger rail station, must comply with the provisions of Table 602.

Pedestrian walkways and tunnels which connect garages to passenger rail stations must be constructed in accordance with Section 3104.

427.1.5 Kiosks. Kiosks and similar structures (temporary or permanent) must not be located within 20 feet of a passenger rail station and must meet the following requirements:

1. Combustible kiosks or other structures will be constructed of fire-retardant treated wood complying with Section 2303.2.

2. Foam plastics having a maximum heat release rate not greater than 100 kW (105 Btu/h) when tested in accordance with the exhibit booth protocol UL 1975 or when tested in accordance with NFPA 289 using the 20 kW ignition source.

3. Aluminum composite material (ACM) meeting the requirements of Class A interior finish in accordance to Chapter 8 when tested as an assembly in the maximum thickness intended.

4. The horizontal separation between kiosks or grouping thereof and other structures must be not less than 20 feet (6096 mm).
5. Each kiosk or similar structure or grouping thereof will have an area not greater than 300 square feet (28 m²).

427.1.6 Children’s play structures. Children’s play structures will comply with Section 424. The horizontal separation between the passenger rail station and children’s play structures must be not less than 20 feet (6096 mm). The horizontal separation between children’s play structures, kiosks and similar structures must be not less than 20 feet (6096 mm). Children’s play structure groupings must have an area not greater than 300 square feet (28 m²).

427.2 Means of egress. Required means of egress for buildings or structures connected to passenger rail stations will be provided independent of the passenger rail station. The occupant load of the building opening into the passenger rail station will not be included in determination means of egress requirements of the passenger rail station. Building exits terminating at the passenger rail station will be considered as a dead end.

(42) Section 428 is added to the IBC, as adopted by the Building Code of the State of Hawaii. Section 429 is added to read:

SECTION 428 – STANDBY POWER.

428.1 Installation. Installation of standby power systems will be in accordance to Section 2702 and the International Mechanical Code.

428.2 Operations and Maintenance. Operation and maintenance of standby power systems will be in accordance to the Fire Code.

(43) Subsection 501.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

501.1 Scope. The provisions of this chapter control the height, area and location of structures hereafter erected and additions to existing structures.

(44) Subsection 501.3 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 501.3 is added to read:

501.3 Location of building for fire department access. One fire apparatus access road must be provided for every building, or portion of a
building such that any portion of an exterior wall of the first story above grade of the building is located not more than 150 feet (45 720 mm) measured around the exterior of the building. A fire apparatus access road must extend to within 50 feet (15 m) of a single exterior door providing access to the interior of the building on at least one side of a building.

Exceptions:

1. When exterior walls with fire separation distance less than 3 feet (914 mm) are constructed in accordance to the building code, the total perimeter of that portion of the building, will not exceed 200 linear feet (60 960 mm) or when the building is protected throughout with an automatic sprinkler system, the total perimeter of that portion of the building, must not exceed 400 linear feet (122 m).

2. Where the building is equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3 the distance to a fire department apparatus road will be permitted to be 450 feet (137 m) measured around the exterior of the building.

3. Buildings with gross area greater than 62,000 square feet (5760 m²) will have not less than access to two separate fire apparatus access roads.

4. When there are not more than two one- and two-family dwellings or private garages, carports, sheds, and agricultural buildings, a fire apparatus access road must extend to within 50 feet (15 240 mm) of a single exterior door providing access to the interior of the building.

5. Buildings with high-pile storage area greater than 12,000 s.f. in area must have access to not less than two separate fire access roads.

6. Where approved by the Fire Chief.

Where more than one access to a public way or fire apparatus access roads are required, at least two will be located a distance not less than one half of the diagonal of the length of the maximum overall diagonal dimension of the lot or area to be served, measured in a straight line between accesses.
When fire department apparatus access roads cannot be installed due to location on property, topography, waterways, nonnegotiable grades, or other similar conditions, the authority having jurisdiction will be authorized to require other additional fire protection.

(45) Subsection 501.3.1 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 501.3.1 is added to read as follows:

501.3.1 Fire department apparatus access roads.

501.3.1.1 Dimensions. Fire apparatus access roads will have an unobstructed width of no less than 20 feet (6096 mm) and an unobstructed vertical clearance of not less than 13 feet 6 inches (4115 mm). Where there are fire hydrants the minimum road width will be not less than 26 feet (7925 mm). See figure 503.1.

501.3.1.2 Surface. Fire apparatus access roads will be designed and manufactured to support the imposed loads of fire apparatus and must be provided with a surface so as to provide all-weather driving capabilities.

501.3.1.3 Turning Radius. The turning radius of a fire apparatus road will be in accordance to figure 503.1.

501.3.1.4 Dead Ends. Dead-end fire apparatus access roads in excess of 150 feet (45 720 mm) in length must be provided with approved provisions for turning fire apparatus around, and will have a maximum gradient of 5%, see figure 503.1.
501.3.1.5 Bridges. When a bridge is required to be used as part of a fire apparatus access road, it must be capable of supporting the imposed load of a fire apparatus weighing at least 83,500 pounds (37,875 kg) and maintained in accordance with AASHTO- HB-17. Vehicle load limits must be posted at both entrances to bridges.

501.3.1.6 Grade. The gradient for a fire apparatus access road must not exceed 10 percent.

Exception: Grades steeper than 10 percent will be approved by the fire chief.

501.3.1.7 Gates or barricades. Gates or barricades installed across fire apparatus access roads will not be installed unless authorized by the fire chief.

501.3.1.8 Fire Department access for ground-mounted photovoltaic system installation. A gravel base or other noncombustible base must be installed and maintained under and around the installation. A clear area of 10 feet (3048 mm) around the ground-mounted photovoltaic installation must be provided.
501.3.2 Fire hydrants. Fire hydrants within 150 feet (45,720 mm) of the building or structure must be installed on fire apparatus access roads in accordance with the Water System Standards of the City and County of Honolulu.

(46) Subsection 503.3.1.1 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 503.3.1.1 is added to read as follows:

503.3.1.1 Dimensions. Fire apparatus access roads will have an unobstructed width of no less than 20 feet (6096 mm) and an unobstructed vertical clearance of not less than 13 feet 6 inches (4115 mm). See figure 503.1 below.

![Figure 503.1](image)

(47) Subsection 504.4 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 504.4 is added to read:
504.4 Stair Enclosure pressurization increase. For Group R-1 and R-2 occupancies in buildings of VA, IV or IIA construction equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, the maximum number of stories permitted in Section 504.2 may be increased by one additional story and 20 feet of height provided the interior exit stairways and ramps are pressurized in accordance with Sections 909.20 and Section 909.11 or the exit stairways are designed in accordance to the open exterior stairway requirements of Section 1026 with 2 hour fire-rated shaft construction.

504.4.1 Special Provisions. Group R-1 and R-2 meeting the requirements of Section 504.4 will be permitted to be constructed as separate and distinct building as allowed in Section 510.2.

(48) Subsection 506.2.2 (Open space limits) of the IBC, adopted by the Building Code of the State of Hawaii is amended by adding the following exception:

Exception: For the purposes of this section, an adjoining private right-of-way may be considered in determining open spaces if the owner of the premises for which the building permit application is filed owns a portion thereof.

(49) Subsection 510.2 (Horizontal building separation allowance, Condition No. 6) of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

6. The building below the horizontal assembly must be protected throughout by an approved automatic sprinkler system in accordance with Section 903.3.1.1 and will be permitted to be any occupancy allowed by this code except Group H.

(50) Subsection 510.10 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 510.10 is added to read:

510.10 Carport. A carport constructed of Type V-B construction on a hillside may exceed one story in height provided the space below the carport floor is unused or used for Group U occupancy only.

(51) Subsection 603.1 of the IBC, adopted by the Building Code of the State of Hawaii. Section 603.1 is amended by adding Item No. 3 to read:
3  Wood construction will be permitted for mezzanines constructed in buildings of Type IIB construction, subject to the following:

3.1  Mezzanines must conform to Section 505.

3.2  The aggregate area of these mezzanines must be included in the determination of the floor area and will be included in calculating the allowable floor area of the stories in which the mezzanines are located.

3.3  Mezzanine floors, including supporting beams, girders, and columns must be of one-hour fire-resistant construction.

3.4  Fire sprinkler substitutions for one hour construction is not permitted.

(52) Subsection 901.2 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

**901.2 Fire protection systems.** Fire protection systems shall be installed, repaired, operated and maintained in accordance with this code and the International Fire Code.

Any fire protection system for which an exception or reduction to the provisions of this code has been granted shall be considered to be a required system.

All buried galvanized steel and other ferrous piping used in connection with fire-extinguishing systems must be wrapped or otherwise protected against corrosion in accordance with the Plumbing Code provisions for protection of galvanized ferrous piping for potable water.

(53) Subsection 903.1.1 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

**903.1.1 Alternative protection.** Alternate automatic fire-extinguishing systems complying with Section 904 will be permitted in lieu of automatic sprinkler protection where recognized by the applicable standard and approved by the building and the fire code officials.

(54) Subsection 903.1.2 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 903.1.2 is added to read as follows:
903.1.2 Storage height signage. In any building requiring an automatic sprinkler system, with a ceiling height greater than 12 feet (3658 mm), a readily visible, metal sign, with letters painted or stenciled, not less than 1 inch (25 mm) high on a contrasting background that states the maximum storage height allowable for the installed sprinkler system, must be placed next to the main shutoff valve of the automatic sprinkler riser.

(55) Subsection 903.2.1.2 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read as follows:

903.2.1.2 Group A-2. An automatic sprinkler system shall be provided for Group A-2 occupancies where one of the following conditions exist:

1. The fire area exceeds 4,000 square feet (373 m²);

2. The fire area has an occupant load of 100 or more;

3. The fire area is located on a floor other than a level of exit discharge serving such occupancies.

(56) Subsection 903.2.8 of the Building Code of the State of Hawaii is amended to read:

903.2.8 Group R-1 and R-2. An automatic sprinkler system installed in accordance with Section 903.3 must be provided throughout all buildings with a Group R-1 and R-2 fire area.

Exception: In accordance with HRS 46-19.8 Fire sprinklers; residences, until June 30, 2027 no county shall require the installation or retrofitting of automatic fire sprinklers or an automatic fire sprinkler system in:

1. Any new or existing detached one- or two-family dwelling unit in a structure used only for residential purposes; and

2. Nonresidential agricultural and aquacultural buildings and structures located outside an urban area; provided that this section shall not apply to new homes that require a variance from access road or firefighting water supply requirements.”

(57) Subsection 903.2.11.1, Item 2 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:
903.2.11.1 Stories without openings. An automatic sprinkler system shall be installed throughout all stories, including basements of all buildings where the floor area exceeds 1,500 square feet (139.4 m²) and where there is not provided at least one of the following types of exterior wall openings:

2. Such required openings must be unobstructed by sunshades, louvers, grillwork, or other construction on the exterior wall which will prevent or hinder access to the openings by the fire department personnel.

(58) Subsection 903.3.1.1.1 of the IBC, adopted by the Building Code of the State of Hawaii is amended by adding the following exempt locations:

7. Closets having an area of less than 12 square feet (1.1. m²) in individual dwelling units in R-2 occupancies, will not be required to be sprinklered. Closets that contain equipment such as washers, dryers, furnaces, or water heaters must be sprinklered regardless of size.

(59) Subsection 903.4.1 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

903.4.1 Monitoring. Alarm, supervisory and trouble signals must be distinctly different and must be automatically transmitted to an approved supervising station and when approved by the building official, will sound an audible signal at a constantly attended location.

Exceptions:

1. Underground key or hub valves in roadway boxes provided by the municipality or public utility are not required to be monitored.

2. Backflow prevention device test valves located in limited area sprinkler system supply piping must be locked in the open position. In occupancies required to be equipped with a fire alarm system, the backflow preventer valves must be electronically supervised by a tamper switch installed in accordance with NFPA 72 and separately annunciated.

(60) Subsection 904.2 of the IBC, adopted by the Building Code of the State of Hawaii is amended as follows:
904.2 Where required. Automatic fire-extinguishing systems installed as an alternative to the required sprinkler system of Section 903 must be approved by the building code official. Automatic fire-extinguishing systems will not be considered alternatives for the purpose of exceptions or reductions allowed by other requirements of this code.

(61) Subsection 904.2.1 of the IBC, adopted by the Building Code of the State of Hawaii is amended as follows:

904.2.1 Commercial hood and duct systems. Commercial hood and duct systems will be required by Title 11 Chapter 39, paragraph §11-39-3(7) Administrative Rules of the State of Hawaii, Department of Health. Each Type I hood and duct system will be protected by an approved automatic fire-extinguishing system installed in accordance to this code.

(62) Subsection 904.11.1 of the IBC, adopted by the Building Code of the State of Hawaii is amended by adding the following exception:

EXCEPTION:

1. Automatic sprinkler systems will not be required to be equipped with manual actuation means.

2. Kitchen areas less than 300 square feet (27.87 m²) will have a readily accessible means for manual activation located between 42 inches and 48 inches (1067 mm and 1219 mm) above the floor, be accessible in the event of a fire, and be located at or near a means of egress.

(63) Subsection 905.1 of the IBC, adopted by the Building Code of the State of Hawaii is amended as follows:

905.1 General. Standpipe systems must be provided in new buildings and structures in accordance with this section. Fire hose threads used in connection with standpipe systems must be approved and will be compatible with fire department hose threads. All hose connection outlets must be installed so that a 12-inch (305 mm) long wrench may be used in connecting the hose with clearance for the wrench on all sides of the outlet. The location of the fire department hose connection must be approved by the fire chief. All horizontal runs of standpipe systems will be sloped to a drain valve at the low point of the system, the drain valve must be arranged to discharge at an approved location.
(64) Subsection 905.2 of the IBC, adopted by the Building Code of the State of Hawaii is amended as follows:

**905.2 Installation standard.** Standpipe systems shall be installed in accordance with this section and NFPA 14. When water pressure at a standpipe outlet exceeds 175 psi static or residual at 250 gpm flow, a pressure-reducing valve shall be provided. The required pressure-reducing valves shall be located at the hose valve outlet only. Only field-adjustable valves shall be allowed.

(65) Subsection 905.3.2, Exception 2 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

2. Class I manual wet standpipes are allowed in buildings that are not high-rise buildings.

(66) Subsection 905.4, Item 6, of the IBC, adopted by the Building Code of the State of Hawaii amended to read:

6. Where the most remote portion of a nonsprinklered floor or story is more than 150 feet (45 720 mm) from a hose connection, additional hose connections must be provided.

(67) Subsection 907.7.2 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

**907.7.2 Record of completion.** A record of completion in accordance with NFPA 72 verifying that the system has been installed and tested in accordance with the approved plans and specifications shall be provided. The record of completion, approved fire alarm shop drawings and specifications must be provided to the building and fire officials prior to final inspections or prior to final occupancy.

The record of completion must be provided by:

1. An Electrical Engineer licensed in the State of Hawaii.

2. An individual certified by the International Code Council as a Commercial Fire Alarm Inspector or Fire Inspector II, or by the National Fire Protection Association as a Certified Fire Inspector.
3. Personnel who are factory trained and certified for fire system design and emergency communications system design of the specific type and brand of the installed system.

(68) Subsection 907.8 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

907.8 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems will be in accordance to Section 13.7.3.2.3 of the Fire Code.

(69) Subsection 910.2.2 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

910.2.2 High-piled combustible storage. Buildings and portions thereof containing high-piled combustible stock or rack storage in any occupancy group in accordance with Section 413 and this Section.

(70) Section 911 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

SECTION 911 - FIRE COMMAND CENTER

911.1 General. See Fire Code.

(71) Subsection 915.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by deleting the phrase “Section 510 of the International” to read as follows:

915.1 General. Emergency responder radio coverage shall be provided in all new buildings in accordance with the Fire Code.

(72) Section 916 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 916 is added to read:

SECTION 916
FIRE PROTECTION SYSTEMS SPECIAL INSPECTIONS

916.1 General. Where application is made for construction as described in this section, the owner or the licensed design professional in responsible charge, acting as the owner’s agent must employ one or more fire protection systems’ special inspectors to provide inspections during
construction on the types of work listed under Section 916. The fire protection system special inspector must be approved by the building official. These inspections are in addition to the inspections specified in Section 110.

916.1.1 Building Permit Requirement. The submitted plans must include a statement of fire protection system inspection prepared by the licensed engineer of record as a condition for permit issuance.

Exception: The building official may waive the requirements for the employment of a special inspector if the construction is of minor nature.

916.1.2 Report Requirement. Fire protection system inspectors will keep records of inspections and will review working drawings prior to installation. The fire protection system inspector must furnish inspection reports to the owner, licensed engineer or architect of record, and other owner-designated persons. Reports must indicate that work inspected was done in conformance to the applicable code and must include, but not be limited to, working drawings and acceptance tests required by this section.

All discrepancies will be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the proper design professional and to the building official.

The special inspector will submit a final signed report stating that they have reviewed the working drawings and whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of this code, this report must include a copy of the working drawings provided to the building official prior to the final inspection.

916.2 Automatic Sprinkler Systems. Automatic systems will be inspected and evaluated in accordance to the requirements of Section 903.

1. During installation.

Exception: Special inspector need not be present continuously during the installation of the sprinkler system provided the special inspector has
inspected for conformance with this code and approved plans prior to concealment.

2. During acceptance tests as required by NFPA 13, 13R and 13D.

916.3 Alternative Automatic Fire-Extinguishing Systems. Alternative automatic fire-extinguishing systems will be inspected and evaluated in accordance to the requirements of Section 904.

1. During installation.

Exception: Special inspector need not be present continuously during the installation of the alternate automatic fire extinguishing system provided the special inspector has inspected for conformance with this code and approved plans prior to concealment.

2. During tests as required by NFPA 11, 12, 12A, 16, 17, and 17A.

916.4 Standpipe Systems. Standpipe systems will be inspected and evaluated in accordance to the requirements of Section 905.

1. During installation.

Exception: Special inspector need not be present continuously during the installation of the standpipe system provided the special inspector has inspected for conformance with this code and approved plans prior to concealment.

2. During acceptance tests as required by NFPA 14.

916.5 Smoke Control Systems. Smoke control systems will be inspected and evaluated in accordance to the requirements of Section 909.

1. During erection of ductwork and prior to concealment for the purposes of leakage testing and recording device location.

2. Prior to occupancy and after sufficient completion for the purposes of pressure difference testing, flow measurements, and detection and control verification.
916.6 Fire pumps. Fire pump systems will be inspected and tested in accordance to the requirements of Section 913. Acceptance test must be performed and submitted to the building official.

(73) Subsection 1001.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding the following occupancies and building categories to read:

1001.4 Fire safety and evacuation plans. Fire safety and evacuation plans will be provided and maintained for the following occupancies and buildings:

1. Group A, other than Group A occupancies used exclusively for purposes of religious worship that have an occupant load less than 2,000.

2. Group B buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.

3. Group E.

4. Group F buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.

5. Group H.

6. Group I.

7. Group R-1.


11. Group M buildings having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge.
12. Covered malls exceeding 50,000 square feet (4645 m$^2$) in aggregate floor area.

13. Open mall buildings exceeding 50,000 square feet (4645 m$^2$) in aggregate area within perimeter line.


15. Buildings with an atrium and having an occupancy in Group A, E or M.

1001.4.1 Contents. Fire safety and evacuation plan contents will be in accordance with Section 1001.4.2 and 1001.4.3.

1001.4.2 Fire evacuation plans. Fire evacuation plans will include the following:

1. Emergency egress or escape routes and whether evacuation of the building is to be complete or, where approved, by selected floors or areas only.

2. Procedures for employees who must remain to operate critical equipment before evacuating.

3. Procedures for assisted rescue for persons unable to use the general means of egress unassisted.

4. Procedures for accounting for employees and occupants after evacuation has been completed.

5. Identification and assignment of personnel responsible for rescue or emergency medical aid.

6. The preferred and any alternative means of notifying occupants of a fire or emergency.

7. The preferred and any alternative means of reporting fires and other emergencies to the fire department or designated emergency response organization.

8. Identification and assignment of personnel who can be contacted for further information or explanation of duties under the plan.
9. A description of the emergency voice/alarm communication system alert tone and preprogrammed voice messages, where provided.

1001.4.3 Fire safety plans. Fire safety plans will include the following:

1. The procedure for reporting a fire or other emergency.

2. The life safety strategy and procedures for notifying, relocating or evacuating occupants, including occupants who need assistance.

3. Site plans indicating the following:
   
   3.1. The occupancy assembly point.
   
   3.2. The locations of fire hydrants.
   
   3.3. The normal routes of fire department vehicle access.

4. Floor plans identifying the locations of the following:

   4.1. Exits.
   
   4.2. Primary evacuation routes.
   
   4.3. Secondary evacuation routes.
   
   4.4. Accessible egress routes.
   
   4.5. Areas of refuge.
   
   4.6. Exterior areas for assisted rescue.
   
   
   4.8. Portable fire extinguishers.
   
   4.9. Occupant-use hose stations.
   
   4.10. Fire alarm annunciators and controls.

5. A list of major fire hazards associated with the normal use and occupancy of the premises, including maintenance and housekeeping
procedures

6. Identification and assignment of personnel responsible for maintenance of systems and equipment installed to prevent or control fires.

7. Identification and assignment of personnel responsible for maintenance, housekeeping and controlling fuel hazard sources.

(74) Subsections 1001.5 through 1001.8 are added to the IBC, adopted by the Building Code of the State of Hawaii. Section 1001, is amended by adding Sections 1001.5 through 1001.8 to read as follows:

1001.5 Maintenance. Fire safety and evacuation plans will be reviewed or updated annually or as necessitated by changes in staff assignments, occupancy or the physical arrangement of the building.

1001.6 Availability. Fire safety and evacuation plans will be available in the workplace for reference and review by employees, and copies will be furnished for review upon request.

1001.7 Distribution. The fire safety and evacuation plans will be distributed to the tenants and building service employees by the owner or owner's agent. Tenants will distribute to their employees applicable parts of the fire safety plan affecting the employees' actions in the event of a fire or other emergency.

1001.8 Exit Plan. An exit plan complying with the requirements of Chapter 10 must be provided for all buildings and occupancies.

(75) Subsection 1005.7.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a third exception to read:

Exception:

3. Exterior screen and storm doors of individual units of Group R-2 and Group R-3.

(76) Subsection 1008.1.4.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a second paragraph to read:

1008.1.4.4 Security grilles. (2nd paragraph)
For assembly occupancy groups A-2 and A-3 which are accessory to Group B, M, R-1 and R-2, horizontal sliding or vertical security grilles are permitted at the main exit and must be secured in the fully opened position during periods that the space is occupied. A readily visible durable sign is posted on the egress side adjacent to the grille stating “THIS GRILLE TO BE SECURED IN THE OPEN POSITION WHEN THIS SPACE IS OCCUPIED.” The sign must be in letters not less than 1 inch (25 mm) high on a contrasting background. Not more than one means of egress will be equipped with horizontal sliding or vertical security grilles. The use of these grills is revocable by the building official for due cause.

(77) Subsection 1008.1.10 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Exception #2 to read:

Exceptions:

2. Double-acting screen doors used in conjunction with exit doors having panic hardware in school cafeterias.

(78) Subsection 1008.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding the second Exception to read:

Exceptions:

2. Security gates may be permitted across corridors or passageways in school buildings if there is a readily visible durable sign on or adjacent to the gate, stating "THIS GATE IS TO REMAIN SECURED IN THE OPEN POSITION WHENEVER THIS BUILDING IS IN USE." The sign must be in letters not less than one inch high on a contrasting background. The use of this exception may be revoked by the building official for due cause.

(79) Subsection 1009.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Exception # 5 to read:

Exceptions:

5. Private stairways serving an occupant load of less than 5 must not be less than 30 inches (76 mm) in width.
(80) Subsection 1013.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Exception #7 to read:

Exceptions:

7. Guards in Group R-1 and R-2 Occupancies will not contain:

7.1 Horizontal rails other than top and bottom rails, or

7.2 Cutouts or indentations greater than 1-3/4 inches in width protrusions that may provide a foothold for young children.

(81) Subsection 1021.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by replacing the Exceptions with the following:

Exceptions: A single exit or access to a single exit will be permitted from any story or occupied roof where one of the following conditions exists:

1. The occupant load, number of dwelling units and common path of egress travel distance does not exceed the values in Table 1021.2(1) or 1021.2(2).

2. Rooms, areas and spaces complying with Section 1015.1 with exits that discharge directly to the exterior at the level of exit discharge, are permitted to have one exit or access to a single exit.

3. Parking garages where vehicles are mechanically parked must be permitted to have one exit or access to a single exit.

4. Group R-3 and R-4 occupancies will be permitted to have one exit or access to a single exit.

5. Individual single-story or multistory dwelling units will be permitted to have a single exit or access to a single exit from the dwelling unit provided that both of the following criteria are met:

5.1 The dwelling unit complies with Section 1006.2.1 as a space with one means of egress.

5.2 Either the exit from the dwelling unit discharges directly to the exterior at the level of exit discharge, or the exit access outside the dwelling unit's entrance door provides access to not less than two
approved independent.

6. Not more than 5 stories of Group R-2 occupancy are permitted to be served by a single exit under the following conditions:

6.1 The building has not more than six stories above grade plane.

6.2 The building does not contain a boarding house.

6.3 There must be no more than four dwelling units on any floor.

6.4 The building must be of not less than one-hour fire-resistive construction and must also be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Residential-type sprinklers must be used in all habitable spaces in each dwelling unit.

6.5 There will be no more than two single exit stairway conditions on the same property.

6.6 An exterior stairway or interior exit stairway must be provided. The interior exit stairway, including any related exit passageway, must be pressurized in accordance with Section 909.20. Doors in the stairway must swing into the interior exit stairway regardless of the occupant load served, provided that doors from the interior exit stairway to the building exterior are permitted to swing in the direction of exit travel.

6.7 A corridor must separate each dwelling unit entry/exit door from the door to an interior exit stairway, including any related exit passageway, on each floor. Dwelling unit doors must not open directly into an interior exit stairway. Dwelling unit doors are permitted to open directly into an exterior stairway.

6.8 There must be no more than 20 feet (6096 mm) of travel to the exit stairway from the entry/exit door of any dwelling unit.

6.9 Travel distance measured in accordance with Section 1016 must not exceed 125 feet.

6.10 The exit will not terminate in an egress court where the court depth exceeds the 10 court width unless it is possible to exit in either
direction to the public way.

6.11 Elevators will be pressurized in accordance with Section 909.21 or will open into elevator lobbies that comply with Section 713.14.1. Where approved by the building official, natural ventilation is permitted to be substituted for pressurization where the ventilation would prevent the accumulation of smoke or toxic gases.

6.12 Other occupancies are permitted in the same building provided they comply with all the requirements of this code. Other occupancies must not communicate with the Group R occupancy portion of the building or with the single-exit stairway.

Exception: Parking garages accessory to the Group R occupancy are 20 permitted to communicate with the exit stairway.

6.13 The exit serving the Group R occupancy must not discharge through any other occupancy, including an accessory parking garage.

6.14 There will be no openings within 10 feet (3048 mm) of unprotected openings into the stairway other than required exit doors having a one-hour fire-resistance rating.

6.15 The minimum width of this stairway must be not less than 48 inches.

(82) Subsection 1026.2 of the IBC, deleted in its entirety by the Building Code of the State of Hawaii, is amended to read as follows:

1026.2 Use in a means of egress. For occupancies other than Group I-2, exterior exit stairways and ramps will be permitted as an element of a required means of egress for buildings.

(83) Subsection 1026.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a second paragraph to read:

1026.3 Open side. (second paragraph)

Exterior exit stairways must be arranged to avoid any impediments to the use by persons having a fear of high places. Outside stairs more than 6
stories above the grade plane must be provided with an opaque visual obstruction not less than 48 in. (1220 mm) in height.

(84) Subsection 1026.6 of the IBC, adopted by the Building Code of the State of Hawaii is amended to read:

1026.6 Exterior stairway and ramp protection. Exterior exit stairways and ramps shall be separated from the interior of the building as required in Section 1022.2. Openings shall be limited to those necessary for egress from normally occupied spaces.

Exceptions:
1. Separation from the interior of the building is not required for occupancies, other than those in Group R-1 or R-2, in buildings that are no more than two stories above grade plane where a level of exit discharge serving such occupancies is the first story above grade plane.

2. Separation from the interior of the building is not required where the exterior stairway or ramp is served by an exterior ramp or balcony that connects two remote exterior stairways or other approved exits with a perimeter that is not less than 50 percent open. To be considered open, the opening shall be a minimum of 50 percent of the height of the enclosing wall, with the top of the openings no less than 7 feet (2134 mm) above the top of the balcony.

3. Separation from the interior of the building is not required for an exterior stairway or ramp located in a building or structure that is permitted to have unenclosed exit access stairways in accordance with Section 1009.3.

4. Separation from the interior of the building is not required for exterior stairways or ramps connected to open-ended corridors, provided that Items 4.1 through 4.6 are met:

4.1. The building, including corridors, stairways or ramps, shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.12.

4.2. The open-ended corridors comply with Section 1018.

4.3. The open-ended corridors are connected on each end to an exterior
exit stairway or ramp complying with Section 1026.

