CHAPTER 16
STRUCTURAL DESIGN

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

1604.6 In-situ load tests.
The *building official* is authorized to require an engineering analysis or a load test, or both, of any construction whenever there is reason to question the safety of the construction for the intended occupancy. Engineering analysis and load tests shall be conducted in accordance with Section ~~1709~~ **1708**.

1604.7 Preconstruction load tests.
Materials and methods of construction that are not capable of being designed by *approved* engineering analysis or that do not comply with the applicable referenced standards, or alternative test procedures in accordance with Section 1707, shall be load tested in accordance with Section ~~1710~~ **1709**.

SECTION 1608
SNOW LOADS

1608.2 Ground snow loads.
The ground snow loads to be used in determining the design snow loads for roofs shall be determined in accordance with ASCE 7 or Figure 1608.2 for ~~the contiguous United States and Table 1608.2 for Alaska~~ North Carolina. Site-specific case studies shall be made in areas designated "CS" in Figure 1608.2. Ground snow loads for sites at elevations above the limits indicated in Figure 1608.2 and for all sites within the CS areas shall be *approved*. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval). ~~Snow loads are zero for Hawaii, except in mountainous regions as *approved* by the *building official*.~~

~~**TABLE 1608.2**~~
~~**GROUND SNOW LOADS, p_g, FOR ALASKAN LOCATIONS**~~

~~LOCATION~~	~~POUNDS PER SQUARE FOOT~~	~~LOCATION~~	~~POUNDS PER SQUARE FOOT~~	~~LOCATION~~	~~POUNDS PER SQUARE FOOT~~
~~Adak~~	~~30~~	~~Galena~~	~~60~~	~~Petersburg~~	~~150~~
~~Anchorage~~	~~50~~	~~Gulkana~~	~~70~~	~~St. Paul Islands~~	~~40~~
~~Angoon~~	~~70~~	~~Homer~~	~~40~~	~~Seward~~	~~50~~
~~Barrow~~	~~25~~	~~Juneau~~	~~60~~	~~Shemya~~	~~25~~
~~Barter Island~~	~~35~~	~~Kenai~~	~~70~~	~~Sitka~~	~~50~~
~~Bethel~~	~~40~~	~~Kodiak~~	~~30~~	~~Talkeetna~~	~~120~~
~~Big Delta~~	~~50~~	~~Kotzebue~~	~~60~~	~~Unalakleet~~	~~50~~
~~Cold Bay~~	~~25~~	~~McGrath~~	~~70~~	~~Valdez~~	~~160~~
~~Cordova~~	~~100~~	~~Nenana~~	~~80~~	~~Whittier~~	~~300~~
~~Fairbanks~~	~~60~~	~~Nome~~	~~70~~	~~Wrangell~~	~~60~~

Fort Yukon	60	Palmer	50	Yakutat	150

For SI: 1 pound per square foot = 0.0479 kN/m^2.

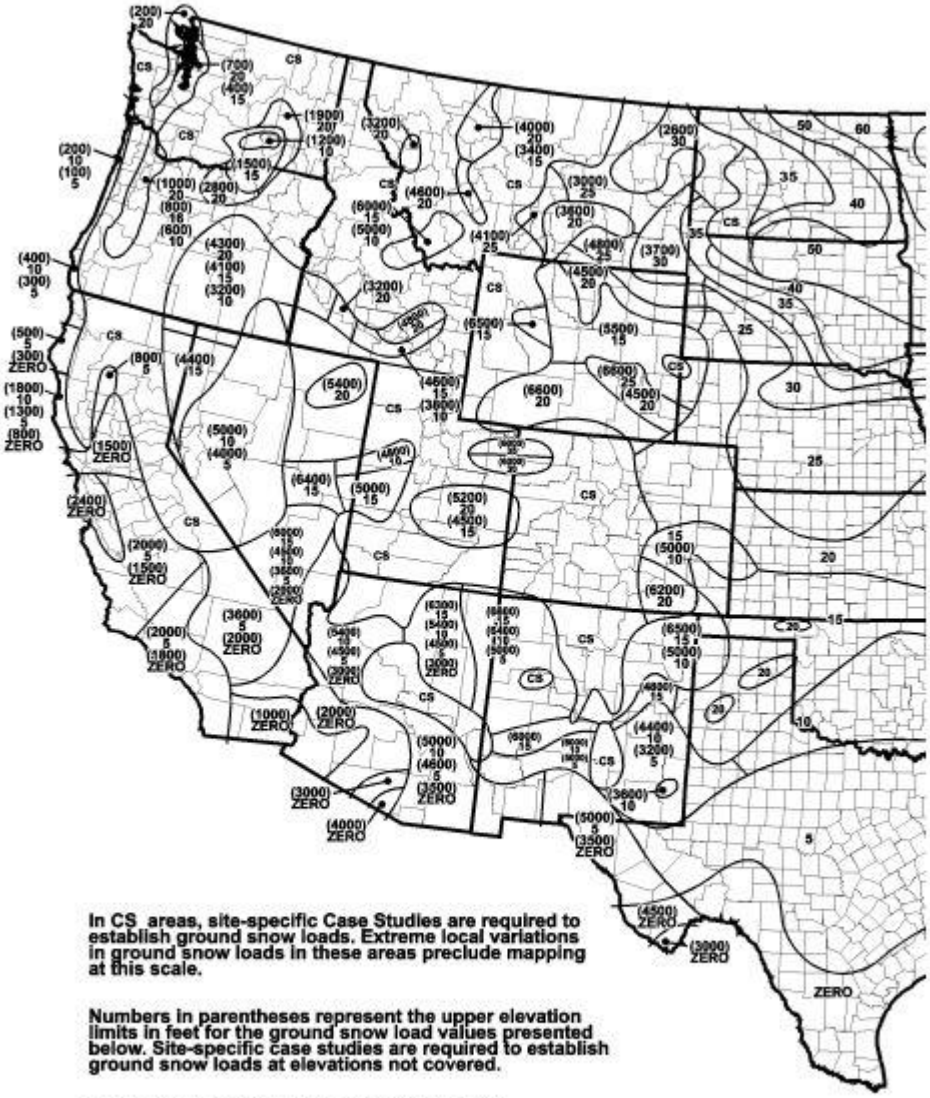
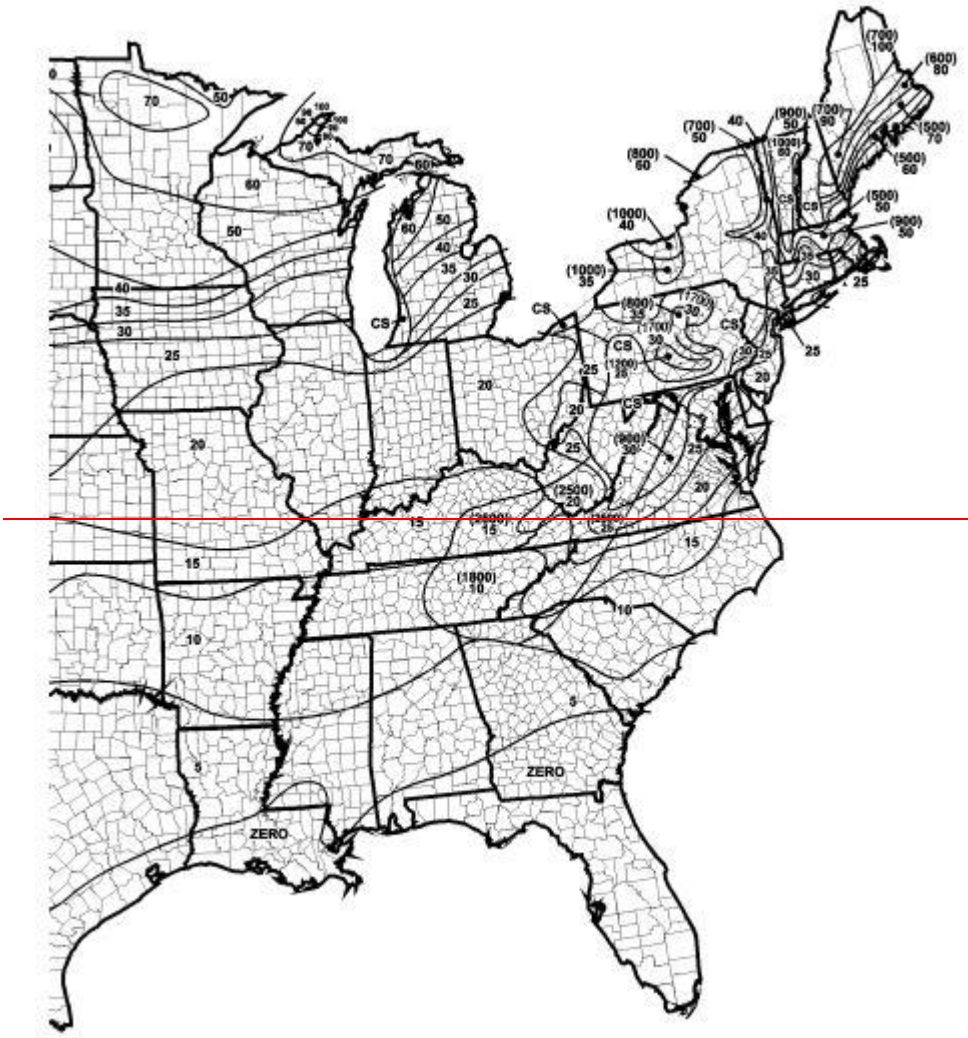


FIGURE 1608.2(DELETE THE FIGURE)
GROUND SNOW LOADS, p_g, FOR THE UNITED STATES (psf)



~~**FIGURE 1608.2—continued (DELETE THE FIGURE)**~~
~~**GROUND SNOW LOADS, p_g, FOR THE UNITED STATES (psf)**~~

In CS (hatched counties) areas, site-specific Case Studies are required to establish ground snow loads. Extreme local variations in ground snow loads in these areas preclude mapping at this scale.

FIGURE 1608.2 (ADD NC FIGURE FROM 2012 NCBC Figure 1608.2)
GROUND SNOW LOADS, p_g, FOR THE STATE OF NORTH CAROLINA (psf)

1608.3 Ponding instability.
Susceptible bays of roofs shall be evaluated for ponding instability in accordance with Section 7.11 of ASCE 7.

SECTION 1609
WIND LOADS

1609.1.2 Protection of openings.
In *wind-borne debris regions*, glazing in buildings shall 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 shall meet the requirements of the large missile test of ASTM E 1996.

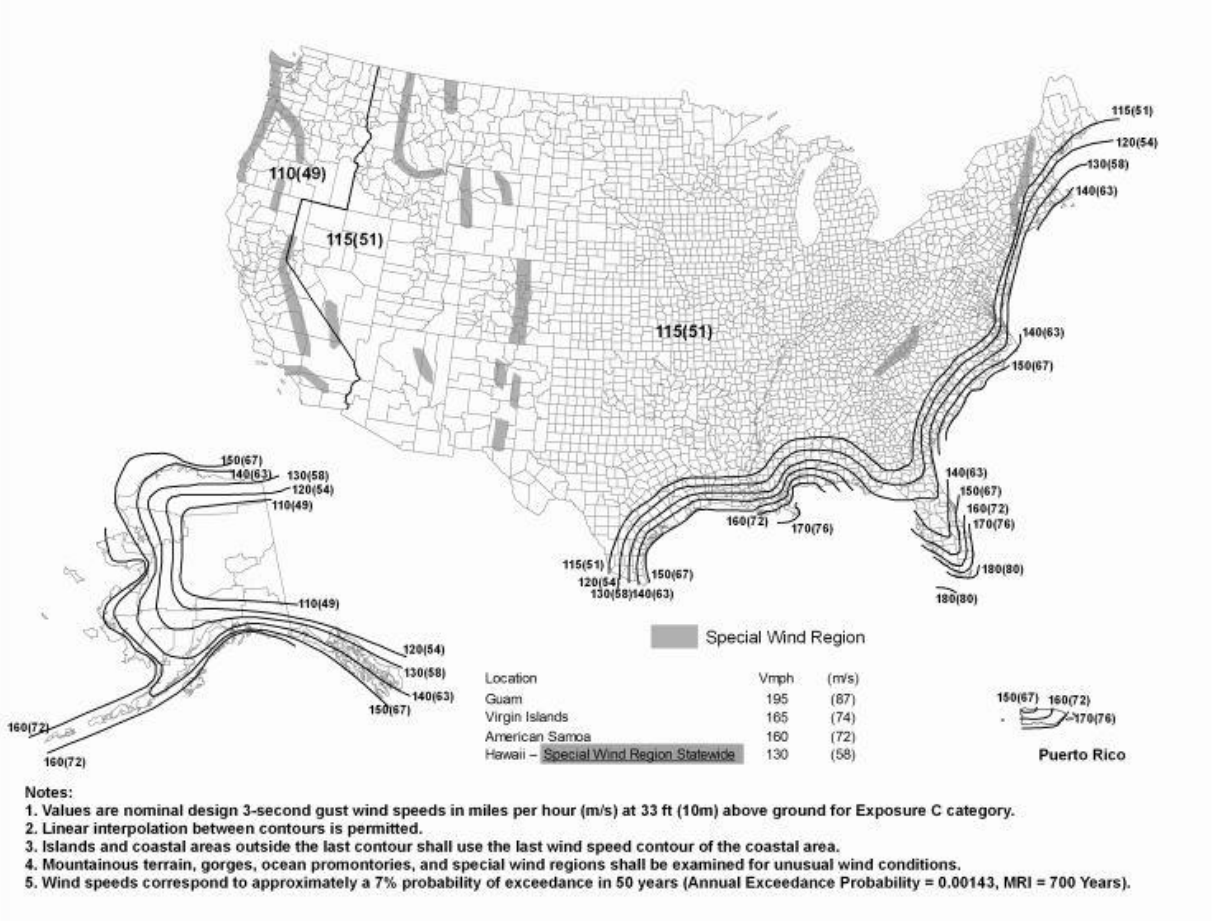
2. Glazed openings located more than 30 feet (9144 mm) above grade shall meet the provisions of the small missile test of ASTM E 1996.

Exceptions:

1. Wood structural panels with a minimum thickness of $^{7}/_{16}$ inch (11.1 mm) and maximum panel span of 8 feet (2438 mm) shall be permitted for opening protection in buildings with a mean roof height of ~~33~~ 45 feet (10 058 mm) or less ~~that are classified as a Group R-3 or R-4 occupancy~~. Panels shall be precut so that they shall be attached to the framing surrounding the opening containing the product with the glazed opening. ~~Panels shall be predrilled as required for the anchorage method and shall 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 45 feet (13 716 mm) or less~~.~~ ~~where V_{asd} determined in accordance with Section 1609.3.1 does not exceed 140 mph (63 m/s).~~

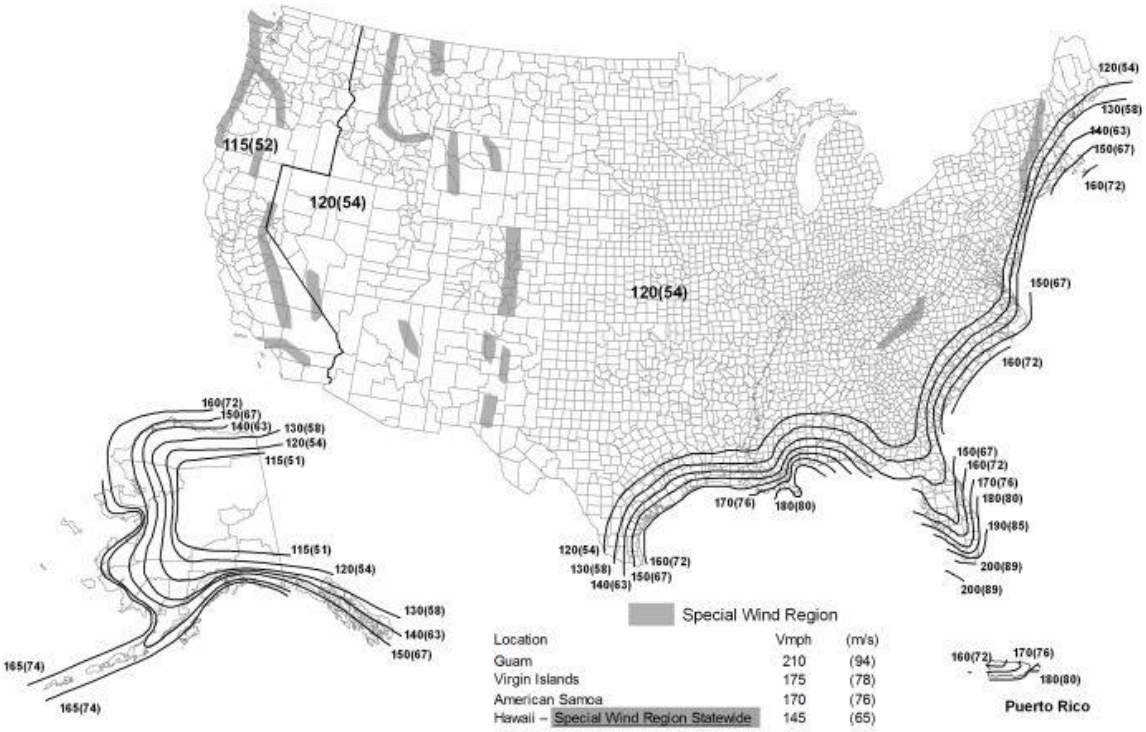
2. Glazing in *Risk Category* I buildings, including greenhouses that are occupied for growing plants on a production or research basis, without public access shall be permitted to be unprotected.

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 shall be permitted to be unprotected.



Replace with NC maps and notes.

FIGURE 1609.3(1)
ULTIMATE DESIGN WIND SPEEDS, v_{ult}, FOR RISK CATEGORY II BUILDINGS AND OTHER STRUCTURES

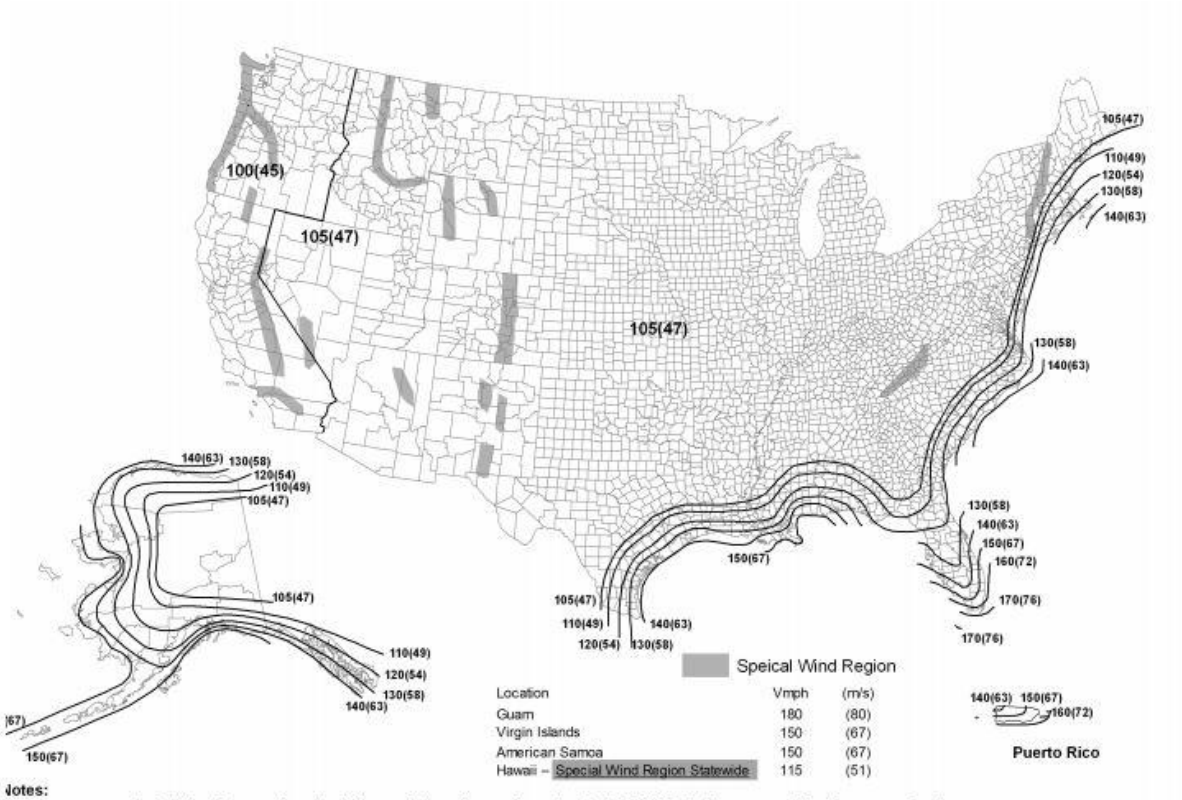


Notes:

1. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
2. Linear interpolation between contours is permitted.
3. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
4. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
5. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (Annual Exceedance Probability = 0.000588, MRI = 1700 Years).

Replace with NC maps and notes.

FIGURE 1609.3(2)
ULTIMATE DESIGN WIND SPEEDS, v_{ult}, FOR RISK CATEGORY III AND IV BUILDINGS AND OTHER STRUCTURES

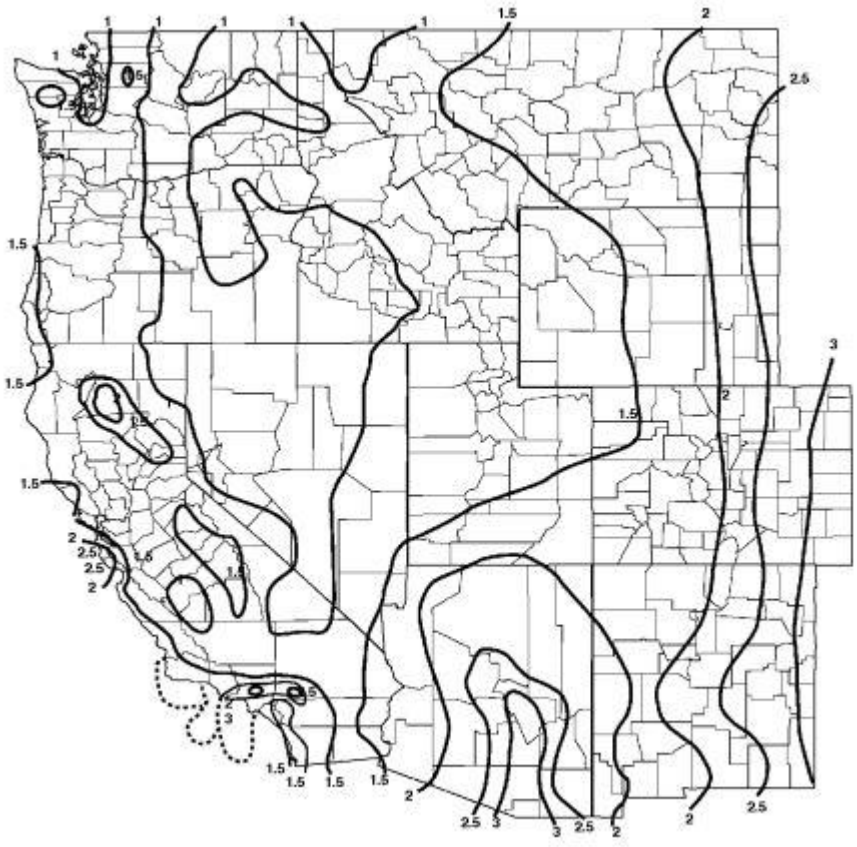


lotes:

. Values are nominal design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.
:. Linear interpolation between contours is permitted.
. Islands and coastal areas outside the last contour shall use the last wind speed contour of the coastal area.
. Mountainous terrain, gorges, ocean promontories, and special wind regions shall be examined for unusual wind conditions.
. Wind speeds correspond to approximately a 15% probability of exceedance in 50 years (Annual Exceedance Probability = 0.00333, MRI = 300 Years).

Replace with NC maps and notes.