4.4. The exterior walls and openings adjacent to the exterior exit stairway or ramp comply with Section 1022.7.

4.5. At any location in an open-ended corridor where a change of direction exceeding 45 degrees (0.79 rad) occurs, a clear opening of not less than 35 square feet (3.3 m²) or an exterior stairway or ramp shall be provided. Where clear openings are provided, they shall be located so as to minimize the accumulation of smoke or toxic gases.

4.6. Must not be a required means of egress for buildings exceeding six stories above grade plane or which are high-rise buildings.

(85) Subsection 1026.7 is added to the IBC, adopted by the Building Code of the State of Hawaii. Subsection 1026.7 is added to read:

1026.7 Water accumulation. Exterior exit stairways and ramps will be designed to minimize water accumulation on their surfaces.

(86) Subsection 1029.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding an Exception to read:

Exception: Escape or rescue windows in Group R-1 and R-2 occupancies opening into an exterior exit balcony serving more than two dwelling units or hotel guest rooms will be permitted to have a finished sill height not more than 68 inches above the floor.

(87) Subsection 1029.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding an Exception to read:

Exception: Glass jalousie bladed windows which are not safety glazed may be used for emergency escape or rescue.

(88) Subsection 1101.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1101.1 Scope. The provisions of this chapter are guidelines for the design and construction of facilities for accessibility to physically disabled persons and shall be in accordance with the following regulations:

1. For construction of buildings or facilities of the state and
county governments, compliance with Section 103-50 HRS, administered by the Disability and Communication Access Board, State of Hawaii.

2. Department of Justice’s Americans with Disabilities Act Standards for Accessible Design.

3. Housing and Urban Development recognized ‘Safe Harbors’ for compliance with the Fair Housing Acts design and construction requirements.

4. Other pertinent laws relating with disabilities shall be administered and enforced by agencies responsible for their enforcement.

Prior to the issuance of a building permit, the owner (or the owner’s representative, professional architect, or engineer), shall submit a statement that all requirements, relating to accessibility for persons with disabilities, shall be complied with."

(89) Subsection 1101.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1101.2 Design. Buildings and facilities shall be designed and constructed to be accessible in accordance with this code and ICC A117.1. Conformance with the design and construction requirements of the Americans with Disabilities Act Accessibility Guidelines administered by the Department of Justice or the Fair Housing Act Accessibility Guidelines administered by the Department of Housing and Urban Development will be equivalent to meeting the accessibility of this code. Construction of public buildings or facilities in compliance with HRS 103-50 will be equivalent to meeting the accessibility of this code. At the time of submittal of an application for a building permit, the applicant will state on the plans that the project is subject to the above requirements.

(90) Subsection 1203.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1203.1 General. Buildings shall be provided with natural ventilation in accordance with Section 1204.4, or mechanical ventilation in accordance with the State of Hawaii, Title 11, Administrative Rules of the Department of Health, Chapter 39.
(91) Subsection 1203.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1203.2 Attic space. Attics and enclosed rafter spaces of combustible construction where ceilings are applied directly to the underside of roof rafters will have cross ventilation for each separate space by ventilating openings protected against the entrance of rain. Blocking and bridging shall be arranged so as not to interfere with the movement of air. An airspace of not less than 1 inch (25 mm) shall be provided between the insulation and the roof sheathing. The net free ventilating area shall not be less than 1/150th of the area of the space ventilated.

(92) Subsection 1203.2 (Third Exception) of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

Exceptions:

3. The attic space will be permitted to be unvented when the design professional determines it would be beneficial to eliminate ventilation openings to reduce salt-laden air and to maintain relative humidity to 60 percent or lower to:

3.1 Avoid corrosion to steel components;

3.2 Avoid moisture condensation in the attic space; or

3.3 Minimize consumption in the attic space, or ventilation by maintaining satisfactory space conditions in both the attic and occupied space below.

(93) Subsection 1203.4.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1203.4.1 Ventilation area required. The operable area of the openings to the outdoors shall be not less than 5 percent of the floor area being ventilated.

(94) Subsection 1203.4.1.1 and Exceptions 1 and 2 of the IBC, adopted by the Building Code of the State of Hawaii, are amended to read:
1203.4.1.1 Adjoining spaces. Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining room shall be unobstructed and shall have an area of not less than 10 percent of the floor area of the interior room or space, but not less than 25 square feet (2.3 square meters). The operable area of the openings to the outdoor shall be based on the total floor area being ventilated.

Exceptions:

1. Exterior openings required for ventilation shall be permitted to open into a sunroom with thermal isolation or a patio cover provided that the openable area between the sunroom addition or patio cover and the interior room shall have an area of not less than 10 percent of the floor area of the interior room or space, but not less than 20 square feet (1.86 m²). The openable area of the opening to the outdoors shall be based on the total floor area being ventilated.

2. For Residential Group R-2, when the openings are obstructed, a licensed mechanical engineer shall provide a mechanical ventilation system in accordance with Section 403 of the International Mechanical Code.

(95) Subsection 1205.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1205.2 Natural light. The minimum net glazed area shall be not less than 10 percent of the floor area of the room served.

(96) Subsection 1205.2.2 (Exterior openings) of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding Exceptions 3 & 4 to read:

Exceptions:

3. Residential Group R-3 and R-4, lighting must be in accordance with Section R303 of the International Residential Code.

4. For Residential Group R-1 and R-2, artificial light is only permitted for adjoining spaces complying with Section 1205.2.1, when the openings are obstructed.
(97) Section 1207 of the IBC, adopted by the Building Code of the State of Hawaii, is deleted in its entirety.

(98) Subsection 1301.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1301.1 Scope. Buildings will be designed and constructed in accordance with ROH Chapter 32.

(99) Subsection 1503.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

1503.4 Roof drainage. Design and installation of roof drainage systems must comply with Section 1503 of this code and Sections 1105 through 1109 of the Plumbing Code. Roof drains discharge at the public way must be in accordance with ROH Chapter 14.

(100) Subsection 1503.4.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1503.4.1 Secondary (emergency overflow) drains or scuppers. Where roof drains are required, secondary (emergency overflow) roof drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be trapped if the primary drains allow buildup for any reason. The installation and sizing of secondary emergency overflow drains, leaders and conductors must comply with Sections 1106 through 1108 of the Plumbing Code.

(101) Subsection 1507.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1507.1 Scope. Roof coverings must be applied in accordance with the applicable provisions of this section and the manufacturer’s installation instructions. For the purposes of Section 1507, high wind requirements for roof coverings, wherever the term $V_{asd}$ is used, it will be $V_{eff-asd}$, which is the effective ultimate design wind speed, $V_{eff-ult}$ multiplied by $\sqrt{0.625}$. The effective ultimate design wind speeds are given in Figure 1609.3.2 for Risk Category II and Figure 1609.3.3 for Risk Category III and IV.
(102) Section 1512 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 1512 is added to read as follows:

**1512 Miscellaneous roof top structures.** Cabanas, trellises, and other similar structures on roof tops must conform to all of the following:

1. Have a headroom clearance of not less than 7 feet 6 inches (228 mm).
2. Be not more than 225 square feet (93 m²) in area.
3. Aggregate area of such structures will not exceed 1,000 square feet in area (413 m²).
4. Where the fire separation distance is greater than 10 feet (3048 mm), the structure must be constructed of the type of materials specified by the type of construction for exterior walls but will not be required to comply with fire resistive rating requirement.
5. Type V construction will be permitted if there is a fire separation of not less than 20 feet (610 m).
6. The height of such structure must not exceed 75 feet above the fire department access road and must be fire sprinklered when required by other sections of this code.
7. Where the fire separation distance is greater than 20 feet (610m), the structure will be permitted to be constructed of fire-retardant-treated-wood.

(103) Subsection 1603.1 of the Building Code of the State of Hawaii, is amended to read:

**1603.1 General.** Construction documents must show the size, section, and relative locations of structural members with floor levels, column centers and offsets adequately dimensioned. The design loads and other information pertinent to the structural design required by Sections 1603.1.1 through 1603.1.9 must be clearly indicated on the construction documents.
Exception: Construction documents for buildings constructed in accordance with the conventional light-frame construction provisions of Section 2308 must indicate the following structural design information:

1. Floor and roof live loads.
2. Risk Category.
3. Wind exposure.
4. Ultimate design wind speed (3-second gust) $V_{ult}$ and effective nominal design wind speed $V_{eff-asd}$ (3-second gust), miles per hour (mph) (km/hr).
5. Design spectral response acceleration parameters, $S_{DS}$ and $S_{D1}$.
6. Seismic design category and site class.
7. The design load-bearing values of soils.
8. Flood design data, if located in flood hazard areas established in Section 1612.3.

(104) Subsection 1603.1.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**1603.1.1 Floor live load.** The uniformly distributed, concentrated and impact floor live load used in the design must be indicated for floor areas. Live load reduction of the uniformly distributed floor live loads, if used in the design, must be indicated.

(105) Subsection 1603.1.4 of the Building Code of the State of Hawaii, Appendix “W”, is amended to read:

**1603.1.4 Wind design data.** The following information related to wind loads must be shown, regardless of whether wind loads govern the design of the lateral-force-resisting system of the building:

1. Ultimate design wind speed (3-second gust), $V_{ult}$, and effective nominal design wind speed $V_{eff-asd}$, miles per hour (km/hr).
2. Building Risk Category.
3. Wind exposure, if more than one wind exposure is utilized, the wind exposure for each applicable wind direction must be indicated.

4. The applicable internal pressure coefficient.

5. Components and cladding. The design wind pressures in terms of psf (kN/m²) used for the design of exterior components, and cladding not specifically designed by the registered design professional.

(106) Subsection 1609.1.1 and Subsection 1609.1.1.1 of the Building Code of the State of Hawaii, Appendix “W”, are amended to read:

1609.1.1 Determination of wind loads. Wind loads on every building or structure will be determined in accordance with Chapters 26 to 30 of ASCE 7. Minimum values for Directionality Factor, $K_d$, Velocity Pressure Exposure Coefficient, $K_z$, and Topographic Factor, $K_{zt}$, will be determined in accordance with Section 1609. The type of opening protection required, the ultimate design wind speed, $V_{ult}$, and the exposure category for a site is permitted to be determined in accordance with Section 1609 or ASCE 7. Wind will be assumed to come from any horizontal direction and wind pressures will be assumed to act normal to the surface considered.

Exceptions:

1. Subject to the limitations of Section 1609.1.1.1, the provisions of ICC 600 will be permitted for applicable Group R-2 and R-3 buildings.

2. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of the AF&PA WFCM.


4. Designs using TIA 222 for antenna-supporting structures and antennas, provided the effect of topography is included in accordance with Section 1609.3.3 Topographic effects.

5. Subject to the limitations of Section 1609.1.1.1, residential structures using the provisions of AISI S230.

6. Wind tunnel tests in accordance with Chapter 31 of ASCE 7, subject to the limitations in Section 1609.1.1.2.
The wind speeds in Figures 1609A, 1609B, and 1609C are ultimate design wind speeds, $V_{ult}$. Values of effective nominal design wind speeds, $V_{eff,asdl}$, determined in accordance with Sections 1609.3.1 and 1609.3.2, will be used when the standards referenced in Exceptions 1, 2, 3, and 5 are used.

**1609.1.1.1 Applicability.** The provisions of ICC 600 are applicable only to buildings located within Exposure B or C as defined in Section 1609.4. The prescriptive provisions of ICC 600, AWC WFCM, or AISI S230, shall not be permitted for either of the following cases:

1. Structures which are more than two stories above grade plane in height.

2. Structures designed using exception 4 in Section 1609.1.2 Protection of Openings.

(107) Subsections 1609.1.2, 16091.2.1 and 1609.1.2.2 of the Building Code of the State of Hawaii, Appendix "W", are amended to read:

**1609.1.2 Protection of openings.** In wind-borne debris regions, glazing in buildings must be impact-resistant or protected with an impact-resistant covering meeting the requirements of an approved impact resistant standard or ASTM E 1996 and ASTM E 1886 referenced herein as follows:

1. Glazed openings located within 30 feet (9144 mm) of grade must meet the requirements of the Large Missile Test of ASTM E 1996-14.

2. Glazed openings located more than 30 feet (9144 mm) above grade must meet the provisions of the Small Missile Test of ASTM E 1996-14.

3. Glazing in Risk Category III buildings defined by Table 1604.5 of the following occupancies must be provided with windborne debris protection:

3.1 Covered structures whose primary occupancy is public assembly with an occupant load greater than 300.
3.2 Health care facilities with an occupant load of 50 or more resident patients, but not having surgery or emergency treatment facilities.

3.3 Any other public building with an occupant load greater than 5,000.

Exceptions:

1. Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum panel span of 8 feet (2438 mm) must be permitted for opening protection in one- and two-story buildings classified as Group R-3 or R-4 occupancy. Panels must be precut so that they will be attached to the framing surrounding the opening containing the product with the glazed opening. Panels must be predrilled as required for the anchorage method and must be secured with the attachment hardware provided. Attachments shall be designed to resist the components and cladding loads determined in accordance with the provisions of ASCE 7, with corrosion-resistant attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table 1609.1.2 with corrosion–resistant attachment hardware provided and anchors permanently installed on the building is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where effective ultimate design wind speeds, V_{eff,ult} do not exceed 175 mph (78 m/s).

2. Glazing in Risk Category I buildings as defined in Section 1604.5, including greenhouses that are occupied for growing plants on a production or research basis, without public access will be permitted to be unprotected.

3. Glazing in Risk Category II, III or IV buildings located over 60 feet (18 288 mm) above the ground and over 30 feet (9144 mm) above aggregate surface roofs located within 1,500 feet (458 m) of the building will be permitted to be unprotected.

4. Risk Category II buildings shall be permitted to be designed with unprotected openings subject to the following requirements:

   a) For each direction of wind, determination of enclosure classification shall be based on the assumption that all unprotected glazing on windward walls are openings while glazing on the remaining walls and roof are intact and are not assumed to be openings.
b) Partially enclosed and open occupancy R-3 buildings without wind-borne debris protection shall also include a residential safe room in accordance with ROH Chapter 16, Article 13, Hawaii residential safe room, or alternatively provide an equivalently sized room structurally protected by construction complying with Section 16-13.7.

1609.1.2.1 Louvers. Louvers protecting intake and exhaust ventilation ducts not assumed to be open that are located within 30 feet (9144 mm) of grade must meet the requirements of an approved impact-resisting standard or the Large Missile Test of ASTM E 1996-14.

1609.1.2.2 Garage doors. Garage door glazed opening protection for wind-borne debris must meet the requirements of an approved impact-resisting standard or ANSI/DASMA 115.

### Table 1609.1.2
Wind-Borne Debris Protection Fastening Schedule For Wood Structural Panels

<table>
<thead>
<tr>
<th>Fastener Type</th>
<th>Panel span (\leq 4) feet</th>
<th>Panel span (&gt; 4) feet and (\leq 6) feet</th>
<th>Panel span (&gt; 6) feet and (\leq 8) feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 8 Wood screw based anchor with 2-inch embedment length</td>
<td>16&quot;</td>
<td>10&quot;</td>
<td>8&quot;</td>
</tr>
<tr>
<td>No. 10 Wood screw based anchor with 2-inch embedment length</td>
<td>16&quot;</td>
<td>12&quot;</td>
<td>9&quot;</td>
</tr>
<tr>
<td>¼-inch lag screw based anchor with 2-inch</td>
<td>16&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>
embedment length

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 mile per hour = 1.609 km/h.

a. This table is based on a 175 mph effective ultimate design wind speed and a mean roof height of 45 feet.

b. Fasteners must be installed at opposing ends of the wood structural panel. Fasteners must be located a minimum of 1 inch from the edge of the panel.

c. Anchors must penetrate through the exterior wall covering with an embedment length of 2 inches minimum into the building frame. Fasteners must be located a minimum of 2-1/2 inches from the edge of concrete block or concrete.

d. Where panels are attached to masonry or masonry/stucco, they must be attached utilizing vibration-resistant anchors having a minimum withdrawal capacity of 1,500 pounds.

(108) Subsection 1609.3 of the Building Code of the State of Hawaii, Appendix “W”, is amended to read:

1609.3 Basic wind speed (topographic and directionality factors). The ultimate design wind speed, $V_{ult}$ in mph, for the determination of the wind loads will be determined by Figure 1609A, 1609B and 1609C. The ultimate design wind speed $V_{ult}$, for use in the design of Risk Category II buildings and structures will be obtained from Figure 1609A. The ultimate design wind speed, $V_{ult}$, for use in the design of Risk Category III and IV buildings and structures will be obtained from Figure 1609B. The ultimate design wind speed, $V_{ult}$, for use in the design of Risk Category I buildings and structures will be obtained from Figure 1609C.

The effective ultimate design wind speed, $V_{eff,ult}$, for the special wind regions indicated near mountainous terrain and near gorges must be in accordance with Section 1609.3.2.

Special wind regions near mountainous terrain and valleys are accounted within the Topographic Factor defined in Section 1609.3.3. Wind speeds derived from simulation techniques will only be used in lieu of the wind speeds given in Figure 1609 when, (1) approved simulation or extreme-value statistical-analysis procedures are used (the use of regional wind speed data obtained from anemometers is not permitted to define the hurricane wind speed risk in Hawaii) and (2) the ultimate design wind speeds resulting from the study must not be less than the resulting 700-year return period wind speed for Risk Category II and 1700-year return period wind speed for Risk Category III and IV, and 300-year return period design wind speed for Risk Category I.
1609.3.1 Effective wind speed conversion. For Section 2308.10.1 and the exceptions permitted under Section 1609.1.1, and when otherwise required, the nominal design wind speed value used for determination of the wind loads, will be the Effective Nominal Design Wind Speed, \( V_{\text{eff-asd}} \), determined by multiplying the effective ultimate design wind speed values, \( V_{\text{eff-ult}} \), given in Section 1609.3.2 by \( \sqrt{0.625} \), in accordance with Equation 16-33.

\[
V_{\text{eff-asd}} = V_{\text{eff-ult}} \sqrt{0.625} \quad \text{(Equation 16-33)}
\]

1609.3.2 Effective ultimate design wind speed, \( V_{\text{eff-ult}} \), contour maps. Figures 1609.3.2.1, 1609.3.2.2, and 1609.3.2.3 are added as follows:

**Figure 1609.3.2.1**

City and County of Honolulu Effective Ultimate Design Wind Speed, \( V_{\text{eff-ult}} \), for Components and Cladding for Risk Category I Buildings less than 100 feet Tall
Figure 1609.3.2.2
City and County of Honolulu Effective Ultimate Design Wind Speed, $V_{eff-ult}$, for Components and Cladding for Risk Category II Buildings less than 100 feet Tall
Figure 1609.3.2.3
City and County of Honolulu Effective Ultimate Design Wind Speed, $V_{eff-ult}$, for Components and Cladding for Risk Category III and IV Buildings less than 100 feet Tall

1609.3.3 Topographic effects. Wind speed-up effects caused by topography must be included in the calculation of wind loads by using the factor $K_{zt}$, where $K_{zt}$ is given in Figure 1609.3.3.

Exception: Site-specific probabilistic analysis of directional $K_{zt}$ based on wind-tunnel testing of topographic speed-up will be permitted to be submitted for approval by the building official.
Figure 1609.3.3
City and County of Honolulu Peak Topographic Factor $K_{zt}$ for Building Heights up to 100 feet$^{a,b}$

a. Site-specific probabilistic analysis of directional $K_{zt}$ based on wind-tunnel testing of topographic speed-up will be permitted to be submitted for approval by the building official. For buildings taller than 160 feet, this submittal must include peak gust velocity profiles for all wind direction sectors.

b. At Exposure b sites with ground elevations less than 500 feet, $K_{zt}$ values $\geq 1.2$ will be permitted to be reduced for building heights greater than 100 feet by multiplying $K_{zt}$ mapped in Figure 1609.3.3 by the height adjustments given in the Table 1609.3.3.2. Interpolation is permitted.
### Table 1609.3.3.2
Height Adjustment of Mapped Kzt Values at Sites with Ground Elevation Less than 500 feet

<table>
<thead>
<tr>
<th>Building roof height above ground (ft)</th>
<th>≤100</th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
<th>200</th>
<th>220</th>
<th>≥240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment factor to K_d≥1.2</td>
<td>100%</td>
<td>98%</td>
<td>96%</td>
<td>94%</td>
<td>92%</td>
<td>90%</td>
<td>92%</td>
<td>94%</td>
</tr>
</tbody>
</table>

### 1609.3.4 Directionality factor.
The wind directionality factor, K_d, will be determined from Tables 1609.3.4(a) and 1609.3.4(b), and Figures 1609.3.4(a) and 1609.3.4(b).

### Table 1609.3.4(a)
Kd Values for Main Wind Force Resisting Systems Sited on Oahu, Hawaii

<table>
<thead>
<tr>
<th>Topographic Location on Oahu, Hawaii</th>
<th>Main Wind Force Resisting Systems</th>
<th>Main Wind Force Resisting Systems with totally independent systems in each orthogonal direction</th>
<th>Biaxially Symmetric and Axisymmetric Structures of any Height and Arched roof Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites within valleys at an elevation of at least 50 ft. but not greater than 500 ft.</td>
<td>Mean Roof Height less than or equal to 100 ft.</td>
<td>Mean Roof Height greater than 100 ft.</td>
<td>Mean Roof Height less than or equal to 100 ft.</td>
</tr>
<tr>
<td></td>
<td>0.65</td>
<td>0.70</td>
<td>0.70</td>
</tr>
<tr>
<td>Central Oahu above an elevation of 500 ft., the Ewa and Kapolei plains, and coastal areas with Kzt (10m) not greater than 1.2</td>
<td>0.75</td>
<td>0.80</td>
<td>0.75</td>
</tr>
<tr>
<td>All other areas, including</td>
<td>0.7</td>
<td>0.75</td>
<td>0.75</td>
</tr>
</tbody>
</table>
Hills, Hillsides, Ridges, Bluffs, and Escarpments at any elevation or height; coastal and inland areas with $K_{zt}(10m)$ greater than 1.2.

Table 1609.3.4(b) $K_d$ Values for Components and Cladding of Buildings Sited on Oahu, Hawaii $^a,b$

<table>
<thead>
<tr>
<th>Topographic Location on Oahu</th>
<th>Components and Cladding</th>
<th>Risk Category IV Buildings and Structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sites within valleys at an elevation of at least 50 ft. but not greater than 500 ft.</td>
<td>Mean Roof Height less than or equal to 100 ft.</td>
<td>Mean Roof Height greater than 100 ft.</td>
</tr>
<tr>
<td></td>
<td>0.65</td>
<td>0.70</td>
</tr>
<tr>
<td>Central Oahu above an elevation of 500 ft., the Ewa and Kapolei plains, and coastal areas with $K_{zt}(10m)$ not greater than 1.2</td>
<td>0.75</td>
<td>0.80</td>
</tr>
<tr>
<td>All other areas, including Hills, Hillsides, Ridges, Bluffs, and Escarpments at any elevation or height; coastal and inland areas with $K_{zt}(10m)$ greater than 1.2</td>
<td>0.70</td>
<td>0.75</td>
</tr>
</tbody>
</table>

a. The values of $K_d$ for other non-building structures indicated in ASCE-7 Table 26-4 will be permitted.

b. Site-specific probabilistic analysis of $K_d$ based on wind-tunnel testing of topography and peak gust velocity profile will be permitted to be submitted for approval by the Building Official, but $K_d$ must have a value not less than 0.65.
b. Site-specific probabilistic analysis of $K_d$ based on wind-tunnel testing of topography and peak gust velocity profile will be permitted to be submitted for approval by the Building Official, but in any case subject to a minimum value of 0.65.

(109) Subsection 1609.4.1 of the Building Code of the State of Hawaii, is amended to read:

1609.4.1 Wind directions and sectors. For each selected wind direction at which the wind loads are to be evaluated, the exposure of the building or structure will be determined for the two upwind sectors extending 45 degrees (0.79 rad) either side of the selected wind direction. The exposures in these two sectors will be determined in accordance with Sections 1609.4.2 and 1609.4.3 and the exposure resulting in the highest wind loads will be used to represent winds from that direction.

Exception: Exposure categories will be permitted to be determined using Figures 1609.4.
Figure 1609.4 (add-exposure D)
Exposure Category Zones for the City and County of Honolulu

(110) Subsection 1609.5.4 added to the Building Code of the State of Hawaii reads as follows:

1609.5.4 Roof-mounted solar collectors for buildings. The design wind force for roof-mounted solar collector panels located on buildings will be determined based on the location and height of the panel system and the configuration of the roof, in accordance with Sections 1609.5.4.1 through 1609.5.4.6.
In addition to all the other applicable provisions of this Code, the roof itself must be designed for both of the following:

1. The case where solar collectors are present. Wind loads acting on solar collectors in accordance with this section must be applied simultaneously with roof wind loads specified in other sections acting on areas of the roof not covered by the plan projection of solar collectors. For this case, unless otherwise noted, roof wind loads specified in other sections need not be applied on areas of the roof covered by the plan projection of solar collectors.

2. Cases where the solar arrays have been removed or are absent.

The following variables are defined for use in determining the design wind force applied to rooftop solar collectors/panels:

- \( A \) = the area of the solar panel element.
- \( d_1 \) = horizontal distance measured from the edge of one panel to the building edge or to an adjacent array. The distance is perpendicular to the panel edge ignoring any rooftop equipment. See Figures 1609.5-1 or 1609.5-3, in ft.
- \( d_2 \) = horizontal distance measured from the edge of one panel to the nearest edge in the next row of panels. See Figure 1609.5-1 or 1609.5-3, in ft.
- \( F \) = the design wind force normal to each panel determined in accordance with Section 1609.5.4
- \( h_1 \) = height of solar panel above the roof at the lower edge of the panel measured perpendicular to the surface of the roof. See Figures 1609.5-1 or 1609.5-3, in ft.
- \( h_2 \) = height of a solar panel above the roof at the upper edge of the panel measured perpendicular to the surface of the roof. See Figures 1609.5.1 or 1609.5-3, in ft.
- \( L_p \) = panel chord dimension, in ft., for use with rooftop solar collectors as shown in Figures 1609.5-1 or 1609.5-3
\[ \theta = \text{Angle of the roof surface, in degrees. See Figures 1609.5-1 or 1609.5-3.} \]

\[ \omega = \text{Angle that the solar panel makes with the roof surface, in degrees. See Figures 1609.5-1 or 1609.5-3.} \]

**1609.5.4.1 Roof-mounted panels mounted flush or within 10 inches (254 mm) of the roof surface and not located on a roof overhang.**

The design wind force determined in accordance with this section shall apply to rooftop solar collectors meeting the following conditions:

1. Rooftop solar collectors are located on enclosed or partially enclosed buildings of any height.

2. Panels are parallel to the roof surface, within a tolerance of 2°.

3. The maximum height above the roof surface, \( h_2 \), shall not exceed 10 inches (254 mm).

4. A minimum gap of 0.25 inches (6.4 mm) shall be provided between all panels.

5. The spacing of gaps between panels shall not exceed 6.7 ft. (2.04 m).

6. The array shall be located at least \( 2h_2 \) from the nearest roof edge, gable ridge, or hip ridge.

The design wind force for rooftop solar collectors shall be determined by Equation 1609-1:

\[ F = q_h G C_p \gamma \gamma_a A \quad (1b) \quad (\text{N}) \quad (\text{Equation 1609-1}) \]

Where:

\[ q_h = \text{velocity pressure at the mean roof height.} \]

\[ G C_p = \text{external pressure coefficient for Components and Cladding of roofs with respective roof zoning for the corresponding location on the roof, with the effective wind area, } A, \text{ equal to that of the solar panel.} \]
A BILL FOR AN ORDINANCE

\( \gamma_E = \) solar array edge factor for use with rooftop solar collectors.

\( \gamma_E = 1.5 \) for panels that are exposed and those within a distance 1.5 \( (L_p) \) from the end of a row at an exposed edge of the array; \( \gamma_E = 1.0 \) elsewhere, as illustrated by the example array configuration shown in Figure 1609.5-3.

A panel is defined as exposed if \( d_1 \) to the roof edge > 0.5h and one of the following applies:

1. \( d_1 \) to the adjacent array > 4 feet (1.22 m), or
2. \( d_2 \) to the next adjacent panel > 4 feet (1.22 m).

\( \gamma_a = \) solar collector pressure equalization factor, from Figure 1609.5-2.

Alternatively, it will be permitted to determine the normal design wind force in accordance with Equation 1609-2:

\[
F = 40 A (V_{eff\text{-ult}}/105)^2 \text{ (lbs) (Equation 1609-2)}
\]

Where:

\( V_{eff\text{-ult}} = \) the Effective Ultimate Design Wind Speed as determined from Figures 1609.3.2.1 through 1609.3.2.3, which adjusts the basic Hawaii wind speed for the special topographic wind region.

The force F will be permitted to be applied to the centroid of the calculated pressure.

1609.5.4.2 Rooftop solar collectors for buildings of all heights with flat roofs or gable or hip roofs with slopes less than 7°.

The design wind force determined in accordance with this section must apply to rooftop solar collectors meeting the following conditions:

1) Rooftop solar collectors are located on enclosed or partially enclosed buildings of any height.

2) Flat, gable, or hip roofs with slopes, \( \theta \leq 7°. \)
3) Panels installation will conform to the following limitations:

\[ L_p \leq 6.7 \text{ ft} \ (2.04 \text{ m}), \]
\[ \omega \leq 35^\circ, \]
\[ h_1 \leq 2 \text{ ft} \ (0.61 \text{ m}), \]
\[ h_2 \leq 4 \text{ ft} \ (1.22 \text{ m}) \]

4) A minimum gap of 0.25 inches (6.4 mm) must be provided between all panels.