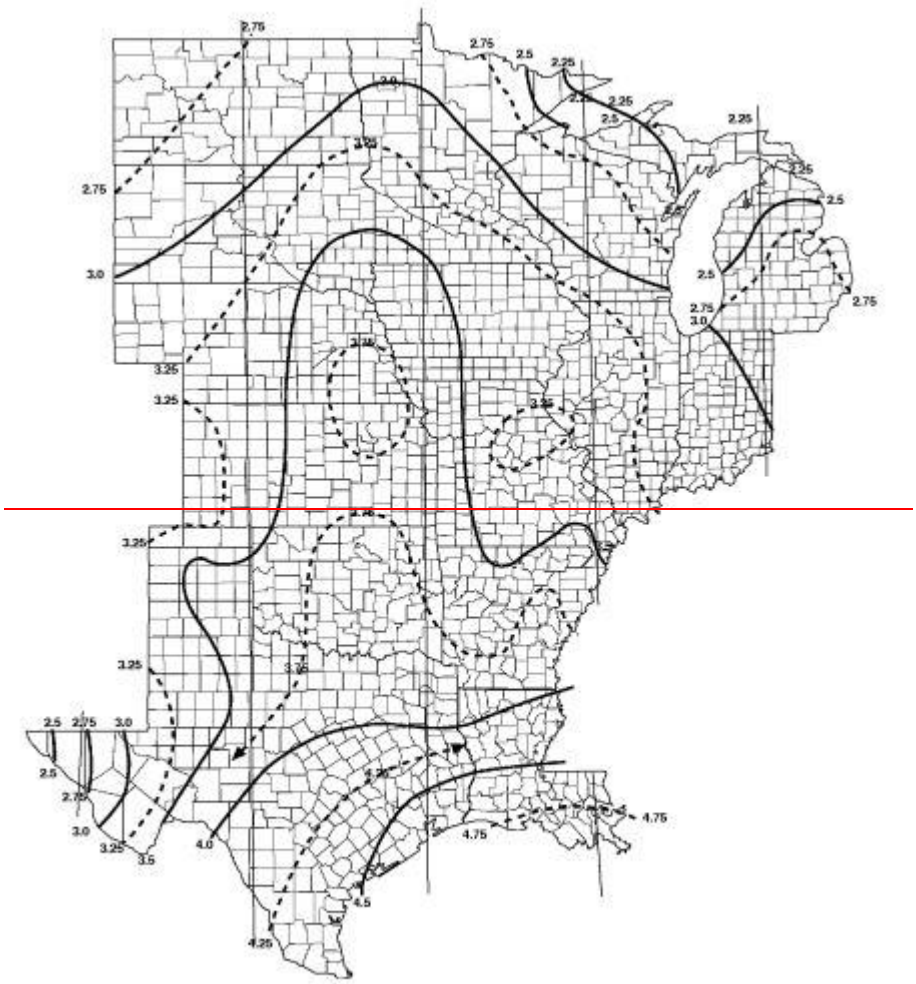
FIGURE 1609.3(3)
ULTIMATE DESIGN WIND SPEEDS, v_{ult}, FOR RISK CATEGORY I BUILDINGS AND OTHER STRUCTURES



~~For SI: 1 inch = 25.4 mm.~~
~~Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.~~

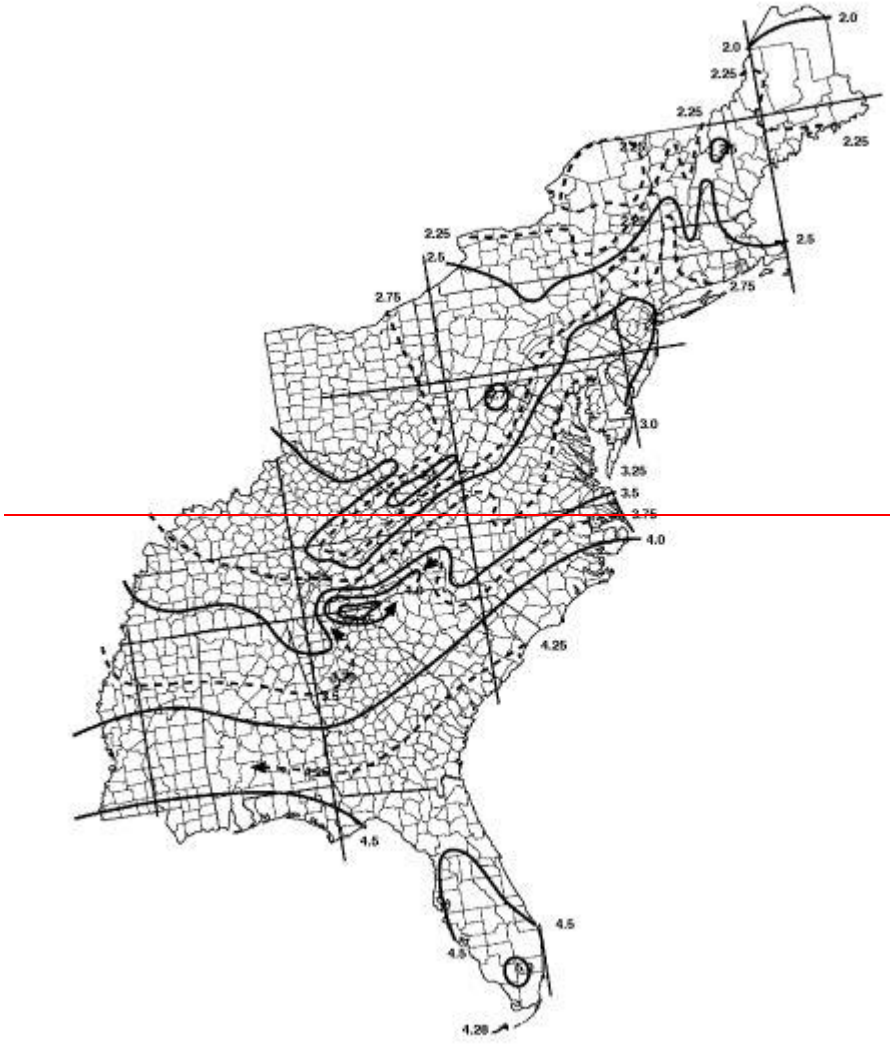
REPLACE FIG. 1611.1 WITH NC MAP AND NOTES

~~[P] FIGURE 1611.1~~
~~100-YEAR, 1-HOUR RAINFALL (INCHES) WESTERN UNITED STATES~~



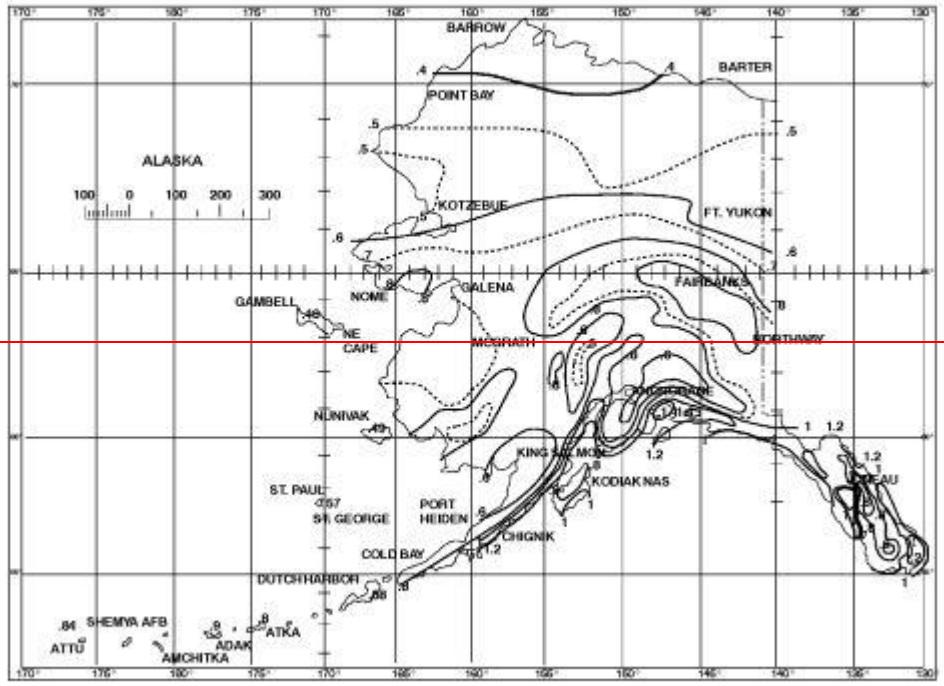
For SI: 1 inch = 25.4 mm.
Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

[P] FIGURE 1611.1—continued
100-YEAR, 1-HOUR RAINFALL (INCHES) CENTRAL UNITED STATES



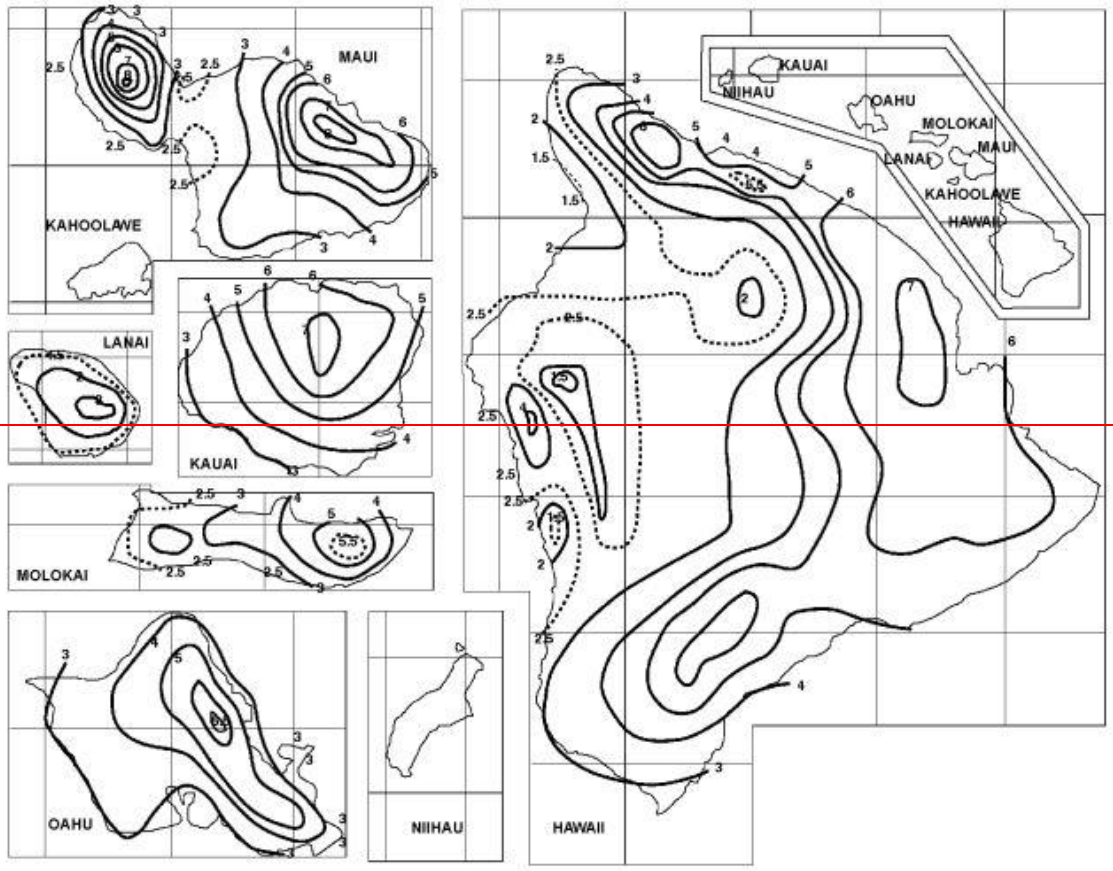
For SI: 1 inch = 25.4 mm.
Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

[P] FIGURE 1611.1—continued
100-YEAR, 1-HOUR RAINFALL (INCHES) EASTERN UNITED STATES



~~For SI: 1 inch = 25.4 mm.~~
~~Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.~~

~~[P] FIGURE 1611.1—continued~~
~~100-YEAR, 1-HOUR RAINFALL (INCHES) ALASKA~~



~~For SI: 1 inch = 25.4 mm.~~
~~Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.~~

~~[P] FIGURE 1611.1—continued~~
~~100-YEAR, 1-HOUR RAINFALL (INCHES) HAWAII~~

1611.2 Ponding instability.
Susceptible bays of roofs shall be evaluated for ponding instability in accordance with Section 8.4 of ASCE 7.

1612.2 Definitions.
The following terms are defined in Chapter 2:

BASE FLOOD.

BASE FLOOD ELEVATION.

BASEMENT.

COASTAL A ZONE.

COASTAL HIGH HAZARD AREA.

DESIGN FLOOD.

DESIGN FLOOD ELEVATION.

DRY FLOODPROOFING.

~~**EXISTING CONSTRUCTION.**~~

EXISTING STRUCTURE.

FLOOD or FLOODING.

FLOOD DAMAGE-RESISTANT MATERIALS.

FLOOD HAZARD AREA.

FLOOD INSURANCE RATE MAP (FIRM).

FLOOD INSURANCE STUDY.

FLOODWAY.

LOWEST FLOOR.

SPECIAL FLOOD HAZARD AREA.

START OF CONSTRUCTION.

SUBSTANTIAL DAMAGE.

SUBSTANTIAL IMPROVEMENT.

1612.5 Flood hazard documentation.
The following documentation shall be prepared and sealed by a *registered design professional* and submitted to the *building official*:

1. For construction in *flood hazard areas* other than *coastal high hazard areas* or *coastal A zones*:

    1.1. The elevation of the lowest floor, including the basement, prior to further vertical construction. ~~as required by the lowest floor elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.10.1~~.

    1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.~~6~~.7.2.1 of ASCE 24, *construction documents* shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.~~6~~.7.2.2 of ASCE 24.

    1.3. For dry floodproofed nonresidential buildings, *construction documents* shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.

2. For construction in *coastal high hazard areas* and *coastal A zones*:

    2.1. The elevation of the bottom of the lowest horizontal structural member prior to further vertical construction. ~~as required by the lowest floor elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.10.1~~.

    2.2. *Construction documents* shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.

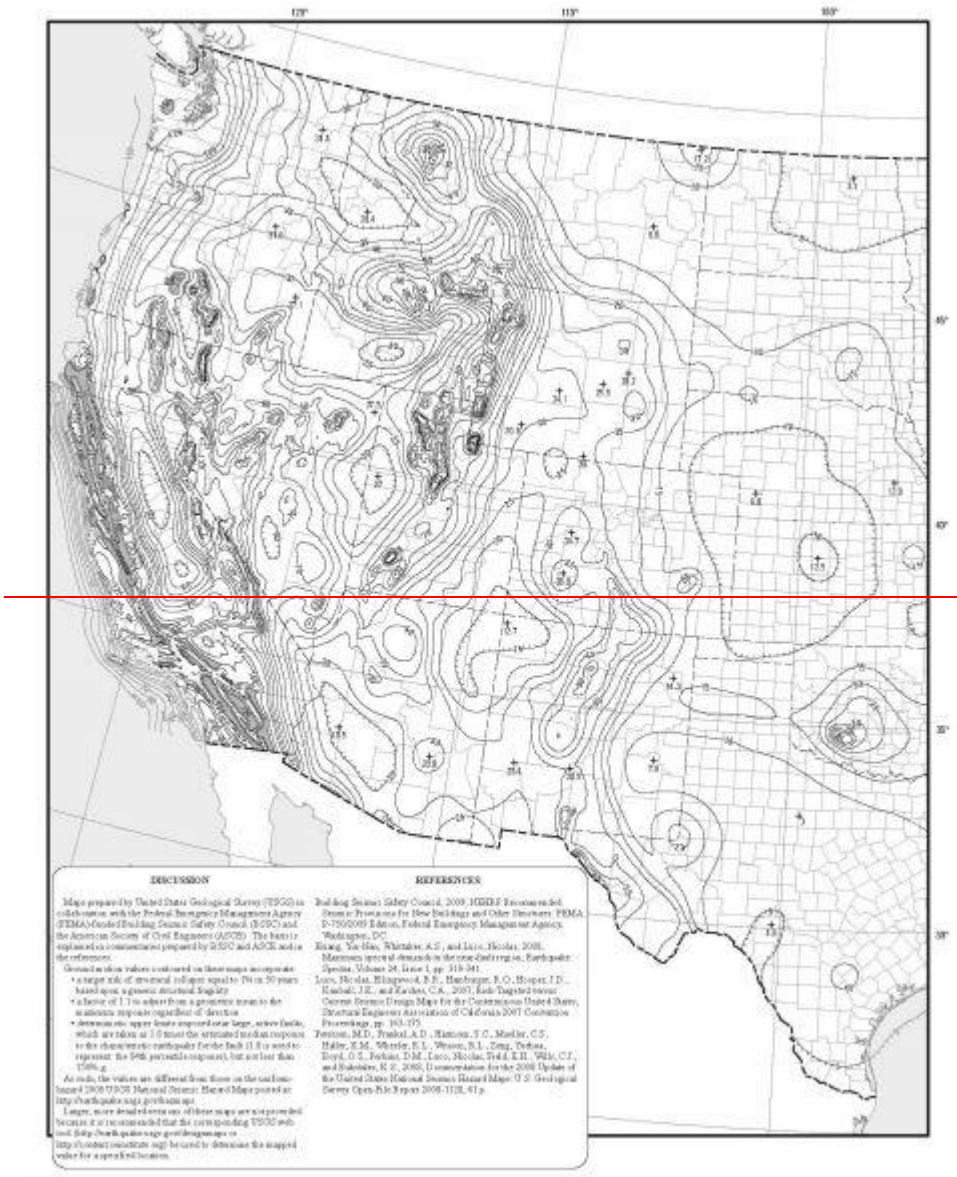
    2.3. For breakaway walls designed to have a resistance of more than 20 psf (0.96 kN/m^2) determined using allowable stress design, *construction documents* shall include a statement that the breakaway wall is designed in accordance with ASCE 24.

SECTION 1613
EARTHQUAKE LOADS

1613.3.1 Mapped acceleration parameters. The parameters S_S and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.3.1(1)

through 1613.3.1(8). Where S_1 is less than or equal to 0.04 and S_S is less than or equal to 0.15, the structure is permitted to be assigned *Seismic Design Category* A.

REPLACE FIGS. 1613.5(x) WITH NC FIGURES. UPDATE LINES TO 2015 IBC.



~~**FIGURE 1613.3.1(1)**~~
~~**RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE**~~
~~**ACCELERATIONS FOR THE CONTERMINOUS UNITED STATES OF 0.2-SECOND SPECTRAL RESPONSE ACCELERATION**~~
~~**(5% OF CRITICAL DAMPING), SITE CLASS B**~~

~~*(continued)*~~

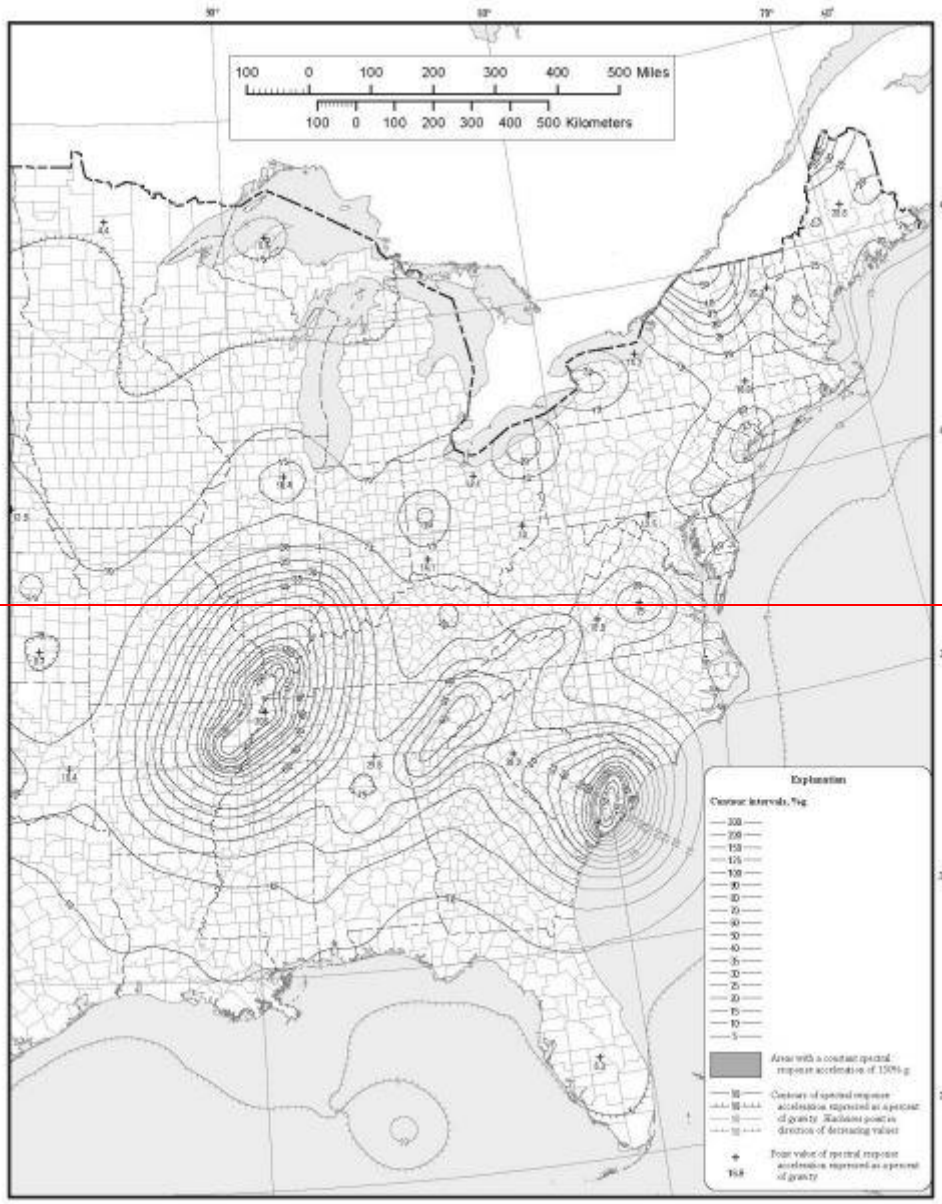


FIGURE 1613.3.1(1)—continued
RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS FOR THE CONTERMINOUS UNITED STATES OF 0.2-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B

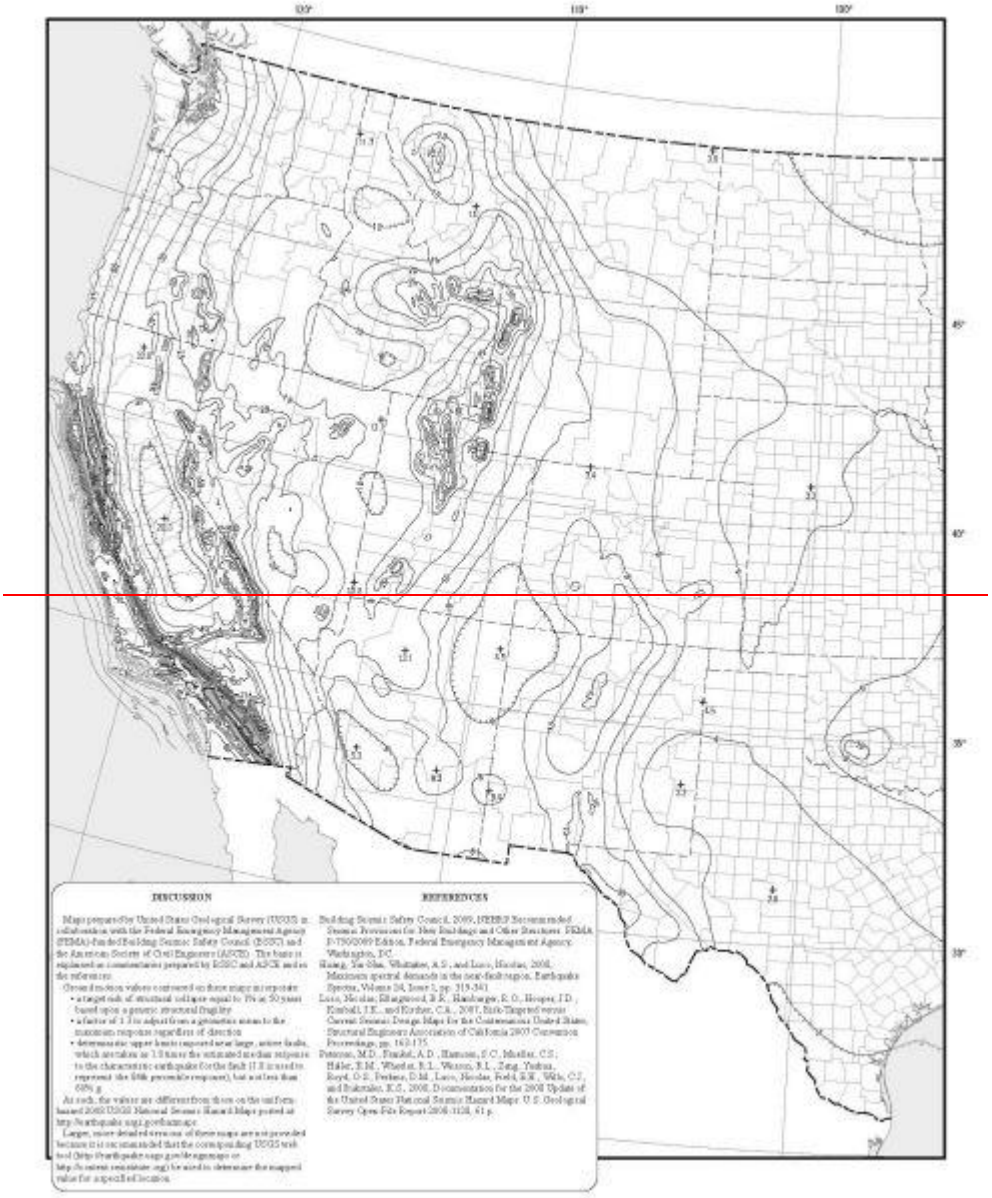
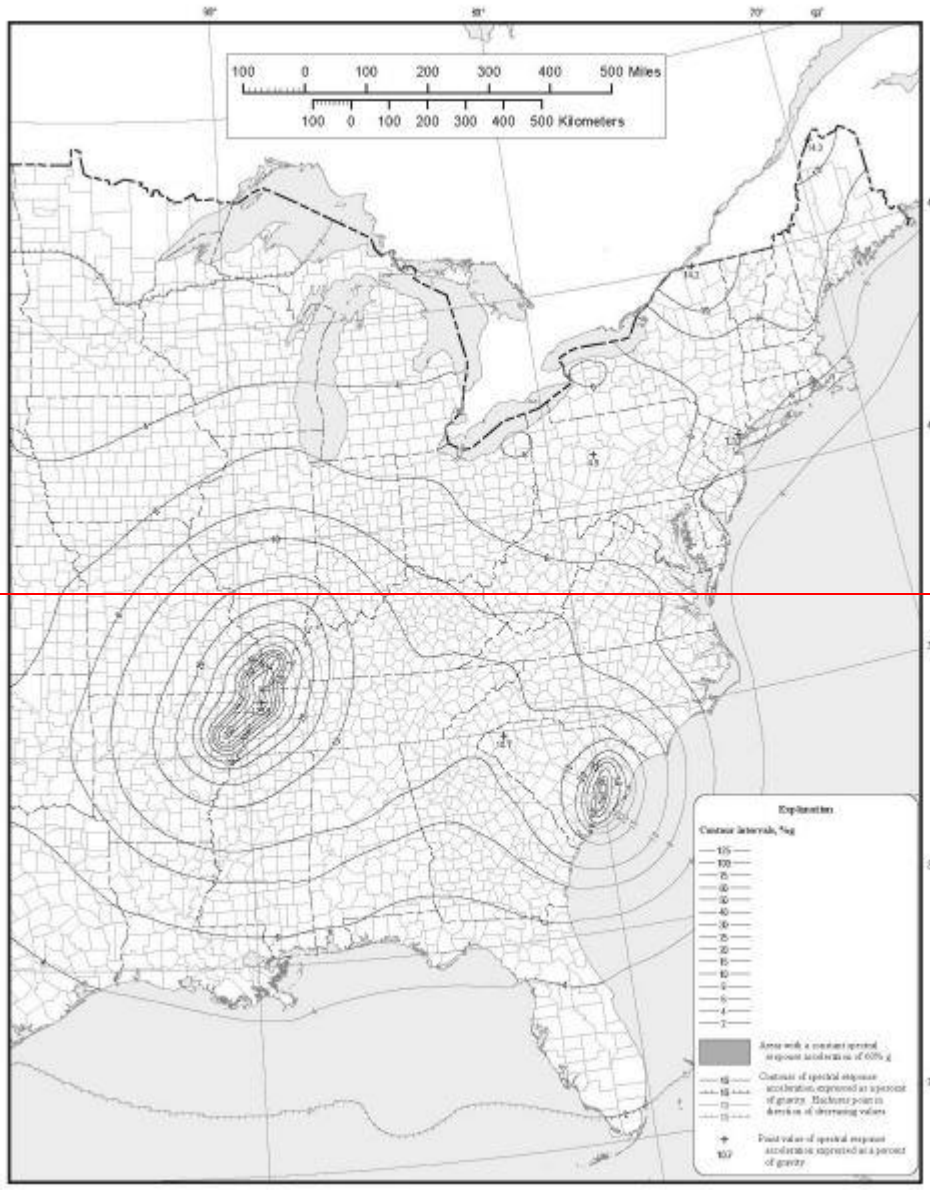
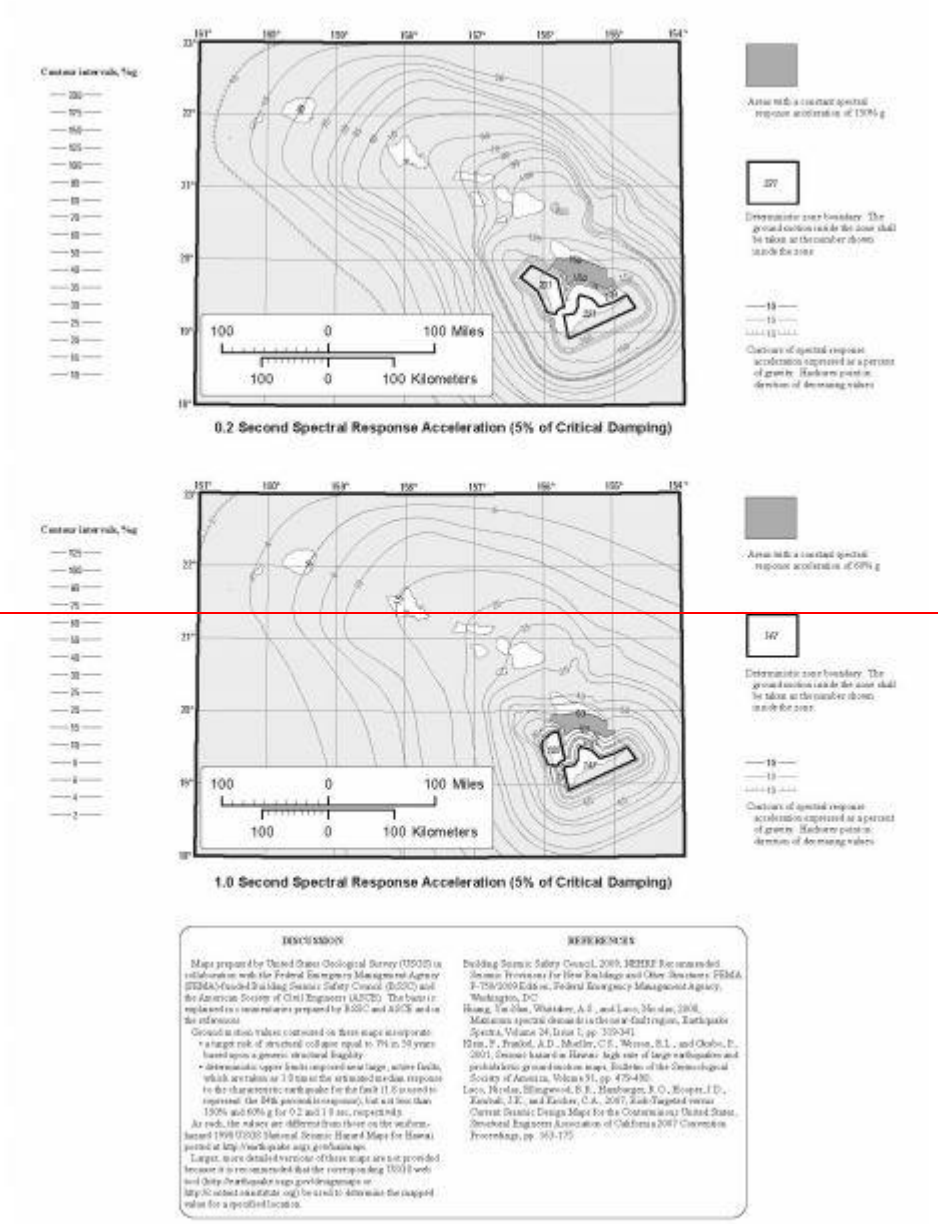


FIGURE 1613.3.1(2)
RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS FOR THE CONTERMINOUS UNITED STATES OF 1-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B



~~FIGURE 1613.3.1(2)—continued~~
~~RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE~~
~~ACCELERATIONS FOR THE CONTERMINOUS UNITED STATES OF 1-SECOND SPECTRAL RESPONSE ACCELERATION~~
~~(5% OF CRITICAL DAMPING), SITE CLASS B~~



~~**FIGURE 1613.3.1(3)**~~
~~**RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE$_R$) GROUND MOTION RESPONSE**~~
~~**ACCELERATIONS FOR HAWAII OF 0.2- AND 1-SECOND SPECTRAL RESPONSE ACCELERATION**~~
~~**(5% OF CRITICAL DAMPING), SITE CLASS B**~~

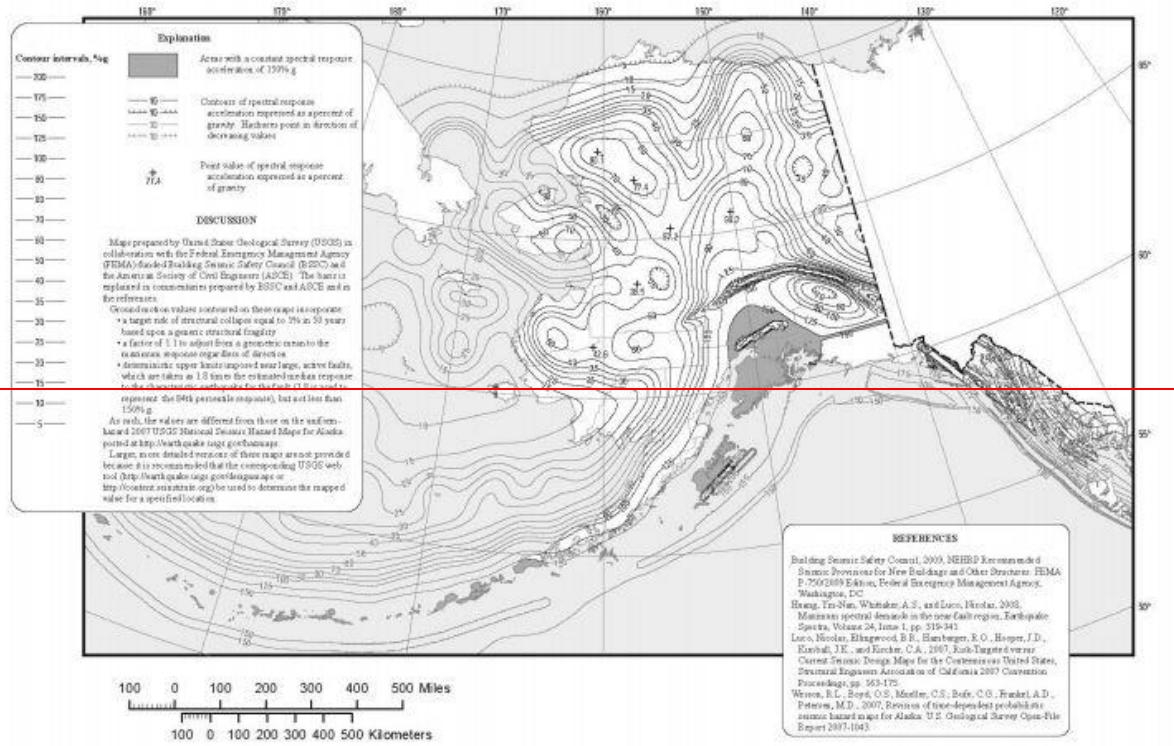


FIGURE 1613.3.1(4)
RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS FOR ALASKA OF 0.2-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B

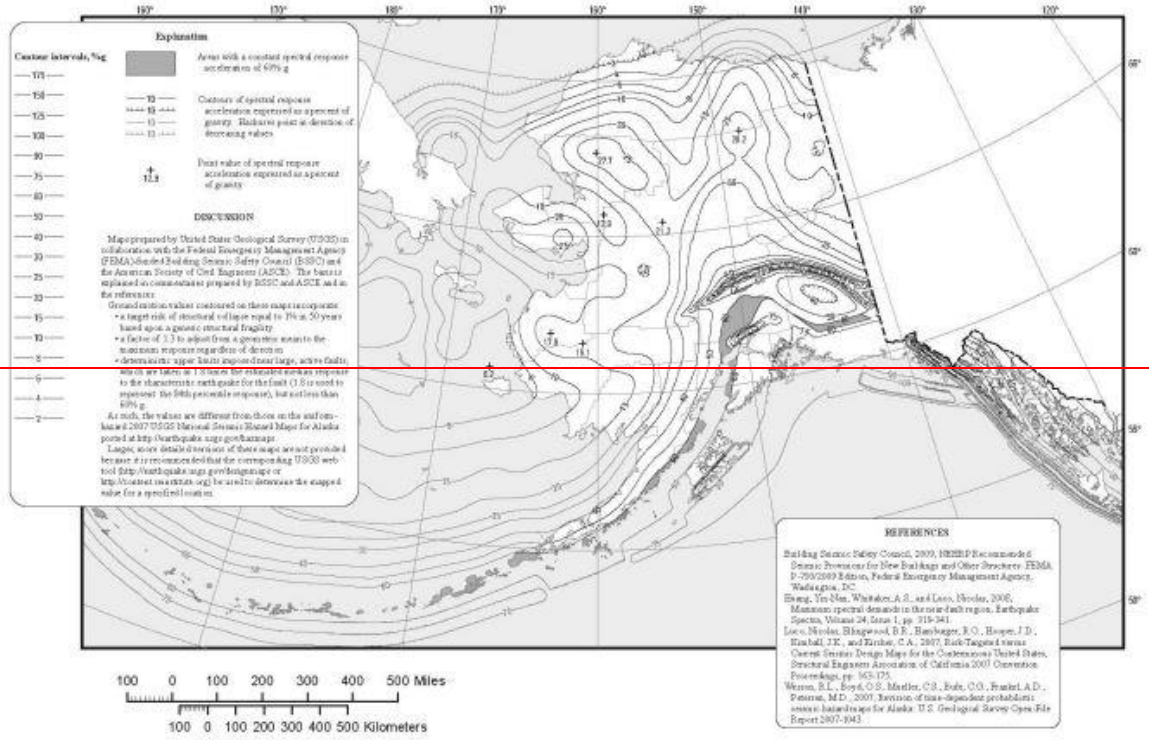
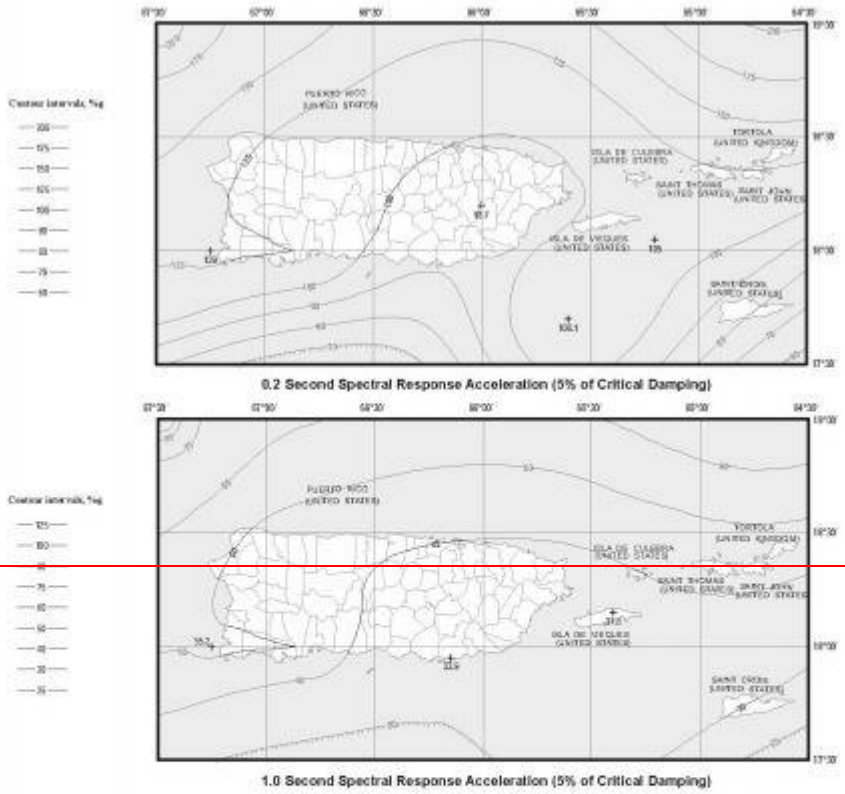
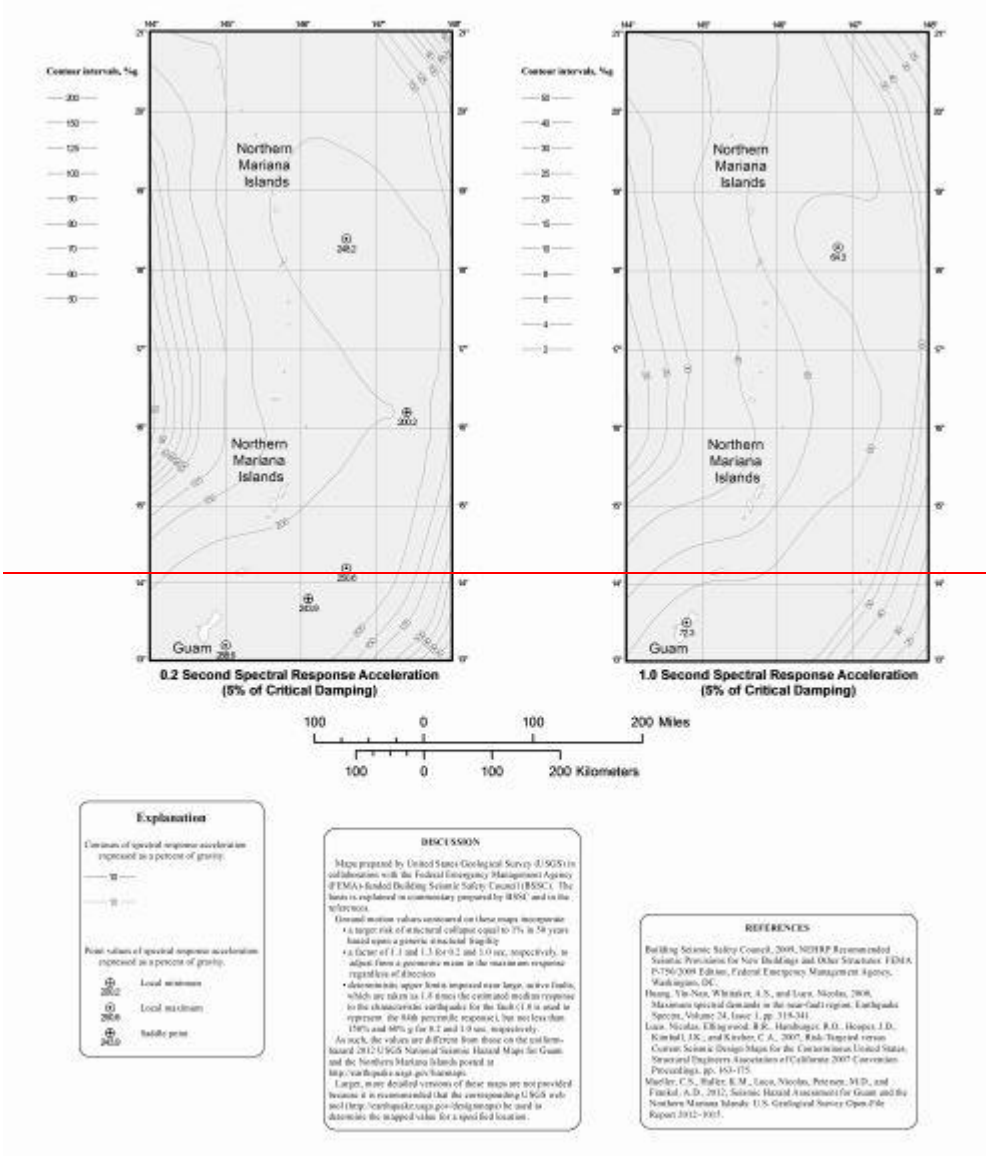


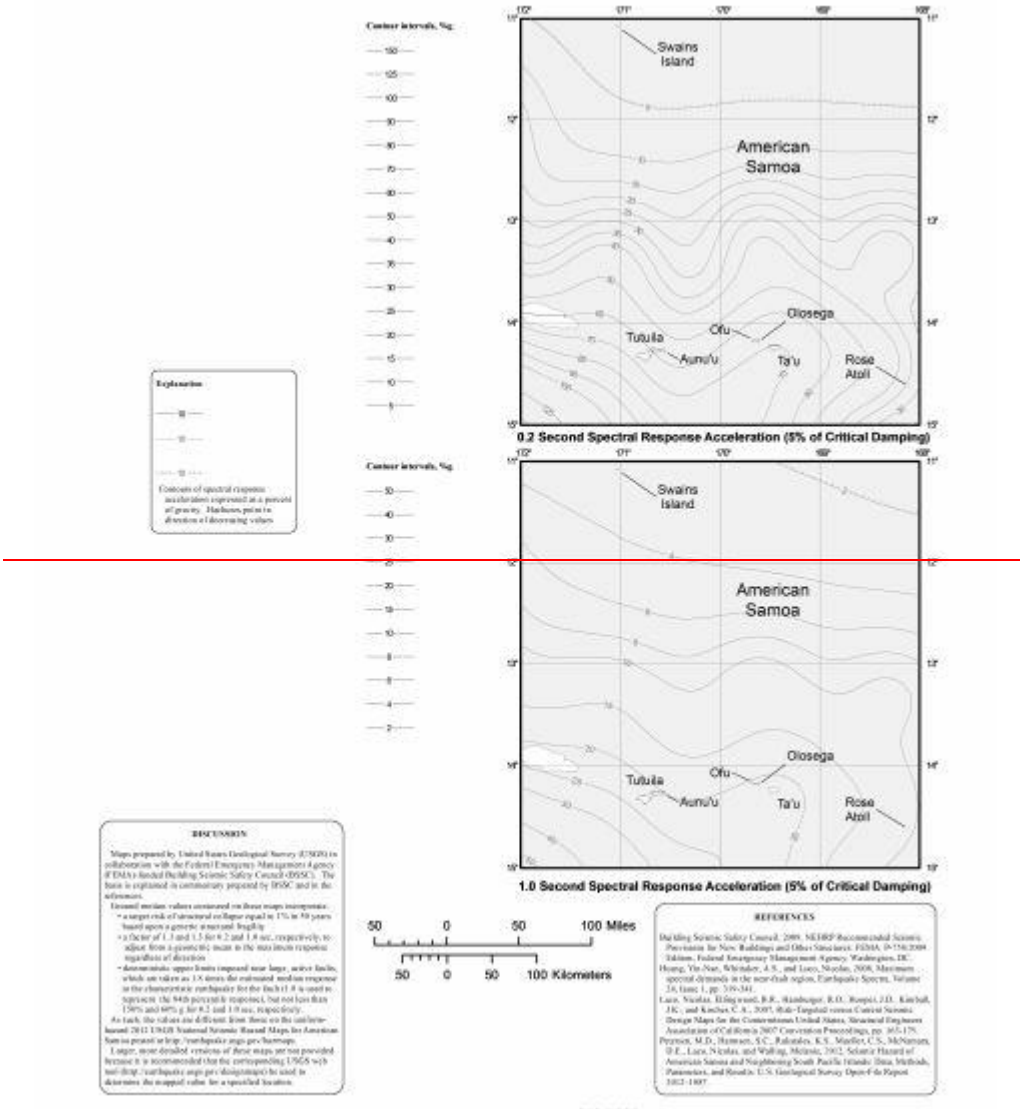
FIGURE 1613.3.1(5)
RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATIONS FOR ALASKA OF 1.0-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B



~~FIGURE 1613.3.1(6)~~
~~RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE$_R$) GROUND MOTION RESPONSE ACCELERATIONS FOR PUERTO RICO AND THE UNITED STATES VIRGIN ISLANDSOF 0.2- AND 1-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B~~



~~FIGURE 1613.3.1(7)~~
~~RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE$_R$) GROUND MOTION RESPONSE ACCELERATIONS FOR GUAM AND THE NORTHERN MARIANA ISLANDS OF 0.2- AND 1-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B~~



~~FIGURE 1613.3.1(8)~~
~~RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE$_R$) GROUND MOTION RESPONSE ACCELERATIONS FOR AMERICAN SAMOA OF 0.2- AND 1-SECOND SPECTRAL RESPONSE ACCELERATION (5% OF CRITICAL DAMPING), SITE CLASS B~~

CHAPTER 17
SPECIAL INSPECTIONS AND TESTS

~~User note: Code change proposals to sections preceded by the designation [BF] will be considered by the IBC — Fire Safety Code Development Committee during the 2015 (Group A) Code Development Cycle. Sections preceded by the designation [F] will be considered by the International Fire Code Development Committee during the 2016 (Group B) Code Development Cycle. All other code change proposals will be considered by the IBC — Structural Code Development Committee during the Group B cycle. See explanation on page iv.~~

SECTION 1701
GENERAL

1701.1 Scope. The provisions of this chapter shall govern the quality, workmanship and requirements for materials covered. Materials of construction and tests shall conform to the applicable standards listed in this code.

1701.2 ~~New~~ Alternative materials. New building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this chapter and in the ~~*approved* rules to determine character, quality and limitations of use~~ North Carolina Administrative Code and Policies.

SECTION 1703
APPROVALS

1703.4.1 Research and investigation. Sufficient technical data shall be submitted to the *building official* to substantiate the proposed use of any product, material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the *building official* shall approve the use of the product, material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the owner ~~or the owner's authorized agent~~.

~~**1703.5.4 Method of labeling.** Deleted~~
~~Information required to be permanently identified on the product, material or assembly shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.~~

SECTION 1704
SPECIAL INSPECTIONS AND TESTS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATION

1704.1 General.
Special inspections and tests, statements of special inspections, responsibilities of contractors, submittals to the *building official* and structural observations shall meet the applicable requirements of this section.

Where application is made for construction as described in this section, the owner shall employ one or more special inspectors to provide inspections during construction on the types of work listed in accordance with Section 1705.1. These inspections are in addition to the inspections specified in the North Carolina Administrative Code and Policies.

1704.1.1 Building permit requirement. The permit applicant shall submit a statement of special inspections prepared by the registered design professional in responsible charge in accordance with the *North Carolina Administrative Code and Policies* as a condition for permit issuance. This statement shall include a list of materials and work requiring special inspections by Section 1705.1, the inspections to be performed and a list of the individuals, approved agencies or firms intended to be retained for conducting such inspections.

1704.2 Special inspections and tests.
Where application is made to the *building official* for construction as specified in ~~Section 105,~~ the *North Carolina Administrative Code and Policies* the owner ~~or the owner's authorized agent, other than the contractor,~~ shall employ one or more *approved agencies* to provide *special inspections* and tests during construction on the types of work specified in Section 1705 and identify the *approved agencies* to the *building official*. ~~These *special inspections* and tests are in addition to the inspections by the *building official* that are identified in Section 110.~~

Exceptions:

1. *Special inspections* and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by the *building official.*

2. Unless otherwise required by the *building official*, *special inspections* and tests 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.

3. *Special inspections* and tests are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.

4. The contractor is permitted to employ the *approved agencies* where the contractor is also the owner.

1704.2.1 Special inspector qualifications.

~~Prior to the start of the construction, the *approved agencies* shall provide written documentation to the *building official* demonstrating the competence and relevant experience or training of the *special inspectors* who will perform the *special inspections* and tests during construction. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of *special inspection* or testing 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 special inspectors for the work designed by them, provided they qualify as special inspectors.~~

The *registered design professional in responsible charge* or engineers of record involved in the design of the project shall indicate in the project documents the required qualifications of the *special inspector*.

The *special inspector* shall demonstrate competence in accordance with the required qualifications, to the satisfaction of the *building official*, for the inspection of the particular type of construction or operation requiring *special inspection*. 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 inspector for the work designed by them, provided those personnel meet the qualification requirements of this section to the satisfaction of the *building official*. The special inspector shall provide written documentation to the *building official* demonstrating his or her competence and relevant experience or training. Experience or training shall 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.

1704.2.3 Submittal of Statement of special inspections.

The applicant shall submit a statement of *special inspections* ~~in accordance with Section 107.1~~ as a condition for permit issuance. This statement shall be in accordance with Section 1704.3.

Exception:

1. A statement of *special inspections* is not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.

2. The *building official* is authorized to waive the submission of a statement of special inspections if it is found that the nature of the work applied for is such that review of a statement of special inspections is not necessary to obtain compliance with this code.