5) The spacing of gaps between panels will not exceed 6.7 ft (2.04 m).

6) The minimum horizontal clear distance between the panels and the edge of the roof will be the larger of the roof will be the larger of \( 2(h_2 - h_{pl}) \) and 4 feet (1.22 m).

The design wind force for rooftop solar collectors will be determined by Equation 1609-3:

\[ F = q_{n} G_{Crn} A \ (\text{lb/ft}^2) \ (\text{N/m}^2) \quad \text{(Equation 1609-3)} \]

Where:

\[ G_{Crn} = \gamma_p \gamma_c \gamma_E (G_{Crn})_{nom} \quad \text{(Equation 1609-4)} \]

Where:

\( (G_{Crn})_{nom} = \) nominal net pressure coefficient from Figure 1609.5.3.

\[ \gamma_p = \min (1.2, 0.9 + \frac{h_{pl}}{h}) \]

\[ \gamma_c = \max (0.6 + 0.06L_p, 0.8) \]

\[ \gamma_E = 1.5 \text{ for panels that are exposed and those within a distance } 1.5(L_p) \text{ from the end of a row at an exposed edge of the array; } \gamma_E = 1.0 \text{ elsewhere, as illustrated by the example array configuration shown in Figure 1609.5-3.} \]
A panel is defined as exposed if \( d_1 \) to the roof edge > 0.5h and one of the following applies:

1. \( d_1 \) to the adjacent array > max (4\( h_2 \), 4 feet (1.22m))

2. \( d_2 \) to the next adjacent panel > max (4\( h_2 \), 4 feet (1.22m))

The force \( F \) will be permitted to be applied to the centroid of the calculated pressure.

**Figure 1609.5-1** Solar Collector Pressure Equalization Factor, \( y_a \), for enclosed and partially enclosed buildings of all heights.
Figure 1609.5-2 Solar Collector Pressure Equalization Factor, $\gamma_a$, for enclosed and partially enclosed buildings of all heights.
Figure 1609.5-3 Rooftop Solar Collectors for buildings of all heights with flat roofs or gables or hip roofs with slopes less than 7°

Notes for Figure 1609.5-3:

1. \((GC_m)\) acts towards (+) and away (-) from the top surface of the panels.

2. Linear interpolation will be permitted for \(\omega\) between 5° and 15°.

3. Notation:

\[
A_n = \left( \frac{1000}{\text{max}(L_b, 15)^2} \right) A.
\]

- \(A_n\) = normalized wind area for rooftop solar collectors
- \(L_b = \min(0.4(hW_L)^{0.5}, h, W_S)\), in ft.
- \(W_L = \text{width of a building on its longest side in Figure 1609.5-3, in ft.}\)
- \(W_S = \text{width of a building on its shortest side in Figure 1609.5-3, in ft.}\)

1609.5.4.3 Roof-mounted panels in all other locations. The normal force on roof-mounted panels not regulated by Section 1609.5.4.1 or 1609.5.4.2 will be determined by Equation 1609-5:

\[
F = q_hGC_pCNA \text{ (lb) (N)} \text{ (Equation 1609-5)}
\]

Where:

\[
F = 100 A (V_{eff-ult}/105)^2 \text{ (lbs) (Equation 1609-6)} \text{ } C_N = \text{ pressure coefficients for monoslope free roofs from ASCE 7 considering each elevated panel as a free roof surface in clear wind flow. The angle } \theta \text{ used for the determination of } C_N \text{ will be measured as the angle of the panel with respect to the plane of the roof. Values of } C_N \text{ for forces on the panel may be taken as the Zone 1 coefficients, except Zone 2 coefficients for } C_N \text{ will be used where panels of angle } \theta > 7.5 \text{ degrees are located a distance equal to or less than twice the roof height measured from a roof corner with a parapet greater than 24 inches (610 mm) in height above the roof.}\]

\(GC_p\) = the component and cladding external pressure coefficient for roofs for the roof zone corresponding to the location of the solar panel, and the effective wind area will be that of the solar panel. The
minimum magnitude of negative pressure values of $GC_p$ in Zone 1 will be taken as -1.0.

$A$ = the total area of the solar panel element.

Alternatively, it will be permitted to determine the normal force in accordance with Equation 1609-6:

Where:

$V_{eff-ult}$ = the Effective Ultimate Design Wind Speed as determined from Figures 1609.3.2.1 through 1609.3.2.3, which adjusts the basic Hawaii wind speed for the special topographic wind region.

When located in roof zone 2 or 3 as defined in ASCE 7, the force $F$ will be applied with an eccentricity equal to a third of the solar panel width.

1609.5.4.3.1 Additive panel wind loads. The load on the panel will be applied as point load anchorage reactions additive to the resultant of the pressure determined acting on the portion of the roof underlying the panel.

1609.5.4.4 Ballasted panels. Panels that are ballasted for uplift resistance and tilted at an angle $\alpha$ of 10 degrees or more from a horizontal plane will be designed to resist the force determined by Equation 1609-7:

$$F_{ballast} \geq F\left(\frac{\mu \cos \beta + \sin \beta}{\mu \cos \alpha - \sin \alpha}\right) \text{ (lb) (N)} \quad \text{(Equation 1609-7)}$$

Where:

$F$ = the normal force on each panel determined in accordance with Section 1609.5.4

$\alpha$ = the angle of the roof plane with respect to horizontal.

$\beta$ = the angle of tilt of the panel with respect to the roof plane.

$\mu$ = the static friction coefficient between the panel base and its bearing surface.

Alternatively, to resist uplift and sliding, ballasted panels that are tilted at an angle of less than 10 degrees from a horizontal plane will each be ballasted to resist a force equal to 2 times the normal force on each panel.
determined in Sections 1609.5.4.1 or 1609.5.4.2. Ballasted panels that are tilted at an angle between 10 degrees to 25 degrees from a horizontal plane will each be ballasted to resist a force equal to 8 times the normal force on each panel determined in Sections 1609.5.4.1 or 1609.5.4.2.

1609.5.4.5 Permeability. A reduction of load on the panels for permeability of the panel system will not be permitted unless demonstrated by approved wind-tunnel testing or recognized documentation for the type of panel system being considered. Testing or documentation will replicate the panel separation spacing and height above the roof.

1609.5.4.6 Shielding. A reduction of load on the panels for shielding provided by the roof or other obstruction will not be permitted unless demonstrated by approved wind-tunnel testing or recognized documentation for the type of panel system being considered. Testing or documentation will replicate the panel separation spacing and height above the roof.

(111) Subsection 1609.6.3 of the Building Code of the State of Hawaii, Appendix “W”, is amended to read as follows:

1609.6.3 Design equations. When using the alternative all-heights method, the MWFRS, and components and cladding of every structure will be designed to resist the effects of wind pressures on the building envelope in accordance with Equation 16-35.

\[ P_{net} = 0.00256 V_{ult}^2 K_z C_{net} K_{zt} (K_d/0.85) \]  
(Equation 16-35)

Design wind forces for the MWFRS will not be less than 16 psf (0.77 kN/m²) multiplied by the area of the structure projected on a plane normal to the assumed wind direction (see ASCE 7 Section 27.4.7 for criteria). Design net wind pressure for components and cladding will not be less than 16 psf (0.77 kN/m²) acting in either direction normal to the surface.

(112) Subsection 1609.6.4.2 of the Building Code of the State of Hawaii, Appendix “W”, is amended as follows:

1609.6.4.2 Determination of \( K_z, K_{zt} \) and \( K_d \). Velocity pressure exposure coefficient, \( K_z \), will be determined in accordance with ASCE 7 Section 27.3.1. The topographic factor, \( K_{zt} \), shall be determined in accordance
with Section 1609.3.3. The wind directionality factor, $K_d$, shall be determined in accordance with Section 1609.3.4.

1. For the windward side of a structure, $K_z$ and $K_{zt}$ will be based on height $z$.

2. For leeward and sidewalls, and for windward and leeward roofs, $K_z$ will be based on mean roof height $h$, and $K_{zt}$ will be based on height $z$.

(113) Section 1615 of the Building Code of the State of Hawaii is deleted in its entirety and replaced with the following:

**SECTION 1615 - TSUNAMI LOADS**

1615.1 General. The design and construction of Risk Category III and IV buildings and structures and Risk Category II buildings meeting the criteria of Section 1615.2, where located in the Tsunami Design Zones defined in the ASCE 7 Tsunami Design Geodatabase (version 2016-1.0), shall be in accordance with Chapter 6 of ASCE 7-16.

1615.2 Criteria for Risk Category II buildings to be subject to tsunami-resilient design and construction. Risk Category II buildings and structures shall comply with Chapter 6 of ASCE 7 when meeting all of the following conditions:

1. Are of Occupancy Classifications A, B, E, I, M, R-1, R-2, or Higher Education Laboratories, and

2. Located where the tsunami inundation depth is greater than 3 feet (0.914m) at any location within the intended footprint of the structure, and

3. The highest occupiable floor exceeds 45 feet above grade plane and also exceeds the tsunami inundation depth determined at the site.

1615.3 Definitions.

Tsunami Design Geodatabase. The ASCE 7 database (version 2016-1.0) of Tsunami Design Zone maps and associated design data for the states of Alaska, California, Hawaii, Oregon, and Washington
Tsunami Design Zone. An area identified on the Tsunami Design Zone map between the shoreline and the inundation limit, within which certain structures designated in Chapter 6 are designed for or protected from inundation.

(114) Subsection 1704.1.1 added to the IBC, adopted by the Building Code of the State of Hawaii. Section 1704.1.1 is added and reads as follows:

1704.1.1 Building permit requirement. The construction drawings will have all special inspections listed as a condition for permit issuance.

(115) Subsection 1704.2 of the Building Code of the State of Hawaii, is amended to read:

1704.2 Special inspections. Where application is made for construction as described in this section, the owner or the registered design professional in responsible charge acting as the owner’s agent must employ one or more special inspectors independent of the contractors performing the work, to provide inspections during construction on the types of work listed under Sections 1705. These inspections are in addition to the inspections specified in Section 110.

Exceptions:

1. Special inspections are not required for construction of a minor nature or as warranted by conditions as approved by the building official:

2. The employment of a special inspector will not be required for construction work for any government agency that provides for its own inspections.

3. Special inspections are not required for building components unless the design involves the practice of professional engineering or architecture as defined by HRS 464.

4. Unless otherwise required by the building official, special inspections are not required for Group U occupancies that are accessory to a residential occupancy, including but not limited to those listed in Section 312.1.
5. Special inspections are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2308. For these structures, Section 1705.10 will nevertheless apply.

1704.2.1 Special inspector qualifications. Each special inspector will provide written documentation to the building official demonstrating his or her competence and relevant experience or training in each type of inspection they will perform. Inspector personnel will not be allowed to perform inspections without these qualifications unless directly supervised by the qualified, responsible special inspector. Experience or training will be considered relevant when the documented experience or training is related in complexity to the same type of special inspection activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code.

The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as the special inspectors for the work designed by them, with the exception of welding and high strength bolting.

1704.2.3 Statement of special inspections. The applicant will submit a statement of special inspections in accordance with Section 107.1 as a condition for permit issuance. This statement will be deemed to be satisfied by Section 1704.3.

1704.2.4 Report requirement. Special inspectors will keep records of inspections. The special inspector will furnish inspection reports to the owner, licensed engineer or architect of record, and other owner-designated persons. Reports will indicate that work inspected was done in conformance to approved construction documents. Discrepancies will be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the licensed engineer or architect of record and to the building official. The special inspector will submit a final signed report to the owner and licensed engineer or architect of record, stating whether the work requiring special inspection was, to the best of the inspector’s knowledge, in conformance to the approved plans and
specifications and the applicable workmanship provisions of this code. Prior to the final inspection required under Section 109.3.10 the licensed engineer or architect of record will submit a written statement verifying receipt of the final inspection reports and documenting that there are no known unresolved code requirements that create significant public safety deficiencies.

(116) Subsection 1704.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1704.3 Special inspection construction document. Where special inspection or testing is required by Section 1705, the registered design professional in responsible charge shall prepare a statement of special inspection in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3. The construction drawings will include a complete list of special inspections required by this section.

(117) Subsection 1704.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1704.4. Contractor responsibility. When special inspection is required, a contractor's statement will be submitted containing an acknowledgement of awareness of the special inspection requirements contained on the drawings and that the construction requiring special inspections will be made accessible for inspections.

(118) Subsection 1704.5 of the Building Code of the State of Hawaii, is amended to read:

1704.5 Structural observations. The owner will employ a registered design professional to perform structural observations. Structural observations must be performed in accordance with Section 464-5, Hawaii Revised Statutes, administered and enforced by the Department of Commerce and Consumer Affairs.

Prior to the final inspection required under Section 110.3.10, the licensed engineer or architect of record will submit a written statement verifying receipt of the final special inspection reports and documenting that to the best of his/her knowledge, information and belief, there are no known unresolved code requirements that create significant public safety deficiencies.
(119) Table 1705.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

**TABLE 1705.3**

**REQUIRED VERIFICATION AND INSPECTION OF CONCRETE CONSTRUCTION**

<table>
<thead>
<tr>
<th>VERIFICATION AND INSPECTION</th>
<th>CONTINUOUS</th>
<th>PERIODIC</th>
<th>REFERENCED STANDARD&lt;sup&gt;a&lt;/sup&gt;</th>
<th>IBC REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inspection of reinforcing steel, including prestressing tendons, and placement.</td>
<td>—</td>
<td>X</td>
<td>ACI 318: 3.5, 7.1-7.7</td>
<td>1910.4</td>
</tr>
<tr>
<td>2. Inspection of reinforcing steel welding in accordance with Table 1705.2.2, Item 2b.</td>
<td>—</td>
<td>—</td>
<td>AWS D1.4 ACI 318: 3.5.2</td>
<td>—</td>
</tr>
<tr>
<td>3. Inspection of anchors cast in concrete where allowable loads have been increased or where strength design is used.</td>
<td>—</td>
<td>X</td>
<td>ACI 318: D9.2</td>
<td>1908.5, 1909.1</td>
</tr>
<tr>
<td>4. Inspection of anchors post-installed in hardened concrete members&lt;sup&gt;b&lt;/sup&gt;.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Adhesive anchors installed in horizontally or upwardly inclined orientation to resist sustained tension loads</td>
<td>X</td>
<td>—</td>
<td>ACI 318: D.9.2.4</td>
<td>—</td>
</tr>
<tr>
<td>b. Mechanical anchors and adhesive anchors not defined in 4.a.</td>
<td>—</td>
<td>X</td>
<td>ACI 318: D.9.2</td>
<td>—</td>
</tr>
<tr>
<td>5. Verifying use of required design mix.</td>
<td>—</td>
<td>X</td>
<td>ACI 318: Ch. 4, 5.2-5.4</td>
<td>1904.2, 1910.2, 1910.3</td>
</tr>
<tr>
<td>6. At the time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.</td>
<td>X</td>
<td>—</td>
<td>ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8</td>
<td>1910.10</td>
</tr>
<tr>
<td>7. Inspection of concrete and shotcrete placement for proper application techniques.</td>
<td>X</td>
<td>—</td>
<td>ACI 318: 5.9, 5.10</td>
<td>1910.6, 1910.7, 1910.8</td>
</tr>
</tbody>
</table>
8. Inspection for maintenance of specified curing temperature and techniques. 

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>ACI 318: 5.11-5.13</th>
<th>1910.9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Inspection of prestressed concrete:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>ACI 318: 18.20</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Application of prestressing forces.</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Grouting of bonded prestressing tendons in the seismic force-resisting system.</td>
<td>X</td>
<td>ACI 318: 18.18.4</td>
<td></td>
</tr>
</tbody>
</table>

10. Erection of precast concrete members.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>ACI 318: Ch. 16</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11. Verification of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>ACI 318: 6.2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Inspect formwork for shape, location and dimensions of the concrete member being formed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>ACI 318: 6.1.1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm.

a. Where applicable, see also Section 1705.11, Special inspections for seismic resistance.

b. Specific requirements for special inspection will be included in the research report for the anchor issued by an approved source in accordance with D.9.2 in ACI 318 or other qualification procedures. Where specific requirements are not provided, special inspection requirements will be specified by the registered design professional and must be approved by the building official prior to the commencement of the work.

(120) Subsection 1705.18 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 1705.18 is added and reads as follows:

*1705.18 Fire-protection systems.* Special inspection for fire-protection systems will be as required by Section 916.

(121) Subsection 1705.19 is added to the IBC, adopted by the Building Code of the State of Hawaii. Section 1705.19 is added and reads as follows:
1705.19 Termite protection. Where termite protection consists of soil treatment, installation of termite barrier, structural lumber and pipe penetrations for new wood frame residential buildings.

(122) Subsection 1801.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a second paragraph to read:

1801.1 Scope (second paragraph)

Reference is made to ROH Chapter 14, for requirements governing excavation, grading, and earthwork construction, including fills and embankments.

(123) Subsection 1801.3 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 1801.3 reads as follows:

1801.3 Inspection requirements. The building official will be permitted to require special inspection for requirements of Chapter 16.

(124) Subsection 1802.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding the following definitions:

a. Adding a new definition before “DEEP FOUNDATION.” to read:


b. Adding new definitions before “SHALLOW FOUNDATION.” to read:

RECEIVING WATERS. Groundwater, creeks, streams, rivers, lakes or other water bodies that receive treated or untreated waste water or stormwater, including water from combined sewer systems and stormwater drains.

REDEVELOPMENT. Means developed land, which is subsequently redeveloped or renovated.

RETENTION (STORMWATER). The permanent holding of stormwater on a site, preventing the water from leaving the site as surface drainage and allowing for use of the water on site, or loss of the water through percolation, evaporation or absorption by vegetation.
(125) Subsection 1804.7 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 1804.7 reads as follows:

1804.7 Stormwater management. Stormwater management systems, including but not limited to, infiltration, evapo-transpiration, rainwater harvest and runoff reuse; will be provided and maintained on the building site.

1804.7.1 Increased runoff. Stormwater management systems will address the increase in runoff that would occur resulting from development on the building site and will either:

1. Manage rainfall onsite and size the management system to retain not less than the volume of a single storm that is equal to the 95th – percentile rainfall event as recorded by the National Climate Data Center or other approved precipitation records and all smaller storms and maintain the predevelopment natural runoff; or

2. Maintain or restore the predevelopment stable, natural runoff hydrology of the site throughout the development or redevelopment process. Post-construction runoff rate, volume, and duration will not exceed predevelopment rates. For a redevelopment site, the existing impervious surfaces will be reduced by a minimum of 10%, or the stormwater management design will capture and treat 10% of the stormwater from the existing impervious surfaces, or a combination of the two equal to not less than a 10% reduction/treatment of the stormwater runoff from the impervious surfaces runoff. The stormwater management system design will be based, in part on a hydrologic analysis of the building site.

1804.7.2 Adjoining lots and property. The stormwater management system will not redirect or concentrate offsite discharge that would cause increased erosion or other drainage related damage to adjoining lots or public property.

1804.7.3 Soil and water quality protection. Soil and water quality will be protected in accordance to ROH Chapter 14, and the Rules Relating to Water Quality of the Administrative Rules, Title 20, Department of Planning and Permitting, Chapter 3.
1804.7.3.1 Special Inspections. The owner or the registered design professional in responsible charge, acting as the owner’s agent will employ one or more approved special inspection agency or special inspectors independent of the contractors performing the work, to provide inspections during construction for the requirements of this chapter. These inspections are in addition specified in Section 110.

(126) Subsection 1805.4.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

1805.4.3 Drainage discharge. The floor base and foundation perimeter drain shall discharge by gravity or mechanical means into an approved drainage system that complies with the Plumbing Code.

(127) Subsection 1810.3.6 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

1810.3.6 Splices. Splices will be constructed so as to provide and maintain true alignment and position of the component parts of the pier or pile during installation and subsequent thereto and will be of adequate strength to transmit the vertical and lateral loads and moments occurring at the location of the splice during driving and under service loading. Splices occurring in the upper 10 feet (3048 mm) of the embedded portion of the pier or pile must be capable of resisting at allowable working stresses the moment and shear that would result from an assumed eccentricity of the pier or pile load of 3 inches (76 mm), or the pier or pile will be braced in accordance with Section 1810.2.2 to other piers or piles that do not have splices in the upper 10 feet (3048 mm) of embedment.

(128) Subsection 1901.5 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 1901.5 reads as follows:

1901.5 Anchoring to concrete. Anchoring to concrete will be in accordance with ACI 318 as amended in Section 1905, and applies to cast-in (headed bolts, headed studs, and hooked J- or L- bolts) anchors and post-installed expansion (torque-controlled and displacement-controlled) undercut, and adhesive anchors.

(129) Subsection 1904.3 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 1904.3 reads as follows:
1904.3 Concrete Strap-Type Anchors. Concrete strap-type anchors made out of cold-formed steel shall not be used along the perimeter edges of a slab on grade where the steel does not have at least 1-1/2 inches side cover or other adequate protection.

(130) Section 1909 of the IBC, adopted by the Building Code of the State of Hawaii, is deleted.

(131) Subsection 2104.1.7 is added to the Building Code of the State of Hawaii. The added Subsection 2104.1.7 read as follows:

2104.1.7 Cleanouts. Cleanouts will be provided for all grout pours over 5 feet 4 inches in height. Special provisions shall be made to keep the bottom and sides of the grout spaces, as well as the minimum total clear area required by ACI 530.1/ASCE 6/TMS 602 clean and clear prior to grouting.

Exception: Cleanouts are not required for grout pours 8 feet or less in height providing all of the following conditions are met:

1. The hollow masonry unit is 8-inch nominal width or greater.
2. The specified compressive strength of masonry, f’m, is less than or equal to 1,900 psi as determined per Table 2105.2.2.1.2;
3. Fine grout is used complying with ASTM C-476 minimum compressive strength of 3,000 psi; and
4. Special Inspection is provided.

(132) Subsection 2203.2.1 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 2203.2.1 reads as follows:

2203.2.1 Protection of Sill Track. Residential load bearing framing members that are in direct contact with moisture from the slab on grade or from the outdoor climate shall be adequately shielded with additional corrosion protection or manufactured from a material not susceptible to corrosion. The exterior face of the sill track shall also be protected.

(133) Subsection 2211.7 of the Building Code of the State of Hawaii, is amended to read:
2211.7 Prescriptive Framing. Detached one- and two-family dwellings and townhouses, less than or equal to two stories above grade plane, will be permitted to be constructed in accordance with AISI S230 subject to the limitations therein. Prescriptive framing shall not be applicable for structures designed using Exception 4 in Section 1609.1.2 Protection of Openings.

(134) Subsection 2301.2 of the Building Code of the State of Hawaii, is amended to read:

2301.2 General design requirements. The design of structural elements or systems, constructed partially or wholly of wood or wood-based products, must be in accordance with one of the following methods:

1. Allowable stress design in accordance with Sections 2304, 2305 and 2306.

2. Load and resistance factor design in accordance with Sections 2304, 2305 and 2307.

3. Conventional light-frame construction in accordance with Sections 2304 and 2308.

Exception: Buildings designed in accordance with the provisions of the AWC WFCM shall be deemed to meet the requirements of Section 2308. Prescriptive framing of detached one- and two-family dwellings and townhouses, using Section 2308 or the AWC WFCM shall be limited to heights of less than or equal to two stories above grade plane. Prescriptive framing shall not be applicable for structures designed using Exception 4 in Section 1609.1.2 Protection of Openings.

(135) Subsection 2303.1.8 of the Building Code of the State of Hawaii, is amended to read:

2303.1.8 Preservative–treated wood. Structural lumber, including plywood, posts, beams, rafters, joists, trusses, studs, plates, sills, sleepers, roof and floor sheathing, flooring and headers of new wood-frame buildings and additions will be:

1. Treated in accordance with AWPA Standard U1 (UC1 through UC4B) for AWPA Standardized Preservatives, all marked or branded by an
approving agency. Incising is not required, providing that the retention and penetration requirements of these standards are met; or

2. For SBX disodium octaborate tetrahydrate (DOT) retention will be not less than 0.28 pcf B203 (0.42 = pcf DOT) for exposure to Formosan termites. All such lumber must be protected from direct weather exposure as directed in AWPA UC1 and UC2.

3. For structural glued laminated members made up of dimensional lumber, engineered wood products, or structural composite lumber, pressure treated in accordance with AWPA U 1 (UC1 through UC4B) or by Light Oil Solvent Preservative (LOSP) treatment standard as approved by the building official. Water based treatment processes as listed in paragraphs 1 and 2 are not allowed to be used on these products unless specified by a structural engineer for use with reduced load values.

4. For structural composite wood products by non-pressure process treated in accordance with AWPA Standard U1 (UC1, UC2 and UC3A) or approved by the building official.

2303.1.8.1 Treatment. Wood treatment will include the following:

1. A quality control and inspection program which meets or exceeds the current requirements of AWPA Standards M2-01 and M3-03;

2. Inspection and testing for the treatment standards as adopted by this code must be an independent agency approved by the building official accredited by the American Lumber Standards Committee (ALSC) and contracted by the treating company; and

3. Field protection of all cut surfaces with a preservative, which must be applied in accordance with AWPA Standard M-4-02 or in accordance with the approved preservative manufacturer’s ICC-Evaluation Services report requirements.

2303.1.8.2 Labeling. Labeling will be applied to all structural lumber 2 inches (51 mm) or greater nominal thickness, with the following information provided on each piece as permanent ink stamp on one face on a durable tab permanently fastened to ends with the following information:
1. Name of treating facility;
2. Type of preservative;
3. AWPA use category;
4. Quality mark of third party inspection agency;
5. Retention minimum requirements; and

All lumber less than 2 inches (51 mm) in nominal thickness, will be identified per bundle by means of a label consisting of the above requirements. Labels measuring no less than 6 inches (152 mm) by 8 inches (203 mm) must be placed on the lower left corner of the strapped bundle.

2303.1.8.3 Moisture content of treated wood. When wood pressure treated with a water-borne preservative is used in enclosed locations where drying in service cannot readily occur, such wood must be at a moisture content of 19 percent or less before being covered with insulation, interior wall finish, floor covering or other material.


2304.6.1 Wood structural panel sheathing. Where wood structural panel sheathing is used as the exposed finish on the exterior of outside walls, it must have an exterior exposure durability classification. Where wood structural panel sheathing is used elsewhere, but not as the exposed finish, it must be of a type manufactured with exterior glue (Exposure 1 or Exterior). Wood structural panel wall sheathing or siding used as structural sheathing must be capable of resisting wind pressures in accordance with Section 1609. Maximum effective wind speeds for wood structural panel sheathing used to resist wind pressures will be in accordance with Table 2304.6.1 for enclosed buildings with a mean roof height not greater than 30 feet (9144 mm).

(137) Table 2304.6.1 of the Building Code of the State of Hawaii, Appendix “W”, is amended as follows:
TABLE 2304.6.1
MAXIMUM EFFECTIVE WIND SPEED (mph) (3-SECOND GUST) PERMITTED FOR
WOOD STRUCTURAL PANEL WALL SHEATHING USED TO RESIST
WIND PRESSURES a,b,c

<table>
<thead>
<tr>
<th>MINIMUM NAIL</th>
<th>MINIMUM WOOD STRUCTURAL PANEL SPAN RATING</th>
<th>MINIMUM NOMINAL PANEL THICKNESS (inches)</th>
<th>MAXIMUM WALL STUD SPACING (inches)</th>
<th>PANEL NAIL SPACING</th>
<th>$V_{eff}$ and MAXIMUM EFFECTIVE WIND SPEED (MPH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Penetration (inches)</td>
<td></td>
<td></td>
<td>Edges (inches o.c.)</td>
<td>Field (inches o.c.)</td>
</tr>
<tr>
<td>6d common (2.0&quot; x 0.133&quot;)</td>
<td>1.5</td>
<td>24/0</td>
<td>3/8</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>8d common (2.5&quot; x 0.131&quot;)</td>
<td>1.75</td>
<td>24/16</td>
<td>7/16</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12</td>
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<td></td>
<td>6</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.

a. Panel strength axis will be parallel or perpendicular to supports. Three-ply plywood sheathing with studs spaced more than 16 inches on center will be applied with panel strength axis perpendicular to supports.

b. The table is based on wind pressures acting toward and away from building surfaces in accordance with Chapter 27 of ASCE 7. Lateral requirements will be in accordance with Section 2305 or 2308.

c. Wood structural panels with span ratings of wall-16 or wall-24 will be permitted as an alternative to panels with a 24/0 span rating. Plywood siding rated 16 o.c. or 24 o.c. will be permitted as an alternative to panels with a 24/16 span rating. Wall-16 and plywood siding 16 o.c. will be used with studs spaced a maximum of 16 inches o.c.

(138) Subsection 2304.11 of the Building Code of the State of Hawaii, is amended to read:

**2304.11 Protection against decay and termites.**

**2304.11.1 General.** Where required by this section, protection from decay and termites will be provided by the use of naturally durable or preservative-treated wood.
2304.11.2 Wood used above ground. Structural lumber installed above ground will be preservative-treated wood in accordance with Section 2303.1.8.

2304.11.2.1 Soil treatment and termite barriers. Where structural lumber of wood frame buildings or structures are supported directly on the ground by a concrete slab, or concrete and/or masonry foundation, Formosan subterranean termite protection must be provided by either chemically treating the soil beneath and adjacent to the building or structure by a Hawaii licensed pest control operator, or stainless steel termite barrier, or other termite protection measures approved by the building official. All soil treatment, stainless steel termite barrier, and termite protection measures will be installed according to manufacturer's recommendations for control of Formosan subterranean termites, with chemical barriers applied at the maximum label rates.

2304.11.3 Wood in ground contact. Wood supporting permanent buildings and structures, which is in direct soil contact or is embedded in concrete or masonry in direct contact with earth must be treated to the appropriate commodity specification of AWPA Standard U1. Wood in direct soil contact but not supporting any permanent buildings or structures must be treated to the appropriate commodity specification of AWPA Standard U1 for ground contact.

2304.11.4 Retaining walls. Wood in retaining or crib wall will be treated to AWPA Standard U1.

2304.11.5 Wood and earth separation. Where wood is used with less than 6-inch (152 mm) vertical separation from earth (finish grade), the wood must be treated for ground contact use.

Where planter boxes are installed adjacent to wood frame walls, a 2-inch-wide (51 mm) air space will be provided between the planter and the wall. Flashings will be installed when the air space is less than 6 inches (152 mm) in width. Where flashing is used, provisions will be made to permit circulation of air in the air space. The wood-frame wall must be provided with an exterior wall covering conforming to the provisions of Section 2304.6.

2304.11.6 Under-floor clearance for access and inspection. Minimum clearance between the bottom of floor joists or bottom of floors without joists and the ground beneath will be 24 inches (610 mm); the minimum
clearance between the bottom of girders and the ground beneath will be 18 inches (457 mm).

**Exception:** Open slat wood decks must have ground clearance of at least 6 inches (152 mm) for any wood member. Accessible under-floor areas will be provided with a minimum 18 inch-by-24 inch (152 mm X 610mm) access opening, effectively screened or covered. Pipes, ducts and other construction must not interfere with the accessibility to or within under-floor areas.

**2304.11.7 Wood used in retaining walls and cribs.** Wood installed in retaining or crib walls will be preservative treated in accordance with AWPA U1 (Commodity Specifications A or F) for soil and fresh water use.

**2304.11.8 Weather exposure.** All portions of timbers (over 5-inch nominal width) and glued-laminated timbers that form structural supports of a building or other structure must be protected by a roof, eave, overhangs, flashings, or similar coverings. All wood or wood composite panels, in weather-exposed applications, must be of exterior type.

**2304.11.9 Water splash.** Where wood-frame walls and partitions are covered on the interior with plaster, tile or similar materials and are subject to water splash, the framing will be protected with approved waterproof paper conforming to Section 1404.2.

**2304.11.10 Pipe and other penetrations.** Insulations around plumbing pipes must not pass through ground floor slabs. Openings around pipes or similar penetrations in concrete or masonry slab, which is in direct contact with earth, will be filled with non-shrink grout, BTB, or other approved physical barrier.

(139) Subsection 2308.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**2308.1 General.** The requirements of this section are intended for conventional light-frame construction. Other methods are permitted to be used, provided a satisfactory design is submitted showing compliance with other provisions of this code. Interior non-loadbearing partitions, ceilings and curtain walls of conventional light-frame construction are not subject to the limitations of this section. Alternatively, compliance with AF&PA WFCM will be permitted subject to the limitations therein and the limitations of this code.
(140) Subsection 2308.9.4.3 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 2308.9.4.3 reads as follows:

**2308.9.4.3 Pre-engineered bracing of post and pier foundations.** For conventional light-framed single family residences two stories or less above grade, bracing of elevated wood post and pier foundation systems will be permitted to be pre-engineered designs for braces or shear walls constructed in accordance with FEMA Hazard Mitigation Grant Program DR-1664-HI drawings, *Structural Seismic Retrofits for Hawaii Single Family Residences with Post and Pier Foundations, May 2009.*

(141) Table 2308.10.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

<table>
<thead>
<tr>
<th>Effective Nominal Design Wind Speed, $V_{eff-asd, 3\text{-sec gust}}$</th>
<th>Roof Span (feet)</th>
<th>Overhangs (pounds/ft)$^d$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>85</td>
<td>-72</td>
<td>-120</td>
</tr>
<tr>
<td>90</td>
<td>-91</td>
<td>-152</td>
</tr>
<tr>
<td>100</td>
<td>-131</td>
<td>-218</td>
</tr>
<tr>
<td>110</td>
<td>-175</td>
<td>-292</td>
</tr>
<tr>
<td>120</td>
<td>-240</td>
<td>-400</td>
</tr>
<tr>
<td>130</td>
<td>-304</td>
<td>-506</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 mile per hour = 1.61 km/hr, 1 pound = 0.454 kg, 1 pound/foot = 14.5939 N/m.

a. The uplift connection requirements are based on a 30-foot mean roof height located in Exposure B. For Exposure C or D and for other mean roof heights, multiply the above loads by the adjustment coefficients below.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Mean Roof Height (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
</tr>
<tr>
<td>B</td>
<td>1.00</td>
</tr>
<tr>
<td>C</td>
<td>1.21</td>
</tr>
<tr>
<td>D</td>
<td>1.47</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 204.8 mm, 1 mile per hour = 1.61 km/hr, 1 pound = 0.454 kg, 1 pound/foot = 14.5939 N/m.
b. The uplift connection requirements are based on the framing being spaced 24 inches on center. Multiply by 0.67 for framing spacing 16 inches on center and multiply by 0.5 for framing spaced 12 inches on center.

c. The uplift connection requirements include an allowance for 10 pounds of dead load.

d. The uplift connection requirements do not account for the effects of overhangs. The magnitude of the above loads will be increased by adding the overhang loads found in the table. The overhang loads are also based on framing spaced 24 inches on center. The overhang loads given will be multiplied by the overhang projection and added to the roof uplift value in the table.

e. The uplift connection requirements are based upon wind loading on end zones as defined in chapter 30, Figure 30.5-1, of ASCE 7. Connection loads for connections located a distance of 20 percent of the least horizontal dimensions of the building from the corner of the building are permitted to be reduced by multiplying the table connection value by 0.7 and multiplying the overhang load by 0.8.

f. For wall-to-wall and wall-to-foundation connections, the capacity of the uplift connector is permitted to be reduced 100 pounds for each full wall above. (For example, if a 500-pound rated connector is used on the roof framing, a 400-pound rated connector is permitted at the next level floor level down.)

g. Interpolation is permitted for intermediate values of basic wind speeds and roof spans.

h. The rated capacity of approved tie-down devices is permitted to include up to a 60-percent increase for wind effects where allowed by material specifications.

i. $V_{eff,asd}$ is determined from Figure 1609.3.2.1 and Sections 1609.3.1 and 1609.3.2.

(142) Subsection 2403.5 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**2403.5 Louvered windows or jalousies.** Regular plate, sheet, or patterned glass louvered windows and jalousies will be no thinner than nominal 7/32 inch (11 mm) and no longer than 36 inches (914 mm). When other glass types are used, design must be submitted to the building official for approval. Exposed glass edges must be smooth. Wired glass with wire exposed on longitudinal edges will not be used in jalousies or louvered windows.

(143) Chapter 28, Mechanical Systems, of the IBC is repealed in its entirety and replaced with a new Chapter 28 related to Water Resource Conservation Quality and Efficiency. For the most part, the provisions of this Chapter have been extracted from Chapter 4 and Chapter 7 of the International Green Code (IGC), subject to amendments. Add new Chapter 28 to read:
CHAPTER 28

WATER RESOURCE CONSERVATION QUALITY AND EFFICIENCY

2801 - WATER RESOURCE CONSERVATION QUALITY AND EFFICIENCY

2801.1 General. Where development or redevelopment disturbs a site, the following water resource conservation and efficiency requirements may apply to the occupancy, use and construction of that development or redevelopment.

2802 – DEFINITIONS

Unless otherwise expressly stated, the following words and terms are for the purposes of this Chapter.

APPROVED. Acceptable to the code official or authority having jurisdiction.

ALTERNATE ONSITE NONPOTABLE WATER SOURCES. Nonpotable water from other than public utilities, onsite surface sources and subsurface natural freshwater sources. Examples of such water are gray water, onsite reclaimed water, collected rainwater, captured condensate, and rejected water from reverse osmosis systems.

AREA, TOTAL BUILDING FLOOR. The total of the total floor areas on all stories of the building.

AREA, TOTAL FLOOR. The total area of a story as measured from the interior side of the exterior walls.

BROWNFIELD. A site in which the expansion, redevelopment or reuse of would be required to address the presence of potential presence of a hazardous substance, pollutant or contaminant. Brownfield sites include:

1. EPA-recognized brownfield sites as defined in Public Law 107-118 (H.R. 2869) “Small Business Liability Relief and Brownfields Revitalization Act,” 40 CFR, Part 300; and

2. Sites determined to be contaminated according to local or state regulations.
BUILDING THERMAL ENVELOPE. The basement walls, exterior walls, floor, roof, and any other building elements that enclose conditioned space. This boundary also includes the boundary between conditioned space and any exempt or unconditioned space.

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

FLOODPLAIN. An area of land at risk of being inundated with water during high flows. Floodplains are associated with both water courses, such as rivers and streams, and bodies of water, such as oceans and lakes.

FLOOR 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. The area designated as a floor hazard area on a community’s flood hazard map, or otherwise legally designated.

GRAY WATER. Untreated waste water that has not come into contact with waste water from water closets, urinals, kitchen sinks, or dishwashers. Gray water includes, but is not limited to, waste water from bathtubs, showers, lavatories, clothes washers, and laundry trays.

GREENFIELD. Land that has not been previously developed or has a history of only agricultural use.

INVASIVE PLANT SPECIES. Species that are not native to the ecosystem under consideration and that cause, or are likely to cause, economic or environmental harm or harm to human, animal or plant health, defined by using the best scientific knowledge of that region. Consideration for inclusion as an invasive species shall include, but shall not be limited to, those species identified on:

1. Approved city, county or regional lists,

2. State noxious weed laws,

3. Federal noxious weed laws.
LIGHTING BOUNDARY. Where the lot line abuts a public walkway, bikeway, plaza, or parking lot, the *lighting boundary* shall be a line 5 feet (1524 mm) from the lot line and located on the public property. Where the lot line abuts a public roadway or public transit corridor, the *lighting boundary* shall be the centerline of the public roadway or public transit corridor. In all other circumstances, the *lighting boundary* shall be at the lot line.

METER. A measuring device used to collect data and indicate usage.

NONPOTABLE WATER. Water not safe for drinking, personal or culinary utilization.

POTABLE WATER. Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming to the bacteriological and chemical quality requirements of the Public Health Service Drinking Water Standards or the regulations of the public health authority having jurisdiction.

RECLAIMED WATER. Nonpotable water that has been derived from the treatment of waste by a facility or system licensed or permitted to produce water meeting the jurisdiction’s water requirements for its intended uses. Also known as “recycled Water.”

2803 – COMPLIANCE STATEMENT

2803.1 General. When Chapter 28 is used, the plan shall include the following conformance statement completed by the responsible engineer or architect that the design conforms to the provisions of this Chapter.
This block shall be on the first sheet of the pertinent plan, e.g. architectural, electrical, and mechanical. The above may be submitted separately to the Building Official in a letter including the identification of the building.

**2804 – LANDSCAPE IRRIGATION AND OUTDOOR FOUNTAINS**

**2804.1 Landscape irrigation systems.** Irrigation of exterior landscaping will comply with Sections 2804.1.1 and 2804.1.2.

**2804.1.1 Water for outdoor landscape irrigation.** Outdoor landscape irrigation systems will be designed and installed to reduce potable water use by 50 percent from a calculated mid-summer baseline in accordance with Section 2804.1.2 or from an approved non-potable water source.

Exception: Potable water is permitted to be used as follows:

1. During the establishment phase of newly planted landscaping.
2. To irrigate food production.
3. To supplement non-potable water irrigation of shade trees provided in accordance with the Land Use Ordinance ROH Chapter 21.
4. Potable water is permitted for landscape irrigation when approved by the building official.
2804.1.2 Irrigation system design and installation. Where in-ground irrigations are provided, the system will comply with all of the following:

1. The design and installation of outdoor irrigation systems will be under the supervision of a licensed, Civil Engineer or Landscape Architect.

2. Landscape irrigation systems will not direct water onto building exterior surfaces, foundations, exterior paved surfaces or adjoining lots. Systems must not generate runoff.

3. Where an irrigation control system is used, the system will be one that regulates irrigation based on weather, climatological or soil moisture status data. The controller will have integrated or separate sensors to suspend irrigation events during rainfall.

4. Irrigation zones will be based on plant water needs with plants of similar need grouped together. Turf grass will not be grouped with other plants on the same zone.

5. Micro-irrigation zones will be equipped with pressure regulators that ensure zone pressure is not greater than 40 psi (275.8 kPa), filters, and flush end assemblies.

6. Irrigation sprinklers will:

   6.1 Have nozzles with matched precipitation rates.

   6.2 Be prohibited on landscape areas less than 4 feet (1230 mm) in any dimension.

   6.3 Be prohibited on slopes greater than 1 unit vertical to 4 units horizontal (25-percent slope).

   **Exception:** Where the application rate of the irrigation sprinklers is less than or equal to 0.5 inches (12.7 mm) per hour.

   6.4 Be permitted for use on turfgrass and crop areas only excepting microsprays of a flow less than 45 gallons (170 liters) per hour.

   6.5 If the pop-up configuration, pop-up to a height of not less than 4 inches (101 mm).
6.6 Only be installed in zones composed exclusively of irrigation sprinklers and will be designed to achieve a lower quarter distribution uniformity of not less and 0.65.

2804.2 Outdoor ornamental fountains and water features. Where available and approved by the building official alternate non-potable onsite water sources complying with Sections 2806 and 2807 will be used for outdoor ornamental fountains and other water features constructed or installed on a building site. Where the fountain or water feature is the primary user of the building site’s non-potable water source, a potable makeup water connection is prohibited.

Exception: Outdoor ornamental fountains and water features are allowed to use potable water provided water is recirculated and there is not an automatic refill valve connection to a source of potable water, and provided that either:

1. The catch basin or reservoir is not greater than 100 gallons (379 L); or
2. Less than 20 square feet (1.86 m²) of water surface area is exposed.

2804.2.1 Treatment. The treatment required to maintain appropriate water quality will be in accordance to the Hawaii State Department of Health Administrative Rules.

2804.2.2 Recirculation. Outdoor ornamental fountains and water features will be equipped to recirculate and reuse the supplied water.

2804.2.3 Signage. Signage will be provided to read “CAUTION: NONPOTABLE WATER – DO NOT DRINK.”

2805 – HVAC SYSTEMS AND EQUIPMENT

2805.1 Hydronic closed systems. Closed loop hydronic heating and cooling systems, and ground-source heat pump systems will not be connected to a potable makeup water supply.

2805.2 Humidification systems. Except where greater humidity is required for medical, agricultural, archival or scientific research purposes, humidification systems will be disabled and locked-out when the relative humidity in the space served is greater than 55 percent.
2805.3 Condensate coolers and tempering. Potable water will not be used as tempering water for sanitary discharge where the tempering water volume requirement for the application exceeds 200 gallons per day (757 liters per day). Where the tempering water volume required for the application is 200 gallons per day (757 liters per day) or less and potable water is used for tempering, water flow control devices will be installed. Such control devices will limit the flow rate of tempering water to that which is necessary to limit the temperature of the waste discharge to a maximum of 140°F (60°C). Such devices will have a maximum flow rate of 200 gallons per day (757 liters per day).

2805.4 Condensate drainage recovery. Condensate will be collected and reused onsite for applications such as, but not limited to, water features, fountains, gray water collection systems and rainwater collection systems. Where onsite applications for condensate reuse are not available, condensate will be discharged to the sanitary sewer system except where prohibited by the City and County of Honolulu, Department of Environmental Services.

2805.5 Heat exchangers. Once-through cooling will be prohibited. Heat exchangers will be connected to a recirculating water system such as a chilled water loop, cooling tower loop or similar recirculating system.

2805.6 Humidifier discharge. Water discharge from flow-through-type humidifiers and from the draining and flushing operations of other types of humidifiers will be collected for reuse where a collection and reuse system exists.

2805.7 Cooling towers, evaporative condensers and fluid coolers. Cooling towers, evaporative condensers, and fluid coolers will be installed in accordance with the requirements of Section 908 of the International Mechanical Code.

2805.7.1 Location. Cooling towers, evaporative condensers and fluid coolers will be located on the property as required for buildings in accordance with the International Building Code and will be located so as to prevent the discharge vapor plumes from entering occupied spaces. Plume discharges will be not less than 5 feet (1524 mm) above and 20 feet (6096 mm) away from any ventilation inlet to a building.

2905.7.2 Once-through cooling. The use of potable water for once-through or single-pass cooling operations is prohibited.
2805.7.3 Metering. The metering of mechanical systems, system components, equipment and appliances will be metered. Meters will be installed in accordance to the Plumbing Code. Each meter will be capable of communicating water consumption data remotely and at a minimum be capable of providing daily data with electronic data storage and reporting capacity that can produce reports that show daily, monthly, and annual water consumption.

2805.7.4 Controllers and alarms. Cooling towers, evaporative condensers, and fluid coolers will be equipped with conductivity controllers and overflow alarms.

2805.7.5 Drift. Cooling towers, evaporative condensers and fluid coolers will produce drift losses of not greater than 0.002 percent of the recirculated water volume for counter-flow systems, and not greater than 0.005 percent of the recirculated water for cross-flow systems.

2805.7.6 Water quality. Where nonpotable water is used within cooling towers, evaporative condensers and fluid coolers, it will conform to the water quality and treatment requirements of the Hawaii State Department of Health Administrative Rules, and the water chemistry guidelines recommended by the equipment manufacturers.

2805.7.7 Discharge. The discharge water from cooling towers used for air-conditioning systems will be in compliance with Table 2805.7.7. Where the discharge water is not captured for reuse, it will be discharged and treated in accordance with the Hawaii State Department of Health Administrative Rules.

Exception: Discharge water with total dissolved solids in excess of 1,500 ppm (1,500 mg/L), or silica in excess of 120 ppm (120 mg/L) measured as silicon dioxide will not be required to meet the minimum parameters specified in Table 2804.7.7.
TABLE 2805.7.7
MINIMUM CYCLES OF CONCENTRATION FOR DISCHARGE WATER

<table>
<thead>
<tr>
<th>MAKEUP WATER TOTAL HARDNESS (mg/L)a</th>
<th>MAXIMUM CYCLES OF CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 200</td>
<td>5</td>
</tr>
<tr>
<td>≥ 200</td>
<td>3.5</td>
</tr>
</tbody>
</table>

a. Total hardness concentration expressed as calcium carbonate.

2805.8 Wet-hood exhaust scrubber systems. Where wet-hood exhaust scrubber systems are used, they will incorporate a water recirculation system.

2805.8.1 Washdown systems. Hoods incorporating washdown or rinsing systems for prechloric acid and similar chemicals will utilize self-closing valves. Such systems will be designed to drain automatically after each washdown process has been completed.

2805.8.2 Water sources. Where suitable alternate onsite nonpotable water or municipal reclaimed water is available, makeup water supplies to the recirculation system of wet-hood exhaust scrubbers will utilize alternate onsite nonpotable water or municipal reclaimed water of a water quality appropriate for the application.

2805.9 Evaporative cooling. Evaporative cooling systems will use less than 4 gallons of water per ton-hour (4.2 L per kWh) of cooling capacity when system controls are set to the maximum water use. The amount of water use will be expressed in maximum water use per ton-hour (kWh) of cooling capacity and will be marked on the equipment, included in product user manuals, included in product information literature and included in manufacturer's instructions. Water use information will be readily available at the time of code compliance inspection.

2805.9.1 Overflow alarm. Cooling systems will be equipped with an overflow alarm to alert building owners, tenants or maintenance personnel when the water refill valve continues to allow water to flow into the reservoir when the reservoir is full. The alarm will have a minimum sound pressure level rating of 85 dB measured at a distance of 10 feet (3048 mm).
2805.9.2 Automatic pump shutoff. Cooling systems will automatically cease pumping water to the evaporation pads when sensible heat reduction is not needed.

2805.9.3 Cooler reservoir discharge. A water quality management system such as a timer or water quality sensor will be required. Where timers are used, the time interval between the discharge events of the water reservoir will be set to 6 hours or greater of cooler operation. Continuous discharge or continuous bleed systems will be prohibited.

2805.9.4 Discharge water reuse. Discharge water will be reused where appropriate applications exist on site. Where a nonpotable water source system exists on site, evaporative cooler discharge water will be collected and discharged to such collection system.

Exception: Where the reservoir water will adversely affect the quality of the non-potable water supply making the non-potable water unusable for its intended purposes.

2805.9.5 Discharge water to drain. Where discharge water is not required to be recovered for reuse, the sump overflow pipe will not directly connect to a drain. Where the discharge water is discharged into a sanitary drain, an air gap of not less than 6 inches (152 mm) will be required between the termination of the discharge pipe and the drain opening. The discharge pipe will terminate in a location that is readily visible to the building owners, tenants or maintenance personnel.

2806 - WATER TREATMENT DEVICES AND EQUIPMENT

2806.1 Water softeners. Water softeners will comply with Sections 2806.1.1 through 2806.1.4.

2806.1.1 Demand-initiated regeneration. Water softeners will be equipped with demand-initiated regeneration control systems. Such control systems must automatically initiate the regeneration cycle after determining the depletion, or impending depletion of softening capacity.

2806.1.2 Water consumption. Water softeners will have a maximum water consumption during regeneration of 5 gallons (18.9 L) per 1000 grains (17.1 g/L) of hardness removed as measured in accordance with NSF 44.
2806.1.3 Waste connections. Waste water from water softener regeneration will not discharge to reclaimed water collection systems and will discharge in accordance with the Plumbing Code.

2806.1.4 Efficiency and listing. Water softeners that regenerate in place, that are connected to the water system they serve by piping not exceeding 1 1/4 inches (31.8 mm) in diameter, or that have a volume of 3 cubic feet (0.085 m$^3$) or more of cation exchange media will have a rated salt efficiency of not less than 4,000 grains of total hardness exchange per pound of salt (477 g of total hardness exchange per kg of salt), based on sodium chloride equivalency and will be listed and labeled in accordance with NSF 44. All other water softeners will have a rated salt efficiency of not less than 3,500 grains of total hardness exchange per pound of salt (477 g of total hardness exchange per kg of salt), based on sodium chloride equivalency.

2806.2 Reverse osmosis water treatment systems. Point-of-use reverse osmosis treatment systems will be listed and labeled in accordance with NSF 58. The discharge pipe from a reverse osmosis drinking water treatment unit will connect to the building drainage system in accordance with the Plumbing Code. Point-of-use reverse osmosis systems will be equipped with an automatic shutoff valve that prevents the production of reject water when there is no demand for treated water.

2806.3 Onsite reclaimed water treatment systems. Onsite reclaimed water treatment systems, including gray water reuse treatment systems and waste water treatment systems, used to produce non-potable water for use in water closet and urinal flushing, surface irrigation and similar applications will be listed and labeled to NSF 350.

2807 - METERING

2807.1 Metering. Water consumed from any source associated with the building or building site will be metered. Each potable and reclaimed source of water, and each onsite non-potable water source, will be metered separately. Meters will be installed in accordance with the requirements of the Plumbing Code. For the purposes of Section 2807.1.1, each meter identified in Table 2807.1.1 must be capable of communicating water consumption data remotely and at a minimum, be capable of providing daily data with electronic data storage and reporting capability that can produce reports that show daily, monthly, and annual water consumption.
2807.1.1 Metering. All potable and non-potable water supplied to the applications listed in Table 2807.1.1. Similar appliances and equipment will be permitted to be grouped and supplied from piping connected to a single meter.

**TABLE 2807.1.1**
METERING REQUIREMENTS

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation</td>
<td>Irrigation systems that are automatically controlled will be metered.</td>
</tr>
<tr>
<td>Tenant spaces</td>
<td>Tenant spaces that are estimated to consume over 1000 gallons of water per day will be metered individually.</td>
</tr>
<tr>
<td>Onsite water collection systems</td>
<td>The makeup water lines supplying onsite water collection systems will be metered.</td>
</tr>
<tr>
<td>Ornamental water features</td>
<td>Ornamental water features with a permanently installed water supply will be required to utilize a meter on makeup water supply lines.</td>
</tr>
<tr>
<td>Pools and in-ground spas</td>
<td>Indoor and outdoor pools and in-ground spas will be required to utilize a meter on makeup water supply lines.</td>
</tr>
<tr>
<td>Cooling towers</td>
<td>Cooling towers of 100 tons capacity or greater or groups of towers will be required to utilize a meter on makeup water and blow-down water supply lines.</td>
</tr>
<tr>
<td>Steam boilers</td>
<td>The makeup water supply line to steam boilers anticipated to draw more than 100,000 gallons annually or having a rating of 500,000 Btu/h or greater will be metered.</td>
</tr>
<tr>
<td>Industrial processes</td>
<td>Industrial processes consuming more than 1,000 gallons per day on average will be metered individually.</td>
</tr>
<tr>
<td>Evaporative coolers</td>
<td>Evaporative coolers supplying in excess of 0.6 gpm, on average, makeup water will be.</td>
</tr>
<tr>
<td>Fluid coolers and chillers</td>
<td>Water-cooled fluid coolers and chillers that do not utilize closed-loop recirculation will be metered.</td>
</tr>
</tbody>
</table>
Makeup water for closed loop systems such as chilled water and hydronic systems | Makeup water supplying systems of 50 tons of cooling capacity or 500,000 Btu/h of heating capacity will be metered.
---|---
Roof spray systems | Roof spray systems for irrigating vegetated roofs or thermal conditioning will be metered.

For SI: 1 gallon = 3.8 L, 1 gallon per minute = 3.8 Lpm, 1 ton = 12,000 Btu, 1 British thermal unit per hour = 0.00029 kWh.

2808 - NONPOTABLE WATER REQUIREMENTS

2808.1 Scope. The provisions of this section will govern the use of non-potable water and the construction, installation, and design of systems utilizing non-potable water. The use and application of non-potable water will comply with the State of Hawaii, Department of Health, Administrative Rules.

2808.2 Signage required. Where non-potable water is used for a water use application, signage will be provided that reads as follows: "Non-potable water is utilized for [APPLICATION NAME]. Caution: non-potable water. DO NOT DRINK." The words will be legibly and indelibly printed on a sign constructed of corrosion-resistant waterproof material. The letters of the words will be not less than 0.5 inches (13 mm) in height and of a color in contrast to the background on which they are applied. In addition to the required wordage, the pictograph shown in Figure 2808.2 must appear on the signage required by this section. The required location of the signage and pictograph will be in accordance with the applicable section of this code that requires the use of non-potable water.
2808.3 Water quality. Nonpotable water for each end use application will meet the minimum water quality requirements as established by the State of Hawaii, Department of Health, Administrative Rules.

2809 - RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS

2809.1 Scope. Will conform to the City and County of Honolulu, Rules Relating to Storm Drainage Standards.

2809.2 Potable water connections. Where a potable system is connected to a rainwater collection and conveyance system, the potable water supply will be protected against backflow in accordance with the Plumbing Code.

2809.3 Nonpotable water connections. Where nonpotable water from different sources is combined in a system, the system will comply with the most stringent of the requirements of this code that are applicable to such sources.

2809.4 Installation. Except as provided for in this section, all systems will be installed in compliance with the provisions of the Plumbing Code and the manufacturer’s instructions.

2809.5 Rainwater collected for landscape irrigation. Rainwater collected on the surface of the building site, or from the roof surfaces of
the building, and used for landscape irrigation purposes will not be limited regarding the method of application. Rainwater collected from elevated building locations that is to be used in building site irrigation, will comply with the provisions of Section 2809 with the exception of Sections 2809.10.1 and 2809.10.5.3.

2809.6 Approved components and materials. Piping, plumbing components, and materials used in the collection and conveyance systems will be manufactured of material approved for the intended application and compatible with any disinfection and treatment systems used.

2809.7 Insect and vermin control. Inlets and vents to the system will be protected to prevent the entrance of insects and vermin into storage tanks and piping systems. Screens installed on vent pipes, inlets, and overflow pipes will have an aperture of not greater than 1/16 inch (1.6 mm) and will be close fitting. Screen materials will be compatible with contacting system components and will not accelerate corrosion of system components.

2809.8 Drainage. Water drained from the roof washer or debris excluder will not be drained to the sanitary sewer. Such water will be diverted from the storage tank and discharge in a location that will not cause erosion or damage to property. Roof washers and debris excluders will be provided with an automatic means of self-draining between rain events, and will not drain onto roof surfaces.

2809.9 Trenching requirements. All water service piping, including piping containing rainwater, will be separated from the building sewer by 5 feet (1524 m) of undisturbed or compacted earth. Water service pipes, potable and nonpotable, will not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried rainwater collection and distribution piping will comply with the requirements of the Plumbing Code or the Standard Details for Public Works Construction of the City and County of Honolulu for support, trenching, bedding, backfilling and tunneling.

Exceptions:

1. The required separation distance will not apply where the bottom of the water service pipe within 5 feet (1524 mm) of the sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the sewer
and the pipe materials will comply with the Plumbing Code for such applications.