1704.2.5 Special inspection of fabricated items.

Where fabrication of structural, load-bearing or lateral load-resisting members or assemblies is being conducted on the premises of a fabricator's shop, *special inspections* of the *fabricated items* shall be performed during fabrication.

Exceptions:

1. *Special inspections* during fabrication are not required where the fabricator maintains *approved* detailed fabrication and quality control procedures that provide a basis for control of the workmanship and the fabricator's ability to conform to *approved construction documents* and this code. Approval shall be based upon review of fabrication and quality control procedures and periodic inspection of fabrication practices by ~~the building official~~. an *approved agency*.

2. Special inspections are not required where the fabricator is registered and *approved* in accordance with Section 1704.2.5.1.

1704.3 Statement of special inspections.
Where *special inspections* or tests are required by Section 1705, the *registered design professional in responsible charge* for each discipline shall prepare a statement of *special inspections* in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3. Statements of special inspections shall be included in the construction documents.

1704.6 Structural observations.
Where required by the provisions of Section 1704.6.1 or 1704.6.2, the owner ~~or the owner's authorized agent~~ shall employ a *registered design professional* to perform structural observations. Structural observation does not include or waive the responsibility for the inspections in ~~Section 110~~ the North Carolina Administrative Code And Policies or the *special inspections* in Section 1705 or other sections of this code.

1704.6.2 Structural observations for wind requirements.
Structural observations shall be provided for those structures sited where V_{asd} as determined in accordance with Section 1609.3.1 exceeds 110 mph (49 m/sec) { V_{ult}=142 mph}, where one or more of the following conditions exist:

1. The structure is classified as *Risk Category* III or IV.

2. The *building height* is greater than 75 feet (22 860 mm).

3. When so designated by the *registered design professional* responsible for the structural design.

4. When such observation is specifically required by the *building official*.

1705.1.2 Specific Elements Always Requiring Special Inspections~~.~~
Special inspections in accordance with Sections 1704 and 1705 are required for the following elements only, regardless of the building or structure that they are in:

1. Piles, piers and special foundations in accordance with Sections 1705.7, 1705.8, 1705.9, 1810.3.5.2.4 and 1810.3.5.2.5;

2. Sprayed fire-resistant materials in accordance with Section 1705.14;

3. Mastic and intumescent fire-resistant coatings in accordance with Section 1705.15;

4. Smoke control and smoke exhaust systems in accordance with Sections 1705.18;

5. Retaining walls and retaining systems exceeding 5 feet (1524 mm) of unbalanced backfill height in accordance with Section 1807.2.

Special Inspections are not required for other elements unless the building or structure is one identified in Section 1705.1.3.

1705.1.3 Structures Requiring Special Inspections
Special inspections in accordance with Sections 1704 and 1705 are required for building, building components or other structures according to the following:

1. Buildings or other structures listed in Table 1604.5 in Risk Category II if:

1.1. *Building height* exceeds 45 feet (13.7 m) or three *stories*, or

1.2. The building is an underground building in accordance with Section 405.1.

2. Buildings or other structures listed in Table 1604.5 in Risk Categories III or IV;

1705.4.2 Vertical masonry foundation elements. Deleted
~~*Special inspections* and tests of *vertical masonry foundation elements* shall be performed in accordance with Section 1705.4.~~

SECTION 1706

DESIGN STRENGTHS OF MATERIALS

1706.2 Alternative ~~New~~ materials.
For materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests as provided for in Section 1707.

SECTION 1707

ALTERNATIVE TEST PROCEDURE

1707.1 General.
In the absence of *approved* rules or other *approved* standards, the *building official* shall make, or cause to be made, the necessary tests and investigations; or the *building official* shall accept duly authenticated reports from *approved agencies* in respect to the quality and manner of use of new materials or assemblies as provided for in ~~Section 104.11~~ the North Carolina Administrative Code And Policies. The cost of all tests and other investigations required under the provisions of this code shall be borne by the owner ~~or the owner's authorized agent~~.

CHAPTER 18
SOILS AND FOUNDATIONS

~~User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.~~

1803.5.6 Rock strata.
Where subsurface explorations at the project site indicate variations or doubtful characteristics in the structure of rock upon which foundations are to be constructed, a sufficient number of borings shall be drilled to sufficient depths to assess the competency of the rock and its load-bearing capacity.

1803.6 Reporting.
Where geotechnical investigations are required, a written report of the investigations shall be submitted to the *building official* ~~by the permit applicant~~ at the time of permit application. This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.

2. A complete record of the soil boring and penetration test logs and soil samples.

3. A record of the soil profile.

4. Elevation of the water table, if encountered.

5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads.

6. Expected total and differential settlement.

7. Deep foundation information in accordance with Section 1803.5.5.

8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.

9. Compacted fill material properties and testing in accordance with Section 1803.5.8.

10. Controlled low-strength material properties and testing in accordance with Section 1803.5.9.

1805.4.2 Foundation drain.
A drain shall be placed around the perimeter of a foundation that consists of gravel or crushed stone containing not more than 10-percent material that passes through a No. 4 (4.75 mm) sieve. The drain shall extend a minimum of 12 inches (305 mm) beyond the outside edge of the footing. The thickness shall be such that the bottom of the drain is not higher than the bottom of the base under the floor, and that the top of the drain is not less than 6 inches (152 mm) above the top of the footing. The ~~top of the~~ drain shall be ~~covered~~ wrapped with an *approved* filter membrane material. Where a drain tile or perforated pipe is used, the invert of the pipe or tile shall not be higher than the floor elevation. ~~The top of joints or the top of perforations shall be protected with an *approved* filter membrane material.~~ The pipe or tile shall be placed on not less than 2 inches (51 mm) of gravel or crushed stone complying with Section 1805.4.1, and shall be covered with not less than 6 inches (152 mm) of the same material. The drain system, consisting of pipe or tile and gravel or crushed stone, shall be wrapped with an *approved* filter membrane material.

SECTION 1806

PRESUMPTIVE LOAD-BEARING

VALUES OF SOILS

1806.2 Presumptive load-bearing values.
The load-bearing values used in design for supporting soils near the surface shall not exceed the values specified in Table 1806.2 ~~unless data to substantiate the use of higher values are submitted and *approved*.~~ provided that all of the following criteria are satisfied.

1. Presumptive bearing pressures are acceptable only for structures where column loads are less than 50 kips per column and wall loads do not exceed 3.0 kips per linear foot.

2. Finished grades, including cut or fill operations, do not differ from the natural grades by more than 5 feet (1524mm).

3. Histories of favorable foundation performance are available from adjoining sites for similar loading conditions.

1807.2.4 Retaining systems adjacent to structures.
Retaining systems less than 5 feet (1524 mm) in cumulative vertical relief and adjacent to a structure located closer than the vertical relief shall be designed under the responsible charge of a registered design professional.

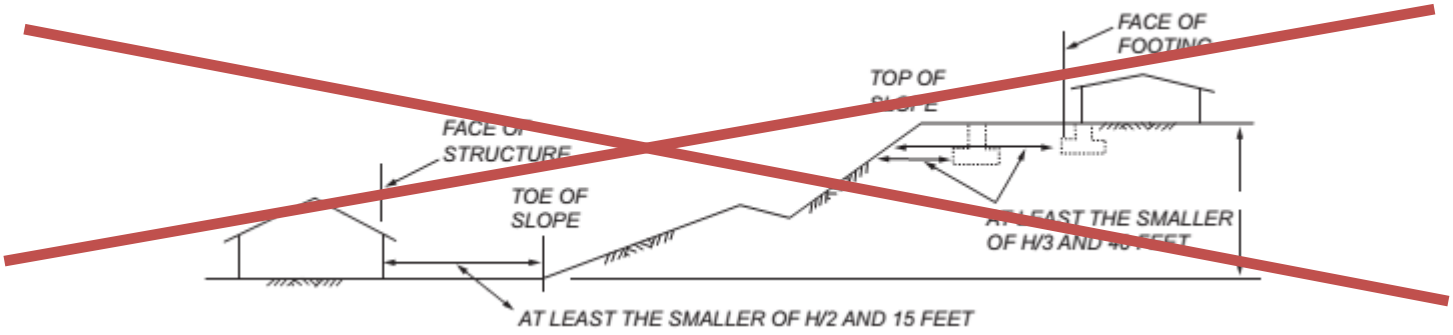
1807.2.5 Retaining systems. Retaining systems providing a cumulative vertical relief greater than 5 feet (1524 mm) in height within a horizontal separation distance of 50 feet (15 m) or less, including retaining walls or mechanically stabilized earth walls, shall be designed under the responsible

charge of a registered design professional. Retaining systems shall meet the requirements of Section 1610. Testing and inspection reports shall comply with Section 1704.2.4 and shall verify:

1. Foundation support system is adequate for the intended site conditions;
2. Measurement of the quality of construction materials for conformance with specifications;
3. Determination of similarity of actual soil conditions to those anticipated in design; and
4. Examination of backfill materials and any drainage systems for compliance with plans and specifications.

1808.7 Foundations on or adjacent to slopes.
The placement of buildings and structures on or adjacent to slopes steeper than one unit vertical in three units horizontal (33.3-percent slope) shall comply with Sections 1808.7.1 through 1808.7.5.

1808.7.1 Building clearance from ascending slopes.
In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures. Except as provided in Section 1808.7.5 and Figure 1808.7.1, the following criteria will be assumed to provide this protection. Where the existing slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of 45 degrees (0.79 rad) to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope.



For SI: 1 foot = 304.8 mm

FIGURE 1808.7.1
~~**FOUNDATION CLEARANCES FROM SLOPES**~~
(Use Figure 1808.7.1 from the 2012 North Carolina Building Code)

1809.4 Depth and width of footings.
The minimum depth of footings below the undisturbed ground surface shall be 12 inches (305 mm). Where applicable, the requirements of Section 1809.5 shall also be satisfied. The minimum width of footings shall be ~~12 inches (305 mm)~~ 16 inches (406 mm). Minimum width of turned down slabs shall be 12 inches (305 mm) unless engineering analysis is provided.

TABLE 1809.7
PRESCRIPTIVE FOOTINGS SUPPORTING WALLS OF LIGHT-FRAME CONSTRUCTION[a, b, c, d, e]

NUMBER OF FLOORS SUPPORTED BY THE FOOTING[f]	WIDTH OF FOOTING (inches)	THICKNESS OF FOOTING (inches)
1	~~12~~ 16	6
2	~~15~~ 16	6
3	18	8[g]

1810.3.2.4 Timber.
Timber deep foundation elements shall be designed as piles or poles in accordance with AWC NDS. Round timber elements shall conform to ASTM D 25. Sawn timber elements shall conform to DOC PS-20.

1810.3.2.4.1 Preservative treatment.
Timber deep foundation elements used to support permanent structures shall be treated in accordance with this section unless it is established that the tops of the untreated timber elements will be below the lowest ground-water level assumed to exist during the life of the structure. Preservative and minimum final retention shall be in accordance with AWPA U1 (Commodity Specification E, Use Category 4C) for round timber elements and AWPA U1 (Commodity Specification A, Use Category 4B) for sawn timber elements. Preservative-treated timber elements shall be subject to a quality control program administered by an *approved agency*.Element cutoffs shall be treated in accordance with AWPA M4. For preservative treatment of piles in marine and underwater environments see Chapter 36.

1810.3.5.2.4 Pile test. A pile load test shall be performed if 400 psi (2758 kPa) shaft stress is exceeded. The pile load test shall be in accordance with Section 1810.3.3.1.2.

1810.3.5.2.5 Quality control. For piles having a shaft stress exceeding 400 psi (2758 kPa), the following quality control procedures shall be met:

1. Calibrate pile installation equipment to accurately measure grout volumes and pressure prior to test pile installation. This calibration shall be expressed in cubic feet per pump stroke.
2. Document the amount of grout injected into the test pile by recording the number of pump strokes per linear foot or number of pump strokes per 5 linear foot (1524 mm) section.
3. Subject the installation procedures to a static load test in accordance with ASTM D 1143.
4. If the load test is successful, ensure that each production pile is installed using the same procedure that installed the successful test pile.
5. A *registered design professional* shall certify to the code enforcement official that all pilings were installed in accordance with the *approved* design and tested installation procedure. The *registered design professional* shall be prepared to submit upon request a report showing the following information:
   5.1. Pile identification;
   5.2. Pile length;
   5.3. Date;

5.4. Rate of auger withdrawal (grouting time); and
5.5. Grout volume in cubic feet per linear foot or cubic feet per 5 foot (1524 mm)section.

CHAPTER 19
CONCRETE

~~*Italics are used for text within Sections 1903 through 1905 of this code to indicate provisions that differ from ACI 318.*~~

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

1905.1 General.
The text of ACI 318 shall be modified as indicated in Sections 1905.1.1 through 1905.1.8.

1905.1.1 ACI 318, Section 2.3.
Modify existing definitions and add the following definitions to ACI 318, Section 2.3.

DESIGN DISPLACEMENT. Total lateral displacement expected for the design-basis earthquake, *as specified by Section 12.8.6 of ASCE 7.*

DETAILED PLAIN CONCRETE STRUCTURAL WALL. A wall complying with the requirements of Chapter 14, including 14.6.~~2~~.1.

ORDINARY PRECAST STRUCTURAL WALL. A precast wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.

ORDINARY REINFORCED CONCRETE STRUCTURAL WALL. A *cast-in-place* wall complying with the requirements of Chapters 1 through 13, 15, 16 and 19 through 26.

ORDINARY STRUCTURAL PLAIN CONCRETE WALL. A wall complying with the requirements of Chapter 14, *excluding 14.6. .*~~2~~.1.

SPECIAL STRUCTURAL WALL. A cast-in-place or precast wall complying with the requirements of 18.2.4 through 18.2.8, 18.10 and 18.11, as applicable, in addition to the requirements for ordinary reinforced concrete structural walls *or ordinary precast structural walls, as applicable. Where ASCE 7 refers to a "special reinforced concrete structural wall," it shall be deemed to mean a "special structural wall."*

1905.1.2 ACI 318, Section 18.2.1.
Modify ACI 318 Sections 18.2.1.2 and 18.2.1.6 to read as follows:

18.2.1.2 – Structures ~~*assigned to Seismic Design Category A*~~ shall satisfy requirements of Chapters 1 through 17 and 19 through 26*;* ~~*Chapter 18 does not apply*~~. In addition, ~~S~~structures assigned to *Seismic Design Category* B, C, D, E or F ~~also~~ shall satisfy 18.2.1.3 through 18.2.1.7, as applicable. *Except for structural elements of plain concrete complying*

with Section 1905.1.7 of the International Building Code, structural elements of plain concrete are prohibited in structures assigned to Seismic Design Category C, D, E or F.

1905.1.6 ACI 318, Section 14.6.
Modify ACI 318, Section 14.6, by adding new Section 14.6.2 to read as follows:

14.6.2 – Detailed plain concrete structural walls.

14.6.2.1 – Detailed plain concrete structural walls are walls conforming to the requirements of ordinary structural plain concrete walls and 14.6.2.2.

14.6.2.2 – Reinforcement shall be provided as follows:

(a) Vertical reinforcement of at least 0.20 square inch (129 mm^2) in cross-sectional area shall be provided continuously from support to support at each corner, at each side of each opening and at the ends of walls. The continuous vertical bar required beside an opening is permitted to substitute for one of the two No. 5 bars required by 14.6.1.

(b) Horizontal reinforcement at least 0.20 square inch (129 mm^2) in cross-sectional area shall be provided:

1. Continuously at structurally connected roof and floor levels and at the top of walls;

2. At the bottom of load-bearing walls or in the top of foundations where doweled to the wall; and

3. At a maximum spacing of 120 inches (3048 mm).

Reinforcement at the top and bottom of openings, where used in determining the maximum spacing specified in Item 3 above, shall be continuous in the wall.

1905.1.7 ACI 318, Section 14.1.4.
Delete ACI 318, Section 14.1.4, and replace with the following:

14.1.4 – Plain concrete in structures assigned to Seismic Design Category C, D, E or F.

14.1.4.1 – Structures assigned to Seismic Design Category C, D, E or F shall not have elements of structural plain concrete, except as follows:

~~*(a) Structural plain concrete basement, foundation or other walls below the base as defined in ASCE 7 are permitted in detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls. In dwellings assigned to Seismic Design Category D or E, the height of the wall shall not exceed 8 feet (2438 mm), the thickness shall be not less than 7 1/2 inches (190 mm), and the wall shall retain no more than 4 feet (1219 mm) of unbalanced fill. Walls shall have reinforcement in accordance with 14.6.1.*~~

(~~b~~a) Isolated footings of plain concrete supporting pedestals or columns are permitted, provided the projection of the footing beyond the face of the supported member does not exceed the footing thickness.

~~Exception:~~ *~~In detached one- and two-family dwellings three stories or less in height, the projection of the footing beyond the face of the supported member is permitted to exceed the footing thickness.~~*

(~~c~~b) Plain concrete footings supporting walls are permitted, provided the footings have at least two continuous longitudinal reinforcing bars. Bars shall not be smaller than No. 4 and shall have a total area of not less than 0.002 times the gross cross-sectional area of the footing. For footings that exceed 8 inches (203 mm) in thickness, a minimum of one bar shall be provided at the top and bottom of the footing. Continuity of reinforcement shall be provided at corners and intersections.

Exceptions:

1. *~~In Seismic Design Categories A, B and C, detached one- and two-family dwellings three stories or less in height constructed with stud-bearing walls are permitted to have plain concrete footings without longitudinal reinforcement.~~*

~~2~~1. *For foundation systems consisting of a plain concrete footing and a plain concrete stemwall, a minimum of one bar shall be provided at the top of the stemwall and at the bottom of the footing.*

~~3~~2. *Where a slab on ground is cast monolithically with the footing, one No. 5 bar is permitted to be located at either the top of the slab or bottom of the footing.*

CHAPTER 20
ALUMINUM

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

CHAPTER 21
MASONRY

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

2111.2 Fireplace drawings.
The *construction documents* shall describe in sufficient detail the location, size and construction of masonry fireplaces. The structural reinforcement, thickness and characteristics of materials and the clearances from walls, partitions and ceilings shall be indicated.

2111.3 Footings and foundations.
Footings for masonry fireplaces and their chimneys shall be constructed of concrete or solid masonry at least 12 inches (305 mm) thick and shall extend at least ~~6~~ 12 inches (~~153~~ 305 mm) beyond the face of the fireplace or foundation wall on all sides. Footings shall be founded on natural undisturbed earth or engineered fill below frost depth. In areas not subjected to freezing, footings shall be at least 12 inches (305 mm) below finished grade.

2113.4 Seismic anchorage.
Masonry chimneys and foundations shall be anchored at each floor, ceiling or roof line more than 6 feet (1829 mm) above grade with two $^{3}/_{16}$-inch by 1-inch (4.8 mm by 25 mm) straps embedded not less than 12 inches (305 mm) into the chimney. Straps shall be hooked around the outer bars and extend 6 inches (152 mm) beyond the bend. Each strap shall be fastened to not less than four floor joists with two $^{1}/_{2}$-inch (12.7 mm) bolts.

Exception: Seismic anchorage is not required for the following;

1. In structures assigned to *Seismic Design Category* A or B.

2. Where the masonry ~~fireplace~~ chimney is constructed completely within the exterior walls.

CHAPTER 22
STEEL

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

2211.3 Truss design.
Cold-formed steel trusses and the placement diagram shall be designed and detailed by a *registered design professional* and in accordance with AISI S214, Sections 2211.3.1 through 2211.3.4 and accepted engineering practice.

2211.3.1 Truss design drawings.
The truss design drawings shall conform to the requirements of Section B2.3 of AISI S214 and shall be provided with the shipment of trusses delivered to the job site. The truss design drawings shall include the details of permanent individual truss member restraint/bracing in accordance with Section B6(a) or B 6(c) of AISI S214 where these methods are utilized to provide restraint/bracing. Each individual truss design drawing shall bear the seal and signature of the truss designer.

2211.3.2 Deferred submittals.
AISI S214 Section B4.2 shall be deleted. The truss submittal package shall consist of each individual truss design drawing, the truss placement diagram for the project, the truss member permanent bracing specification and, as applicable, the cover sheet/truss index sheet. The submittal package shall be submitted to the project *registered design professional* for final approval prior to fabrication of trusses.

CHAPTER 23
WOOD

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

SECTION 2301
GENERAL

2301.1 Scope.
The provisions of this chapter shall govern the materials, design, construction and quality of wood members and their fasteners. Refer to Chapter 7 for fire-resistance requirements. Refer to Section 718 for fireblocking and draftstopping requirements.

2301.1.1 Minimum lumber grades. The minimum grade of lumber used for conventional light-frame construction shall be:

1. For joists and rafters, those obtained in AWC STJR Span Tables for Joists and Rafters.
2. For load-bearing studs, No. 3 grade, standard grade or stud grade, utility grade may be used to support roof and ceiling loads only.
3. For nonload-bearing studs, utility grade.
4. For wall top plates, utility grade.

2301.1.2 Moisture content. All lumber shall have a maximum moisture content of 19 percent at time of grading.

2303.4.1.4 Truss designer.
The individual or organization responsible for the design of trusses shall be a *registered design professional*.

2303.4.1.4.1 Truss design drawings.
~~Where required by the *registered design professional*, the *building official* or the statutes of the jurisdiction in which the project is to be constructed, e~~Each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions: Deleted

~~1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.~~

~~2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.~~

2303.4.3 Truss submittal package.
The truss submittal package provided by the truss manufacturer shall consist of each individual truss design drawing, the truss placement diagram, the permanent individual truss member restraint/bracing method and details and any other structural details germane to the trusses; and, as applicable, the cover/truss index sheet. The submittal package shall be submitted to the *registered design professional in responsible charge* for final approval prior to fabrication of trusses.

2303.7 Shrinkage.
~~Consideration shall be given in design to the possible effect of cross-grain dimensional changes considered vertically which may occur in lumber fabricated in a green condition.~~Deleted.

TABLE 2304.8(1)
ALLOWABLE SPANS FOR LUMBER FLOOR AND ROOF SHEATHING[a, b]

SPAN (inches)	MINIMUM NET THICKNESS (inches) OF LUMBER PLACED			
	Perpendicular to supports		Diagonally to supports	
	Surfaced dry[c]	Surfaced unseasoned	Surfaced dry[c]	Surfaced unseasoned
Floors				
24	3/4	25/32	3/4	25/32
16	5/8	11/16	5/8	11/16
Roofs				
24	5/8	11/16	3/4	25/32

For SI: 1 inch = 25.4 mm.
a. Installation details shall conform to Sections 2304.8.1 and 2304.8.2 for floor and roof sheathing, respectively.
b. Floor or roof sheathing complying with this table shall be deemed to meet the design criteria of Section 2304.~~7.~~8
c. Maximum 19-percent moisture content.

2304.10 Connectors and fasteners.
Connectors and fasteners shall comply with the applicable provisions of Sections 2304.10.1 through 2304.10.7 or the 2015 IBC references within the ICC Evaluation Service, LLC Evaluation Report ESR-1539.

2304.11.3 Roof framing.
Every roof girder and at least every alternate roof beam shall be anchored to its supporting member; and every monitor and every sawtooth construction shall be anchored to the main roof construction. Such anchors shall be ~~consist of steel or iron bolts~~ of sufficient strength to resist vertical uplift of the roof.

2304.11.5 Roof decks.
Where supported by a wall, roof decks shall be anchored to walls to resist uplift forces determined in accordance with Chapter 16. Such anchors shall be ~~consist of steel or iron bolts~~ of sufficient strength to resist vertical uplift of the roof.

~~**2304.12.4** Termite protection.~~
~~In geographical areas where hazard of termite damage is known to be very heavy, wood floor framing in the locations specified in Section 2304.12.2.1 and exposed framing of exterior decks or balconies shall be of naturally durable species (termite resistant) or preservative treated in accordance with AWPA U1 for the species, product preservative and end use or provided with *approved* methods of termite protection.~~

2304.12.4 Termite control methods. Protection shall be one of the following methods or a combination of these methods:

1. Chemical termiticide treatment, as provided in Section 2304.12.4.2.
2. Termite baiting system installed and maintained according to the label.
3. Pressure-preservative-treated wood in accordance with the AWPA standards listed in Section 2303.
4. Naturally termite-resistant wood as provided in Section 2304.12.4.3.
5. Physical barriers as provided in Section 2304.12.4.4.

2304.12.4.1 Field treatment. Field-cut ends, notches and drilled holes of pressure-preservative-treated wood shall be retreated in the field in accordance with AWPA M4.

2304.12.4.2 Chemical termiticide treatment. Chemical termiticide treatment shall include soil treatment and field-applied-wood treatment. The concentration, rate of application and method of treatment of the chemical termiticide shall be in accordance with the termiticide label and applied according to the rules adopted by the North Carolina Structural Pest Control Committee.

2304.12.4.3 Naturally resistant wood. Heartwood of redwood and eastern red cedar shall be considered termite resistant.

2304.12.4.4 Barriers. *Approved* physical barriers, such as metal or plastic sheeting or collars specifically designed for termite prevention, shall be installed in a 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.

2306.2 Wood-frame diaphragms.
Wood-frame diaphragms shall be designed and constructed in accordance with AWC SDPWS. Where panels are fastened to framing members with staples, requirements and limitations of AWC SDPWS shall be met and the allowable shear values set forth in Table 2306.2(1) or 2306.2(2) shall be permitted. For diaphragms using nails, see the ICC Evaluation Service, LLC Evaluation Report ESR-1539. The allowable shear values in Tables 2306.2(1) and 2306.2(2) are permitted to be increased 40 percent for wind design.

2306.3 Wood-frame shear walls.
Wood-frame shear walls shall be designed and constructed in accordance with AWC SDPWS. Where panels are fastened to framing members with staples, requirements and limitations of AWC SDPWS shall be met and the allowable shear values set forth in Table 2306.3(1), 2306.3(2) or 2306.3(3) shall be permitted. For shear walls using nails, see the ICC Evaluation Service, LLC Evaluation Report ESR-1539. The allowable shear values in Tables 2306.3(1) and 2306.3(2) are permitted to be increased 40 percent for wind design. Panels complying with ANSI/APA PRP-210 shall be permitted to use design values for Plywood Siding in the AWC SDPWS.