2. Water service pipe is permitted to be located in the same trench with a building sewer, provided such sewer is constructed of materials that comply with the Plumbing Code for such installations.

3. The required separation distance will not apply where a nonpotable water service pipe crosses a sewer pipe provided the water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the Plumbing Code for such applications.

4. Irrigation piping located outside of a building and downstream of the backflow preventer is not required to meet the trenching requirements where rainwater is used for outdoor applications.

5. Buried rainwater collection and distribution piping located more than 5 feet (1524 mm) from the building will be permitted to comply with the Standard Details for Public Works Construction of the City and County of Honolulu.

2809.10 Rainwater catchment and collection systems. The design of rainwater collection and conveyance systems will conform to the City and County of Honolulu, Rules Relating to Storm Drainage Standards.

2809.10.1 Collection surface. Rainwater will be collected only from above-ground impervious roofing surfaces constructed from approved materials. Collection of water from vehicular parking or pedestrian surfaces will be prohibited except where the water is used exclusively for landscape irrigation. Overflow and bleed-off pipes from roof-mounted appliances including but not limited to evaporative coolers, water heaters, and solar water heaters will not discharge onto rainwater collection surfaces.

2809.10.2 Debris excluders. Downspouts and leaders will be connected to a roof washer and will be equipped with a debris excluder or equivalent device to prevent the contamination of collected rainwater with leaves, sticks, pine needles and similar material. Debris excluders and equivalent devices will be self-cleaning.
2809.10.3 Roof gutters and downspouts. Gutters and downspouts will be constructed of materials that are compatible with the collection surface and the rainwater quality for the desired end use. Joints will be water tight.

2809.10.3.1 Slope. Roof gutters, leaders, and rainwater collection piping will slope continuously toward collection inlets. Gutters and downspouts will have a slope of not less than 1 unit in 96 units along their entire length, and must not permit the collection or pooling of water at any point.

Exception: Siphonic drainage systems installed in accordance with the manufacturer’s installation instructions will not be required to have slope.

2809.10.3.2 Size. Gutters and downspouts will be installed and sized in accordance with the Plumbing Code.

2809.10.3.3 Cleanouts. Cleanouts will be provided in the water conveyance system so as to allow access to all filters, flushes, pipes and downspouts.

2809.10.4 Collection pipe materials. In buildings where rainwater collection and conveyance systems are installed, drainage piping approved for use within plumbing drainage systems will be utilized to collect rainwater and convey it to the storage tank. Vent piping approved for use within plumbing venting systems will be utilized for all vents within the rainwater system. Drains to a storm water discharge will use approved waste piping.

2809.10.4.1 Joints. Collection piping conveying rainwater will utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in the Plumbing Code.

2809.10.4.2 Size. Collection piping conveying rainwater from collection surfaces will be sized in accordance with the Plumbing Code and local rainfall rates.

2809.10.4.3 Marking. Additional marking of rainwater collection piping will not be required beyond that required for sanitary drainage, waste, and vent piping by the Plumbing Code.

2809.10.5 Storage tank. The design of the storage tank will be in accordance with Sections 2809.10.5.1 through 2809.10.5.10.
2809.10.5.1 Location. Storage tanks will be installed either above or below grade. Above-grade storage tanks will be protected from direct sunlight and will be constructed using opaque, UV-resistant materials including, but not limited to, heavily tinted plastic, fiberglass, lined metal, concrete, wood, or painted to prevent algae growth, or will have specially constructed sun barriers including, but not limited to, installation in garages, crawlspace, or sheds. Storage tanks and their manholes will not be located directly under any soil or waste piping or any source of contamination. Rainwater storage tanks will be located with a minimum horizontal distance between various elements as indicated in Table 2809.10.5.1.

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>MINIMUM HORIZONTAL DISTANCE FROM STORAGE TANK (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical root zone (CRZ) of protected trees</td>
<td>2</td>
</tr>
<tr>
<td>Lot line adjoining private lots</td>
<td>5</td>
</tr>
<tr>
<td>Seepage pits</td>
<td>5</td>
</tr>
<tr>
<td>Septic tanks</td>
<td>5</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.

2809.10.5.2 Materials. Where water is collected onsite, it will be collected in an approved tank constructed of durable, nonabsorbent and corrosion-resistant materials. Storage vessels will be compatible with the material being stored. Storage tanks will be constructed of materials compatible with the type of disinfection system used to treat water upstream of the tank and used to maintain water quality within the tank.

2809.10.5.2.1 Wooden tanks. Wooden storage tanks will not be required to have a liner. Where a tank is lined and used for potable water, the liner will be in accordance with NSF standards. Where unlined tanks are used, the species of wood will be decay resistant and untreated.

2809.10.5.3 Makeup water. Where an uninterrupted supply is required for the intended application, potable or municipally supplied reclaimed or recycled water will be provided as a source of makeup water for the storage tank. The potable or reclaimed or recycled water supply will be protected against backflow in accordance with the Plumbing Code.
2809.10.5.4 Overflow. The storage tank will be equipped with an overflow pipe having the same or larger area as the sum of the areas of all tank inlet pipes. The overflow pipe will be protected from insects or vermin and the discharge from such pipe will be disposed of in a manner consistent with storm water runoff requirements of the jurisdiction. The overflow pipe will discharge at a sufficient distance from the tank to avoid damaging the tank foundation or the adjacent property. The overflow drain will not be equipped with a shutoff valve. A minimum of one cleanout will be provided on each overflow pipe in accordance with the Plumbing Code.

2809.10.5.5 Access. A minimum of one access opening will be provided to allow inspection and cleaning of the tank interior. Access openings to storage tanks and other vessels will have an approved locking device or will otherwise be protected from unauthorized access. Below-grade storage tanks, located outside of the building, will be provided with either a manhole not less than 24 inches (610 mm) square or a manhole with an inside diameter of not less than 24 inches (610 mm). Manholes will extend not less than 4 inches (102 mm) above ground or will be designed so as to prevent water infiltration. Finish grade will be sloped away from the manhole to divert surface water from the manhole. Each manhole cover will be secured to prevent unauthorized access. Service ports in manhole covers will be not less than 8 inches (203 mm) in diameter and will be not less than 4 inches (102 mm) above the finished grade level. The service port will be secured to prevent unauthorized access.

Exception: Storage tanks having a volume of less than 800 gallons (3028 L) and installed below grade will not be required to be equipped with a manhole where provided with a service port that is not less than 8 inches (203 mm) in diameter.

2809.10.5.6 Venting. Tanks will be provided with a vent sized in accordance with the Plumbing Code and based on the diameter of the tank influent pipe. Tank vents will not be connected to sanitary drainage system vents.

2809.10.5.7 Inlets. Storage tank inlets will be designed to introduce water into the tank with minimum turbulence, and will be located and designed to avoid agitating the contents of the storage tank.

2809.10.5.8 Outlets. Outlets will be located not less than
4 inches (102 mm) above the bottom of the storage tanks and will not skim water from the surface.

2809.10.5.9 Draining of tanks. Where tanks require draining for service or cleaning, tanks will be drained by using a pump or by a drain located at the lowest point in the tank. The discharge from draining the tank will be disposed of in a manner consistent with the storm water runoff requirements of ROH Chapter 14 and at a sufficient distance from the tank to avoid damaging the tank foundation.

2809.10.5.10 Markings and signage. Each storage tank will be marked with its rated capacity. Storage tanks will bear signage that reads as follows: "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Where an opening is provided that could allow the entry of personnel, the opening will bear signage that reads as follows: "DANGER – CONFINED SPACE." Markings will be indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material mounted on the tank or will be indelibly printed on the tank. The letters of words will be not less than 0.5 inches (13 mm) in height and must be of a color that contrasts with the background on which they are applied.

2809.10.6 Valves. Valves will be supplied in accordance with Section 2809.10.6.1.

2809.10.6.1 Backwater valve. Backwater valves will be installed on each overflow and tank drain pipe. Backwater valves will be installed so that access is provided to the working parts for service and repair.

2809.10.7 Roof washer. A sufficient amount of rainwater will be diverted at the beginning of each rain event, and not allowed to enter the storage tank, to wash accumulated debris from the collection surface. The amount of rainfall to be diverted will be field adjustable as necessary to minimize storage tank water contamination. The roof washer will not rely on manually operated valves or devices, and will operate automatically. Diverted rainwater will not be drained to the roof surface, and will be discharged into a separate storage system. Roof washers and the diverted rainwater storage systems will be accessible for maintenance and service.

2809.10.8 Vent piping. Storage tanks will be provided with a vent in accordance with the requirements of Section 2809.10.5.6. Vents will be sized in accordance with the Plumbing Code, based on the aggregate
diameter of storage tank influent pipe(s). Vents will be protected from contamination by means of a U-bend installed with the opening directed downward or an approved cap. Vent outlets will extend a minimum of 4 inches (102 mm) above grade, or as necessary to prevent surface water from entering the storage tank. Vent openings must be protected against the entrance of vermin and insects in accordance with the requirements of Section 2809.10.5.

2809.10.9 Pumping and control system. Mechanical equipment including pumps, valves and filters will be easily accessible and removable in order to perform repair, maintenance and cleaning. Where collected rainwater is to be treated to potable water standards, the pump and all other pump components will be listed, labeled and approved for use with potable water systems. Pressurized water will be supplied at a pressure appropriate for the application and within the range specified by the Plumbing Code. Where water could be supplied at an excessive pressure, a pressure-reducing valve will be installed in accordance with the requirements of the Plumbing Code.

2809.10.9.1 Water-pressure-reducing valve or regulator. Where the rainwater pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve will be installed to reduce the pressure in the rainwater distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves will be specified and installed in accordance with the Plumbing Code.

2809.10 Distribution pipe. Distribution piping will comply with Sections 2809.10.1 through 2809.10.4.

2809.10.1 Materials. Distribution piping conveying rainwater will conform to the standards and requirements specified by the Plumbing Code for nonpotable or potable water, as applicable.

2809.10.2 Joints. Distribution piping conveying rainwater will utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in the Plumbing Code.

2809.10.3 Size. Distribution piping conveying rainwater will be sized in accordance with the Plumbing Code for the intended application.

2809.10.4 Marking. Nonpotable rainwater distribution piping will be of the color purple and will be embossed or integrally stamped or marked.
with the words: "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or will be installed with a purple identification tape or wrap. Identification tape will be not less than 3 inches (76 mm) wide and have white or black lettering on purple field stating "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Identification tape will be installed on top of nonpotable rainwater distribution pipes, fastened not greater than every 10 feet (3048 mm) to each pipe length and run continuously the entire length of the pipe. Lettering must be readily observable within the room or space where the piping is located.

**Exception:** Piping located outside of the building and downstream of the backflow preventer is not required to be purple where rainwater is used for outdoor applications.

**2809.11 Tests and inspections.** Tests and inspection will be performed in accordance with Sections 2809.11.1 through 2809.11.10.

**2809.11.1 Drainage and vent tests.** The testing of rainwater collection piping, overflow piping, vent piping and storage tank drains will be conducted in accordance with the *Plumbing Code*.

**2809.11.2 Drainage and vent final test.** A final test will be applied to the rainwater collection piping, overflow piping, storage tank, and tank vent piping in accordance with the *Plumbing Code*.

**2809.11.3 Water supply system test.** The testing of makeup water supply piping and rainwater distribution piping will be conducted in accordance with the Plumbing Code.

**2809.11.4 Inspection and testing of backflow prevention assemblies.** The testing of backflow preventers and backwater valves will be conducted in accordance with the Plumbing Code.

**2809.11.5 Inspection vermin and insect protection.** Inlets and vents to the system will be inspected to ensure that each is protected to prevent the entrance of insects or vermin into storage tank and piping systems in accordance with Section 2809.7.

**2809.11.6 Roof gutter inspection and test.** Roof gutters will be inspected to verify that the installation and slope is in accordance with Section 2808.10.3. Gutters will be tested by pouring not less than 1 gallon
(3.8 L) of water into the end of the gutter opposite the collection point. The gutter being tested will not leak and will not retain standing water.

2809.11.7 Roof washer test. Roof washers will be tested by introducing water into the gutters. Proper diversion of the first quantity of water in accordance with the requirements of Section 2809.10.7 will be verified.

2809.11.8 Storage tank tests. Storage tanks will be tested in accordance with the following:

1. Storage tanks will be filled with water to the overflow line prior to and during inspection. Seams and joints will be left exposed and the tank will remain water tight without leakage for a period of 24 hours.

2. After 24 hours, supplemental water will be introduced for a period of 15 minutes to verify proper drainage of the overflow system and verify that there are no leaks.

3. The makeup water system will be observed for proper operation and successful automatic shutoff of the system at the refill threshold will be verified.

2809.11.9 Supply pressure test. The static water pressure at the point of use furthest from the supply will be verified to be within the range required for the application, in accordance with Section 2809.10.9.

2809.11.10 Water quality test. The quality of the water will be in accordance to the State of Hawaii, Department of Health, Administrative Rules.

2809.12 Operations and maintenance manuals. When required by the Storm Water Quality Checklist for new development and redevelopment of priority A or B projects as defined by the City and County of Honolulu, Rules relating to Storm Drainage standards, operations and maintenance materials will be supplied in accordance with Sections 2809.12.1 through 2809.12.4.

2809.12.1 Manual. A detailed operations and maintenance manual will be supplied in hardcopy form with all rainwater collection systems.
2809.12.2 Schematics. The manual will include a detailed system schematic, the locations of all system components, and a list of all system components including manufacturer and model number.

2809.12.3 Maintenance procedures. The manual will provide a maintenance schedule and procedures for all system components requiring periodic maintenance. Consumable parts including filters will be noted along with part numbers.

2809.12.4 Operations procedures. The manual will include system startup and shutdown procedures. The manual will include detailed operating procedures for the system.

2810 - GRAY WATER SYSTEMS

2810.1 Scope. The provisions of this section will govern the construction, installation, alteration, and repair of gray water reuse systems.

2810.2 Permits. Permits will be required for the construction, installation, alteration, and repair of gray water systems. Construction documents, engineering calculations, diagrams, and other such data pertaining to the gray water system will be submitted with each application for permit in accordance to ROH Chapter 18 and Section 107.2.

2810.3 Potable water connections. Where a potable water system is connected to a gray water system, the potable water supply will be protected against backflow in accordance with the Plumbing Code.

2810.4 Nonpotable water connections. Where nonpotable water from different sources is combined in a system, the system will comply with the most stringent of the requirements of this code that are applicable to such sources.

2810.5 Installation. Except as provided for in this section, all systems will be installed in compliance with the provisions of the Plumbing Code and the manufacturer's instructions, as applicable.

2810.5.1 Gray water systems for landscape irrigation. Gray water systems used for landscape irrigation purposes will be limited to subsurface and surface irrigation applications. Gray water will not be retained longer than 24 hours before being used for surface irrigation. Gray water to be used in gray water irrigation will comply with the
provisions of Section 2810 with the exception of Sections 2810.6 and 2810.12.6.4. Subsurface gray water systems will be in accordance with Section 2810.14. Gray water will be filtered by a 0.004-inch (100 micron) or finer filter. The control panel for the gray water irrigation system will be provided with signage in accordance with Section 2807.2.

**2810.6 Applications.** Untreated gray water will be utilized in accordance with the State of Hawaii, Department of Health Administrative Rules. Treated gray water will be utilized in accordance with Section 2801 and as permitted by the State of Hawaii, Department of Health, Administrative Rules.

**2810.7 Approved components and materials.** The piping, plumbing components, and materials used in gray water systems will be manufactured of material approved for the intended application and compatible with any disinfection and treatment systems used.

**2810.8 Insect and vermin control.** The inlets and vents to the system will be protected to prevent insects and vermin from entering storage tanks and piping systems. Screens installed on vent pipes and overflow pipes will have an aperture not greater than 1/16 inch (1.6 mm) and will be close-fitting. Screen materials will be compatible with contacting system components and will not accelerate corrosion of system components.

**2810.9 Trenching requirements.** Water service piping, including piping containing gray water, will be separated from the building sewer by 5 feet (1524 m) of undisturbed or compacted earth. Gray water piping will be separated from potable water piping underground by 5 feet (1524 m) of undisturbed or compacted earth. Nonpotable water service pipes will not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried gray water piping will comply with the requirements of the Plumbing Code or the Standard Details for Public Works Construction of the City and County of Honolulu for support, trenching, bedding, backfilling, and tunneling.

**Exceptions:**

1. The required separation distance will not apply where the bottom of the gray water service pipe within 5 feet (1524 mm) of the sewer is not less than 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials comply with the requirements of the Plumbing Code for such applications.
2. The required separation distance will not apply where the bottom of the potable water service pipe within 5 feet (1524 mm) of the gray water pipe is not less than 12 inches (305 mm) above the top of the highest point of the gray water pipe and the pipe materials comply with the requirements of the *Plumbing Code* for such applications.

3. Water service pipe is permitted to be located in the same trench with a building sewer, provided that such sewer is constructed of materials that comply with the requirements of the *Plumbing Code* for such applications.

4. The required separation distance will not apply where a potable or nonpotable water service pipe crosses a sewer pipe provided that the water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the *Plumbing Code* for such applications.

5. The required separation distance will not apply where a potable water service pipe crosses a gray water pipe provided that the potable water service pipe is sleeved for a distance of not less than 5 feet (1524 mm) horizontally from the centerline of the gray water pipe on both sides of such crossing with pipe materials that comply with the requirements of the *Plumbing Code* for such applications.

6. Irrigation piping located outside of a building and downstream of the backflow preventer is not required to meet the trenching requirements where gray water is used for outdoor applications.

**2810.10 System abandonment.** If the owner of a gray water system elects to cease use of, or fails to properly maintain such system, the system will be abandoned and will comply with the following:

1. System piping connecting to a utility-provided water system will be removed or disabled.

2. Storage tanks will be secured against accidental access by sealing or locking tank inlets and access points, or filling with sand or equivalent.

**2809.11 Gray water systems.** Gray water systems will comply with Sections 2810.11.1 through 2810.11.4.
2810.11.1 Gray water sources. Gray water reuse systems will collect waste discharge from only the following sources: bathtubs, showers, lavatories, clothes washers, and laundry trays. Water from other approved nonpotable sources including swimming pool backwash operations, air conditioner condensate, rainwater, cooling tower blow-down water, foundation drain water, steam system condensate, fluid cooler discharge water, food steamer discharge water, combination oven discharge water, industrial process water, and fire pump test water will also be permitted to be collected for reuse by gray water systems, as approved by the code official and as appropriate for the intended application.

2810.11.1.1 Prohibited gray water sources. Waste water containing urine or fecal matter will not be diverted to gray water systems and must discharge to the sanitary drainage system of the building or premises in accordance with the Plumbing Code. Water from reverse osmosis system reject water, water softener discharge water, kitchen sink waste water, dishwasher waste water, and waste water discharged from wet-hood scrubbers will not be collected for reuse within a gray water system.

2810.11.2 Traps. Traps serving fixtures and devices discharging waste water to gray water reuse systems will have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm). Where a trap seal is subject to loss by evaporation, a trap seal primer valve will be installed in accordance with the Plumbing Code.

2810.11.3 Collection pipe. Gray water reuse systems will utilize drainage piping approved for use within plumbing drainage systems to collect and convey untreated gray water. Vent piping approved for use within plumbing venting systems will be utilized for vents within the gray water system. Drains to the sanitary sewer will use approved waste piping.

2810.11.3.1 Joints. Collection piping conveying untreated gray water will utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in the Plumbing Code.

2810.11.3.2 Size. Collection piping conveying rainwater from collection surfaces will be sized in accordance with storm drainage sizing requirements specified in the Plumbing Code.
2810.11.3.3 Marking. Additional marking of untreated gray water collection piping will not be required beyond that required for sanitary drainage, waste, and vent piping by the Plumbing Code.

2810.11.4 Filtration. Collected gray water will be filtered as required for the intended end use. Filters will be accessible for inspection and maintenance. Filters will utilize a pressure gage or other approved method to provide indication when a filter requires servicing or replacement. Filters will be installed with shutoff valves installed immediately upstream and downstream to allow for isolation during maintenance.

2810.11.5 Disinfection. Where the intended application for collected gray water requires disinfection or other treatment or both, collected gray water will be disinfected as needed to ensure that the required water quality is delivered at the point of use. Where chlorine is used for disinfection or treatment, water will be tested for residual chlorine in accordance with ASTM D 1253. The levels of residual chlorine will not exceed the levels allowed for the intended use in accordance with the requirements of the jurisdiction. Untreated gray water will be retained in collection reservoirs for a maximum of 24 hours in accordance with Section 2810.11.1.6.1.

2810.11.6 Storage tank. The design of the storage tank will be in accordance with Sections 2810.11.6.1 through 2810.11.6.10.

2810.11.6.1 Sizing. The holding capacity of the storage tank will be sized in accordance with the anticipated demand. Where gray water is to be used in untreated form for groundwater recharge or subsurface irrigation, the storage tank will be sized to limit the retention time of gray water to a maximum of 24 hours.

2810.11.6.2 Location. Storage tanks will be installed above or below grade. Above-grade storage tanks will be protected from direct sunlight and will be constructed using opaque, UV-resistant materials such as, but not limited to, heavily tinted plastic, fiberglass, lined metal, concrete, wood, or painted to prevent algae growth, or will have specially constructed sun barriers including, but not limited to, installation in garages, crawlspaces, or sheds. Storage tanks and their manholes will not be located directly under any soil or waste piping or any source of contamination. Gray water storage tanks will be located with a minimum horizontal distance between various elements as indicated in Table 2810.11.6.2. Storage tanks containing untreated gray water will be
located a minimum horizontal distance of 5 feet (1524 mm) from buildings, in addition to the requirements in Table 2810.11.6.2.

**TABLE 2809.11.6.2**
LOCATION OF GRAY WATER STORAGE TANKS

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>MINIMUM HORIZONTAL DISTANCE FROM STORAGE TANK (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical root zone (CRZ) of protected trees</td>
<td>2</td>
</tr>
<tr>
<td>Lot line adjoining private lots</td>
<td>5</td>
</tr>
<tr>
<td>Seepage pits</td>
<td>5</td>
</tr>
<tr>
<td>Septic tanks</td>
<td>5</td>
</tr>
<tr>
<td>Water wells</td>
<td>50</td>
</tr>
<tr>
<td>Streams, lakes, wetlands and other bodies of water</td>
<td>50</td>
</tr>
<tr>
<td>Water service</td>
<td>5</td>
</tr>
<tr>
<td>Public water main</td>
<td>10</td>
</tr>
</tbody>
</table>

For SI 1 foot = 304.8 mm

**2810.11.6.3 Materials.** Where collected onsite, water will be collected in an approved tank constructed of durable, nonabsorbent and corrosion-resistant materials. The storage tank will be constructed of materials compatible with any disinfection systems used to treat water upstream of the tank and with any systems used to maintain water quality within the tank.

**2810.11.6.3.1 Wood tanks.** Wooden storage tanks that are not equipped with a makeup water source will be provided with a flexible liner.

**2810.11.6.4 Makeup water.** Where an uninterrupted supply of makeup water is required for the intended application, potable or municipally supplied reclaimed/recycled water will be provided as a source of makeup water for the storage tank. The potable, reclaimed or recycled water supply will be protected against backflow by means of an air gap not less than 4 inches (102 mm) above the overflow or an approved backflow device in accordance with the Plumbing Code. There will be a full-open valve located on the makeup water supply line to the storage tank. Inlets to storage tank will be controlled by fill valves or other automatic supply
valves installed so as to prevent the tank from overflowing and to prevent the water level from dropping below a predetermined point. Where makeup water is provided, the water level will not be permitted to drop below the gray water inlet or the intake of any attached pump.

**2810.11.6.5 Overflow.** The storage tank will be equipped with an overflow pipe having the same or larger area as the sum of the areas of all reservoir inlet pipes. The overflow pipe will be trapped and will be indirectly connected to the sanitary drainage system. The overflow drain will not be equipped with a shutoff valve. A minimum of one cleanout will be provided on each overflow pipe in accordance with the *Plumbing Code*.

**2810.11.6.6 Access.** A minimum of one access opening will be provided to allow inspection and cleaning of the tank interior. Access openings will have an approved locking device or other approved method of securing access. Below-grade storage tanks, located outside of the building, will be provided with either a manhole not less than 24 inches (610 mm) square or a manhole with an inside diameter not less than 24 inches (610 mm) and extending not less than 4 inches (102 mm) above ground. Finished grade will be sloped away from the manhole to divert surface water from the manhole. Each manhole cover will have a locking device. Service ports in manhole covers will be not less than 8 inches (203 mm) in diameter and will be not less than 4 inches (102 mm) above the finished grade level. The service port will have a locking cover or a brass cleanout plug.

**Exception:** Storage tanks under 800 gallons (3024 L) in volume installed below grade will not be required to be equipped with a manhole, but will have a service port not less than 8 inches (203 mm) in diameter.

**2810.11.6.7 Venting.** The tank will be provided with a vent sized in accordance with the *Plumbing Code* and based on the diameter of the tank influent pipe. The reservoir vent will not be connected to sanitary drainage vent system.

2810.11.6.8 Outlets. Outlets will be located not less than 4 inches (102 mm) above the bottom of the storage tank, and will not skim water from the surface.

2810.11.6.9 Drain. A drain will be located at the lowest point of the storage tank and will be indirectly connected to the sanitary drainage system. The total area of all drains will not be smaller than the total area
of all overflow pipes. Not less than one cleanout will be provided on each drain pipe in accordance with the *Plumbing code*.

**2810.11.6.10 Signage.** Each storage tank will be marked with its rated capacity and the location of the upstream bypass valve. The contents of storage tanks will be identified with the words "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Where an opening is provided that could allow the entry of personnel, the opening will be marked with the words, "DANGER – CONFINED SPACE." Markings will be indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material mounted on the tank or will be indelibly printed on the tank. The letters of the words must be not less than 0.5 inches (13 mm) in height and will be of a color in contrast with the background on which they are applied.

**2810.11.7 Valves.** Valves will be supplied in accordance with Sections 2810.11.7.1 and 2810.11.7.2.

**2810.11.7.1 Bypass valve.** One three-way diverter valve listed and labeled to NSF 50 or other approved device will be installed on gray water collection piping upstream of each storage tank, or drainfield, as applicable, to divert untreated gray water sources to the sanitary sewer to allow servicing and inspection of the system. Bypass valves will be installed downstream of fixture traps and vent connections. Bypass valves will be marked to indicate the direction of flow, connection and storage tank or drainfield connection. Bypass valves will be installed in accessible locations. Two shutoff valves will not be installed to serve as a bypass valve.

**2810.11.7.2 Backwater valve.** Overflow and tank drain piping will be protected against backwater conditions by the installation of one or more backwater valves. Backwater valves will be installed so that access is provided to the working parts for service and repair.

**2810.11.8 Vent piping.** Storage tanks will be provided with a vent in accordance with the requirements of Section 2810.11.6.8. Vents will be sized in accordance with the *Plumbing Code*, based on the aggregate diameter of storage tank influent pipes. Open vents will be protected from contamination by means of a U-bend installed with the opening directed downward or an approved cap. Vent outlets will extend not less than 4 inches (102 mm) above grade, or as necessary to prevent surface water from entering the storage tank. Vent openings will be protected against
the entrance of vermin and insects in accordance with the requirements of Section 2809.8.

2810.11.9 Pumping and control system. Mechanical equipment including pumps, valves and filters will be accessible and removable in order to perform repair, maintenance and cleaning. Pressurized water will be supplied at a pressure appropriate for the application and within the range specified by the Plumbing Code. Where water could be supplied at an excessive pressure, a pressure-reducing valve will be installed in accordance with the requirements of the Plumbing Code.

2810.11.9.1 Standby power. Where required for the intended application, automatically activated standby power, capable of powering all essential treatment and pumping systems under design conditions will be provided.

2810.11.9.2 Inlet control valve alarm. Makeup water systems will be provided with a warning mechanism that alerts the user to a failure of the inlet control valve to close correctly. The alarm will activate before the water within the collection reservoir storage tank begins to discharge into the overflow system.

2810.11.9.3 Water-pressure-reducing valve or regulator. Where the gray water pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve will be installed to reduce the pressure in the gray water distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves will be specified and installed in accordance with the Plumbing Code.

2810.11.10 Distribution pipe. Distribution piping will comply with Sections 2810.11.10.1 through 2810.11.10.4.

2810.11.10.1 Materials. Distribution piping conveying gray water will conform to standards and requirements specified by the Plumbing Code.

2810.11.10.2 Joints. Distribution piping conveying gray water will utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in the Plumbing Code.

2810.11.10.3 Size. Distribution piping conveying gray water will be sized in accordance with the Plumbing Code for the intended application or applications.
2810.11.10.4 Marking. All gray water distribution piping will be either the color purple and embossed or integrally stamped or marked "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or will be installed with a purple identification tape or wrap. Identification tape will be not less than 3 inches (76 mm) wide and have white or black lettering on purple field stating "CAUTION: NONPOTABLE WATER – DO NOT DRINK.” Identification tape will be installed on top of gray water distribution pipes, fastened not greater than every 10 feet (3048 mm) to each pipe length and run continuously the entire length of the pipe. Lettering will be readily observable within the room or space where the piping is located.

Exception: Outside of the building, purple piping is not required downstream of the backflow preventer where gray water is used for outdoor applications.

2810.12 Tests and inspections. Tests and inspections will be performed in accordance with Sections 2810.12.1 through 2810.12.8.