2308.1.2 Connections and fasteners.
Connectors and fasteners used in conventional construction shall comply with the requirements of Section 2304.10 or the 2015 IBC references within the ICC Evaluation Service, LLC Evaluation Report ESR-1539.

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2308.2.6 Risk category limitation.
The use of the provisions for *conventional light-frame construction* in this section shall not be permitted for *Risk Category* IV buildings assigned to *Seismic Design Category* B, C, D or ~~E~~ F.

CHAPTER 24
GLASS AND GLAZING

~~User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.~~

CHAPTER 25
GYPSUM BOARD, GYPSUM PANEL PRODUCTS AND PLASTER

~~User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.~~

SECTION 2503
INSPECTION

2503.1 Inspection.

~~Lath, gypsum board and gypsum panel products shall be inspected in accordance with Section 110.3.5.~~ Deleted

TABLE 2506.2
GYPSUM BOARD AND GYPSUM PANEL PRODUCTS MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum board	ASTM C1047
Adhesives for fastening gypsum board	ASTM C557
Cold-formed steel studs and track, structural	AISI S200 and ASTM C 955, Section 8
Cold-formed steel studs and track, nonstructural	AISI S220 and ASTM C 645, Section 10
Elastomeric joint sealants	ASTM C 920
Fiber-reinforced gypsum panels	ASTM C 1278
Glass mat gypsum backing panel	ASTM C 1178
Glass mat gypsum panel 5	ASTM C 1658
Glass mat gypsum substrate	ASTM C 1177
Joint reinforcing tape and compound	ASTM C 474; C 475
Nails for gypsum boards	ASTM C 514, F 547, F 1667
Steel screws	ASTM C 954; C 1002
Standard specification for gypsum board	ASTM C 1396
Testing gypsum and gypsum products	ASTM C 22; C 472; C 473

TABLE 2507.2
LATH, PLASTERING MATERIALS AND ACCESSORIES

MATERIAL	STANDARD
Accessories for gypsum veneer base	ASTM C1047
Blended cement	ASTM C595
Exterior plaster bonding compounds	ASTM C932
Cold-formed steel studs and track, structural	AISI S200 and ASTM C 955, Section 8
Cold-formed steel studs and track, nonstructural	AISI S220 and ASTM C 645, Section 10
Hydraulic cement	ASTM C 1157; C 1600
Gypsum casting and molding plaster	ASTM C 59
Gypsum Keene's cement	ASTM C 61
Gypsum plaster	ASTM C 28
Gypsum veneer plaster	ASTM C 587

Interior bonding compounds, gypsum	ASTM C 631
Lime plasters	ASTM C 5; C 206
Masonry cement	ASTM C 91
Metal lath	ASTM C 847
Plaster aggregates Sand Perlite Vermiculite	 ASTM C 35; C 897 ASTM C 35 ASTM C 35
Plastic cement	ASTM C 1328
Portland cement	ASTM C 150
Steel screws	ASTM C 1002; C 954
Welded wire lath	ASTM C 933
Woven wire plaster base	ASTM C 1032

2508.3.1 Floating angles. Fasteners at the top and bottom plates of vertical assemblies, or the edges and ends of horizontal assemblies perpendicular to supports, and at the wall line are permitted to be omitted except on shear resisting elements or fire-resistance-rated assemblies. Fasteners shall be applied in such a manner as not to fracture the face paper with the fastener head.

CHAPTER 26
PLASTIC

2603.8 Protection against termites.
~~In areas where the probability of termite infestation is very heavy in accordance with Figure 2603.8, e~~ Extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundation walls or slab foundations located below grade. ~~The clearance between foam plastics installed above grade and exposed earth shall be not less than 6 inches (152 mm).~~ Foam plastic installed less than 8 inches (203 mm) above or in contact with grade shall be installed in accordance with Section 2603.8.1.

Exceptions:

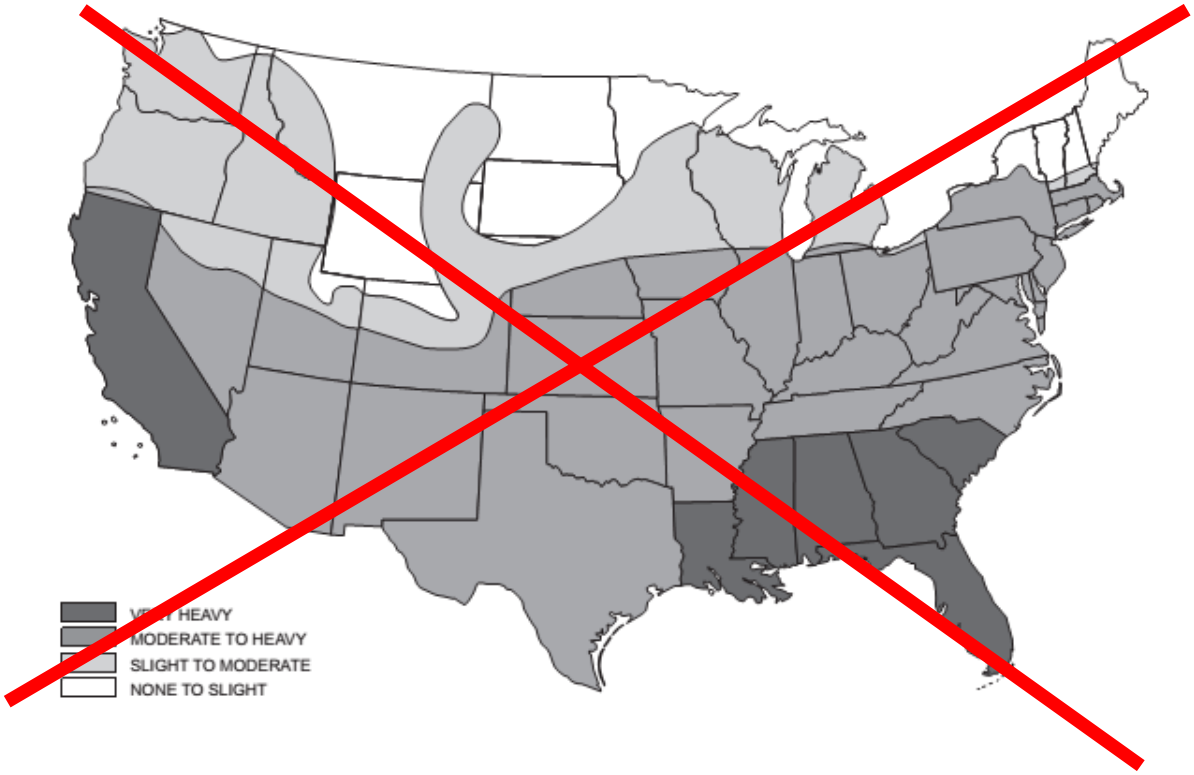
1. Buildings where the structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or preservative-treated wood.

2. An approved method of protecting the foam plastic and structure from subterranean termite damage is provided.

3. On the interior side of basement walls.

2603.8.1 Chemical treatment. When foam plastic is less than 6 inches or in contact with the ground, the soil area shall be chemically treated in accordance with the North Carolina Structural Pest Control Committee rules.

2603.8.2 Inspection gap. Foam plastic in contact with ground shall not be continuous to the bottom of the weather-resistant siding. A clear unobstructed 2-inch minimum inspection gap shall be maintained from the bottom of weather-resistant siding to the top of foam plactic. The top edge of the foam plastic shall be cut at a 45-degree angle to drain moisture way from the structure.



~~FIGURE 2603.8~~ Delete
~~TERMITE INFESTATION PROBABILITY MAP~~

CHAPTER 27
~~ELECTRICAL~~
EMERGENCY AND STANDBY POWER SYSTEMS

SECTION 2701 GENERAL

2701.1 Scope.
This chapter governs the electrical components, equipment and systems used in buildings and structures covered by this code. Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of ~~NFPA 70~~ the North Carolina Electrical Code.

Exception: Optional back-up systems as defined by the North Carolina Electrical Code are not required to meet the provisions of this chapter.

[F] 2702.3 Critical circuits.
Cables used for survivability of ~~required~~ critical circuits supplying fire pumps shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

CHAPTER 28
MECHANICAL SYSTEMS

CHAPTER 29
PLUMBING SYSTEMS

SECTION 2902 MINIMUM PLUMBING FACILITIES

[P] 2902.1 Minimum number of fixtures.
~~Plumbing fixtures shall be provided in the minimum number as shown in Table 2902.1 based on the actual use of the building or space. Uses not shown in Table 2902.1 shall be considered individually by the code official. The number of occupants shall be determined by this code.~~ In new construction or building additions and in changes of occupancy as defined in the *North Carolina Building Code*, plumbing fixtures shall be provided for the type of occupancy and in the minimum number shown in Table 2902.1 based on the actual use of the building or space. Uses not shown in Table 2902.1 shall be considered individually by the code official. The number of occupants shall be determined by Section 1004. Occupancy classification shall be determined in accordance with Chapter 3.

[P] TABLE 2902.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a, p]
(See Sections 2902.1.1 and 2902.2)

No.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS SEE SECTION 419.2 OF THE *INTERNATIONAL PLUMBING CODE*)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAINS (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE)*	OTHER
				Male	Female	Male	Female			
1	Assembly (See Sections 2902.2, 2902.3 and 2902.3.2.2)	A-1[d]	Theaters and other buildings for the performing arts and motion pictures	1 per 125	1 per 65	1 per 200		—	1 per 500	1 service sink
		A-1[d]	Theaters in K-12 Schools[i]	1 per 125	1 per 100	1 per 200			1 per 500	1 service sink

		A-2[d]	Nightclubs, bars, taverns, dance halls and buildings for similar purposes	1 per 40	1 per 40	1 per 75	—	1 per 500	1 service sink
			Restaurants, banquet halls and food courts	1 per 75	1 per 75	1 per 200	—	1 per 500	1 service sink
			Cafeterias in K-12 Schools[i]	1 per 125	1 per 100	1 per 200	—	1 per 500	1 service sink
		A-3[d]	Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums	1 per 125	1 per 65	1 per 200	—	1 per 500	1 service sink
			Gymnasiums in K-12 Schools[i]	1 per 125	1 per 100	1 per 200	—	1 per 500	1 service sink
			Passenger terminals and transportation facilities	1 per 500	1 per 500	1 per 750	—	1 per 1,000	1 service sink
			Places of worship and other religious services Churches without assembly halls[e]	1 per 150	1 per 75	1 per 200	—	1 per 1,000	1 service sink

(continued)

[P] TABLE 2902.1—(continued)
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a, p]
(See Sections 2902.1.1 and 2902.2)

No.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS SEE SECTION 419.2 OF THE *INTERNATIONAL PLUMBING CODE*)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAINS (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE)*	OTHER
				Male	Female	Male	Female			
1	Assembly (See Sections 2902.2, 2902.3 and 2902.3.2.2 Cont'd)	A-4	Coliseums, arenas, skating rinks, pools and tennis courts for indoor sporting events and activities[k]	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	—	1 per 1,000	1 service sink
		A-5	Stadiums, amusement parks, bleachers and grandstands for outdoor sporting events and activities	1 per 75 for the first 1,500 and 1 per 120 for the remainder exceeding 1,500	1 per 40 for the first 1,520 and 1 per 60 for the remainder exceeding 1,520	1 per 200	1 per 150	—	1 per 1,000	1 service sink
			K-12 Stadiums, bleachers and grandstands for outdoor sporting events and activities[i,k]	1 per 125	1 per 100	1 per 250	1 per 200	—	1 per 1000	—

2	Business (See Sections 2902.2, 2902.3 and 2902.3.2.2)	B	Buildings for the transaction of business, professional services, other services involving merchandise, office buildings, banks, light industrial and similar uses	1 per 25 for the first 50 and 1 per 50 for the remainder exceeding 50	1 per 40 for the first 80 and 1 per 80 for the remainder exceeding 80	—	1 per 100	1 service sink[o]
~~3~~	~~Educational~~	~~E~~	~~Educational facilities~~	~~1 per 50~~	~~1 per 50~~	~~—~~	~~1 per 100~~	~~1 service sink~~
3	Educational[i]	E[b]	K-8 9-12 Teacher/Staff	1 per 25 1 per 30 1 per 30	1 per 25 1 per 25 1 per 25	1 per 60 1 per 100 1 per 100	—	1 per 100
4	Factory and industrial	F-1 and F-2	Structures in which occupants are engaged in work fabricating, assembly or processing of products or materials (See Section 2902.3.1 for adjustments in occupant content)	1 per 100	1 per 100	See Section 411 of the ~~*International Plumbing Code*~~ *North Carolina Plumbing Code*	1 per 400	1 service sink

5	Institutional	I-1	Residential care	1 per 10	1 per 10	1 per 8	~~1 per 100~~	~~1 service sink~~
		I-2	Hospitals[b], ~~ambulatory nursing home care recipient[b]~~	Fixture requirements are regulated and enforced by state licensing and certification jurisdictions only				
			Employees[b] ~~, other than residential care[b]~~	1 per 25	1 per 35	—	1 per 100	—
			Visitors, ~~other than residential care~~	1 per 75	1 per 100	—	1 per 500	—
		I-3	Prisons[b]	Fixture requirements are regulated and enforced by state licensing and certification jurisdictions only				
			Reformatories, detention centers and correctional centers[b]	Fixture requirements are regulated and enforced by state licensing and certification jurisdictions only				

		I-3	Employees[b]	1 per 25	1 per 35	—	1 per 100	—
			Visitors	1 per 75	1 per 100	—	1 per 500	—
		I-4	Adult Day Care ~~and child day care~~	Fixture requirements are regulated and enforced by state licensing and certification jurisdictions only				
5	Institutional		Child Care[b]	1 per 15	1 per 25	—	—	—
			Employees	1 per 25	1 per 35	—	1 per 100	—
			Vistors	1 per 75	1 per 100	—	1 per 500	—

(continued)

[P] TABLE 2902.1—continued
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES[a, p]
(See Sections 2902.1.1 and 2902.2)

No.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS SEE SECTION 419.2 OF THE *INTERNATIONAL PLUMBING CODE*)		LAVATORIES		BATHTUBS OR SHOWERS	DRINKING FOUNTAINS (SEE SECTION 410 OF THE *INTERNATIONAL PLUMBING CODE)*	OTHER
				Male	Female	Male	Female			
6	Mercantile (See Sections 2902.2, 2902.3 and 2902.3.2.2)	M	Retail stores, service stations, shops, salesrooms, markets and shopping centers	1 per 500		1 per 750		—	~~1 per 1,000~~ 100 – 1,000 1 greater than 1,000 required 1 more for each additional 1,000	1 service sink[e]
7	Residential	R-1	Hotels, motels, boarding houses (transient)	1 per sleeping unit		1 per sleeping unit		1 per sleeping unit	—	~~1 service sink~~
		R-2	Dormitories, fraternities, sororities and boarding houses (not transient)	1 per 10		1 per 10		1 per 8	1 per 100	~~1 service sink~~
		R-2	Apartment house	1 per dwelling unit		1 per dwelling unit		1 per dwelling unit	—	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per 20 dwelling units
		R-3[i]	One- and two-family dwellings and lodging houses with five or fewer guest rooms	1 per dwelling unit		1 per 10		1 per dwelling unit	—	1 kitchen sink per dwelling unit; 1 automatic clothes washer connection per dwelling unit[f]

		R-3	Congregate living facilities with 16 or fewer persons	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
		R-4	Congregate living facilities with 16 or fewer persons	1 per 10	1 per 10	1 per 8	1 per 100	1 service sink
8	Storage	S-1 S-2	Structures for the storage of goods, warehouses, storehouses and freight depots, low and moderate hazard[m,n]	1 per 100	1 per 100	See Section 411 of the *International Plumbing Code*	1 per 1,000	1 service sink

a. The fixtures shown are based on one fixture being the minimum required for the number of persons indicated or any fraction of the number of persons indicated. The number of occupants shall be determined by this code.
b. Toilet facilities for employees shall be separate from facilities for inmates or care recipients.
c. A single-occupant toilet room with one water closet and one lavatory serving not more than two adjacent patient *sleeping units* shall be permitted, provided that each patient *sleeping unit* has direct access to the toilet room and provisions for privacy for the toilet room user are provided.
d. The occupant load for seasonal outdoor seating and entertainment areas shall be included when determining the minimum number of facilities required.
~~e. For business and mercantile occupancies with an occupant load of 15 or fewer, service sinks shall not be required.~~
e. The number of fixtures provided shall be based on either the capacity of the church sanctuary or the church educational building (including fellowship halls and multiple purpose rooms), whichever is larger and within 300 feet (91.44m)
f. For attached one- and two- family dwellings, one automatic clothes washer connection shall be required per 20 dwelling units.
g. A mop receptacle with a water supply, or a hose bib and floor drain, may be used in lieu of a service sink.
h. A can wash may be used in lieu of a service sink.
i. See Section 2902.9 for additional information on plumbing fixtures for schools.
j. When the rearrangement of an area or space increase the occupant content, the plumbing facilities shall be increased in accordance with this code.
k. For baseball stadiums, the number of fixtures shall be reduced by 50 percent.
l. Service sink may be omitted when located within a single-family dwelling.
m. Self-service mini-service facilities without an office area are exempt.
n. Unheated storage building which are used periodically are not required to have toilet rooms.
o. For business and mercantile occupant load of 25 or fewer, service sinks shall not be required.
p. See Section 2902.7 for adjustments in occupant count.

[P] 2902.1.1 Fixture calculations.

To determine the *occupant load* of each sex, the total *occupant load* shall be divided in half. To determine the required number of fixtures, the fixture ratio or ratios for each fixture type shall be applied to the *occupant load* of each sex in accordance with Table 2902.1. Fractional numbers resulting from applying the fixture ratios of Table 2902.1 shall be rounded up to the next whole number. For calculations involving multiple occupancies, such fractional numbers for each occupancy shall first be summed and then rounded up to the next whole number.

Exception:

1. The total *occupant load* shall not be required to be divided in half where *approved* statistical data indicate a distribution of the sexes of other than 50 percent of each sex.

2. In buildings that contain dwelling or sleeping units that have a pool dedicated to the residents, a percentage reduction of the total required fixtures provided for a pool and pool deck without bleachers and grandstands may be taken equal to the percentage of total residential units whose entries fall within 500 feet of the pool deck.

[P] 2902.1.2 Family or assisted-use toilet and bath fixtures.
Fixtures located within family or assisted-use toilet and bathing rooms required by Section 1109.2.1 are permitted to be included in the number of required fixtures for either the male or female occupants in assembly and mercantile occupancies.

[P] 2902.2 Separate facilities.
Where plumbing fixtures are required, separate facilities shall be provided for each sex.

Exceptions:

1. Separate facilities shall not be required for *dwelling units* and *sleeping units*.

2. Separate facilities shall not be required in structures or tenant spaces with a total *occupant load*, including both employees and customers, of ~~15~~ 25 or fewer.

3. Separate facilities shall not be required in mercantile occupancies in which the maximum occupant load is 100 or less.

4. Except as provided in Section 405.3.2 of the *North Carolina Plumbing Code*.

5. Where the code requires only one toilet facility for each sex, two unisex facilities may be substituted for separate sex facilities.

[P] 2902.2.1 Family or assisted-use toilet facilities serving as separate facilities.
Where a building or tenant space requires a separate toilet facility for each sex and each toilet facility is required to have only one water closet, two family or assisted-use toilet facilities shall be permitted to serve as the required separate facilities. Family or assisted-use toilet facilities shall not be required to be identified for exclusive use by either sex as required by Section 2902.4.

[P] 2902.3 Employee and public toilet facilities.
Customers, patrons and visitors shall be provided with public toilet facilities in structures and tenant spaces intended for public utilization. The number of plumbing fixtures located within the required toilet facilities shall be provided in accordance with Section 2902.1 for all users. Employees shall be provided with toilet facilities in all occupancies. Employee toilet facilities shall be either separate or combined employee and public toilet facilities.

Exception: Public toilet facilities shall not be required in:

1. Open or enclosed parking garages where there are no parking attendants.

2. Structures and tenant spaces intended for quick transactions, including takeout, pickup and drop-off, having a public access area less than or equal to 300 square feet (28 m^2).

[P] 2902.3.1 Access.
The route to the public toilet facilities required by Section 2902.3 shall not pass through kitchens, storage rooms or closets. Access to the required facilities shall be from within the building or from the exterior of the building. Routes shall comply with the accessibility requirements of this code. The public shall have access to the required toilet facilities at all times that the building is occupied.

[P] 2902.3.2 Location of toilet facilities in occupancies other than malls.
In occupancies other than covered and open mall buildings, the required public and employee toilet facilities shall be located not more than one *story* above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 500 feet (152 m).

[P] 2902.3.2.1 Location of employee toilet facilities in occupancies other than assembly or mercantile.
Access to toilet facilities in occupancies other than mercantile and assembly occupancies shall be from within the employees working area.

Employee facilities shall be either separate facilities or combined employee and public facilities.

Exception: Facilities that are required for employees in storage structures or kiosks, and are located in adjacent structures under the same ownership, lease or control, shall be a maximum travel distance of 500 feet (152 m) from the employees working area.

2902.3.2.2 location of employee toilet facilities in mercantile and assembly occupancies.
Employees shall be provided with toilet facilities in buildings and tenant spaces utilized as restaurants, nightclubs, places of public assembly and mercantile occupancies. The employee facilities shall be either separate facilities or combine employee and public facilities.

Exception: The location and maximum distances of travel to required employee facilities in factory and industrial occupancies are permitted to exceed that required by this section, provided that the location and maximum distance of travel are *approved*.

[P] 2902.3.3 Location of toilet facilities in malls.
In covered and open mall buildings, the required public and employee toilet facilities shall be located not more than one story above or below the space required to be provided with toilet facilities, and the path of travel to such facilities shall not exceed a distance of 300 feet (91 mm).
In mall buildings, the required facilities shall be based on total square footage (m^2) within a covered mall building or within the perimeter line of an open mall building, and facilities shall be installed in each individual store or in a central toilet area located in accordance with this section. The maximum distance of travel to central toilet facilities in mall buildings shall be measured from the main entrance of any store or tenant space. In mall buildings, where employees' toilet facilities are not provided in the individual store, the maximum distance of travel shall be measured from the employees' work area of the store or tenant space.

[P] 2902.3.4 Pay facilities.
Where pay facilities are installed, such facilities shall be in excess of the required minimum facilities. Required facilities shall be free of charge.

[P] 2902.3.5 Door locking.
Where a toilet room is provided for the use of multiple occupants, the egress door for the room shall not be lockable from the inside of the room. This section does not apply to family or assisted-use toilet rooms.

[P] 2902.3.6 Prohibited toilet room location.
Toilet rooms shall not open directly into a room used for the preparation of food for service to the public.

[P] 2902.4 Signage.
Required public facilities shall be provided with signs that designate the sex as required by Section 2902.2. Signs shall be readily visible and located near the entrance to each toilet facility. Signs for accessible toilet facilities shall comply with Section 1111.

[P] 2902.4.1 Directional signage.
Directional signage indicating the route to the required public toilet facilities shall be posted in a lobby, corridor, aisle or similar space, such that the sign can be readily seen from the main entrance to the building or tenant space.

[P] 2902.5 Drinking fountain location.
Drinking fountains shall not be required to be located in individual tenant spaces provided that public drinking fountains are located within a distance of travel of 500 feet (152 m) of the most remote location in the tenant space and not more than one story above or below the tenant space. Where the tenant space is in a covered or open mall, such distance shall not exceed 300 feet (91 440 mm). Drinking fountains shall be located on an accessible route.

[P] 2902.6 Small occupancies.
Drinking fountains shall not be required for an occupant load of 15 or fewer.

[P] 2902.7 Adjustments in occupant content.
If an owner or tenant requests, the plumbing official shall make adjustments in the occupant content established by Table 403.1 of the *North Carolina Plumbing Code* for manufacturing, workshops, loft building, foundries, storage, aircraft hangars, garages and similar establishments. The owner or occupant shall provide written data accompanied by plans that substantiates a claim that the occupant content of a particular building or tenancy will, at all times, be less than provided for in the above table. Approval of such data and accompanying claims shall not prevent the plumbing official from requiring additional facilities based on the above table, should changes be made affecting the floor plan upon which the original approval was based whether such changes be made by the original or ultimate owner or building occupant or occupants. The remainder of the facilities requirements of Section 403.2 of the *North Carolina Plumbing Code* are not affected by this paragraph.

[P] 2902.8 Multiplex theaters.
Plumbing fixtures for multiple adjoining motion picture theaters with a common lobby shall be based upon the seating capacity of the largest single auditorium plus 50 percent of the seats in the remaining auditoriums.

[P] 2902.9 Plumbing fixtures for public schools.

[P] 2902.9.1 Occupant content.
Occupant content of public schools for the purpose of determining the number of required facilities shall be the maximum legal class size multiplied by the number of classrooms. A public school classroom is a room or space 500 square feet (46.5 m2) or larger normally used for instructional purposes. Maximum class sizes are 29 students for grades K through 8 and 33 students for grades 9 through 12 (GS 115C-301). The occupant load for private schools shall be as listed in Table 1004.1.2 of the *North Carolina Building Code*.

[P] 2902.9.2 Occupant load and distance.
The total student occupant load shall be the sum of the occupant loads for all classrooms, labs, shops and vocational spaces. The total occupant load for all buildings on a campus may be utilized when calculating the total number of fixtures required. Toilet facilities for students and teachers may be located in an adjacent building but shall be located so that no person will have more than 200 feet (61 mm) of accessible, covered horizontal travel distance from any classroom lab, shop or vocational space closest door for access to the required number of fixtures. The occupant content of kindergarten and first grade classrooms with internal toilet facilities is not required to be used in determining the number of group facilities for the entire school.

[P] 2902.9.3 Occupant load for teachers and staff.
Fixtures provided for teachers and staff shall be determined by multiplying the number of classrooms by 1.75. Staffing ratio for grades K through 8 is 80-percent female and 20-percent male. Staffing ratio for grades 9 through 12 is 70-percent female and 30-percent male.

[P] 2902.9.4 Gymnasiums, cafeterias, auditoriums and stadiums for schools.
Fixtures in group toilet facilities provided for classroom areas may be used toward satisfying the total number of required fixtures for gymnasiums, cafeterias and auditoriums provided that such facilities are located within 200 feet (61 m) from the space and cannot be locked off from access during after-school-hours' use of the gymnasium, cafeteria or auditorium. Simultaneous use of classrooms, gymnasium, cafeteria or auditoriums shall not be considered for calculation of occupant loads for toilet fixtures. Stadium facilities shall be located within 400 feet (122 m) of the closest bleacher exit from each set of bleachers that the facility serves.

[P] 2902.9.5 Miscellaneous provisions.

[P] 2902.9.5.1 Unisex facilities.
A single unisex facility may be used when the classroom area served is 1,200 square feet (112 m2) or less and is used either for K through grade 2 or is a modular classroom used for any grade level. Unisex facilities may be provided for teacher/staff if their total occupant load within 200 feet (61 m) is 15 or less.

[P] 2902.9.5.2 Student group facilities.
Every public school group facility shall have a minimum of four flushing type fixtures. Four flushing male group toilets shall have a minimum of two water closets.

[P] 2902.9.5.3 Substitutions.
Water closets may be substituted for urinals for grades K through 2. Urinals may be substituted for water closets in male group toilet rooms for teachers/staff and gyms, auditoriums, cafeterias or stadiums. The number of water closets shall not be reduced to less than one-third of the required total number of flushing fixtures.

[P] 2902.9.5.4 Modular classroom buildings.
Toilet rooms may be omitted in a modular classroom building when facilities of sufficient capacity for the additional occupants are provided

CHAPTER 30
ELEVATORS AND CONVEYING SYSTEMS

~~*User note: Code change proposals to sections preceded by the designation [F] will be considered by the International Fire Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

3002.10 Pits
For damproofing and waterproofing requirement refer to Section 1805.

3008.8.1 Protection of wiring or cables.
Wires or cables that are located outside of the elevator hoistway, machine room, control room and control space and that provide normal or standby power, control signals, communication with the car, lighting, heating, air conditioning, *ventilation* and fire-detecting systems to ~~fire service access~~ occupancy evaculation elevators shall be protected by construction having a *fire-resistance rating* of not less than 2 hours, shall be circuit integrity cable having a fire-resistance rating of not less than 2 hours or shall be protected by a listed electrical circuit protective system having a *fire-resistance rating* of not less than 2 hours.

CHAPTER 31
SPECIAL CONSTRUCTION

~~*User note: Code change proposals to sections preceded by the designation [BS] will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

SECTION 3103
TEMPORARY STRUCTURES

3103.1 General.
The provisions of Sections 3103.1 through 3103.4 shall apply to structures erected for a period of less than 180 days. Tents, canopies, and other membrane structures erected for a period of less than 180 days shall only comply with Chapter 31 of the *International Fire Code*. Those erected for a longer period of time shall comply with applicable sections of this code.

SECTION 3105
AWNINGS AND CANOPIES

3105.1 General.
Awnings and *canopies* shall comply with the requirements of Sections 3105.2 through 3105.4 and other applicable sections of this code. For awnings or canopies that encroach into public right-of-ways, refer to Chapter 32.

3105.5 Permanent canopies. Permanent canopies are permitted to extend over adjacent open spaces, provided:

1. The canopy and its supports shall be of noncombustible material, fire-retardant-treated wood, Type IV construction, or of 1-hour fire-resistance-rated construction.

   Exception: Any textile covering for the canopy shall be flame resistant as determined by tests conducted in accordance with NFPA 701 after both accelerated water leaching and accelerating weathering.

2. Any canopy covering, other than textiles, shall have a flame spread index not greater than 25 when tested in accordance with ASTM E 84 or UL 723 in the form intended for use.

3. The canopy shall have at least one long side open.

4. The width of the canopy perpendicular to the building shall not exceed 15 feet (4572 mm).

5. The fire resistance of exterior walls shall not be reduced.

SECTION 3107
SIGNS

3107.1 General.
Signs shall be designed, constructed and maintained in accordance with Appendix H of this code.

3108.3 Foundations. Footings and foundations shall be designed and constructed in accordance with the provisions of Chapter 18.

SWIMMING POOLS.

3109.3 Public swimming pools.
Public swimming pools (all occupancies except Group R-3) shall be completely enclosed by a fence or barrier not less than 4 feet (1290 mm) in height or a screen enclosure. Openings in the fence shall not *permit* the passage of a 4-inch-diameter (102 mm) sphere. The fence or screen enclosure shall be equipped with self-closing and self-latching gates.

CHAPTER 32
ENCROACHMENTS INTO THE PUBLIC RIGHT-OF-WAY

3202.5 Space under public property.

3202.5.1 Space under sidewalk. Where space under the sidewalk is used for any purpose, a special permit shall be required.

3202.5.2 Sidewalk lights. When glass is set in the sidewalk to provide light for spaces underneath, the glass shall be supported by metal or reinforced concrete frames and such glass shall be not less than 1/2 inch (12.7 mm) thick. Where such glass is over 12 square inches (7742mm2), it shall have wire mesh embedded in the glass. All portions of sidewalk lights shall be of not less strength than required for the load specified.

CHAPTER 33
SAFEGUARDS DURING CONSTRUCTION

~~*User note: Code change proposals to sections preceded by the designation [F] will be considered by the International Fire Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

3304.1.2 Surcharge.
No fill or other surcharge loads shall be placed adjacent to any building or structure unless such building or structure is capable of withstanding the additional loads caused by the fill or surcharge. Existing footings or foundations that can be affected by any excavation shall be underpinned adequately or otherwise protected against settlement and shall be protected against lateral movement or vertical movement or both. See Section 1808.3.2 for an exception.

CHAPTER 34
RESERVED

Action taken during the 2012 Code Development Process removed Chapter 34, Existing Structures, from the ~~IBC~~ North Carolina State Building Code.
The provisions of this chapter are contained in the International Existing Building Code. See ~~Section 101.4.7~~ North Carolina State Building Code: Administrative Code and Policies.

CHAPTER 36
DOCKS, PIERS, BULKHEADS AND WATERWAY STRUCTURES

SECTION 3601
GENERAL AND SCOPE

This chapter is a North Carolina addition to the 2015 International Building Code. There will be no underlined text.

3601.1 General. The intent of this chapter is to provide minimum standards for the design, construction and maintenance of docks, piers, bulkheads and waterway structures. The guidelines in this chapter address minimum standards for foundations, design forces, structural integrity, material selection and utilization and construction techniques.

Commentary: *The design of docks, piers, bulkheads and waterway structures is essential for the protection of life and property without causing adverse effects to the shoreline. These structures by their very nature result in some modification of physical environment and therefore require minimum design standards.*

3601.2 Scope. The following structures shall be designed in accordance with the requirements of this chapter:

1. Docks, piers, gangways and catwalks, other than residential and farm docks and piers exempted from this chapter in the exceptions below, shall be designed by a registered design professional.

2. All bulkheads having an exposed height greater than 5 feet or with a superimposed load shall be designed by a registered design professional and require special inspection. Special inspection shall be waived for bulkheads of any height constructed from property line to property line of one and two family dwellings and including attachment to neighboring bulkheads.

Commentary: *Chapters 17 and 18 require special inspection on retaining walls exceeding 5 feet in height due to failures associated with construction related deficiencies. Bulkheads are also prone to the same sort of construction deficiencies; therefore, special inspection is required for bulkheads greater than 5 feet, including common bulkheads for multi-family residential projects or subdivisions where the bulkhead services multiple single family residences. The exception is a bulkhead servicing the property of one single family residence.*

3. Oceanfront retaining walls, bulkheads and other types of retaining walls used by the public on the coastline of the ocean or adjacent inlets shall be designed by a registered design professional.

4. Marine terminal or port facilities for berthing, mooring, docking and servicing ships, barges or tug boats that handle cargo of all types, including bulks, containers, liquids, fuels and people,

which shall be designed by a registered design professional in accordance with accepted industry standards.

Commentary: *Wharves and piers for cargo handling facilities typically require consideration of loadings unique to each individual facility. As a result, these facilities must be designed by a registered design professional. Support structures, such as warehouses, office buildings, and cranes supported on these structures, are required to comply with the provisions of this code. For more information on cargo wharves and docks, the reader is referred to the Department of Defense UFC 4-152-01 Design: Piers and Wharves, UFC 4-152-07 Design: Small Craft Berthing Facilities, and the Port of Long Beach Wharf Design Criteria.*

5. Groins not exempted below, jetties, breakwaters, oceanfront seawalls, and oceanfront revetments which shall be designed by a registered design professional in accordance with accepted industry standards.

Commentary: *These structures typically require consideration of loadings unique to each individual facility. As a result, these structures must be designed by a registered design professional. For more information, refer to documents such as The Coastal Engineering Manual by the U. S. Army Corps of Engineers.*

Exceptions*:* The following structures are exempt from the requirements of this chapter:

1. Sill structures combined with marsh plantings and certain groins in accordance with the Department of Environmental and Natural Resources general permit requirements.
2. Oceanfront and inlet sandbag revetments in accordance with the Department of Environmental and Natural Resources general permit requirements.
3. Revetments constructed on single family residential property having a height no greater than 10 feet and slope greater than 1.5 horizontal: 1.0 vertical and in accordance with the Department of Environmental and Natural Resources general permit requirements.
4. Farm structures not on public waters.

Commentary: *Farm structures should be limited solely for use by the farmer, his family, and his employees.*

5. Piers and docks associated with one and two family dwellings meeting the exceptions of the *NC Residential Code*.

SECTION 3602
DEFINITIONS

ADDITIVES. Substances added to a polymer resin or vinyl chloride material to aid in processing the material.

BOAT SLIP. A berthing place for one or two watercraft where the watercraft can be securely moored

to cleats, piling, or other devices while the boats are in the water. Boat slips are commonly configured as “side-ties” or as single or double loaded “U” shaped berths.

BULKHEAD. A vertical wall structure designed to retain shoreline material and prevent erosion due to wave activity.

CATWALK. A narrow footway platform extending alongside a structure.

DESIGN WAVE. A ~~design~~ wave that is potentially most damaging to an economically feasible structure, or wave for which a structure is designed.

DOCK. A structure extending alongshore or out from the shore into a body of water, usually accommodating multiple boat slips, to which boats may be moored in order to load or unload people or cargo~~.~~, or to provide access to the water.

EXTRUSION. Manufacturing process whereby a material is pushed through a die to form a shape of constant cross section. Vinyl Chloride sheet piling is generally manufactured using an extrusion process.

FETCH. Open water exposure over which waves are generated.

FIBER. One or more glass, carbon, or aramid filaments in the form of a continuous strand or roving in an FRP material.

FIBER ARCHITECTURE. Construction of a composite material from layers with different types and orientations of fibrous material.

FIBER ORIENTATION. Fiber orientation is the alignment of the longitudinal axis of a fiber in an FRP material with respect to the stated reference axis.

FIBER REINFORCED POLYMER (FRP). ~~A composite material which consists of a polymer resin-based matrix reinforced with fibers of glass, carbon, aramid, or hybrid combinations of these fiber types~~ A polymeric composite material consisting of reinforcement fibers, impregnated with a fiber-binding polymer, such as glass, carbon, aramid, or hybrid combinations of these fiber types; which are then molded and hardened. Fiber-reinforced polymers are permitted to contain cores laminated between fiber-reinforced polymer facings.

FIBER VOLUME FRACTION. The volume of reinforcement fiber in a cured composite divided by the volume of the composite section.

FILLER. Substance added to the matrix of a FRP material intended to alter its engineering properties, performance, and/or cost.

GANGWAY. A footway bridge extending from the dock, pier, bulkhead or shore, usually to a floating structure.

GLASS TRANSITION TEMPERATURE (T_g). Temperature at which the polymer matrix of an FRP material changes from a glassy state to a rubbery state.

KING PILE. The primary structural member that supports horizontal panels to form a vertical wall sometimes used in bulkhead or groin construction.

LAMINA. A layer of fibers and resin in an FRP material.

MATERIAL LONGITUDINAL DIRECTION. Direction in an FRP material parallel to the direction of pultrusion (pulling) during the manufacture of a plate or structural shape.

MATERIAL TRANSVERSE DIRECTION. Direction in an FRP material orthogonal to the longitudinal direction.

MATRIX. Continuous constituent of an FRP material surrounding the reinforcing fibers and consisting of a polymer resin with any fillers and additives.

PIER. An elevated deck structure, usually pile supported, extending out into the water from the shore.

PILE. A timber, concrete, metal, or composite member embedded into the ground to support or brace a structure. “Piles” or “piling” are plural forms of “pile.”

PRIVATE WATERFRONT STRUCTURES. A *dock, pier, bulkhead,* or associated structure not open to the general public and with no more than ten total boat slips and no more than ten owners.

PUBLIC WATERFRONT STRUCTURES. A *dock, pier, bulkhead,* or associated structure located on *multi-family* residential property (greater than ten *dwelling units*), public property or commercial property.

PULTRUSION. Manufacturing process whereby a material is pulled through a die to form a shape of constant cross section. FRP plates and structural shapes are generally manufactured using a pultrusion process.

RESIN. An organic polymer possessing indefinite and often high molecular weight and a softening or melting range that exhibits a tendency to flow when subjected to stress.

REVETMENT. A sloping structure usually constructed of stone or concrete and placed on a shoreline to protect it against erosion by wave and current action.

ROVING. In an FRP material a roving is a large number of continuous parallel filaments or a group of untwisted parallel strands.

SHEET PILE. A pile with a generally slender flat cross section to be embedded into the ground or seabed and meshed or interlocked with like members to form a diaphragm, wall or bulkhead.

SYMMETRIC COMPOSITE. A symmetric composite is a composite material in which the sequence of lamina below the laminate mid-plane is a mirror image to those above the laminate mid-plane.

SECTION 3603

PERMITS AND APPROVALS

3603.1 General. In addition to a building permit, permits may be required from federal, state or county agencies such as, but not limited to, the United States Army Corps of Engineers or the Department of Environmental and Natural Resources. In cases of structures to be built on lakes operated by an electric utility for the generation of power, a permit from the operating utility may also be required.

SECTION 3604
MINIMUM DESIGN LOADS

3604.1 General. Every structure shall be of sufficient strength to support the imposed dead, live, snow, wind, impact and seismic loads without exceeding the prescribed stresses for the various materials described elsewhere in this code. Adequate consideration shall be made for forces imposed by earth, water, docking and mooring.

3604.2 Dead loads. The weight of the component parts of a structure shall be used in the design when it will influence the strength of the structural elements. All utilities, permanent furniture, dock boxes and mooring hardware should be considered as dead load.

3604.3 Live loads. Design live loads shall be the greatest load that will likely be imposed on the structure, including superimposed loads on retained material which exert horizontal loads on the structure. Where vehicles are allowed, actual weight of vehicles and wheel loads as specified in the latest edition of Standard Specifications for Highway Bridges of the American Association of State Highway and Transportation Officials or obtained from the vehicle manufacturer shall be used. The design load shall be posted at the dock or pier approach where vehicles are allowed. Minimum live loads are:

1. Fixed piers, docks, catwalks - Private waterfront piers: 40 psf or 300 pounds concentrated load on any 2 foot by 2 foot area ~~2 foot square~~. Public waterfront piers: Design loads shall be the greatest combinations of loads exerted on the structure but not less than 60 psf~~.~~ or 300 pounds concentrated load on any 2 foot by 2 foot area.

2. Floating docks - Private waterfront docks: 20 psf, public waterfront docks: 30 psf, or 300 pounds concentrated load on any 2 foot by 2 foot area ~~2 foot square~~.. Under dead and live load, all floating docks shall have a minimum of 3 inches freeboard from the top of the flotation device, other than low freeboard watercraft (e.g. kayak) launching facilities. Floating docks with roofs shall have a minimum of 3 inches freeboard from the top of the flotation device under a combination of dead, snow and 75% of live load. All floating docks subject to this chapter shall have not more than 5 degrees tilt from the horizontal under uniform live loading on one-half of the dock width or under concentrated load of 400 pounds applied within 12 inches of any side.

3. Gangways - Gangways shall be designed for a live load of for 100 psf. Flotation for gangway landing shall be designed for 50 psf, live load.

4. Bulkheads, revetments - Design loads shall be the greatest combinations of loads exerted on the structure. Consideration shall be given to horizontal loads exerted by superimposed loads on the retained earth and by inclined surface slopes. Superimposed loads shall be considered when exceeding 50 psf and located within a horizontal distance of three times the height of the bulkhead from the face of the bulkhead.

3604.4 Snow Loads. Design snow loads shall be as prescribed in Chapter 16.

3604.5 Wind loads. Design wind loads shall be as prescribed in Chapter 16 without moored vessels. In wind regions with a design wind speed greater than 90 mph, the design wind speed with moored vessels shall be no less than 90 mph (3 second gust). This gust wind speed shall be adjusted for duration and height (not restricted to 15 feet minimum) for wind pressures applied to vessels moored at the facility in accordance with Chapter 16.

Commentary: *During hurricanes, the intent is that vessels be removed from the water or sailed out to sea away from the storm, hence the reduced design wind speed for moored vessels. A design wind speed of 90 mph (3 second gust) is consistent with a thunderstorm.*

3604.6 Impact loads. Design impact loads shall be as prescribed in Chapter 16 but not less than 1.25 times the kinetic energy exerted by a striking vessel or vehicle.

3604.7 Seismic Loads. Design seismic loads shall be as prescribed in Chapter 16. Seismic loads are not applicable for any structure exempted from design by a registered design professional.

3604.8 Water loads. Hydrostatic and hydrodynamic loadings shall be considered as follows:

3604.8.1 Hydrostatic Pressures. Hydrostatic pressures shall be considered in conjunction with the equivalent fluid pressure of soil and any surcharge acting on the structure. For bulkheads hydrostatic pressures shall be estimated based on maximum difference between retained and offshore water surface elevations.

3604.8.2 Current Loads. Current loads for structures and vessels shall be determined from records on current velocity using accepted engineering practice.

3604.8.3 Anchorage for Uplift. Sufficient anchorage against uplift between all components, except elements specifically designed to break away shall be provided. Resisting forces shall be not less than 1.5 times the applied uplift force.

3604.8.4 Wave Forces. Wave forces shall be determined from wave records where available. Where no wave records are available, the design wave shall be determined from probable wind speed, direction, fetch and water depth that will yield a critical wave. Forces shall then be calculated using accepted engineering practice.

3604.8.5 Forces due to Passing Vessels. ~~All piers and floating docks~~ All piers, floating docks, bulkheads and revetments shall be designed for water loading generated by wind and passing vessels. Adjacent to federal designated channels, water loading shall be based on commercial and

recreational vessels with minimum passing speeds of 10 and 20 knots, respectively.

3604.9 Earth loads. Lateral earth pressures shall be determined by considering the specific soil properties and applying earth pressure theories generally accepted for soil mechanics in engineering practice. A geotechnical investigation or other adequate consideration shall be given by the registered design professional for the effect of probable varying levels of retained water, tide and flood water. Pressures exerted by the earth shall be checked for dry, moist, and saturated conditions as applicable.

3604.10 Erosion. The effects of reasonably predictable erosion, propeller wash-induced scour, and wave-induced scour shall be given ample consideration.

3604.11 Water Levels. The ability to accommodate dead, live, wind, current and wave loadings for the range of water levels (from low water to base flood level) anticipated at the site shall be given ample consideration. For public and private floating docks, guide piling systems shall be capable of accommodating water levels extending a minimum of 2 feet above base flood elevation plus the freeboard of the dock structure.

SECTION 3605
MATERIALS

3605.1 General. The quality of materials and fasteners used for load-supporting purposes shall conform to good engineering practices.

Commentary: *Marine environments are quite hostile to many materials. Fresh water facilitates corrosion of metals, and salt water further accelerates corrosion. While conventional concrete cover affords some protection to reinforcing steel, wet service in all marine environments and chloride penetration in salt water environments can break down the passive protection afforded by concrete cover. Wood is subject to attack by decay, insects, and, in salt water, by marine borers. Due to the hostile environments in marine applications, durability of materials is as important a consideration in the selection of materials as strength.*

3605.2 Piling and Foundations. Materials used for piling and repairing piling shall comply with applicable provisions of Chapter 18 and the material requirements of Sections 3605.3 through 3605.7.

3605.2.1 Helical Anchors. Helical anchors shall be hot dip galvanized or stainless steel. A representative number of helical anchors subjected to tensile loading shall be load tested in accordance with ASTM D 3689 to two times their design load capacity. Load testing of anchors in tension shall include creep testing of a representative number of the anchors. Helical anchors shall be designed and installed as determined by a registered design professional.

Commentary: *The design should consider the risk of varying soils at the site with specific concern for deposits of marine clays susceptible to creep. In sedimentary regions and areas created with fill from dredged deposits, pockets of such clays can exist and lack of long term testing at that specific*

location could result in creep of the anchor.

3605.3 Wood. Wood shall be pressure treated with a preservative recommended by the American Wood Preservers' Association for the specific application. Wood species, preservative treatment, minimum lumber size, and lumber grade shall be in accordance with Table 3605.3. Handrails, guardrails, wallcaps, and decking may be constructed of naturally durable species where located above the normal high water mark.

3605.3.1 Wood Connections. All steel bolts, rods and other hardware shall be hot-dipped galvanized or protected with an equivalent system. All bolts, rods and other metal materials shall be no smaller than 5/8 inch in diameter. Beams, girders or pile caps shall be attached to the piling with a minimum of two 5/8-inch hot-dip galvanized steel bolts per beam member through bolted at each piling connection. Piling shall not be notched so that the cross-section is reduced below 50 percent. Threaded fasteners shall not be tightened directly against wood surfaces but used only in conjunction with standard ogee or flat washers. Cold formed metal connectors shall not be used in wet applications or applications subject to wetting and drying cycles. Mooring hardware, including cleats, and pile guides shall be through bolted using sizes recommended by the manufacturer.

Table 3605.3: SPECIFICATIONS FOR SOUTHERN PINE[2] LUMBER IN FRESH AND SALT WATER SERVICE

Location	Component	AWPA Use Category[1,4]		Dimensions	Lumber Grade		Moisture Content at Treatment
		Saltwater	Freshwater		Saltwater	Freshwater	
Above Normal High Water	**Decking[3]**	3B	3B	5/4 “ 2” Nominal Min.	Premium No. 2	Premium No. 2	Surfaced Dry 19%
	Guardrails	3B	3B	2” Nominal Min.	No. 2	No. 2	Surfaced Dry 19%
	Wallcaps	3B	3B	2” Nominal Min.	No. 2	No. 2	Surfaced Dry 19%
	Walers	3B	3B	4x6 Nominal	No. 2	No. 2	KD 20% or less or Dry 23%
	Cross Bracing	3B	3B	2” to 4” Nominal	No. 2	No. 2	Surfaced Dry 19%
Splash Zone	**Split Pile Caps**	4B	4B	2” to 4” Nominal	No. 2	No. 2	Surfaced Dry 19%
	Stringers	4B	4B	2” Nominal	No. 2	No. 2	Surfaced Dry 19%
Below Normal High Water	**Sheet Piles**	5B	4C	2” to 4” Nominal	Marine No. 1[7]	No. 2	Surfaced Dry 19%
	Walers	5B	4C	4x6 Nominal	Marine No. 1[7]	No. 2	KD 20% or less or Dry 23%
	Cross Bracing	5B	4C	2” to 4” Nominal	Marine No. 1[7]	No. 2	Surfaced Dry 19%
	Rectangular Timber Piles	Not Allowed[6]	4C	6x6 Nominal	Not Allowed[6]	No. 2	KD 20% or less or Dry 23%
	Round Timber Piles	5B[6]	4C	ASTM D25	ASTM D25	ASTM D25	KD 25% or Less
Engineered Lumber	**Glulam Timber**	5B	4B	4” Nominal Min.	Note 5	Note 5	12% Average
	Parallel Strand Lumber	5B	4B	3½” Minimum	1.8E or Better	1.8E or Better	Per Manufacturer’s Specifications

Footnotes:

1. Lumber shall be pressure treated with preservative treatment in accordance with AWPA U1.
2. At the discretion of the Building Official, lumber species other than Southern Pine may be approved when span tables for wet use conditions are submitted, and the lumber is treated for comparable service life to the treatment specifications required by Table 3605.1.
3. Wood composite decking, treated or untreated, shall provide equivalent service life to the treated decking specified in Table 3605.1.
4. All notches, holes, and field cuts shall be field treated in accordance with AWPA M4.
5. Glulam grade shall be specified as a layup combination or stress class in accordance with the National Design Specification or the manufacturer's published data. Layup combinations shall consist of species and grades capable of the treatment retentions equivalent to the AWPA use categories specified in Table 3605.1.
6. Commercial pile wraps may be used to extend the life expectancy of timber piles exposed to marine borers.
7. AWPA requirements for Marine No. 1 specify that no heartwood be exposed on any face prior to preservative treatment.