2810.12.1 Drainage and vent test. A pressure test will be applied to the gray water collection piping, overflow piping, storage tank drainage piping and tank vent piping in accordance with the Plumbing Code.

2810.12.2 Drainage and vent final test. A final test will be applied to the gray water collection piping, overflow piping, and tank vent piping in accordance with the Plumbing Code.

2810.12.3 Water supply system test. The testing of makeup water supply piping and rainwater distribution piping will be conducted in accordance with the Plumbing Code.

2810.12.4 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and backwater valves will be conducted in accordance with the Plumbing Code.

2810.12.5 Inspection vermin and insect protection. Inlets and vents to the system will be inspected to verify that each is protected to prevent the entrance of insects and vermin into the storage tank and piping systems in accordance with Section 2809.7.

2810.12.6 Storage tank tests. Storage tanks will be tested in accordance with all of the following:
1. Storage tanks will be filled with water to the overflow line prior to and during inspection. All seams and joints will be left exposed and the tank will remain water tight without leakage for a period of 24 hours.

2. After 24 hours, supplemental water will be introduced for a period of 15 minutes to verify proper drainage of the overflow system and verify that there are no leaks.

3. Following the successful test of the overflow, the water level in the tank will be reduced to a point that is 2 inches (51 mm) below the makeup water trigger point using the tank drain. The tank drain will be observed for proper operation. The makeup water system will be observed to verify proper operation, and successful automatic shutoff of the system at the refill threshold. Water will not be drained from the overflow at any time during the refill test.

2810.12.7 Supply pressure test. The static water pressure at the point of use furthest from the supply will be verified to be within the range required for the application, in accordance with Section 2809.11.9.

2810.12.8 Water quality test. The quality of the water for the intended application will be verified at the point of use in accordance with the requirements of the jurisdiction.

2810.13 Subsurface gray water irrigation systems. Gravity subsurface gray water irrigation systems, where provided in accordance with Section 2804.1.1, will be designed and installed in accordance with Sections 2810.13.1 through 2810.13.6. Gray water collection and storage systems will comply with this section and the provisions of Section 2809 except for Sections 2810.5 and 2810.11.6.4.

2810.13.1 Estimating gray water discharge. The irrigation system will be sized in accordance with the gallons-per-day-per-occupant number based on the type of fixtures connected to the gray water system. The discharge will be calculated by the following equation:

\[ C = (A \times B) - D \]  \hspace{1cm} \text{(Equation 28-1)}

where:

\[ A = \text{Number of occupants:} \]
Residential—For dwelling units, the number of occupants will be determined by the actual number of occupants, but not less than two occupants for one bedroom and one occupant for each additional bedroom.

Commercial—Number of occupants for buildings without dwelling units will be determined by the *International Building Code*.

\[ B = \text{Estimated flow demands for each occupant} \]

Residential—For dwelling units, 25 gallons per day (94.6 Lpd) per occupant for showers, bathtubs and lavatories and 15 gallons per day (56.7 Lpd) per occupant for clothes washers or laundry trays.

Commercial—For buildings, without dwelling units, based on type of fixture or water use records minus the discharge of fixtures other than those discharging gray water.

\[ C = \text{Estimated gallons (L) of gray water discharge based on the total number of occupants} \]

\[ D = \text{Estimated gallons (L) of gray water to be used within the interior of the building} \]

### 2810.13.2 Percolation tests

The permeability of the soil in the proposed absorption system will be determined by percolation tests or permeability evaluation.

### 2810.13.2.1 Percolation tests and procedures

Not less than three percolation tests in each system area will be conducted. The holes will be spaced uniformly in relation to the bottom depth of the proposed absorption system. Additional percolation tests will be made where necessary, depending on system design.

### 2810.13.2.1.1 Percolation test hole

The test hole will be dug or bored. The test hole will have vertical sides and a horizontal dimension of 4 inches to 8 inches (102 mm to 203 mm). The bottom and sides of the hole will be scratched with a sharp-pointed instrument to expose the natural soil. All loose material will be removed from the hole and the bottom will be covered with 2 inches (51 mm) of gravel or coarse sand.
2810.13.2.1.2 Test procedure, sandy soils. The hole will be filled with clearwater to a depth of not less than 12 inches (305 mm) above the bottom of the hole for tests in sandy soils. The time for this amount of water to seep away will be determined, and this procedure will be repeated if the water from the second filling of the hole seeps away in 10 minutes or less. The test will proceed as follows:

1. Water will be added to a point not more than 6 inches (152 mm) above the gravel or coarse sand.

2. Thereupon, from a fixed reference point, water levels will be measured at 10-minute intervals for a period of 1 hour.

3. Where 6 inches (152 mm) of water seeps away in less than 10 minutes, a shorter interval between measurements will be used, but in no case will the water depth exceed 6 inches (152 mm). Where 6 inches (152 mm) of water seeps away in less than 2 minutes, the test will be stopped and a rate of less than 3 minutes per inch (7.2 s/mm) will be reported.

4. The final water level drop will be used to calculate the percolation rate.

Soils not meeting the above requirements will be tested in accordance with Section 2810.13.2.1.3.

2810.13.2.1.3 Test procedure, other soils. The hole will be filled with clear water, and a water depth of not less than 12 inches (305 mm) will be maintained above the bottom of the hole for a 4-hour period by refilling whenever necessary or by use of an automatic siphon. Water remaining in the hole after 4 hours will not be removed. Thereafter, the soil will be allowed to swell not less than 16 hours or more than 30 hours. Immediately after the soil swelling period, the measurements for determining the percolation rate will be made as follows:

1. Any soil sloughed into the hole will be removed and the water level will be adjusted to 6 inches (152 mm) above the gravel or coarse sand.

2. From a fixed reference point, the water level will be measured at 30-minute intervals for a period of 4 hours, unless two successive water level drops do not vary by more than $\frac{1}{16}$ inch (1.59 mm). Not less than three water level drops will be observed and recorded.
3. The hole will be filled with clear water to a point not more than 6 inches (152 mm) above the gravel or coarse sand whenever it becomes nearly empty. Adjustments of the water level will not be made during the three measurement periods except to the limits of the last measured water level drop.

4. When the first 6 inches (152 mm) of water seeps away in less than 30 minutes, the time interval between measurements will be 10 minutes and the test run for 1 hour. The water depth will not exceed 5 inches (127 mm) at any time during the measurement period.

5. The drop that occurs during the final measurement period will be used in calculating the percolation rate.

2810.13.2.1.4 Mechanical test equipment. Mechanical percolation test equipment will be of an approved type.

2810.13.3 Permeability evaluation. Soil will be evaluated for estimated percolation based on soil structure and texture in accordance with accepted soil evaluation practices. Borings will be made in accordance with Section 2810.13.2.1 for evaluating the soil.

2810.13.4 Subsurface landscape irrigation site location. The surface grade of all soil absorption systems will be located at a point lower than the surface grade of any water well or reservoir on the same or adjoining lots. Where this is not possible, the irrigation system will be located so that surface water drainage from the building site is not directed toward a well or reservoir. The soil absorption system will be located with a minimum horizontal distance between various elements as indicated in Table 2810.13.4 and as provided in Section 2810.11.6.2. Surface water will be diverted away from any soil absorption site on the same or adjoining lots.

<table>
<thead>
<tr>
<th>TABLE 2810.13.4</th>
<th>LOCATION OF GRAY WATER SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEMENT</strong></td>
<td><strong>MINIMUM HORIZONTAL DISTANCE (feet) TO IRRIGATION DISPOSAL FIELD</strong></td>
</tr>
<tr>
<td>Buildings</td>
<td>2</td>
</tr>
</tbody>
</table>

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Lot lines other than lot lines adjoining public ways & 5 \\
Water wells & 100 \\
Streams, lakes, wetlands other bodies of water & 100 \\
Critical root zone (CRZ) of protected trees & 2 \\
Seepage pits & 5 \\
Septic tanks & 5 \\
Water service & 5 \\
Public water main & 10

For SI: 1 foot = 304.8 mm.

**2810.13.5 Installation.** Absorption systems will be installed in accordance with Sections 2810.13.5.1 through 2810.13.5.5 to provide landscape irrigation without surfacing of gray water. Excavations will not encroach upon the critical root zone (CRZ) of protected trees.

**2810.13.5.1 Absorption area.** The total absorption area required will be computed from the estimated daily gray water discharge and the design-loading rate based on the percolation rate for the site. The required absorption area equals the estimated gray water discharge divided by the design-loading rate from Table 2810.13.5.1.

**TABLE 2810.13.5.1**

<table>
<thead>
<tr>
<th>PERCOLATION RATE (minutes per inch)</th>
<th>DESIGN LOAD FACTOR (gallons per square foot per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>1.2</td>
</tr>
<tr>
<td>10 to less than 30</td>
<td>0.8</td>
</tr>
<tr>
<td>30 to less than 45</td>
<td>0.72</td>
</tr>
<tr>
<td>45 and greater</td>
<td>0.4</td>
</tr>
</tbody>
</table>

For SI: 1 minute per inch – min/25.4mm, 1 gallon per square foot – 40.7 L/m².

**2810.13.5.2 Seepage trench excavations.** Seepage trench excavations will be not less than 1 foot (304 mm) and not greater than 5 feet (1524 mm) wide. Trench excavations will be spaced not less than 2 feet (610 mm) apart. The soil absorption area of a seepage trench will be computed
by using the bottom width of the trench multiplied by the length of pipe. Individual seepage trenches will not exceed 100 feet (30 480 mm) in developed length.

2810.13.5.3 Seepage bed excavations. Seepage bed excavations will be not less than 5 feet (1524 mm) wide and will have more than one distribution pipe. The absorption area of a seepage bed will be computed by using the bottom of the trench area. Distribution piping in a seepage bed will be uniformly spaced a not greater than 5 feet (1524 mm) and not less than 3 feet (914 mm) apart, and not greater than 3 feet (914 mm) and not less than 1 foot (305 mm) from the sidewall or headwall.

2810.13.5.4 Excavation and construction. The bottom of a trench or bed excavation will be level. Seepage trenches or beds will not be excavated where the soil is so wet that such material rolled between the hands forms a soil wire. All smeared or compacted soil surfaces in the sidewalls or bottom of seepage trench or bed excavations will be scarified to the depth of smearing or compaction and the loose material removed. Where rain falls on an open excavation, the soil will be left until sufficiently dry so a soil wire will not form when soil from the excavation bottom is rolled between the hands. The bottom area will then be scarified and loose material removed.

2810.13.5.5 Aggregate and backfill. Not less than a 6-inch-thick (152 mm) layer of aggregate ranging in size from 1/2 to 2 1/2 inches (12.7 mm to 64 mm) will be laid into the trench below the distribution piping elevation. The aggregate will be evenly distributed in a layer not less than 2 inches (51 mm) thick over the top of the distribution pipe. The aggregate will be covered with approved synthetic materials. Building paper will not be used to cover the aggregate. Not less than 9 inches (229 mm) of soil backfill will be placed on top of the synthetic material.

2810.13.6 Distribution piping. Distribution piping will be not less than 3 inches (76 mm) in diameter. The top of the distribution pipe will be not less than 8 inches (203 mm) below the original surface. The slope of the distribution pipes will be not less than 2 inches (51 mm) and not greater than 4 inches (102 mm) per 100 feet (30 480 mm).

2810.14 Operation and maintenance manuals. Operations and maintenance materials will be supplied with gray water systems in accordance with Sections 2810.14.1 through 2810.14.4.
2810.14.1 Manual. A detailed operations and maintenance manual will be supplied in hardcopy form with all gray water systems.

2810.14.2 Schematics. The manual will include a detailed system schematic, locations of all system components, and a list of all system components including manufacturer and model number.

2810.14.3 Maintenance procedures. The manual will provide a maintenance schedule and procedures for all system components requiring periodic maintenance. Consumable parts including filters will be noted along with part numbers.

2810.14.4 Operations procedures. The manual will include system startup and shutdown procedures. The manual will include detailed operating procedures for the system.

2811 - RECLAIMED WATER SYSTEMS

2811.1 Scope. The provisions of this section will govern the construction, installation, alteration, and repair of systems supplying nonpotable reclaimed water.

2811.2 Permits. Permits will be required for the construction, installation, alteration, and repair of gray water systems. Construction documents, engineering calculations, diagrams, and other such data pertaining to the gray water system will be submitted with each application for permit in accordance to ROH Chapter 18 and Section 107.2.

2811.3 Potable water connections. Connections between a reclaimed water system and a potable water system will be protected against backflow in accordance with the Plumbing Code.

2811.4 Installation. Except as provided for in this section, systems will be installed in compliance with the provisions of the Plumbing Code and the manufacturer’s instructions, as applicable.

2811.5 Applications. Reclaimed water will be utilized in accordance with Section 2808 and the State of Hawaii, Department of Health, Administrative Rules.

2811.5.1 Reclaimed water for landscape irrigation. Reclaimed water used for landscape irrigation purposes will be limited to subsurface
applications. Reclaimed water used in irrigation systems will comply with the provisions of Section 2811 except for Section 2811.5. Reclaimed water will be filtered by a 0.004-inch (100 micron) or finer filter. The control panel for the reclaimed water irrigation system will be provided with signage in accordance with Section 2807.2.

**Exception:** Subject to the approval of the code official based on the extent of purification occurring in reclamation process, reclaimed water will be permitted in sprinkler irrigation applications.

2811.6 Approved components and materials. Piping, plumbing components, and material used in the reclaimed water systems will be manufactured of material approved for the intended application.

2811.7 Water-pressure-reducing valve or regulator. Where the reclaimed water pressure supplied to the building exceeds 80 psi (552 kPa) static, a pressure-reducing valve will be installed to reduce the pressure in the reclaimed water distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves will be specified and installed in accordance with the Plumbing Code.

2911.8 Trenching requirements. Water service piping, including piping containing reclaimed water, will be separated from the building sewer by 5 feet (1524 m) of undisturbed or compacted earth. Reclaimed water piping will be separated from potable water piping underground by 5 feet (1524 m) of undisturbed or compacted earth. Reclaimed water service pipes will not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried reclaimed water piping will comply with the requirements of the Plumbing Code or the Standard Details for Public Works Construction of the City and County of Honolulu for support, trenching, bedding, backfilling and tunneling.

**Exceptions:**

1. The required separation distance will not apply where the bottom of the reclaimed water service pipe within 5 feet (1524 mm) of the sewer is not less than 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials comply with the requirements of the Plumbing Code for the application.

2. The required separation distance will not apply where the bottom of the potable water service pipe within 5 feet (1524 mm) of the reclaimed
water pipe is not less than 12 inches (305 mm) above the top of the highest point of the reclaimed water pipe and the pipe materials comply with the requirements of the *Plumbing Code* for the application.

3. Water service pipe is permitted to be located in the same trench with a building sewer, provided such sewer is constructed of materials that comply with the requirements of the *Plumbing Code* for the application.

4. The required separation distance will not apply where a potable or nonpotable water service pipe crosses a sewer pipe provided the water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the *Plumbing Code* for the application.

5. The required separation distance will not apply where a potable water service pipe crosses a reclaimed water pipe provided the potable water service pipe is sleeved to not less than 5 feet (1524 mm) horizontally from the reclaimed water pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the *Plumbing Code* for the application.

2811.9 Reclaimed water systems. The design of the reclaimed water systems will conform to ASTM E 2635 and accepted engineering practice.

2811.9.1 Distribution pipe. Distribution piping will comply with Sections 2811.9.1.1 through 2811.9.1.4.

2811.9.1.1 Materials. Distribution piping conveying reclaimed water will conform to standards and requirements specified by the *Plumbing Code*.

2811.9.1.2 Joints. Distribution piping conveying reclaimed water will utilize joints approved for use with the distribution piping and appropriate for the intended applications as specified in the *Plumbing Code*.

2811.9.1.3 Size. Distribution piping conveying reclaimed water will be sized in accordance with the *Plumbing Code* for the intended application.

2811.9.1.4 Marking. Reclaimed water distribution piping will be either the color purple and embossed or integrally stamped or marked "CAUTION: NONPOTABLE WATER – DO NOT DRINK" or be installed with a purple identification tape or wrap. Identification tape will be not less than 3
inches (76 mm) wide and have white or black lettering on purple field stating "CAUTION: NONPOTABLE WATER – DO NOT DRINK." Identification tape will be installed on top of reclaimed water distribution pipes, fastened not greater than every 10 feet (3048 mm) to each pipe length and run continuously the entire length of the pipe. Lettering will be readily observable within the room or space where the piping is located.

Exception: Outside of the building, purple piping is not required downstream of the backflow preventer where reclaimed water is used for outdoor applications.

2811.10 Tests and inspections. Tests and inspections will be performed in accordance with Sections 2811.10.1 and 2811.10.2.

2811.10.1 Water supply system test. The testing of makeup water supply piping and reclaimed water distribution piping will be conducted in accordance with the Plumbing Code.

2811.10.2 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers will be conducted in accordance with the Plumbing Code.

2812 - ALTERNATE ONSITE NONPOTABLE WATER SOURCES

2812.1 Alternate nonpotable sources of water. Other onsite sources of nonpotable water including, but not limited to, stormwater, reverse osmosis reject water, foundation drain water and swimming pool backwash water, will be permitted to be used for nonpotable uses provided that they have been treated to the quality level necessary for their intended use and in accordance with requirements of the State of Hawaii, Department of Health, Administrative Rules.

(144) Subsection 2901.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

2901.1 Scope. Plumbing systems will comply with the Plumbing Code.

(145) Subsection 2901.2 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 2901.2 reads as follows:

2901.2 The provisions of this Chapter will apply to new construction.
(146) Subsection 3001.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**3001.1 Scope.** This chapter governs the design and construction of the building elements for elevator and conveying systems. The design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components are regulated by the State of Hawaii, Department of Labor and Industrial Relations, Hawaii Occupational Safety and Health Division, Boiler and Elevator Inspection Branch.

(147) Subsection 3007.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to include an Exception to read:

**3007.1 General.** Where required by Section 403.6.1, every floor above and including the lowest level of fire department vehicle access of the building shall be served by fire service access elevators complying with Sections 3007.1 through 3007.9. Except as modified in this section, fire service access elevators shall be installed in accordance with this chapter and ASME A17.1/CSA B44.

**Exception:** Elevators that only service an open or enclosed parking garage and the lobby of the building shall not be required to serve as fire service access elevators.

(148) Subsection 3007.7.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to include two Exceptions to read:

**3007.7.1 Access to interior exit stairway or ramp.** The enclosed fire service access elevator lobby shall have direct access from the enclosed elevator lobby to an enclosure for an interior exit stairway or ramp.

**Exception:**

1. Access to an interior exit stairway or ramp shall be permitted to be through a protected path of travel that has a level of fire protection not less than the elevator lobby enclosure. The protected path shall be separated from the enclosed elevator lobby through an opening protected by a smoke and draft control assembly in accordance with Section 716.5.3.1.

2. Access is permitted from an exterior exit stairway as ramp or provided.
(149) Subsection 3103.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**3103.1 General.** See ROH Section 18-3.4.

(150) Subsection 3105.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to include two Exceptions to read:

**3105.3 Design and construction.** Awnings and canopies will be designed and constructed to withstand wind or other lateral loads and live loads as required by Chapter 16 with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members will be protected to prevent deterioration. Awnings will have frames of noncombustible material, fire-retardant-treated wood, wood of Type IV sizes, or 1-hour construction with combustible or noncombustible covers and will be either retractable, folding or collapsible. When collapsed, retracted or folded, the design will be such that the awning does not block any required exit.

Exceptions:

1. A fixed awning not more than 10 feet (3048 mm) in length may be erected over a doorway to the building.

2. Fixed awnings at the first floor projecting not more than 6 feet (1829 mm) from the face of the building may be erected over windows along the street.

(151) Subsections 3106.1 thru 3106.5 of the IBC, adopted by the Building Code of the State of Hawaii, are amended to read:

**3106.1 General.** For the purpose of this section, a marquee will include any object or decoration attached to or a part of said marquee, except a sign as defined in ROH Section 21-7.20.

**3106.2 Thickness.** The maximum height or thickness of a marquee measured vertically from its lowest to its highest point will not exceed 3 feet (914 mm).
3106.3 Roof construction. Where the roof or any part thereof is a skylight, the skylight will comply with the requirements of Chapter 24 of this code. Plastic skylights will comply with Section 2610.

Every roof and skylight of a marquee over a public right-of-way will be sloped to downspouts which will conduct any drainage from the marquee under the sidewalk to the curb.

3106.4 Location prohibited. Every marquee will be so located as not to interfere with the operation of any exterior standpipe or to obstruct the clear passage of stairways or exits from the building or the installation or maintenance of street lighting.

3106.5 Construction. A marquee will be supported entirely from the building and will be constructed entirely of noncombustible materials.

Exception: Drop-off curtains may be suspended below the exterior periphery provided a minimum clearance of 7 feet (2134 mm) from the sidewalk below is maintained.

(152) Subsection 3107.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3107.1 General. Signs shall be designed, constructed and maintained in accordance with this code. Signs will conform to ROH Chapter 21.

(153) Subsection 3109.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3109.1 General. Swimming pools shall comply with the requirements of Section 3109.2 through 3109.5 and other applicable sections of this code. These provisions are applicable to the design and construction of public swimming and wading pools. Those pools covered by these regulations include municipal, institutional, hotel, apartment and similar type occupancies; and hydrotherapy spas, therapeutic pools and special pools of similar type usage. Also covered are swimming pools, spas and hot tubs for one-family and two-family dwelling, and similar type pools; and ornamental pools.

(154) Subsection 3109.4 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:
Section 3109.4 Residential swimming pools. Residential swimming pools are accessory to R-3 residential occupancies. Residential swimming pools will conform to Sections 3109.4.1 through 3109.4.3 and to ROH Chapter 16, Article 6.

(155) Subsection 3202.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3202.2 Balconies, sun-control devices and appendages. Projections such as roof eaves, cornices, sun-control devices, belt courses, and appendages such as water tables, sills, capitals, bases, and architectural projections which cannot be occupied or used, may project over the public street of the building site a distance as determined by the clearance of the lowest point of the projection above the grade immediately below, as follows:

Clearance above grade less than 8 feet (2438 mm) – no projection is permitted greater than 4 inches (102 mm).

Clearance above the grade 8 feet (2438 mm) and over – one inch of projection is permitted for each additional inch of clearance provided that no such projection will exceed a distance of 4 feet (1219 mm).

Roof eaves will be sloped to downspouts and/or gutters leading back to the building which will conduct any drainage under the sidewalk area through the curb to the street gutter. A drain connection permit may be required.

(156) Subsection 3202.2.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3202.2.3 Awnings. Awnings may extend over public property not more than 7 feet (2134 mm) from the face of a supporting building, but no portion will extend nearer than 30 inches (762 mm) to the face of the nearest curb line measured horizontally. In no case will the awning extend over the public property greater than two thirds of the distance from the property line to the nearest curb in front of the building. All portions of any awning will be at least 8 feet (2438 mm) above any public walkway.

Exception: Any valance attached to an awning will not project above the roof of the awning at the point of attachment and will not extend more than 12 inches (305 mm) below the roof of the awning at the point of
attachment, but in no case will any portion of a valance be less than 7 feet (2134 mm) in height above a public way.

(157) Subsection 3202.3.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**3202.3.1 Marquees.** Marquees will project not more than three fourths of the distance from the property line to the face of the curb but in no case reach within 30 inches (762 mm) of the face of the curb. There will be a minimum of 8 feet (2438 mm) vertical clearance between the lowest point of any marquee to the sidewalk below.

(158) Subsection 3202.3.5 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 3202.3.5 reads as follows:

**3202.3.5 Doors.** No door, either fully opened or when opening, will project beyond the property line.

(159) Subsection 3202.5 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 3202.5 reads as follows:

**3202.5 Encroachments within the public right-of-way.** Encroachments below and at grade within the public right-of-way will conform to the requirements of ROH Chapter 14.

(160) Section 3305 of the IBC, adopted by the Building Code of the State of Hawaii, is deleted.

(161) Subsection 3306.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding the following Exception:

**Exception:** Not applicable to construction in preservation, agricultural and residential districts except when required by the building official.

(162) Subsection 3306.5 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**3306.5 Barriers.** Barriers shall be not less than "6 feet (1829 mm) in height and shall be placed on the side of the walkway nearest the construction. Barriers shall extend the entire length of the construction site. Openings in such barriers shall be protected by doors which are normally kept closed. Viewing panels shall be provided in barriers at a
rate of one for every 25 linear feet (7.6m) per frontage, with a minimum of one per frontage. Viewing panels shall be 12 x 12 inches (305 x 305 mm) in size and shall be blocked with plexiglass or an equivalent nonfrangible material. The top of the viewing panel shall be located no more than 6 feet (1829 mm) above the level of the ground, and the bottom of the viewing panel shall be located no less than 3 feet (914 mm) above the level of the ground.

(163) Subsection 3306.10 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 3306.10 reads as follows:

3306.10 Watchman. A watchman will be employed to warn the general public when intermittent hazardous operations are conducted on or above the sidewalk.

(164) Subsection 3307.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a second and third paragraph to read as follows:

The owner and contractor doing the excavation or fill will be responsible to implement safety measures, to include but not be limited to, safety nets, retaining walls or fences, and berms or trenches, to prevent falling rocks, boulders, soil, debris and other dangerous objects from falling, sliding or flowing onto adjoining properties, streets or natural watercourses, or otherwise causing injury or damage to persons or property.

If proposed excavation and backfill work does not require a grading permit under ROH Chapter 14, the building official, if deemed necessary to protect or promote public safety, may require the submittal of an engineering slope hazard report.

(165) Subsection 3308.1.2 is added to the IBC, adopted by the Building Code of the State of Hawaii. The added Subsection 3308.1.2 reads as follows:

3308.1.2 Lighting. Any material or structure temporarily occupying public property, including fences and walkways, which creates a hazard to the public, will be adequately lighted between sunset and sunrise.

(166) Subsection 3308.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3308.2 Utility fixtures. Building materials, fences, sheds or any obstruction of any kind will not be placed so as to obstruct free approach
A BILL FOR AN ORDINANCE

...to any fire hydrant, fire department connection, utility pole, manhole, fire alarm box, or catch basin, or so as to interfere with the passage of water in the gutter, without permission from the agency having jurisdiction. Protection against damage will be provided to such utility fixtures during the progress of the work, but sight of them will not be obstructed. This protection will be maintained while such work is being done and will not obstruct the normal functioning of the device.

(167) Subsection 3309.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read as follows:

3309.2 Fire Hazards. The provisions of this code and the Fire Code shall be strictly observed to safe-guard against all the fire hazards attendant upon construction operations.

(168) Subsection 3401.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended by adding a second Exceptions to reads as follows:

Exception:

1. Existing bleachers, grandstands, and folding and telescopic seating will comply with ICC 300.

2. Conformance with the requirements of ROH Chapter 16, Article 9 International Existing Building Code as amended will be accepted in lieu of this chapter.

(169) Subsection 3401.3 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3401.3 Compliance. Alterations, repairs, additions, and changes of occupancy to, or relocation of existing buildings and structures will comply with the provisions for alteration, repair, additions and changes of occupancy or relocations, respectively, in ROH Chapters 32 (Building Energy Conservation Code), 20 (Fire Code), 19 (Plumbing Code), 16 (Article 1.2, Residential Code), and 17 (Electrical Code). Where provisions of the other codes conflict with provisions of this chapter, the provisions of this chapter will take precedence.

(170) Subsection 3403.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:
3403.2 Flood hazard areas. For existing buildings and structures in flood hazard areas, see ROH Chapter 21A.

(171) Subsection 3404.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3404.2 Flood hazard areas. For existing buildings and structures in flood hazard areas, see ROH Chapter 21A.

(172) Subsection 3407.1 of the Building Code of the State of Hawaii, is amended to read:

3407.1 Conformance. The installation or replacement of glass for new installations will be as required by Chapter 24 of this code.

(173) Subsection 3409.2 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3409.2 Flood hazard areas. For existing buildings and structures in flood hazard areas, see ROH Chapter 21A.

(174) Subsection 3411.1 of the IBC, adopted by the Building Code of the State of Hawaii, is amended to read:

3411.1 Scope. The provisions of Sections 3411.1 through 3411.9 apply to maintenance, change of occupancy, additions and alterations to existing buildings, including those identified as historic buildings.

Conformance with the design and construction requirements of the Americans with Disabilities Act Accessibility Guidelines administered by the Department of Justice or the Fair Housing Act Accessibility Guidelines administered by the Department of Housing and Urban Development will be equivalent to meeting the accessibility of this code. At the time of submittal of an application for a building permit, the applicant will state on the plans that the project is subject to the above requirements.

(175) Chapter 35 (Referenced Standard) - AISC of the IBC, adopted by the Building Code of State of Hawaii, is amended to read:
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Standard reference number | Title                                                                 | Referenced in code section number
----------------------------|----------------------------------------------------------------------|-----------------------------------
AISI S230-15               | Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-Family Dwellings | 1609.1.1, 1609.1.1.1, 2211.7

(176) Chapter 35 (Referenced Standard) - BWS of the IBC, adopted by the Building Code of the State of Hawaii, is added to the Referenced Standard immediately following the Referenced Standard BHMA to read:

Standard reference number | Title                                                   | Referenced in code section number
----------------------------|--------------------------------------------------------|-----------------------------------
BWS-WWS-2002               | Board of Water Supply, Water System Standards 2002     | 503.3.2                           
SDPWC-1984                 | Standard Details for Public Works Construction, September 1984 | 2807.1, 2807.9, 2807.10, 2807.12 
SDS                        | Rules Relating to Storm Drainage Standards, December 2012 | 2808.9                            

(177) Chapter 35 (Referenced Standard) - ICC of the IBC, adopted by the Building Code of the State of Hawaii, Standard Reference numbers AISI S230 and ICC 600 are amended to read:

Standard reference number | Title                                                                 | Referenced in code section number
----------------------------|----------------------------------------------------------------------|-----------------------------------
ICC 600-14                  | Standard for Residential Construction in High-wind Regions           | 1609.1.1, 1609.1.1.1, 2308.2.1

(178) Chapter 35 (Standard Reference) – 30A-12 of the IBC, adopted by the Building Code of the State of Hawaii, is added to the Reference Standard (NFPA) immediately after Standard Reference Number 30-12 to read:

Standard reference number | Title                                                                 | Referenced in code section number
----------------------------|----------------------------------------------------------------------|-----------------------------------
30A-12                      | Code for Motor Fuel Dispensing Facilities and Repair Garages         | 406.8.8.1                         

159
(179) Subsection R101.1 of the Building Code of the State of Hawaii, is amended to read:

**R101.1 Title.** These provisions will be part of the Building Code of the City and County of Honolulu, and will be referred to herein as "the Residential Code."

(180) Subsection R101.2 of the Building Code of the State of Hawaii, is amended to read:

**R101.2 Scope.** The provisions of the International Residential Code for One- and Two-Family Dwellings will be permitted as an alternative to the International Building Code to 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 multiple single-family dwellings (townhouses) not more than two stories in height with a separate means of egress and their accessory structures. A townhouse is a single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides. For patio covers the provisions of Appendix H are made a part of the Residential Code. For R-3 one- and two-family dwellings used as care homes the provisions of Appendix M are made a part of the Residential Code.

(181) Subsection R102.7 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R102.7 Existing structures.** The legal occupancy of any structure existing on the date of adoption of this code will be permitted to continue without change, except as is specifically covered in this code or the Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public.

(182) Subsection R103.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R103.1 General.** Code enforcement agency will be in accordance with International Building Code Section 103.
(183) Subsection R104.11 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

The building official must be permitted to use the most current code edition or standard of the International Code Council or other approved national standard as an alternative to meeting the requirements of this code.

(184) Subsection R105.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R105.1 Required.** A building permit is required to perform work covered by this code as provided in ROH Chapter 18.

(185) Subsection R105.8 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R105.8 Responsibility.** It will be the duty of every person who performs work for the installation, alteration, or repair of building, structure, electrical, gas, mechanical or plumbing systems, for which this code is applicable, to comply with this code.

(186) Subsection R106.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R106.1 Submittal documents.** See ROH Chapter 18. In addition to the requirements of the plot plan required in ROH Chapter 18, the construction documents submitted with the application for permit will be accompanied by a site plan showing to scale the size and location of new
construction and exiting structures on the site plan showing to scale the size of and location of the new construction and distances from lot lines. In the case of demolition, the site plans will show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot.

(187) Subsection R106.1.3 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R106.1.3 Information for construction in flood hazard areas.** For buildings and structures in flood hazard areas as established by ROH Chapter 21A, construction documents will 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 willow 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

4. If design flood elevations are not included on the community’s Flood Insurance Rate Map (FIRM), the applicant will submit a flood study, flood data, and other pertinent information as required by ROH Section 21, prepared by a licensed design professional to the director.

(188) Subsection R107.5 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R107.5 reads as follows:

**R107.5 Stormwater management.** Stormwater management systems, including but not limited to, infiltration, evapo-transpiration, rainwater harvest and runoff reuse will be provided and maintained on the building site.

**R107.5.1 Increased runoff.** Stormwater management systems will address the increase in runoff that would occur resulting from development on the building site and will either:

1. Manage rainfall onsite and size the management system to retain not less than the volume of a single storm that is equal to the 95th –
percentile rainfall event as recorded by the National Climate Data Center or other approved precipitation records and all smaller storms and maintain the predevelopment natural runoff; or

2. Maintain or restore the predevelopment stable, natural runoff hydrology of the site throughout the development or redevelopment process. Post-construction runoff rate, volume, and duration will not exceed predevelopment rates. The stormwater management system design will be based, in part on a hydrologic analysis of the building site.

**R107.5.2 Soil and water quality protection.** Soil and water quality will be protected in accordance to ROH Chapter 14, and the Rules Relating to Water Quality of the Administrative Rules, Title 20, Department of Planning and Permitting, Chapter 3.

(189) Section R108 of the Building Code of the State of Hawaii, is deleted.

(190) Subsections R109.1 through 109.4 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R109.1 Types of Inspections.** Inspections and lot survey will be in accordance with the International Building Code Section B110.

**R109.2 Required inspections.** The building official, upon notification from the permit holder or the permit holder’s agent, will make the following inspections and will either approve that portion of the construction as completed or will notify the permit holder or the permit holder’s agent if the same fails to comply with this code.

**R109.2.1 Floodplain inspections.** For construction in areas prone to flooding as established by ROH Chapter 21A, upon placement of the lowest floor, including basement, and prior to further vertical construction, the building official will require submission of documentation, prepared and sealed by a land surveyor, licensed in the State of Hawaii, of the elevation of the lowest floor, including basement, required in Section R106.

**R109.2.2 Fire-resistance-rated construction inspection.** When fire-resistance-rated construction is required between dwelling units or due to locate on property, an inspection of such construction, after all lathing and/or wallboard is in place, but before any plaster is applied, or before, wallboard joints and fasteners are taped and finished.
R109.2.3 Final inspections. Final inspections will be made after the permitted work is complete and prior to final occupancy.

R109.2.4 Other inspections. In addition to the inspections specified in Sections R109.2.1 through R109.2.3, the building official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by this code.

R109.3 Special inspections. Where application is made for construction as described in this section, the owner will employ one or more special inspectors independent of the contractors performing the work, to provide inspections during construction on the types of work listed under Sections R109.3.1 and R109.3.5. These inspections are in addition to the inspections specified in Section R109. The special inspector will be a qualified person who will demonstrate competence, to the satisfaction of the building official, for inspection of the particular type of construction or operation requiring special inspection. The building official may impose reasonable fees to cover the cost to conduct examination in licensing of special inspectors and issuance of registration cards.

Exceptions:

1. The building official may waive the requirements for the employment of a special inspector if the construction is of minor nature.

2. The employment of a special inspector will not be required for construction work for any government agency that provides for its own inspections.

3. Special inspections are not required for building components unless the design involves the practice of professional engineering or architecture as defined by HRS 464.

R109.3.1 Special Inspections for wind requirements. Special inspections are required for buildings and structures constructed where the 3-section-gust effective ultimate design wind speed is 120 mph (53 m/sec) or greater.

R109.3.1.1 Structural wood. Continuous special inspection is required during field gluing operations of elements of the main windforce-resisting
system. Periodic special inspection is required for nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.

**Exception:** Special inspection is not required for wood shear walls, shear panels and diaphragms, including nailing, bolting, anchoring and other fastening to other components, of the main windforce-resisting system, where the fastener spacing of the sheathing is more than 4 inches (102 mm) on center.

**R109.3.1.2 Cold-formed steel light-frame construction.** Periodic special inspection is required during welding operations of elements of the main windforce-resisting system. Periodic special inspection is required for screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

**Exceptions:** A special inspection is not required for cold-formed steel light-frame shear walls, braces, diaphragms, collectors (drag struts) and hold-downs where either of the following apply:

1. The sheathing is gypsum board of fiberboard.
2. The sheathing is wood structural panel or steel sheets on only one side of the shear wall, shear panel or diaphragm assembly and the fastener spacing of the sheathing is more than 4 inches (102 mm) on center (o.c.).

**R109.3.1.3 Wind-resisting components.** Periodic special inspection is required for the following systems and components:

1. Roof cladding.
2. Wall cladding.

**R109.3.2 Termite protection.** Termite barrier, treated structural lumber and pipe penetrations for new wood frame residential buildings.

**R109.3.3 Automatic fire protection systems.** Where an application is made for automatic fire sprinkler systems will be inspected and evaluated in accordance to the requirements of NPFA 13D.
R109.3.4 **Concrete construction.** The special inspections and verifications for concrete construction will be as inspected.

**Exceptions:** Special inspections will not be required for:

1. Foundation concrete for structures permitted to be designed under the International Residential Code.

2. Concrete footings supporting buildings three stories or less in height that are fully supported on earth or rock where the structural design is based on a specified compressive strength f'c no greater than 2,500 pounds per square inch (psi) (17.2 Mpa), regardless of the compressive strength specified in the construction documents or used in the footing construction. Periodic inspection of the reinforcing for all concrete footings will be required.

3. Nonstructural concrete slabs supported directly on the ground, including pre-stressed slabs on grade, where the effective pre-stress in the concrete is less than 150 psi (1.03 Mpa).

4. Concrete foundation walls constructed in accordance with Table B1805.5 (1), B1805.5 (2), B1805.5 (3) or B1805.5 (4).

5. Concrete patios, driveways and sidewalks, on grade.

R109.3.5 **Floodplain construction.** See ROH Chapter 21A.

**R109.4 Building permit requirement.** Where special inspection or testing is required by Section R109.3, the construction drawings will include a complete list of special inspections required by this section.

(191) Subsections R109.5 through 109.7 are added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsections R109.5 through R109.7 read as follows:

**R109.5 Statement of special inspections.** The applicant will submit a statement of special inspections in accordance with Section R109.7 as a condition for permit issuance.

**R109.6 Contractor responsibility.** When special inspection is required, a contractor’s statement will be submitted containing an acknowledgement
of awareness of the special inspection requirements contained on the drawings and that the construction requiring special inspections will be made accessible for inspections.

**R109.7 Report requirement.** The licensed engineer or architect of record will submit a final signed report stating that they have received all the special inspection reports and documenting that there are no known unresolved code requirements that create significant public safety deficiencies.

(192) Subsection R110.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R110.1 Use and occupancy.** No building or structure will be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof will be made until the building official has issued a certificate of occupancy therefore as provided herein. Issuance of a certificate of occupancy will not be construed as approval of a violation of the provisions of this code or other ordinances of the jurisdiction.

(193) Subsection R110.3 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R110.3 Certificate issued.** After the building official inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the department, the building official will issue a certificate of occupancy which will contain the following:

1. The building permit number.
2. The address of the structure.
3. The name and address of the owner.
4. A description of the structure or portion thereof for which the certificate is issued.
5. A statement that the described structure or portion thereof has been inspected for compliance with the requirements of this code.
6. The name of the building official.
7. The edition of the building code under which the permit was issued.

8. If an automatic sprinkler system is provided.

9. Any special conditions for this permit.

(194) Section R110.4 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R110.4 Temporary occupancy.** The building official is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the permit, provided that such portion or portions will be occupied safely and is in compliance with the requirements of this code. The building official will set a time period during which the temporary certificate of occupancy is valid.

(195) Subsection R110.5 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R110.5 Revocation.** The building official may suspend or revoke a certificate of occupancy issued under the provisions of this code whenever the certificate is issued in error, or on the basis of incorrect information provided, or where it is determined that the structure or portion thereof violates any ordinance or regulation or any of the provisions of this code.

(196) Subsection R112.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R112.1 General.** Board of Appeals will be in accordance with International Building Code Section B113.

(197) Section R113 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**SECTION R113 – VIOLATIONS AND PENALTIES**

For violation and penalty provisions, see ROH Chapter 16, Article 10.

(198) Section R202 (Definitions) of the IRC, adopted by the Building Code of the State of Hawaii, are amended to read:
a. By adding immediately after “ACCESSIBLE, READILY” the following definition to read:

**ACCESSORY DWELLING UNIT (ADU)** means a second dwelling unit, including separate kitchen, bedroom and bathroom facilities, attached or detached from the primary dwelling unit on the zoning lot.

b. By amending the definition of "BUILDING, EXISTING" to read:

**BUILDING, EXISTING** is a building for which a legal building permit has been issued, or one which complied with the Building Code in effect at the time the building was erected.

c. By adding the following definitions:

**BUILDING, ENCLOSED:** A building that does not comply with the requirements for open or partially enclosed building.

**BUILDING, OPEN:** A building having each wall at least 80 percent open. \( A_o \geq 0.8 \ A_g \) where:

\[
A_o = \text{total area of openings in a wall that receives positive external pressure, in \( \text{ft}^2 \) (m²)}
\]

\[
A_g = \text{the gross area of that wall in which} \ A_o \text{is identified, in \( \text{ft}^2 \) (m²) }
\]

**BUILDING, PARTIALLY ENCLOSED:** A building that complies with both the following conditions:

1. The total area of openings in a wall that receives positive external pressure exceeds that sum of the areas of openings in the balance of the building envelope (walls and roof) by more than 10 percent.

2. The total area of openings in a wall that receives positive external pressure exceeds 4 \( \text{ft}^2 \) (0.37 m²) or 1 percent of the area of that wall, whichever is smaller, and the percentage of openings balance of the building envelope does not exceed 20 percent.

These conditions are expressed by the following equations:

1. \( A_o > 1.1A_{oi} \)
2. \( A_o > 4 \text{ ft}^2 (0.37 \text{ m}^2) \) or \( > 0.01 \ A_g \), whichever is smaller, and \( A_o/A_g \leq 0.20 \)

Where:

\( A_o, A_g \) are defined for Open Building.

\( A_{oi} \) = the sum of the areas of openings in the building envelope (walls and roof) not including \( A_o \), in \( \text{ft}^2 (\text{m}^2) \).

\( A_{gi} \) = the sum of the gross surface areas of the building envelope (walls and roof) not including \( A_g \), in \( \text{ft}^2 (\text{m}^2) \).

d. By amending the definition of "BUILDING OFFICIAL" to read:

BUILDING OFFICIAL will mean the director of planning and permitting of the city or the director's authorized representative.

e. By adding the definition of "CARPORT" after "CAP PLATE" to read:

CARPORT is a private garage which is at least 100 percent open on one side and with 50 percent net openings on another side or which is provided with an equivalent of such openings on two or more sides.

A private garage which is 100 percent open on one side and 25 percent open on another side with the latter opening so located to provide adequate cross ventilation may be considered a carport when approved by the building official.

f. By amending the definition of "KITCHEN" to read:

KITCHEN will be as defined in the Land Use Ordinance, ROH Chapter 21.

g. By amending the definition of “THIRD-PARTY CERTIFICATION AGENCY” to read.

THIRD-PARTY CERTIFICATION AGENCY. An approved agency operating a product, material certification system that incorporates a initial product testing, assessment and surveillances of a manufacturer's quality control system. An approved agency may be an
individual who has been qualified by the department to perform single family residential plans review for code compliance, by having the necessary qualifications who has passed an examination administered by the building official with a qualifying score to review for single family residential building permit requirements.

h. By amending the definition of “THIRD PARTY CERTIFIED” to read:

THIRD PARTY CERTIFIED. Either a certification obtained by a manufacturer, indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third-party certification agency; or a certification of code compliance from an approved third party residential plans reviewer, upon a form provided by the building official for compliance to the requirements to obtain a building permit. Manufacturer assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency.

(199) Subsection R301.1.1 of the Building Code of the State of Hawaii, is amended to read:

R301.1.1 Alternative provisions. As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards, the design shall comply with the International Building Code. Where these standards use the basic wind speed as a design criteria, the Effective Ultimate Design Wind Speed, \( V_{\text{eff,ult}} \), determined from Figures R301.2(8) shall be used.

2. AISI Standard for Cold-Formed Steel Framing – Prescriptive Method for One- and Two-Family Dwellings (AISI S230-2015).
3. ICC Standard for Residential Construction in High-Wind Regions (ICC 600-14); or
4. ASCE Minimum Design Loads for Buildings and Other Structures (ASCE 7-10); or
Subsection R301.1.4 is added to the Building Code of the State of Hawaii. The added Subsection R301.1.4 reads as follows:

R301.1.4 Complete load path and uplift ties. Blocking, bridging, straps, approved framing anchors or mechanical fasteners will be designed and installed to provide continuous ties from the roof to the foundation system. Sheet metal clamps, ties or clips, will be formed of galvanized steel or other approved corrosion-resistant material not less than 0.040 inch (1.01 mm) nominal thickness. Uplift resistance will be in accordance with Table R802.11.

Table R301.2 (1) of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

<table>
<thead>
<tr>
<th>WIND SPEED (mph)</th>
<th>SEISMIC DESIGN CATEGORY</th>
<th>SUBJECT TO DAMAGE FROM</th>
<th>FLOOD HAZARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Figure R301.2(8)</td>
<td>C or D₀</td>
<td>Negligible</td>
<td>Very heavy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Moderate to severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FEMA</td>
</tr>
</tbody>
</table>

Subsection R301.2.1 of the Building Code of the State of Hawaii, is amended to read:

R301.2.1 Wind design criteria. Buildings and portions thereof will be constructed in accordance with the wind provisions as specified in Table R301.2.1 using the effective ultimate design wind speed, $V_{\text{eff, ultimate}}$, determined from Figure R301.2(8). Buildings and portions thereof constructed in accordance with the wind provisions of the State Building Code as amended will be deemed to comply with this section.

Table R301.2.1 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Table R301.2.1 reads as follows:
### TABLE R301.2.1

**WIND SPEED BASED ON APPLICABLE WIND DESIGN CRITERIA**

<table>
<thead>
<tr>
<th>Effective Ultimate Design Wind Speed</th>
<th>Effective Nominal Design Wind Speed</th>
<th>Wind Provisions</th>
<th>Windborne Debris Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{eff-ult} &lt; 130$</td>
<td>$V_{eff-asd} &lt; 102$</td>
<td>Residential Code</td>
<td>Not required</td>
</tr>
<tr>
<td>$130 \leq V_{eff-ult} &lt; 139$</td>
<td>$102 \leq V_{eff-asd} &lt; 110$</td>
<td>Residential Code</td>
<td>Required</td>
</tr>
<tr>
<td>$139 \leq V_{eff-ult}$</td>
<td>$110 \leq V_{eff-asd}$</td>
<td>Alternative Provisions</td>
<td>Required</td>
</tr>
</tbody>
</table>

a The Effective Ultimate Design Wind Speed, $V_{eff-ult}$, will be obtained from Figure R301.2(8). The wind speed shown in these figures include topographic effects and are based on the basic wind speed definition used for structural design of buildings in the 2012 IBC, ASCE7-10 and Section 16-1.1.

b Wind speed conversion to the Effective Nominal Design Wind Speed, $V_{eff-asd}$, will be in accordance with section R301.2.1.3.

c Where the Residential Code requires the Basic Wind Speed, the Effective Nominal Design Wind Speed, $V_{eff-asd}$, will be used.

d The applicability of the wind design provisions of the Residential Code are exceeded and will not be used. R301.1.1 Alternative provisions provides a list other codes and standards which will be used in conjunction with applicable requirements of the Residential Code to complete the design.

The structural provisions of this code for wind loads are not permitted where wind design is required as specified in Section R301.2.1.1. Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion will apply. Where not otherwise specified the wind loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles will be designed for wind speeds in accordance with Section R905.2.4. A continuous load path shall be provided to transmit the applicable uplift forces in Section R802.11.1 from the roof assembly to the foundation.

(204) Subsection R301.2.1.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:
R301.2.1.1 Wind limitations and wind design required. The wind provisions of this code will not apply to the design of buildings where wind design is required in accordance with Figure R301.2(4)B.

Exceptions:

1. For concrete construction, the wind provisions of this code will apply in accordance with the limitation of Sections R404 and R611.

2. For structural insulated panels, the wind provisions of this code will apply in accordance with the limitations of Section R613.

In regions where wind design is required in accordance with Figure R301.2(4)B, the design of buildings for wind loads will be in accordance with one or more of the following methods:

1. AF&PA Wood Frame Construction Manual (WFCM); or

2. ICC Standard for Residential Construction in High-Wind Regions (ICC 600); or

3. ASCE Minimum Design Loads for Buildings and Other Structures (ASCE 7); or

4. AISI Standard for Cold-Formed Steel Framing-Prescriptive Method For One – and Two-Family Dwellings (AISI S230); or


The elements of design not addressed by the methods in Items 1 through 5 will be in accordance with the provisions of this code. When ASCE 7 or the International Building Code is used, the wind speed map and exposure category requirements as specified in ASCE 7 and the International Building Code will be used.

(205) Subsection R301.2.1.2 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:
R301.2.1.2 Protection of openings. Windows in buildings located in windborne debris regions will have glazed openings protected from windborne debris. Glazed opening protection for windborne debris will meet the requirements of the Large Missile Test of ASTM E 1996 and of ASTM E 1886 referenced therein.

Exceptions:

1. Wood structural panels with a minimum thickness of 7/16 inch (11 mm) and a maximum panel span of 8 feet (2438 mm) will be permitted for opening protection in one- and two-story buildings classified as Group R-3 or R-4 occupancy. Panels will be precut so that they will be attached to the framing surrounding the opening containing the product with the glazed opening. Panels will be predrilled as required for the anchorage method and will be secured with the attachment hardware provided and anchors permanently installed on the building. Attachment in accordance with Table R301.2.1.2 with corrosion-resistant attachment hardware provided and anchors permanently installed on the building is permitted for buildings with a mean roof height of 33 feet (10 058 mm) or less where effective ultimate design wind speeds, $V_{\text{eff-ult}}$ do not exceed 175 mph (78 m/s).

2. Glazing in accessory structures to the single family dwelling to include but not limited to greenhouses and minor storage sheds.

3. Partially enclosed Occupancy R-3 buildings will be permitted to be designed without wind-borne debris protection. Partially enclosed and open Occupancy R-3 buildings will also include a residential safe room in accordance with ROH Chapter 16, Article 13, Hawaii residential safe room.

**TABLE R301.2.1.2**

WINDBORNE DEBRIS PROTECTION FASTENING SCHEDULE FOR WOOD STRUCTURAL PANELS $^{a, b, c, d}$

<table>
<thead>
<tr>
<th>FASTENER TYPE</th>
<th>FASTENER SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Panel span ≤ 4 ft</td>
</tr>
<tr>
<td>No. 8 Wood screw based</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>
anchor with 2-inch embedment length

<table>
<thead>
<tr>
<th>No. 10 Wood screw based anchor with 2-inch embedment length</th>
<th>16&quot;</th>
<th>12&quot;</th>
<th>9&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4-inch lag screw based anchor with 2-inch embedment length</td>
<td>16&quot;</td>
<td>16&quot;</td>
<td>16&quot;</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 mile per hour = 0.447 m/s.

a. This table is based on 175 mph effective ultimate design wind speed and a mean roof height of 45 feet.
b. Fasteners will be installed at opposing ends of the wood structural panel. Fasteners will be located a minimum of 1 inch from the edge of the panel.
c. Anchors will penetrate through the exterior wall covering with an embedment length of 2 inches minimum into the building frame. Fasteners will be located a minimum of 2-1/2 inches from the edge of concrete block or concrete.
d. Where screws are attached to masonry or masonry/stucco, they will be attached utilizing vibration-resistant anchors having a minimum ultimate withdrawal capacity of 1,500 pounds.

(206) Subsection R301.2.1.3 of the Building Code of the State of Hawaii, is amended to read:

**R301.2.1.3 Wind speed conversion.** When referenced documents are based on fastest mile wind speeds, \( V_{fm} \), or three second gust effective nominal wind speeds, \( V_{eff-asd} \), the effective ultimate design wind speed, \( V_{eff-ult} \), obtained from Figures R301.2(8) will be converted using Table R301.2.1.3.

**TABLE R301.2.1.3**

<table>
<thead>
<tr>
<th>( V_{eff-ult} )</th>
<th>107</th>
<th>114</th>
<th>120</th>
<th>126</th>
<th>133</th>
<th>139</th>
<th>152</th>
<th>158</th>
<th>164</th>
<th>177</th>
<th>183</th>
<th>190</th>
<th>202</th>
<th>215</th>
</tr>
</thead>
<tbody>
<tr>
<td>( V_{eff-asd} )</td>
<td>85</td>
<td>90</td>
<td>95</td>
<td>100</td>
<td>105</td>
<td>110</td>
<td>120</td>
<td>125</td>
<td>130</td>
<td>140</td>
<td>145</td>
<td>150</td>
<td>160</td>
<td>170</td>
</tr>
<tr>
<td>( V_{fm} )</td>
<td>71</td>
<td>76</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>95</td>
<td>104</td>
<td>109</td>
<td>114</td>
<td>123</td>
<td>128</td>
<td>133</td>
<td>142</td>
<td>152</td>
</tr>
</tbody>
</table>

For SI: 1 mile per hour = 0.447 m/s.
a. Linear interpolation is permitted.
b. \( V_{\text{eff-asd}} = \) Effective nominal design wind speed applicable to methods specified in Exceptions 1 through 5 of Section 1609.1.1 of the International Building Code. \( V_{\text{eff-asd}} = 0.791 \cdot V_{\text{eff-ult}} \)
c. \( V_{\text{eff-ult}} = \) Effective ultimate design wind speed from Table R301.2(8)

(207) Figure R301.2 (8) - Effective Wing Speed Map of the Building Code of the State of Hawaii, is amended to read:

![Effective Wing Speed Map](image)

Figure R301.2 (8) Effective Ultimate Design Wind Speed (mph) \( V_{\text{eff}} \), for Components and Cladding for Buildings less than 60-feet tall

(208) Subsection R301.2.1.4 of the Building Code of the State of Hawaii, is amended to read:
R301.2.1.4 Exposure Category. The exposure category shall be determined from Figure R301.2 (9) or using the provisions of ASCE 7-10.

(209) Figure R301.2 (9) — Exposure Category Zones for the City and County of Honolulu is amended to read:

![Exposure Category Zones for buildings with mean roof height less than 130 ft](image)

**Notes:**

1. Intermediate exposures, between categories B and C and between C and D, are permitted when substantiated per ASCE 7 recognized methodology.
2. Sites located within the C (coastal) zone shall be permitted to be evaluated for exposure category D for the wind directions where an adjacent B zone exists in the applicable upwind sector.
3. Sites located within 500 feet from the coastline shall be exposure category D for onshore wind directions.
4. For buildings whose height is equal to or greater than 130 ft, exposure category shall be determined per Section 1609.41.
5. For buildings whose mean roof height is less than or equal to 30 ft, exposure category shall be permitted to be evaluated per Section 1609.4.

Figure R301.2 (9) Exposure Category Zones for the City and County of Honolulu
(210) Subsection R301.2.1.5 of the Building Code of the State of Hawaii, is amended to read:

**R301.2.1.5 Topographic wind effects.** Topographic wind speed effects will be considered in the design of the building. Buildings designed using the effective ultimate wind speed as determined from Figure R301.2 (8) and wind exposure categories determined in accordance with Section R301.2.1.4 shall be deemed to comply with this section.

(211) Subsection R302.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R302.1 Exterior walls.** Construction, projections, openings and penetrations of exterior walls of dwellings and accessory buildings shall comply with Table R302.1(1); or dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 shall comply with Table R302.1(2). Dwellings equipped throughout with an automatic sprinkler system installed in accordance with Section P2904 or NFPA 13D will comply with Table R302.2.

(212) Table R302.1(2) of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read as follows:

<table>
<thead>
<tr>
<th>EXTERIOR WALL ELEMENT</th>
<th>MINIMUM FIRE-RESISTANCE RATING</th>
<th>MINIMUM FIRE SEPARATION DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walls</td>
<td>1 hour-tested in accordance with ASTM E 119 or UL 263 with exposure from both sides</td>
<td>&lt; 3 feet</td>
</tr>
<tr>
<td>(Fire-resistance rated)</td>
<td>0 hours</td>
<td>≥ 3 feet</td>
</tr>
<tr>
<td>(Not fire-resistance rated)</td>
<td>1 hour on the underside</td>
<td>≥ 3 feet</td>
</tr>
<tr>
<td>Projections</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>(Fire-resistance rated)</td>
<td>N/A</td>
<td>&lt; 3 feet</td>
</tr>
<tr>
<td>(Not fire-resistance rated)</td>
<td>0 hours</td>
<td>3 feet</td>
</tr>
<tr>
<td>Openings in walls</td>
<td>Comply with Section R317.3</td>
<td>&lt; 3 feet</td>
</tr>
<tr>
<td>Unlimited</td>
<td>None required</td>
<td>3 feet</td>
</tr>
<tr>
<td>Penetrations</td>
<td>Comply with Section R317.3</td>
<td>&lt; 3 feet</td>
</tr>
</tbody>
</table>

For SI: 1 foot = 304.8 mm.
N/A = Not Applicable.

(213) Subsection R302.3 of the IRC, adopted by the Building Code of the State of Hawaii, is amended by adding a third exception to read:
Exceptions

3. An Accessory Dwelling Unit (ADU) will be permitted to be separated from the primary dwelling unit with a single layer of 5/8-inch Type X gypsum board or the equivalent fire resistive construction on the walls and ceilings on the ADU portion.

(214) Subsection R303.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R303.1 Natural light and ventilation. Natural light and ventilation will be as specified in the Housing Code.

(215) Subsection R303.3 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R303.3 Bathrooms. Light and ventilation for bathrooms will be as specified in the Housing Code.