Commentary: *Table 3605.3 specifies the minimum lumber grades and preservative pressure treatment required for Southern Pine lumber to survive in various marine environments providing a reasonable service life. Southern Pine is the most prevalent species treated in North Carolina. Other species are acceptable when treated in accordance with appropriate AWPA standards and designed accounting for wet use. Treatment is specified in accordance with the use condition categories set forth in AWPA U1. Fresh water applications and salt water applications above normal high water require protection from decay and insects. Salt water applications below normal high water require additional protection from marine borers, teredoes and limnoria. In treating wood against marine borers sapwood is required on exposed faces of the pile. For round piles it is reasonably easy to procure a wood member with no heartwood exposed; however, for square or rectangular piles it is much more expensive to saw the pile in a manner that leaves no heartwood exposed on any face of the pile.*

3605.4 Concrete. Concrete components shall comply with applicable provisions of Chapter 19 and ACI 318. Minimum concrete strength, air entrainment, maximum chloride content, and maximum water cement ratio shall be determined from ACI 318 on the basis of required structural strength, required resistance to freeze-thaw exposure, required abrasion resistance, and required resistance to water penetration and salt water intrusion. Minimum concrete cover shall be increased and reinforcing steel spacing shall be decreased in accordance with ACI 350, to reduce crack size. All steel embedments, other than reinforcing steel, shall be stainless, hot dip galvanized or coated for corrosion protection. Field welds and abrasions of coatings on embeds shall be touch coated in the field.

Commentary: *In marine environments durability requirements dictate material selection and concrete mix designs. ACI 318 specifies maximum water cement ratios for concrete mixes to limit permeability of the concrete. Concrete strength specified by the designer should be consistent with the water cement ratio required. Higher concrete strengths than needed for strength considerations may be required to achieve the required water cement ratio. Controlling cracking of the concrete limits potential pathways of water and chloride ions to the reinforcing steel, thereby reducing corrosion potential.*

3605.5 Structural Steel. Steel components shall comply with applicable provisions of Chapter 22 and AISC 360. All structural steel members, fasteners, and fittings shall be protected from corrosion by coating or cathodic protection for the specific exposure. Steel bulkhead components and dock components shall be hot dip galvanized or coated to achieve the corrosion protection required for the degree of exposure of corrosive elements. Field welds and abrasions to coatings shall be touched up ~~coated~~ after erection or installation is completed. Cold formed metal joists, girders, columns and studs shall not be used in applications where the members are constantly wet or subject to wetting and drying cycles.

Commentary: *Cold formed metal structural members have very little reserve capacity when subjected to a corrosive environment.*

3605.6 Aluminum. Aluminum bulkhead sheets or aluminum bulkhead or dock components shall be of proper alloy to resist corrosive elements in the adjacent water and soil. Bulkhead components and hardware shall be aluminum or stainless steel. Aluminum shall be galvanically and physically isolated from concrete and galvanically isolated from steel. Connection hardware and fasteners for aluminum components may be stainless steel or galvanized steel if isolated from aluminum structural elements.

Commentary: *Aluminum in contact with concrete may react with the concrete producing deleterious effects on the concrete. Aluminum in direct contact with steel precipitates a galvanic reaction resulting in accelerated corrosion of the steel.*

3605.7 Plastics and Composites. Bulkheads, structural shapes, plates, and guardrail systems manufactured from vinyl chloride based materials or fiber reinforced polymer (FRP) materials

shall be designed to comply with manufacturer's published load tables or manufacturer's published mechanical properties subject to the requirements for specific materials in Sections 3605.7.1, 3605.7.2, and 3605.7.3. Plastic and composite members shall contain additives to inhibit ultra violet radiation degradation or shall be protected from ultra violet radiation by an appropriate coating.

3605.7.1 Sheet Piling Manufactured from Vinyl Chloride Based Materials. Vinyl chloride materials for sheet piling shall be specified and tested for conformance in accordance with ASTM D4216, including weathering tests in accordance with ASTM D1435. Mechanical properties shall be established in accordance with the tests specified in Table 3605.7.1. Design values of the tabulated properties shall conform to the limiting values specified in the table. The manufacturer of the sheet piling shall produce a certificate of analysis from a third party testing agency certifying the vinyl chloride material from which the sheet piling is manufactured conforms to the physical properties specified. The third party testing agency shall be accredited in accordance with ISO 17025 to conduct the specified tests. Testing programs shall address changes in material sources and composition over time, and test data shall accurately represent the properties of the product produced at any given time.

Commentary: *Language of 3605.7.1 and its subsections is based on a 2005 Army Corps of Engineers document entitled "INTERIM REPORT, General Design Guide: PVC Sheet Pile." This document appears to be the most current available on the topic.*

The report explains specification of materials using the cell method of categorizing mechanical properties and conformance testing in accordance with ASTM D4216.

According to the report, manufacturers of PVC sheet piling use primarily recycled materials. Variability of recycled materials affects mechanical properties and durability of the product. For this reason, ongoing testing of the materials used in manufacturing the sheet piling by a qualified third party testing agency is of the utmost importance.

3605.7.1.1 Deflection of Vinyl Chloride Based Sheet Piling. Deflection of vinyl sheet pile bulkheads shall not exceed the lesser of 1/60 times the height from the mud line to the top of the wall or 2 inches. Effects of in-service temperatures exceeding 80^0F on modulus of elasticity shall be considered in deflection calculations and selection of materials.

Commentary: *Vinyl chloride based materials have a very low modulus of elasticity. Consequently, large deflections can occur in bulkheads that normally would have sufficient strength to withstand applied loads. Large deflections affect both stability of the bulkhead, especially in the presence of transient superimposed loads, and appearance. Therefore, deflections need to be limited. The elastic modulus of vinyl chloride based materials decreases at a rate of approximately 202 psi/^{0}F with increase in temperature. Consequently, high summertime temperatures and resulting increased surface temperatures can significantly affect deflection of the bulkhead.*

3605.7.1.2 Service Stresses for Vinyl Chloride Based Sheet Piling. Service load stresses in the vinyl sheet piling shall not exceed 3200 psi.

Commentary: *Regardless of design method, ASD or LRFD, the USACE report recommends limiting service load stresses to 3200 psi in order to limit creep deformations.*

3605.7.1.3 Ultra Violet Light Stabilization. Vinyl chloride based materials shall be compounded with stabilizing agents. Addition of stabilizers during the extrusion process is prohibited.

Commentary: *Adding stabilizers during the extrusion process does not adequately stabilize the material against UV deterioration. Stabilizer must be added when the product is compounded.*

3605.7.1.4 Impact Resistance of Vinyl Materials. Vinyl sheet pile bulkheads shall have sufficient impact resistance, determined in accordance with ASTM D256 and ASTM D4226, to resist impact from vessels traveling at mooring speeds, resist wave impact when installed in high velocity flood zones (V-Zones on Flood Insurance Rate Maps), and to resist impact from debris likely to collide with the bulkhead at flood stage or in areas subject to storm surge.

3605.7.1.5 Fire, Smoke, and Toxicity. Vinyl materials shall be tested for the in-service thickness in accordance with ASTM D635 with a resulting burning rate of 2 ½ inches per minute or less.

Mechanical Property	Test Protocol	Limitations on Property
Notch Impact Resistance	ASTM D256	2.0 ft-lb./in minimum
Drop Dart Impact Resistance, Procedure A	ASTM D4226	1.0 in-lb./mil minimum
Drop Dart Impact Resistance, Procedure B	ASTM D4226	2.0 in-lb./mil minimum
Tensile Strength	ASTM D638	6500 psi minimum
Modulus of Elasticity in Tension	ASTM D638	377,000 psi minimum
Deflection Temperature under 264 psi	ASTM D648	158 psi minimum
Linear Coefficient of Expansion	ASTM D696	4.4×10^{-5} in/in/^{0}F maximum

3605.7.2 Pultruded Fiber Reinforced Polymer (FRP) Sheet Piling, Shapes and Plates. Mechanical properties for FRP structural components shall be established in accordance with the tests specified in Table 3605.7.2. Each manufacturer shall publish the characteristic values for the product in accordance with ASTM D7290. The manufacturer of the FRP shall produce a

certificate of analysis certifying the FRP material and constituent materials from which the FRP components are manufactured conform to the physical properties specified. Testing programs shall address changes in material sources and composition over time, and test data shall accurately represent the properties of the product produced at any given time. Manufactured components shall be inspected in the plant in accordance with ASTM D3917 for dimensional tolerances and according to ASTM D4385 for visual defects. Inspection reports shall be provided.

***Commentary**: Section 3605.7.2 is based on the ASCE "Pre-Standard for Load and Resistance Factor Design of Pultruded Fiber Reinforced Polymer Structures." This document has not yet been published as a national standard. Excerpts from the ASCE document necessary to establish consistent material behavior have been reproduced in this code. Methods for proportioning members are left to the designer with reference to manufacturer's published data.*

Table 3605.7.2: LIMITATIONS ON PHYSICAL AND MECHANICAL PROPERTIES FOR FIBER REINFORCED POLYMER COMPONENTS		
Property	**ASTM Test Method**	**Minimum Number of Tests**
Barcol Hardness	D2583	5
Glass Transition Temperature T_g	D4065	5
Coefficient of Thermal Expansion	D696	5
Moisture Equilibrium Content	D570	5
Longitudinal Tensile Strength	D638	10
Transverse Tensile Strength	D638	10
Longitudinal Tensile Modulus	D638	10
Transverse Tensile Modulus	D638	10
Longitudinal Compressive Strength	D6641	10
Transverse Compressive Strength	D6641	10
Longitudinal Compressive Modulus	D6641	10
Transverse Compressive Modulus	D6641	10
Longitudinal Flexural Strength	D790	10
Transverse Flexural Strength	D790	10
Longitudinal Flexural Modulus	D790	10
Transverse Flexural Modulus	D790	10
In-Plane Shear Strength	D5379	10

In-Plane Shear Modulus	D5379	10
Inter-laminar Shear Strength	D2344	10
Longitudinal Pin Bearing Strength	D953[2]	10
Transverse Pin Bearing Strength	D953[2]	10
Pull Through Strength per Fastener t = 3/8” t = ½” t = ¾”	D7332, Proc. B	10

Footnotes:

1. Property requirements for shapes apply to sheet piles.
2. Tests shall be conducted for material thicknesses, t, tabulated and bolt sizes from 3/8 inch to 1 inch in diameter. No more than 1/3 of the bolt shank within the thickness of the connection material may be threaded. Bolts shall be installed snug tight.

3605.7.2.1 Maximum Service Temperature. Service temperature of FRP structural components shall not exceed T_g-40^{0}F, where T_g is the glass transition temperature determined in accordance with ASTM D4065.

3605.7.2.2 FRP Constituent Materials. Fibers and matrix constituents shall comply with the following requirements:

3605.7.2.2.1 Fiber Type. Fibers shall be glass, carbon, aramid, or hybrid combinations of these fiber types. Glass fibers shall conform to ASTM D578.

3605.7.2.2.2 Fiber Architecture and Content. The fiber architecture of any pultruded element comprising the cross section of a pultruded FRP structural member shall be symmetrical and balanced. Each pultruded FRP structural element shall contain a minimum total fiber volume fraction of 30%.

3605.7.2.2.3 Fiber Orientations. Each element of a pultruded FRP structural member shall have fibers oriented in a minimum of two directions separated by a minimum of 30 degrees. In the direction of the longitudinal axis of the member the percentage of continuous fiber in each pultruded element shall be a minimum of 30% of the total fiber reinforcement by volume for shapes and a minimum of 25% of the total fiber reinforcement by volume for plates. When multiple elements share a common edge in the direction of pultrusion, at least 50% of the non-roving reinforcement in the element having the largest percentage of non-roving reinforcement shall extend through the junction connecting the elements.

3605.7.2.2.4 Minimum Fiber Tensile Strength. Determined in accordance with ASTM D7290, the characteristic value of the tensile strength of the fiber strands, yarns, and rovings shall be at least 290,000 psi. Tensile tests shall be conducted in accordance with ASTM D2343.

3605.7.2.2.5 Resin. A commercial grade thermoset resin shall be used for fabricating pultruded FRP structural members.

3605.7.2.2.6 Other Constituent Materials. Additives to the resin system that influence processing or curing, such as fillers, promoter, accelerators, inhibitors, UV resistant agent, and pigments shall be compatible with the fiber and resin system.

3605.7.2.3 Durability and Environmental Effects. Materials for FRP structural components shall be selected, designed, and manufactured to tolerate long term environmental effects anticipated during the service life of the structure.

3605.7.2.3.1 Factors Considered in Material Selection. The following factors shall be considered in selecting FRP materials for marine structures:

a. Performance criteria for the structure;
b. Intended service life of the structure;
c. Expected environmental conditions, including likelihood of exposure to alkalis or organic solvents;
d. Protective measures;

e. Feasibility of maintenance and repair during service.

3605.7.2.3.2 Adjustment of Material Properties to Account for Environmental Effects. Unless the glass transition temperature determined in accordance with ASTM D4065 and the tensile strength of the composite in the longitudinal and transverse directions determined in accordance with ASTM D638, can be shown to retain at least 85% of their characteristic values after conditioning in the environments listed below, the nominal strength and stiffness shall be reduced for design purposes in accordance with test data produced from testing simulating the anticipated environment. Materials that cannot retain at least 15% of their characteristic values after conditioning the listed environments are prohibited in structural applications. Design tensile strength shall be reduced in accordance with material specific tests when in-service temperatures exceed of 90^0F. Condition test samples as follows:
a. Water: Samples shall be immersed in distilled water having a temperature of 100 + 3^0F and tested after 1,000 hours of exposure.

b. Alternating Ultraviolet Light and Condensing Humidity: Samples shall be exposed according to Cycle No. 1 (0.89 W/m^2/mm, 8 hours UV at 60^0C, 4 hours condensation at 50^0C) using UVA-340 lamps in an apparatus meeting the requirements of ASTM G154. Samples shall be tested within two hours after removal from the apparatus.

Commentary: *Many FRP materials lose strength and stiffness as a result of environmental exposure. Adjustment of characteristic mechanical properties used in design is necessary to account for effects of exposure. Otherwise, the material may fail prematurely. Exposure to alkalis and freeze thaw may also adversely affect the performance of FRP materials. However, at this time, there are no ASTM protocols specifically for testing FRP materials in these environments. The designer should take these conditions into account when proportioning the structures and specifying FRP materials.*

3605.7.2.4 Deleted ~~**Impact Resistance of FRP Materials.** FRP sheet pile bulkheads shall have sufficient impact resistance, determined in accordance with ASTM D7136 for the intended application.~~

3605.7.2.5 Deflection of FRP Sheet Piling. Deflection of vinyl sheet pile bulkheads shall not exceed the lesser of 1/60 times the height from the mud line to the top of the wall or 2 inches. Effects of in-service temperatures in excess of 90^0F on modulus of elasticity shall be considered in deflection calculations.

Commentary: *FRP materials have a relatively low modulus of elasticity. Consequently, large deflections can occur in bulkheads that normally would have sufficient strength to withstand applied loads. Large deflections affect both stability of the bulkhead, especially in the presence of transient superimposed loads, and appearance. Therefore, deflections need to be limited.*

3605.7.2.6 Fire, Smoke, and Toxicity. FRP materials shall be tested for the in-service thickness in accordance with ASTM D635 with a resulting burning rate of 2 ½ inches per minute or less.

Commentary: *Criteria are consistent with provisions for CC2 plastics in Section 2606.4.*

ASTM D4216 references D635 for burning characteristics of vinyl materials, and allusion is made to similar requirements in the ASCE Pre-Standard for FRP.

3605.7.3 Carbon Fiber Reinforced Polymer Repair Products. Carbon Fiber Reinforced plate and wrap used for flexural and shear reinforcement of existing concrete structures shall be designed in accordance with the design procedures specified in ACI 440.2R. Mechanical properties of Carbon Fiber Reinforced plate and wrap shall be established in accordance with the tests specified in ACI 440.3R.

3605.8 Masonry. Masonry used in bulkheads and dock work shall comply with Chapter 21.

SECTION 3606
CONSTRUCTION OF PIERS, DOCKS, CATWALKS, GANGWAYS, AND FLOATING DOCKS

3606.1 Fixed piers. Fixed piers shall be constructed in accordance with Sections 3606.1.1 through 3606.1.4.

3606.1.1 Required depth of piles. Fixed piers shall be supported by pilings with tip penetrations dependent on the soil conditions and the total applied load. Piers support by shallow piling, legs or columns with point bearing on rock shall have provisions to resist horizontal forces and overturning, as well as flotation uplift. Piles shall be installed in accordance with the requirements of Chapter 18 and inspected in accordance with the requirements of Chapter 17.

3606.1.2 Structural steel and concrete members. Structural steel members shall be designed in accordance with AISC 360, Chapter 22 of this code, and the material requirements of this chapter. Concrete members shall be designed in accordance with ACI 318, Chapter 19 of this code, and the materials requirements of this chapter.

3606.1.3 Size of wood piles. Piles shall be sized in accordance with the American Wood Council National Design Specification. In no case shall round timber piles be less than 7 inches in diameter at the butt and have a minimum tip diameter of less than 5 ½ inches. Rectangular timber piles shall not be less than nominal 6 inches x 6 inches.

3606.1.4 Bracing of wood piles. Where required by design, bracing shall be sized to limit stresses in the piles from lateral loads in accordance with the American Wood Council National Design Specification to prevent buckling.

3606.1.5 Wood girder and joist spans. Maximum spans for pier pile caps or girders and joists or stringers shall be determined in accordance with the American Wood Council National Design Specification considering the member to be subject to wet use.

3606.1.6 Connections. Connections between piling or legs to pile caps, stringers, beams, bracing and deck shall have sufficient capacity to safely support all applied loads and

provide transfer of load to adjoining members.

3606.1.7 Gangways. On coastal waterways, the maximum slope permitted shall be 3:1 at 0.0 mean low water or above and 2½:1 below 0.0 mean low water. On lakes and other inland waters, the maximum slope shall be 3:1 not less than 90% of the time and 2½:1 not more than 10% of the time.

3606.2 Flotation units. Flotation units shall be foam filled encapsulated floats or polystyrene billets securely wrapped with Class I woven geotextile fabric in accordance with AASHTO M288. The use of metal barrels not specifically designed for use as flotation devices and unwrapped polystyrene billets are prohibited.

3606.3 Electrical service. All electrical service to marine structures shall be in accordance with the *North Carolina Electrical Code*.

3606.4 Fire protection. All fire protection for marine structures shall be in accordance with applicable provisions of the *North Carolina Fire Prevention Code.*

3606.5 Fuel docks. Fuel docks and other marine facilities handling flammable liquids shall comply with the *Flammable and Combustible Liquids Code*, NFPA 30 and the *North Carolina Fire Code*. All fuel installations shall be designed to prevent fuel spillage from entering the water. The fuel docks or floats shall be isolated to the extent that fire or explosion would have minimal opportunity to spread to or from the fuel dock to the berths. Storage tanks for public facilities shall be located a minimum distance of 50 feet from the dispenser with a shutoff valve at the tank.

Commentary: *Other standards typically referenced for fueling facilities are:*
NFPA 30A–Automotive and Marine Service Station Code
NFPA 70–National Electrical Code, Article 555, Marinas and Boatyards
NFPA 302–Pleasure and Commercial Motor Craft
NFPA 303–Marinas and Boatyards
PEI RP1000-09 –Recommended Practices for the Installation of Marina Fueling Systems

3606.6 Guardrails. For walkways, access piers, steps or ramps, guardrails or other safety provisions shall be provided along the edges where the vertical drop to the lesser of the mean low water level , normal low water level (sounds), normal pool (lakes and rivers) or mud line exceeds 6 feet. Edges having a primary function other than walks or access ways, such as docking frontage and swimming access shall not require guardrails. Guardrails shall be designed in accordance with Chapter 16 for balconies. Guardrails shall be a minimum of 42 inches high and shall prevent the passage of a 21 inch sphere except where required otherwise by Chapter 11. Edge protection shall be provided as required by other regulations.

Commentary: *Chapter 36 requirements for guardrails are a compromise intended to address as many general cases as possible. In marine applications, guardrails or deletion of rails may be determined on a case by case basis due to the diversity of activities taking place on the waterfront. In many cases, function and view are important factors in the design of a barrier system. A case in point is an urban waterfront where small to medium sized vessels are docking along a pedestrian promenade. The solution was a minimal barrier system that would allow for function and view while alerting pedestrians that there is a hazard and channeling them away from the hazard. As a compromise, the committee attempted to incorporate these concepts into the draft code provisions. The 21 inch sphere limitation is based from minimum OSHA standards. For a vertical drop less than 6 feet, the intent of omitting guardrails considers that the drop is over water or above a soft substrate. Consideration for guardrails should be made when hazardous conditions exist.*

Exception: For private waterfront piers and docks, guardrails or other safety provisions shall be provided along the edges where the vertical drop to the lesser of the mean low water level , normal low water level (sounds), normal pool (lakes and rivers) or mud line exceeds 8 feet. Guardrails shall be a minimum of 36 inches high and shall prevent the passage of a 21 inch sphere. Edge protection shall be provided as required by other regulations.

3606.7 Accessibility. Piers, docks, catwalks, gangways, and floating docks shall comply with Chapter 11 and ANSI/ICC A117.1 for accessibility.

Commentary: *Compliance with the NC Building Code does not necessarily ensure compliance with the Federal law, The Americans with Disabilities Act. The designer and the owner should investigate Federal requirements. Refer to Chapter 11 for requirements regarding the number and distribution of accessible berths. The provisions of ANSI A117.1 note the maximum running and cross slopes of the floating dock along the accessible route cannot exceed 1:20 and 1:48, respectively, under static loading (no wave loading). Therefore, the maximum cross slope should be checked with any combination of dead load, uniform dock surface live load and dock surface concentrated load as prescribed in Section 3604.3.2.For maximum running slope on a floating dock, the same loadings must be checked including where the gangway lands on the floating dock at the ends of fingers. ANSI A117.1 provides exceptions to the requirements for maximum running slope, maximum rise and changes in level for gangways serving an accessible route based on the number of boat slips at the facility. The height and location of utilities and attached utility structures must be considered based on the provisions of ANSI A117.1.*

3606.8 Egress. Piers and docks shall be provided with means of egress in accordance with Sections 3606.8.1 through 3606.8.4.

3606.8.1 Occupant Load. Occupant load for piers and docks shall be calculated as follows:

3606.8.1.1 Piers and Boardwalks. Occupant load for piers and boardwalks intended for recreational fishing shall be calculated based on 3 linear feet of rail per person on the perimeter plus 50 square feet per person on a net area with a perimeter 3 feet inside the rail.

Occupant load for piers and boardwalks intended for other uses shall be in accordance with Chapter 10.

Commentary: *Occupants on fishing piers tend to be concentrated around the perimeter of the pier. Depending on the event, occupants on piers intended for assembly purposes can be densely packed over the entire area of the pier.*

3606.8.1.2 Public Waterfront Docks. Occupant load for docks constructed a public marinas intended for mooring of private pleasure craft shall be calculated based on 30 square feet of net dock area per person.

3606.8.1.3 Private Waterfront Docks. Occupant load for private waterfront docks shall be calculated based on 20 square feet per person.

Commentary: *Private waterfront docks are likely locations for parties, weddings, and other gatherings. The stated occupant load reflects this probability.*

3606.8.2 Piers. Piers intended for recreational fishing, assembly, or educational purposes with travel distance to exit discharge exceeding 600 feet and greater than 15 feet above mean low water shall have emergency access ladders at 300 feet intervals and at the end of the pier, and the pier shall be constructed of noncombustible material with the exception that the floor decking may be heavy timber.

Commentary: *Emergency access ladders facilitate rescue by watercraft. Noncombustible construction is intended to limit the spread of fire. Heavy timber decking, while combustible, burns more slowly than dimension lumber and offers the designer some advantages in regards to energy absorption from wave forces and durability. Heavy timber decking is defined as solid sawn decking 3 inches nominal in thickness.*

3606.8.3 Public Waterfront Docks. Public waterfront docks intended for mooring of private pleasure craft with travel distance to exit discharge in excess of 600 feet shall have a second means of egress or a means of rescue from the water. Construction for these docks shall be noncombustible with the exception that wood walers may be embedded in the dock edges for attachment of mooring hardware.

Commentary: *Boat owners may be able to cast off and move away from the dock. Guests may not have this option. Means of rescue by water can be designated harbor patrol, life rafts, or life preservers. Noncombustible construction is intended to slow the spread of fire.*

3606.8.4 Buildings Constructed on Piers and Docks. Buildings constructed on public waterfront piers and docks shall comply with the requirements of all applicable provisions of the North Carolina State Building Code.

SECTION 3607
CONSTRUCTION: BULKHEADS AND REVETMENTS

3607.1 Bulkheads. Bulkheads shall be constructed in accordance with Sections 3607.1.1 through 3607.1.5.

3607.1.1 General. Bulkheads shall be constructed in a manner to be effective against erosion and provide for bank stabilization. The bulkhead system may consist of either of the following or combinations thereof: braced sheet pile walls with tie backs, king piles and horizontal panels, gravity walls, cantilever and counterfort retaining walls. Bulkhead walls shall be constructed to prevent passage of fine material (See ASTM D 2487) through joints or cracks from the fill side to the stream side.

3607.1.2 Systems. Local site conditions and performance of bulkheads in service shall govern in selection of a system. The potential for erosion and scour at the mud line shall also be investigated, and compensating features shall be reflected in the construction. Bulkheads shall be terminated by either tying into adjoining structures or by extending the bulkhead line a minimum of 10 feet in a landward direction at an angle of not less than 45 degrees to the shoreline in order to protect against end erosion or flanking by wave action. No structure shall be terminated without regard for end anchorage and stabilization.

3607.1.3 Guardrails. Where designated public walkways, steps or ramps run adjacent to bulkheads within 6 feet, guardrails or other safety provisions shall be provided along the top of the wall where the vertical drop to the lesser of the mean low water level, normal low water level (sounds), normal pool (lakes and rivers) or mud line exceeds 6 feet. Guardrails shall be designed in accordance with Chapter 16 for balcony guardrails. Guardrails shall be 42 inches high and shall prevent the passage of a 21 inch sphere except where required otherwise by Chapter 11. Edge protection shall be provided as required by other regulations.

Commentary: *Chapter 36 requirements for guardrails are a compromise intended to address as many general cases as possible. In marine applications, guardrails or deletion of rails may be determined on a case by case basis due to the diversity of activities taking place on the waterfront. In many cases, function and view are important factors in the design of a barrier system. A case in point is an urban waterfront where small to medium sized vessels are docking along a pedestrian promenade. The solution was a minimal barrier system that would allow for function and view while alerting pedestrians that there is a hazard and channeling them away from the hazard. As a compromise, the committee attempted to incorporate these concepts into the draft code provisions. The 21 inch sphere limitation is based from minimum OSHA standards. For a vertical drop less than 6 feet, the intent of omitting guardrails considers that the drop is over water or above a soft substrate. Consideration for guardrails should be made when hazardous conditions exist.*

Exception: For private waterfront bulkheads with designated walkways within 6 feet, guardrails or other safety provisions shall be provided along the edges where the vertical drop to the lesser of the mean low water level , normal low water level (sounds), normal pool (lakes and rivers) or mud line exceeds 8 feet. Guardrails shall be a minimum of 36 inches high and shall prevent the passage of a 21 inch sphere. A wall cap 30 inches or less in width shall not be considered a designated walkway unless it is connected to a walkway. Edge protection shall be provided as required by other regulations.

3607.1.4 Wood Construction. For wood grades, member sizes, preservative treatment, and protection of metal fasteners and fittings see Section 3605.3.

3607.1.5 Bulkheads of Materials Other than Wood. Vinyl, fiber reinforced polymer, aluminum, concrete and steel bulkheads shall be constructed in a manner to ensure performance. Connections shall be designed to resist the full applied load. For materials and corrosion protection reference Sections 3605.4 through 3605.7.

3607.2 Revetments. Revetments shall be constructed in accordance with Sections 3607.2.1 through 3607.2.2

3607.2.1 Rigid revetments. Rigid revetments shall be founded on a firm foundation to prevent undermining and progressive instability. Provisions shall be made to provide for adequate toe protection to compensate for known or anticipated scour. Additional protection may be needed in active areas and may consist of sheet piling along the toe or stone rip rap. An adequate pattern of weep holes shall be provided in the face to relieve hydrostatic pressure behind the wall. Joints shall be sealed or provided with a properly designed filter to prevent loss of fines from the protected slope.

3607.2.2 Flexible revetments. Adequate provisions shall be made to prevent migration of fine materials through the structure. The face shall not be steeper than one unit horizontal to one unit vertical. Flatter slopes may be needed for stability depending on the construction materials and site conditions. The face may consist of armor stone, rip rap, or individual interlocking concrete units or poured concrete. Toe protection provisions shall be provided as discussed for the rigid type and the top of slope shall be detailed to prevent erosions under the revetment from surface water runoff. Flexible revetments shall be provided with a filter layer designed to prevent loss of fines from the protected slope and to relieve hydrostatic pressure behind the face.

Commentary: *Flexible revetments include geo-textile construction such as sandbags and other geo-textile structures.*

APPENDIX A

Deleted

~~EMPLOYEE QUALIFICATIONS~~

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

~~SECTION A101~~

~~BUILDING OFFICIAL QUALIFICATIONS~~

~~A101.1 Building official.~~
~~The *building official* shall have at least 10 years' experience or equivalent as an architect, engineer, inspector, contractor or superintendent of construction, or any combination of these, 5 years of which shall have been supervisory experience. The *building official* should be certified as a *building official* through a recognized certification program. The building official shall be appointed or hired by the applicable governing authority.~~

~~A101.2 Chief inspector.~~
~~The *building official* can designate supervisors to administer the provisions of this code and the *International Mechanical*, *Plumbing* and *Fuel Gas Codes*. Each supervisor shall have at least 10 years' experience or equivalent as an architect, engineer, inspector, contractor or superintendent of construction, or any combination of these, 5 years of which shall have been in a supervisory capacity. They shall be certified through a recognized certification program for the appropriate trade.~~

~~A101.3 Inspector and plans examiner.~~
~~The *building official* shall appoint or hire such number of officers, inspectors, assistants and other employees as shall be authorized by the jurisdiction. A person shall not be appointed or hired as inspector of construction or plans examiner who has not had at least 5 years' experience as a contractor, engineer, architect, or as a superintendent, foreman or competent mechanic in charge of construction. The inspector or plans examiner shall be certified through a recognized certification program for the appropriate trade.~~

~~A101.4 Termination of employment.~~
~~Employees in the position of *building official*, chief inspector or inspector shall not be removed from office except for cause after full opportunity has been given to be heard on specific charges before such applicable governing authority.~~

~~SECTION A102~~

~~REFERENCED STANDARDS~~

~~IBC—15~~	~~International Building Code~~	~~A101.2~~
~~IMC—15~~	~~International Mechanical Code~~	~~A101.2~~
~~IPC—15~~	~~International Plumbing Code~~	~~A101.2~~
~~IFGC—15~~	~~International Fuel Gas Code~~	~~A101.2~~

APPENDIX B

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~~BOARD OF APPEALS~~

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

~~SECTION B101~~

~~GENERAL~~

~~B101.1 Application.~~

~~The application for appeal shall be filed on a form obtained from the *building official* within 20 days after the notice was served.~~

~~B101.2 Membership of board.~~

~~The board of appeals shall consist of persons appointed by the chief appointing authority as follows:~~

~~1. One for 5 years; one for 4 years; one for 3 years; one for 2 years; and one for 1 year.~~

~~2. Thereafter, each new member shall serve for 5 years or until a successor has been appointed.~~

~~The *building official* shall be an ex officio member of said board but shall have no vote on any matter before the board.~~

~~B101.2.1 Alternate members.~~

~~The chief appointing authority shall appoint two alternate members who shall be called by the board chairperson to hear appeals during the absence or disqualification of a member. Alternate members shall possess the qualifications required for board membership and shall be appointed for 5 years, or until a successor has been appointed.~~

~~B101.2.2 Qualifications.~~

~~The board of appeals shall consist of five individuals, one from each of the following professions or disciplines:~~

1. Registered design professional with architectural experience or a builder or superintendent of building construction with at least 10 years' experience, 5 of which shall have been in responsible charge of work.

2. Registered design professional with structural engineering experience.

3. Registered design professional with mechanical and plumbing engineering experience or a mechanical contractor with at least 10 years' experience, 5 of which shall have been in responsible charge of work.

4. Registered design professional with electrical engineering experience or an electrical contractor with at least 10 years' experience, 5 of which shall have been in responsible charge of work.

5. Registered design professional with fire protection engineering experience or a fire protection contractor with at least 10 years' experience, 5 of which shall have been in responsible charge of work.

B101.2.3 Rules and procedures.
The board is authorized to establish policies and procedures necessary to carry out its duties.

B101.2.4 Chairperson.
The board shall annually select one of its members to serve as chairperson.

B101.2.5 Disqualification of member.
A member shall not hear an appeal in which that member has a personal, professional or financial interest.

B101.2.6 Secretary.
The chief administrative officer shall designate a qualified clerk to serve as secretary to the board. The secretary shall file a detailed record of all proceedings in the office of the chief administrative officer.

B101.2.7 Compensation of members.
Compensation of members shall be determined by law.

B101.3 Notice of meeting.
The board shall meet upon notice from the chairperson, within 10 days of the filing of an appeal or at stated periodic meetings.

B101.3.1 Open hearing.
All hearings before the board shall be open to the public. The appellant, the appellant's representative, the building official and any person whose interests are affected shall be given an opportunity to be heard.

B101.3.2 Procedure.
The board shall adopt and make available to the public through the secretary procedures under which a hearing will be conducted. The procedures shall not require compliance with strict rules of evidence, but shall mandate that only relevant information be received.

~~B101.3.3 Postponed hearing.~~

~~When five members are not present to hear an appeal, either the appellant or the appellant's representative shall have the right to request a postponement of the hearing.~~

~~B101.4 Board decision.~~

~~The board shall modify or reverse the decision of the *building official* by a concurring vote of two-thirds of its members.~~

~~B101.4.1 Resolution.~~

~~The decision of the board shall be by resolution. Certified copies shall be furnished to the appellant and to the *building official*.~~

~~B101.4.2 Administration.~~

~~The *building official* shall take immediate action in accordance with the decision of the board.~~

APPENDIX C

GROUP U—AGRICULTURAL BUILDINGS

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

SECTION C101

GENERAL

C101.1 Scope.
The provisions of this appendix shall apply exclusively to agricultural buildings not exempted by North Carolina General Statute: GS 143-138. Such buildings shall be classified as Group U and shall include the following uses:

APPENDIX D

FIRE DISTRICTS

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

D102.2.8 Permanent canopies.
Permanent canopies are permitted to extend over adjacent open spaces provided all of the following are met:

1. The canopy and its supports shall be of noncombustible material, *fire-retardant-treated wood*, Type IV construction or of 1-hour fire-resistance-rated construction.

   Exception: Any textile covering for the canopy shall be flame resistant as determined by tests conducted in accordance with NFPA 701 after both accelerated water leaching and accelerated weathering.

2. Any canopy covering, other than textiles, shall have a *flame spread index* not greater than 25 when tested in accordance with ASTM E 84 or UL 723 in the form intended for use.

3. The canopy shall have at least one long side open.

4. The maximum horizontal width of the canopy perpendicular to the face of the building shall not exceed 15 feet (4572 mm).

5. The *fire resistance* of *exterior walls* shall not be reduced.

APPENDIX E

SUPPLEMENTARY ACCESSIBILITY REQUIREMENTS

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

E105.3 ~~Gaming machines,~~ ~~d~~Depositories, vending machines, change machines, gaming machines and similar equipment.
Where provided ~~A~~at least one of each type of depository, vending machine, change machine

and similar equipment shall be *accessible*. Two percent of gaming machines shall be *accessible* and provided with a front approach. *Accessible* gaming machines shall be distributed throughout the different types of gaming machines provided.

APPENDIX F

RODENTPROOFING

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

~~User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.~~

APPENDIX G

FLOOD-RESISTANT CONSTRUCTION

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

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

G101.4 Violations.
Any violation of a provision of this appendix, or failure to comply with a *permit* or variance issued pursuant to this appendix or any requirement of this appendix, shall be handled in accordance with ~~Section 114~~ the North Carolina Admintrative Code and Policies.

SECTION G102

APPLICABILITY

G102.1 General.
This appendix, in conjunction with this code, provides minimum requirements for development located in flood hazard areas, including:

1. The subdivision of land.
2. Site improvements and installation of utilities.
3. Placement and replacement of manufactured homes.
4. Placement of recreational vehicles.
5. New construction and repair, reconstruction, rehabilitation or additions to new construction.
6. Substantial improvement of existing buildings and structures, including restoration after damage.

7. Installation of tanks.

8. Temporary structures.

9. Temporary or permanent storage, utility and miscellaneous Group U buildings and structures.

~~10. Certain building work exempt from permit under Section 105.2 and other buildings and development activities.~~

G102.2 Establishment of flood hazard areas.
Flood hazard areas are established in Section 1612.3 of this code~~, adopted by the applicable governing authority on [INSERT DATE]~~.

APPENDIX H

SIGNS

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

SECTION H101
GENERAL

H101.2 Signs exempt from permits.
The following signs are exempt from the requirements to obtain a *permit* before erection:

1. ~~Painted~~ Nonilluminated wall signs.

2. Temporary signs ~~announcing the sale or rent of property~~.

3. Signs erected by transportation authorities.

4. Projecting signs not exceeding ~~2.5~~ 6 square feet (~~0.23~~ 0.56 m^2).

APPENDIX I

PATIO COVERS

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

APPENDIX J

GRADING

The provisions contained in this appendix are ~~not mandatory unless specifically referenced in the adopting ordinance~~ adopted as part of this code.

~~User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.~~

APPENDIX K

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~~ADMINISTRATIVE PROVISIONS~~

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

~~With the exception of Section K111, this appendix contains only administrative provisions that are intended to be used by a jurisdiction to implement and enforce NFPA 70, the National Electrical Code. Annex H of NFPA 70 also contains administrative and enforcement provisions, and these provisions may or may not be completely compatible with or consistent with Chapter 1 of the IBC, whereas the provisions in IBC Appendix K are compatible and consistent with Chapter 1 of the IBC and other ICC codes. Section K111 contains technical provisions that are unique to this appendix and are in addition to those of NFPA 70.~~

~~The provisions of Appendix K are specific to what might be designated as an Electrical Department of Inspection and Code Enforcement and could be implemented where other such provisions are not adopted.~~

~~SECTION K101~~

~~GENERAL~~

~~K101.1 Purpose.~~

~~A purpose of this code is to establish minimum requirements to safeguard public health, safety and general welfare by regulating and controlling the design, construction, installation,~~

quality of materials, location, operation and maintenance or use of electrical systems and equipment.

K101.2 Scope.
This code applies to the design, construction, installation, *alteration*, repairs, relocation, replacement, *addition* to, use or maintenance of electrical systems and equipment.

SECTION K102
APPLICABILITY

K102.1 General.
The provisions of this code apply to all matters affecting or relating to structures and premises, as set forth in Section K101.

K102.2 Existing installations.
Except as otherwise provided for in this chapter, a provision in this code shall not require the removal, *alteration* or abandonment of, or prevent the continued utilization and maintenance of, existing electrical systems and equipment lawfully in existence at the time of the adoption of this code.

K102.3 Maintenance.
Electrical systems, equipment, materials and appurtenances, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe, hazard-free condition. Devices or safeguards that are required by this code shall be maintained in compliance with the code edition under which installed. The *owner* or the *owner's* authorized agent shall be responsible for the maintenance of the electrical systems and equipment. To determine compliance with this provision, the *building official* shall have the authority to require that the electrical systems and equipment be reinspected.

K102.4 Additions, alterations and repairs.
Additions, *alterations*, renovations and *repairs* to electrical systems and equipment shall conform to that required for new electrical systems and equipment without requiring that the existing electrical systems or equipment comply with all of the requirements of this code. *Additions*, *alterations* and *repairs* shall not cause existing electrical systems or equipment to become unsafe, hazardous or overloaded.

Minor *additions*, *alterations*, renovations and *repairs* to existing electrical systems and equipment shall meet the provisions for new construction, except where such work is performed in the same manner and arrangement as was in the existing system, is not hazardous and is *approved*.

K102.5 Subjects not regulated by this code.
Where no applicable standards or requirements are set forth in this code, or are contained within other laws, codes, regulations, ordinances or bylaws adopted by the jurisdiction, compliance with applicable standards of nationally recognized standards as are *approved* shall be deemed as prima facie evidence of compliance with the intent of this code. Nothing herein shall derogate from the authority of the *building official* to determine compliance with

codes or standards for those activities or installations within the building official's jurisdiction or responsibility.

SECTION K103
PERMITS

K103.1 Types of permits.
An *owner*, authorized agent or contractor who desires 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 electrical systems or equipment, the installation of which is regulated by this code, or to cause such work to be done, shall first make application to the *building official* and obtain the required *permit* for the work.

> **Exception:** Where *repair* or replacement of electrical systems or equipment must be performed in an emergency situation, the *permit* application shall be submitted within the next working business day of the department of electrical inspection.

K103.2 Work exempt from permit.
The following work shall be exempt from the requirement for a *permit*:

1. Listed cord- and plug-connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles, but not the outlets therefor.
3. Replacement of branch circuit overcurrent devices of the required capacity in the same location.
4. Temporary wiring for experimental purposes in suitable experimental laboratories.
5. Electrical wiring, devices, appliances, apparatus or equipment operating at less than 25 volts and not capable of supplying more than 50 watts of energy.

Exemption from the permit requirements of this code shall not be deemed to grant authorization for work to be done in violation of the provisions of this code or other laws or ordinances of this jurisdiction.

SECTION K104
CONSTRUCTION DOCUMENTS

K104.1 Information on construction documents.
Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *building official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that such work will conform to the provisions

of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official*.

K104.2 Penetrations.
Construction documents shall indicate where penetrations will be made for electrical systems and shall indicate the materials and methods for maintaining required structural safety, *fire-resistance rating* and *fireblocking*.

K104.3 Load calculations.
Where an *addition* or *alteration* is made to an existing electrical system, an electrical load calculation shall be prepared to determine if the existing electrical service has the capacity to serve the added load.

SECTION K105
ALTERNATIVE ENGINEERED DESIGN

K105.1 General.
The design, documentation, inspection, testing and approval of an alternative engineered design electrical system shall comply with this section.

K105.2 Design criteria.
An alternative engineered design shall conform to the intent of the provisions of this code and shall provide an equivalent level of quality, strength, effectiveness, *fire resistance*, durability and safety. Materials, equipment or components shall be designed and installed in accordance with the manufacturer's instructions.

K105.3 Submittal.
The *registered design professional* shall indicate on the *permit* application that the electrical system is an alternative engineered design. The *permit* and permanent *permit* records shall indicate that an alternative engineered design was part of the *approved* installation.

K105.4 Technical data.
The *registered design professional* shall submit sufficient technical data to substantiate the proposed alternative engineered design and to prove that the performance meets the intent of this code.

K105.5 Construction documents.
The *registered design professional* shall submit to the *building official* two complete sets of signed and sealed *construction documents* for the alternative engineered design. The *construction documents* shall include floor plans and a diagram of the work.

K105.6 Design approval.
Where the *building official* determines that the alternative engineered design conforms to the intent of this code, the electrical system shall be *approved*. If the alternative engineered design is not *approved*, the *building official* shall notify the *registered design professional* in writing, stating the reasons therefor.

K105.7 Inspection and testing.
The alternative engineered design shall be tested and inspected in accordance with the requirements of this code.

SECTION K106
REQUIRED INSPECTIONS

K106.1 General.
The *building official*, upon notification, shall make the inspections set forth in this section.

K106.2 Underground.
Underground inspection shall be made after trenches or ditches are excavated and bedded, piping and conductors installed, and before backfill is put in place. Where excavated soil contains rocks, broken concrete, frozen chunks and other rubble that would damage or break the raceway, cable or conductors, or where corrosive action will occur, protection shall be provided in the form of granular or selected material, *approved* running boards, sleeves or other means.

K106.3 Rough-in.
Rough-in inspection shall be made after the roof, framing, *fireblocking* and bracing are in place and all wiring and other components to be concealed are complete, and prior to the installation of wall or ceiling membranes.

K106.4 Contractors' responsibilities.
It shall be the responsibility of every contractor who enters into contracts for the installation or repair of electrical systems for which a *permit* is required to comply with adopted state and local rules and regulations concerning licensing.

SECTION K107
PREFABRICATED CONSTRUCTION

K107.1 Prefabricated construction.
Prefabricated construction is subject to Sections K107.2 through K107.5.

K107.2 Evaluation and follow-up inspection services.
Prior to the approval of a prefabricated construction assembly having concealed electrical work and the issuance of an electrical *permit*, the *building official* shall require the submittal of an evaluation report on each prefabricated construction assembly, indicating the complete details of the electrical system, including a description of the system and its components, the basis upon which the system is being evaluated, test results and similar information, and other data as necessary for the *building official* to determine conformance to this code.

K107.3 Evaluation service.
The *building official* shall designate the evaluation service of an *approved* agency as the

evaluation agency and review such agency's evaluation report for adequacy and conformance to this code.

K107.4 Follow-up inspection.
Except where ready access is provided to electrical systems, service equipment and accessories for complete inspection at the site without disassembly or dismantling, the *building official* shall conduct the in-plant inspections as frequently as necessary to ensure conformance to the *approved* evaluation report or shall designate an independent, *approved* inspection agency to conduct such inspections. The inspection agency shall furnish the *building official* with the follow-up inspection manual and a report of inspections upon request, and the electrical system shall have an identifying label permanently affixed to the system indicating that factory inspections have been performed.

K107.5 Test and inspection records.
Required test and inspection records shall be available to the *building official* at all times during the fabrication of the electrical system and the erection of the building; or such records as the *building official* designates shall be filed.

SECTION K108
TESTING

K108.1 Testing.
Electrical work shall be tested as required in this code. Tests shall be performed by the *permit* holder and observed by the *building official*.

K108.1.1 Apparatus, material and labor for tests.
Apparatus, material and labor required for testing an electrical system or part thereof shall be furnished by the *permit* holder.

K108.1.2 Reinspection and testing.
Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made so as to achieve compliance with this code. The work or installation shall then be resubmitted to the *building official* for inspection and testing.

SECTION K109
RECONNECTION

K109.1 Connection after order to disconnect.
A person shall not make utility service or energy source connections to systems regulated by this code, which have been disconnected or ordered to be disconnected by the *building official*, or the use of which has been ordered to be discontinued by the *building official* until the *building official* authorizes the reconnection and use of such systems.

SECTION K110

CONDEMNING ELECTRICAL SYSTEMS

K110.1 Authority to condemn electrical systems.
Wherever the *building official* determines that any electrical system, or portion thereof, regulated by this code has become hazardous to life, health or property, the *building official* shall order in writing that such electrical systems either be removed or restored to a safe condition. A time limit for compliance with such order shall be specified in the written notice. A person shall not use or maintain a defective electrical system or equipment after receiving such notice.

Where such electrical system is to be disconnected, written notice as prescribed in this code shall be given. In cases of immediate danger to life or property, such disconnection shall be made immediately without such notice.

SECTION K111

ELECTRICAL PROVISIONS

K111.1 Adoption.
Electrical systems and equipment shall be designed, constructed and installed in accordance with the *International Residential Code* or NFPA 70 as applicable, except as otherwise provided in this code.

[F] K111.2 Abatement of electrical hazards.
All identified electrical hazards shall be abated. All identified hazardous electrical conditions in permanent wiring shall be brought to the attention of the *building official* responsible for enforcement of this code. Electrical wiring, devices, appliances and other equipment that is modified or damaged and constitutes an electrical shock or fire hazard shall not be used.

[F] K111.3 Appliance and fixture listing.
Electrical appliances and fixtures shall be tested and *listed* in published reports of inspected electrical equipment by an *approved* agency and installed in accordance with all instructions included as part of such listing.

K111.4 Nonmetallic-sheathed cable.
The use of Type NM, NMC and NMS (nonmetallic sheathed) cable wiring methods shall not be limited based on height, number of stories or construction type of the building or structure.

K111.5 Cutting, notching and boring.
The cutting, notching and boring of wood and steel framing members, structural members and engineered wood products shall be in accordance with this code.

K111.6 Smoke alarm circuits.
Single- and multiple-station smoke alarms required by this code and installed within *dwelling* units shall not be connected as the only load on a branch circuit. Such alarms shall be supplied by branch circuits having lighting loads consisting of lighting outlets in habitable spaces.

~~**K111.7 Equipment and door labeling.**~~

~~Doors into electrical control panel rooms shall be marked with a plainly visible and legible sign stating ELECTRICAL ROOM or similar *approved* wording. The disconnecting means for each service, feeder or branch circuit originating on a switchboard or panelboard shall be legibly and durably marked to indicate its purpose unless such purpose is clearly evident.~~

APPENDIX L

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~~EARTHQUAKE RECORDING INSTRUMENTATION~~

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

~~User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.~~

~~SECTION L101~~

~~GENERAL~~

~~L101.1 General.~~
~~Every structure located where the 1-second spectral response acceleration, S1, in accordance with Section 1613.3 is greater than 0.40 that either 1 exceeds six stories in height with an aggregate floor area of 60,000 square feet (5574 m^2) or more, or 2 exceeds 10 *stories* in height regardless of floor area, shall be equipped with not less than three approved recording accelerographs. The accelerographs shall be interconnected for common start and common timing.~~

~~L101.2 Location.~~
~~As a minimum, instruments shall be located at the lowest level, mid-height, and near the top of the structure. Each instrument shall be located so that access is maintained at all times and is unobstructed by room contents. A sign stating "MAINTAIN CLEAR ACCESS TO THIS INSTRUMENT" in 1-inch (25 mm) block letters shall be posted in a conspicuous location.~~

~~L101.3 Maintenance.~~
~~Maintenance and service of the instrumentation shall be provided by the owner of the structure. Data produced by the instrument shall be made available to the *building official* on request.~~

~~Maintenance and service of the instruments shall be performed annually by an approved testing agency. The owner shall file with the *building official* a written report from an approved testing agency certifying that each instrument has been serviced and is in proper working condition. This report shall be submitted when the instruments are installed and~~

~~annually thereafter. Each instrument shall have affixed to it an externally visible tag specifying the date of the last maintenance or service and the printed name and address of the testing agency.~~

APPENDIX M

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~~TSUNAMI-GENERATED FLOOD HAZARD~~

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

~~*User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page iv.*~~

~~SECTION M101~~

~~TSUNAMI-GENERATED FLOOD HAZARD~~

~~**M101.1 General.**~~
~~The purpose of this appendix is to provide tsunami regulatory criteria for those communities that have a tsunami hazard and have elected to develop and adopt a map of their tsunami hazard inundation zone.~~

~~**M101.2 Definitions.**~~
~~The following words and terms shall, for the purposes of this appendix, have the meanings shown herein. Refer to Chapter 2 of this code for general definitions.~~

~~**TSUNAMI HAZARD ZONE.** The area vulnerable to being flooded or inundated by a design event tsunami as identified on a community's Tsunami Hazard Zone Map.~~

~~**TSUNAMI HAZARD ZONE MAP.** A map adopted by the community that designates the extent of inundation by a design event tsunami. This map shall be based on the tsunami inundation map that is developed and provided to a community by either the applicable state agency or the National Atmospheric and Oceanic Administration (NOAA) under the National Tsunami Hazard Mitigation Program, but shall be permitted to utilize a different probability or hazard level.~~

~~**M101.3 Establishment of tsunami hazard zone.**~~
~~Where applicable, if a community has adopted a Tsunami Hazard Zone Map, that map shall be used to establish a community's tsunami hazard zone.~~

M101.4 Construction within the tsunami hazard zone.
Construction of structures designated Risk Categories III and IV as specified under Section 1604.5 shall be prohibited within a tsunami hazard zone.

Exceptions:

1. A vertical evacuation tsunami refuge shall be permitted to be located in a tsunami hazard zone provided it is constructed in accordance with FEMA P646.

2. Community critical facilities shall be permitted to be located within the tsunami hazard zone when such a location is necessary to fulfill their function, providing suitable structural and emergency evacuation measures have been incorporated.

SECTION M102

REFERENCED STANDARDS

FEMA P646—12	Guidelines for Design of Structures for Vertical Evacuation from Tsunamis	M101.4