(216) Subsection R303.4 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R303.4 Mechanical ventilation. Mechanical ventilation will be as specified in the Housing Code.

(217) Section R306 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

SECTION R306 – SANITATION

Sanitation will be as specified in the Housing Code.

(218) Subsection R309.2 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R309.2 Carports. Carport floor surfaces will be of approved noncombustible material.

Exceptions:

1. Asphalt surfaces will be permitted at ground level in carports.
2. A carport on a hillside lot serving a detached single-family dwelling may have wood floor planking at least 2 inches (51 mm) in nominal thickness laid with at least ¼-inch (6.4 mm) spacing between the planks.

The area of floor used for parking of automobiles or other vehicles will be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

(219) Subsection R309.3 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R309.3 Flood hazard areas.** See ROH Chapter 16, Article 11.

(220) Subsection R310.1.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended by adding a second Exception to read:

**Exceptions:**

2. Non-safety glazed glass jalousie bladed windows may be used for emergency escape or rescue.

(221) Subsection R311.7.1 of the IRC, adopted by the Building Code of the State of Hawaii. Section R311.7.1 is amended by adding the following Exceptions to read:

**Exceptions:**

2. Private stairways serving an occupant load of less than 5 will not be less than 30 inches (762 mm) in width.

(222) Subsection R313.2.2 is added to the Building Code of the State of Hawaii. The added Subsection R313.2.2 reads as follows:

**R313.2.2 R-3 Care homes.** An automatic residential fire sprinkler system will be installed in one- and two-family dwellings in new care homes.

(223) Subsection R313.2.3 is added to the Building Code of the State of Hawaii. The added Subsection R313.2.3 reads as follows:

**R313.2.3 One- and two-family dwellings with private water systems.** Where the source of water for a one- or two-family dwelling is solely from
a private system, an automatic fire sprinkler system will be installed. Water supply from a tank will conform to NFPA 22 and have a capacity of a minimum of 10,000 gal. (37 854 liters).

Exception: Where approved by the Fire Chief.

(224) Subsection R313.2.4 is added to the Building Code of the State of Hawaii. The added Subsection R313.2.4 reads as follows:

R313.2.4 One- and two-family dwellings location. Where a one- or two-family dwelling is located a distance more than 300 feet (91.44 m) to an approved fire apparatus road, an automatic fire sprinkler system will be installed.

Exception: Where approved by the Fire Chief.

(225) Subsection R317.3.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R317.3.1 Fasteners for preservative-treated wood. Fasteners for non-borate pressure preservative and fire-retardant-treated wood will be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. The coating weights for zinc-coated fasteners will be in accordance with ASTM A 153.

Exceptions:
1. One-half-inch (12.7 mm) diameter or greater steel bolts.
2. Fasteners other than nails and timber rivets will be permitted to be of mechanically deposited zinc-coated steel with coating weights in accordance with ASTM B695, Class 55 minimum.

(226) Subsection R317.5 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R317.5 reads as follows:

R317.5 Glued laminated, engineered or composite structural members. For the portions of these structural members that form the structural supports of a building or other structure, which are structural glued laminated members made up of dimensional lumber, engineered wood products, or structural composite lumber, pressure treated in accordance with AWPA U 1 (UC1 through UC4B) or by Light Oil Solvent
Preservative (LOSP) treatment standard as approved by the building official. Water based treatment processes are not allowed to be used on these products unless specified by a structural engineer for use with reduced load values.

(227) Subsection R317.6 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R317.6 reads as follows:

R317.6 Under-floor clearance. Minimum clearance between the bottom of floor joists or bottom of floors without joists and the ground beneath will be 24 inches (610 mm); the minimum clearance between the bottom of girders and the ground will be 18 inches (457 mm).

Exception: Open slat wood decks will have ground clearance of at least 6 inches (152 mm) for any wood member. Accessible under-floor areas will be provided with a minimum 14 inches x 24 inches (356 mm x 610 mm) access opening.

Accessible under-floor areas will be provided with a minimum 18-inch (457 mm) by 24-inch (610 mm) access opening, effectively screened or covered. Pipes, ducts and other construction will not interfere with the accessibility to or within under-floor areas. See section M1305.1.4 for access requirements where mechanical equipment is located under floors.

(228) Subsection R318.1.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended by adding a second paragraph to read:

R318.1.1 Quality mark. (paragraph #2)

All lumber less than 2 inches (51 mm) in nominal thickness will be identified per bundle by means of a label consisting of the above requirements. Labels measuring no less than 6 inches by 8 inches (152 mm by 203 mm) will be placed on the lower left corner of the strapped bundle.

(229) Subsection R318.1.3 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R318.1.3 reads as follows:

R318.1.3 Structure protection. Where the plates, sills and structural lumber of new wood frame buildings are supported directly on the ground by:
1. A concrete slab or foundation, the soil beneath the building will be either:
   
   1.1 Chemically treated at the maximum label rate for control of Formosan subterranean termites by a licensed pest control operator, or

   1.2 Basaltic Termite Barrier (BTB), stainless steel termite barrier mesh, or other termite barrier approved by the building official, installed according to the manufacturer’s installation instructions.

2. The perimeter of the structure must be protected by either:
   
   2.1 A continuous chemical barrier applied at the maximum label rates by an operator licensed to control ground termites to the backfill in 12-inch (305 mm) lifts in a band extending at least 12 inches (305 mm) beyond the concrete; or

   2.2 A continuous barrier of BTB at least 4 inches (102 mm) in thickness extending at least 6 inches (152 mm) beyond the concrete slab.

3. A poured-in-place concrete foundation wall, the foundation wall must be protected from the adjacent soil by either:
   
   3.1 A continuous chemical barrier applied at the maximum label rates by an operator licensed to control ground termites to the backfill in 12-inch (305 mm) lifts in a band extending at least 12 inches (305 mm) beyond the concrete; or

   3.2 A continuous barrier of BTB at least 6 inches (152 mm) in thickness extending the full height of the retained soil; or

   3.3 An approved stainless steel termite barrier mesh must protect all cracks and joints.

4. A CMU foundation wall, the foundation wall must be protected from the adjacent soil by either:
   
   4.1 A continuous barrier of BTB at least 6 inches (152 mm) in thickness extending the full height of the retained soil; or
4.2. An approved stainless steel termite barrier mesh between the top of the CMU and all wood framing; or

4.3 A continuous cap or reinforced concrete at least 4 inches (102 mm) in thickness between the top of the CMU and all wood framing.

**Exception:** When a CMU foundation wall forms a retaining wall which is part of a wood frame structure, the CMU must be protected from the soil by a full barrier of BTB or stainless steel termite barrier.

(230) Subsection R318.2 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R318.2 Chemical termiticide treatment.** Chemical termiticide treatment shall include soil treatment and/or field applied wood treatment. The concentration, rate of application and method of treatment of the chemical termiticide shall be in strict accordance with the termiticide label. Chemical treatment will be applied at the maximum label rate for control of Formosan subterranean termites by a licensed pest control operator. There must be a continuous chemical barrier applied at the maximum label rates, by an operator licensed to control ground termites, to the finished grade in a band extending at least 12 inches (305 mm) beyond the concrete.

(231) Subsection R318.3 of the IRC, adopted by the Building Code of the State of Hawaii, is amended as follows:

**R318.3 Barriers.** Approved physical barriers, such as metal or plastic sheeting or collars specifically designed for termite prevention, Basaltic Termite Barrier (BTB), stainless steel termite barrier mesh, or other termite barrier approved by the building official, installed according to the manufacturer’s installation instructions, will be installed in manner to prevent termites from entering the structure. Shields placed on top of an exterior foundation wall are permitted to be used only if in combination with another method of protection.
(232) Subsection R318.3.1 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R318.1.3 reads as follows:

**R318.3.1 Pipe and Other Penetrations.** Insulations around plumbing pipes will not pass through ground floor slabs. Openings around pipes or similar penetrations in a concrete or masonry slab, which is in direct contact with earth, will be filled with non-shrink grout, or other approved physical barrier.

(233) Subsection R320.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read.

**R320.1 Scope.** Where there are four or more dwelling units or sleeping units in a single structure the following provisions for Group R-3 will apply:

1. For construction of buildings or facilities of the State and County Governments, compliance with HRS 103-50, administered by the Disability and Communication Access Board, State of Hawaii.

2. American with Disabilities Act, administered and enforced by the U.S. Department of Justice.

3. Fair Housing Act, administered and enforced by the U.S. Department of Housing and Urban Development.

4. Other pertinent laws relating with disabilities will be administered and enforced by agencies responsible for their enforcement.

Prior to the issuance of a building permit, the owner (or the owner's representative, professional architect, or engineer), will submit a statement that all requirements, relating to accessibility for persons with disabilities, will be complied with.

(234) Subsection R322.2 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R322.2 Flood hazard areas.** All areas that have been determined to be located within areas of special flood hazard will be in accordance to ROH Chapter 21A.
(235) Subsection R323.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R323.1 General. This section applies to the construction of storm shelters when constructed as separate detached buildings or when constructed as safe rooms within buildings for the purpose of providing safe refuge from storms that produce high winds, such as tornados and hurricane. In addition to other applicable requirements in this code, storm shelters will be constructed in accordance with ICC/NSSA-500 or the Hawaii Residential Safe Room, ROH Chapter 16, Article 13.

(236) Section R324 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Section R324 reads as follows:

R324 Light-transmission plastic roof structures. Awnings, patio covers, carports and similar structures. Roofed structures constructed of light-transmitting plastics will comply with this section.

R324.1 Specifications. Light-transmitting plastics, including thermoplastic, thermosetting or reinforced thermosetting plastic material will have a self-ignition temperature of 650°F (343°C) or greater where tested in accordance with ASTM D 1929, a smoke-development index not greater than 450 where tested in the manner intended for use in accordance with ASTM E 84 or UL 723, or a maximum average smoke density rating not greater than 75 where tested in the thickness intended to used in accordance with ASTM D 2843 and will conform to one of the following combustibility classifications.

Class CC1: Plastic materials that have a burning extent of 1 inch (25 mm) or less where tested at a nominal thickness of 0.060 inches (1.5 mm), or in the thickness intended for use, in accordance with ASTM D 635.

Class CC2: Plastic materials that have a burning rate of 2½ inches per minute (1.06 m/s) or less where tested at a nominal thickness of 0.060 (1.5 mm), or in the thickness intended for use, in accordance with ASTM D 635.

R324.2 Structural requirements. Light-transmitting plastic materials in their assembly will be of adequate strength and durability to withstand the loads indicated in R301.6. Technical data will be submitted to establish stresses, maximum unsupported spans and such other information for the
various thickness an forms used as deemed necessary by the building official.

**R324.3 Fastening.** Fastening will be adequate to withstand the loads in R301. Proper allowance will be made for expansion and contraction of light-transmitting plastic materials in accordance with accepted data on the coefficient of expansion of the material and other material in conjunction with which it is employed.

**R324.4 Size limitation.**

1. Swimming pool structures will not exceed 5,000 square feet (465 m²) in area and will have a minimum fire separation distance of 10 feet (3048 mm).

2. Roof coverings over carports, terraces and patios will have a minimum fire separation distance of 6 feet (1829 mm).

(237) Subsection R401.5 added to the IRC by the Building Code of the State of Hawaii. The added Subsection R401.5 reads as follows:

**R401.5 Post or Pier Foundations.** Raised floor systems supported by post or pier foundations shall be designed in accordance with accepted engineering practice and the International Building Code, as amended.

(238) Subsection R401.6 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R401.6 reads as follows:

**R401.6 Concrete Strap-Type Anchors.** Concrete strap-type anchors made out of cold-formed steel shall not be used along the perimeter edges of a slab on grade where the steel does not have at least 1-1/2 inches side cover or other adequate protection.

(239) Subsection R401.7 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R401.7 reads as follows:

**R401.7 Anchor Bolts at the Perimeter Edge of a Slab on Grade.** Anchor bolts shall be hot dipped galvanized in accordance with ASTM F2329 and have a minimum concrete side cover of 1-1/2 inches unless provisions have been made to protect the anchor bolts from corrosion.
(240) Subsection R401.8 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R401.8 reads as follows:

**R401.8 Protection of Steel Sill Track.** Residential load bearing framing members that are in direct contact with moisture from the slab on grade or from the outdoor climate shall be adequately shielded with additional corrosion protection or manufactured from a material not susceptible to corrosion. The exterior face of the sill track shall also be protected.

(241) Subsection R401.9 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R401.9 reads as follows:

**R401.9 ACI 318, Section 4.3.1.** Modify ACI 318 Table 4.3.1 as follows: Change the Maximum w/cm ratio for Exposure Class C1 to 0.50.

(242) Subsection R408.8 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection R408.8 reads as follows:

**R408.8 Under-Floor Clearance.** Minimum clearance between the bottom of floor joists or bottom of floors without joists and the ground beneath will be 24 inches (610 mm); the minimum clearance between the bottom of girders and the ground will be 18 inches (457 mm).

**Exception:** Open slat wood decks will have ground clearance of at least 6 inches (152 mm) for any wood member.

(243) Subsection R602.3, of the IRC, adopted by the Building Code of the State of Hawaii, is amended as follows:

**R602.3 Design and construction.** Exterior walls of wood-frame construction will be designed in accordance to R301.2.1. Construction will be in accordance to the provisions of this chapter or in accordance with AF&PA’s NDS. Wall sheathing will be fastened directly to framing members and, when placed on the exterior side of an exterior wall, will be capable of resisting wind pressures. Wood structural panel sheathing used for exterior walls will conform to DOC PS 1, DOC PS 2, or, when manufactured in Canada, CSA 0437 or CSA 0325. All panels will be identified for grade, bond classification, and Performance Category by a grade mark or certificate of inspection issued by an approved agency and will conform to the requirements of Table R602.3(3). The requirements for a greater level of wind resistance must be provided whenever there are
conflicts between the requirements of this chapter and the requirements of:

1. AF&PA Wood Frame Construction Manual (WFCM); or
2. ICC Standard for Residential Construction in High-Wind Regions (ICC 600); or
3. ASCE Minimum Design Loads for Buildings and Other Structures (ASCE 7); or
4. AISI Standard for Cold-Formed Steel Framing-Prescriptive Method For One – and Two-Family Dwellings (AISI S230); or

(244) Table R602.3(3) of the IRC, adopted by the Building Code of the State of Hawaii, is amended as follows:

\[
\begin{array}{|c|c|c|c|c|c|c|c|}
\hline
\text{MINIMUM NAIL} & \text{MINIMUM WOOD STRUCTURAL PANEL SPAN RATING} & \text{MINIMUM NOMINAL PANEL THICKNESS (inches)} & \text{MAXIMUM WALL STUD SPACING (inches)} & \text{PANEL NAIL SPACING} & \text{\(V_{\text{eff-asd}}\text{ MAXIMUM EFFECTIVE NOMINAL DESIGN WIND SPEED (MPH)}\)} \\
\hline
\text{Size} & \text{Penetration (inches)} & \text{Edges (inches o.c.)} & \text{Field (inches o.c.)} & \text{Wind exposure category} & \text{B} & \text{C} & \text{D} \\
\hline
6d common (2.0" x 0.133") & 1.5 & 24/0 & 3/8 & 16 & 6 & 12 & 110 & 90 & 85 \\
 & & 24/16 & 7/16 & 16 & 6 & 12 & 110 & 100 & 90 \\
 & & 24/16 & 7/16 & 16 & 6 & 12 & 150 & 125 & 110 \\
8d common (2.5" x 0.131") & 1.75 & 24/16 & 7/16 & 16 & 6 & 12 & 130 & 110 & 105 \\
 & & 24/16 & 7/16 & 24 & 6 & 12 & 150 & 125 & 110 \\
 & & 24/16 & 7/16 & 24 & 6 & 12 & 110 & 90 & 85 \\
 & & 24/16 & 7/16 & 24 & 6 & 110 & 90 & 85 \\
\hline
\end{array}
\]

For SI: 1 inch = 25.4 mm, 1 mile per hour = 0.447 m/s.
a. Panel strength axis will be parallel or perpendicular to supports. Three-ply plywood sheathing with studs spaced more than 16 inches on center will be applied with panel strength axis perpendicular to supports.

b. The table is based on wind pressures acting toward and away from building surfaces in accordance with Chapter 27 of ASCE 7. Lateral requirements will be in accordance with Section 2305 or 2308.

c. Wood structural panels with span ratings of wall-16 or wall-24 will be permitted as an alternative to panels with a 24/0 span rating. Plywood siding rated 16 o.c. will be used with studs spaced a maximum of 16 inches o.c.

(245) Subsection R602.10.9 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R602.10.9 Braced wall panel support.** Braced wall panel support shall be provided as follows:

1. Cantilevered floor joists complying with Section R502.3.3 shall be permitted to support braced wall panels

2. Raised floor system post or pier foundations supporting braced wall panels shall be designed in accordance with accepted engineering practice and the International Building Code as amended.

3. Masonry stem walls with a length of 48 inches (1219 mm) or less supporting braced wall panels shall be reinforced in accordance with Figure R602.10.9. Masonry stem walls with a length greater than 48 inches (1219 mm) supporting braced wall panels shall be constructed in accordance with Section R403.1 Methods ABW and PFH shall not be permitted to attach to masonry stem walls.

4. Concrete stem walls with a length of 48 inches (1219 mm) or less, greater than 12 inches (305 mm) tall and less than 6 inches (152 mm) thick shall have reinforcement sized and located in accordance with Figure R602.10.9.

(246) Subsection R602.10.9.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**R602.10.9.1 Braced wall panel support for Seismic Design Category D2.** In one-story buildings located in Seismic Design Category D2, braced wall panels shall be supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm). In two-story buildings located in Seismic Design Category D2, all braced wall panels shall be supported on continuous foundations.
Exception: Two-story buildings shall be permitted to have interior braced wall panels supported on continuous foundations at intervals not exceeding 50 feet (15 240 mm) provided that:

1. The height of cripple walls does not exceed 4 feet (1219 mm).
2. First-floor braced wall panels are supported on doubled floor joists, continuous blocking or floor beams.
3. The distance between bracing lines does not exceed twice the building width measured parallel to the braced wall line.

(247) Section R614 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Section R614 reads as follows:

SECTION R614 – WALLS WITHOUT STUDS

R614.1 General. For Type V-B buildings, single-wall construction without studs may be used in accordance with this section for repairs to existing buildings of single-wall construction.

One-story and the uppermost story of wood frame Type V-B buildings may be of single-wall construction with board thickness specified in this section, without studs, when requirements of this section are met. Floor to ceiling height will not exceed 8 feet (2438 mm).

Any provision of this code to the contrary notwithstanding, studding of not less than 2-inch by 3-inch (51 mm by 76.2 mm) may be used on one-story buildings of double-wall construction.

When wood-frame dwellings are supported by posts, 2-inch by 4-inch (51 mm by 102 mm) foundation bracing will be provided.

For one-story conventional residential structures, the local practice of using foundation blocks with termite shields will be acceptable in all areas except in flood hazard areas and developments adjacent to drainage facilities as specified in ROH Section 16.11.1.

R614.2 Board for Single-Wall Construction
R614.2.1 One and One-Eighth Inch Boards. Single-wall construction with boards of 1-1/8 inch (28.6 mm) net thickness are not required to have girts.

R614.2.2 One-Inch Boards. Where single-wall construction is with boards of one-inch thickness (25.4 mm), no girt is required, provided approved stiffeners for any section of such wall are spaced not more than 10 feet (3048 mm) along the wall.

R614.2.3 Three-Fourths-Inch Boards. Single-wall construction with boards of ¾-inch (19.1 mm) net thickness will have girts and cross partitions at least every 30 feet (9144 mm).

R614.2.4 Approved Stiffeners. Approved stiffeners will be studs at least 2-inches by 4-inches (51 mm by 102 mm), full height window or door jambs, posts, walls or partitions at right angles to the section of wall under construction.

R614.2.5 Girts. Girts for single-wall construction will be not less than 2-inch by 6-inch (51 mm by 152 mm) belt course or other approved strengthening about mid height between the floor and ceiling on all exterior walls.

R614.2.6 Complete Load Path. Blocking, bridging, straps, approved framing anchors or mechanical fasteners will be designed and installed to provide continuous ties from the roof to the foundation system. Sheet metal clamps, ties or clips, will be formed of ASTM A153 G90 galvanized steel or other approved corrosion-resistant material not less than 0.040-inch (1.01 mm) nominal thickness. Uplift resistance will be in accordance with Table R802.11.

(248) Subsection R903.4.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

R903.4.1 Secondary (emergency overflow) drains or scuppers. Where roof drains are required, secondary emergency overflow drains or scuppers shall be provided where the roof perimeter construction extends above the roof in such a manner that water will be entrapped if the primary drains allow buildup for any reason. Overflow drains having the same size as the roof drains shall be installed with the inlet flow line located 2 inches (51 mm) above the low point of the roof, or overflow scuppers having three times the size of the roof drains and having a minimum opening height of
4 inches (102 mm) shall be installed in the adjacent parapet walls with the inlet flow located 2 inches (51 mm) above the low point of the roof served.

(249) Chapter 11 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**CHAPTER 11 – ENERGY EFFICIENCY**

Chapter 11 of the IRC is deleted in its entirety and replaced by the provisions in ROH Chapter 32.

(250) Subsection M1201.1 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**M1201.1 Scope.** The provisions of Chapters 12 through 24 will regulate the mechanical installation which are permanently installed and used to control environmental conditions within buildings, mechanical systems, system components, equipment and appliances specifically addressed in this code. Where application is made for construction as described in these chapters, the owner or the licensed design professional in responsible charge, acting as the owner's agent will employ one or more special inspectors to provide inspections during construction on the work in these chapters. These inspections are in addition to the inspections specified in Section R109.

(251) Subsection M1306.3 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection M1306.3 reads as follows:

**M1306.3 Clearance to walls without studs.** For walls constructed in accordance to Section R614, the minimum horizontal clearance from the burner head(s) of a top (or surface) cooking unit to combustible walls within 12 inches (305 mm) will be permitted, provided there is protection equivalent to 1/2–inch (12.7 mm) gypsum wallboard covered with laminated plastic on wood backing.

(252) Subsection M1502.6 is added to the IRC, adopted by the Building Code of the State of Hawaii. The added Subsection M1502.6 reads as follows:

**M1502.6 Makeup Air.** When a closet is designed for the installation of a clothes dryer, a minimum opening of 100 square inches (645 m²) for makeup air will be provided in the door or by other approved means.
(253) Subsection M2301.5 of the IRC, adopted by the Building Code of the State of Hawaii, is amended to read:

**M2301.5 Backflow protection.** Connections from the potable water supply to solar systems shall comply with the Plumbing Code.

(254) Chapter 44 of the IRC (Reference Standards) - AISI S230 and ICC 600, adopted by the Building Code of the State of Hawaii is amended to read:

<table>
<thead>
<tr>
<th>Standard reference number</th>
<th>Title</th>
<th>Referenced in code section number</th>
</tr>
</thead>
<tbody>
<tr>
<td>AISI S230-15</td>
<td>Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-Family Dwellings</td>
<td>R301.1.1, R301.2.1.1, R301.2.2.3.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R301.2.2.3.5, R603.6, R603.9.4.1, R603.9.4.2, R611.9.2, R611.9.3, R611.10</td>
</tr>
<tr>
<td>ICC 600-14</td>
<td>Standard for Residential Construction in High-wind Regions</td>
<td>R301.2.1.1</td>
</tr>
</tbody>
</table>

**SECTION 5.** Chapter 16, Article 9, Revised Ordinances of Honolulu 1990, as amended, is deleted and revised in its entirety:

"Article 9. Adoption of the International Existing Building Code

16-9.1 Existing Building Code.

The 2012 edition of the International Existing Building Code as published by the International Code Council, Inc., 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001 is by reference incorporated herein and made a part hereof, subject to the following amendments.

(255) Subsection 101.2 of Chapter 16, Article 9 is amended to read:

In lieu of Chapter 34 of the International Building Code, the International Existing Building Code will be permitted to be used for the repair, alteration, change of occupancy, and addition to existing buildings.

(256) Subsections 101.4.1 and 101.4.2 of Chapter 16, Article 9 are deleted.

(257) Subsections 103 through 117 of Chapter 16, Article 9 are deleted.
(258) Subsection 301.1.1 of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended to read:

301.1.1 Prescriptive compliance method. Repairs, alterations, additions and changes of occupancy complying with Chapter 4 of this code will be considered in compliance with the provisions of this code.

(259) Subsection 301.2 of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended to read:

301.2 Additional codes. Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures will comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in this code and ROH Chapter 32 Building Energy Conservation Code, ROH Chapter 20, Fire Code of the City and County of Honolulu, ROH Chapter 19, Plumbing Code, ROH Chapter 17, Electrical Code. Where provisions of the other codes conflict with provisions of this code, the provisions of this code will take precedence.

(260) Subsection 402.5 of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended to read:

402.5 Smoke alarms in existing portions of a building. Where an addition is made to a building or structure of a Group R or I-1 occupancy, the existing building will be provided with smoke alarms in accordance with Section 402.5.1 through 402.5.3.

402.5.1 Single- and multi-station smoke alarms. Existing Group I-1 and R occupancies will be provided with single-station smoke alarms.

Exceptions:

1. Where the code that was in effect at the time of construction required smoke alarms and smoke alarms complying with those requirements are already provided.

2. Where smoke alarms have been installed in occupancies and dwellings that were not required to have them at the time of construction, additional smoke alarms will not be required provided that the existing smoke alarms comply with requirements that were in effect at the time of installation.
3. Where smoke detectors connected to a fire alarm system have been installed as a substitute for smoke alarms.

402.5.2 Interconnection. Where more than one smoke alarm is required to be installed within an individual dwelling or sleeping unit, the smoke alarms will be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms will not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm will be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

Exceptions:

1. Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.

2. Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

402.5.3 Power source. Single-station smoke alarms will receive their primary power from the building wiring provided that such wiring is served from a commercial source and will be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup will be connected to an emergency electrical system. Smoke alarms will emit a signal when the batteries are low. Wiring will be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.

2. Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.
3. Smoke alarms are permitted to be solely battery operated in existing areas of buildings undergoing *alterations* or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or *basement* available which could provide access for building wiring without the removal of interior finishes.

(261) Subsection 403.6 of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended to read:

**403.6 Smoke alarms in existing portions of a building.** Where an addition is made to a building or structure of a Group R or I-1 occupancy, the existing building will be provided with smoke alarms in accordance with Section 402.5.1 through 402.5.3.

**403.6.1 Single- and multi-station smoke alarms.** Existing Group I-1 and R occupancies will be provided with single-station smoke alarms.

**Exceptions:**

1. Where the code that was in effect at the time of construction required smoke alarms and smoke alarms complying with those requirements are already provided.

2. Where smoke alarms have been installed in occupancies and dwellings that were not required to have them at the time of construction, additional smoke alarms will not be required provided that the existing smoke alarms comply with requirements that were in effect at the time of installation.

3. Where smoke detectors connected to a fire alarm system have been installed as a substitute for smoke alarms.

**403.6.2 Interconnection.** Where more than one smoke alarm is required to be installed within an individual *dwelling* or *sleeping unit*, the smoke alarms will be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms will not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm will be clearly audible in all bedrooms over background noise levels with all intervening doors closed.
Exceptions:

1. Interconnection is not required in buildings that are not undergoing alterations, repairs or construction of any kind.

2. Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

**403.6.3 Power source.** Single-station smoke alarms will receive their primary power from the building wiring provided that such wiring is served from a commercial source and will be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup will be connected to an emergency electrical system. Smoke alarms will emit a signal when the batteries are low. Wiring will be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exceptions:

1. Smoke alarms are permitted to be solely battery operated in existing buildings where no construction is taking place.

2. Smoke alarms are permitted to be solely battery operated in buildings that are not served from a commercial power source.

3. Smoke alarms are permitted to be solely battery operated in existing areas of buildings undergoing alterations or repairs that do not result in the removal of interior walls or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for building wiring without the removal of interior finishes.

(262) Subsection 609.2 of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended by deleting the exception.

(263) Subsection 803.2.1 Existing vertical opening (Exception #1) of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

Exceptions:
1. Where vertical opening enclosure is not required by the International Building Code.

(264) Section 803.2.3 Supplemental stairway enclosure requirements (Exception) of the 2012 IEBC, adopted by the Building Code of the State of Hawaii, is amended as follows:

Exception:

Where stairway enclosure is not required by the International Building Code.

SECTION 6. Chapter 16, Article 14, Revised Ordinances of Honolulu 1990, as amended, is amended as follows:


(265) Subsection 16-14.1 of ROH Chapter 16, Article 14, adopted by the Building Code of the State of Hawaii, is amended as follows:

16-14.1 Intent and scope.

The purpose of this article is to establish minimum life safety design criteria for enhanced hurricane protection areas within high occupancy state- or county-owned buildings permitted to be occupied during hurricanes of up to Saffir Simpson Category 3. This article shall apply to [Occupancy] Risk Category III and IV buildings defined by [ROH Section 16-1.1 (173),] Table 1604.5.
SECTION 7. This ordinance will take effect 90 calendar days after its approval.

INTRODUCED BY:

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DATE OF INTRODUCTION: ____________________________

Honolulu, Hawaii

APPROVED AS TO FORM AND LEGALITY:

____________________________________

Deputy Corporation Counsel

APPROVED this _____ day of _____________, 20___.

____________________________________

Kirk Caldwell, Mayor
City and County of Honolulu