the use of toenails or nails subject to withdrawal. Where positive connection to the primary building structure cannot be verified during inspection, decks shall be self-supporting. Connections of decks with cantilevered framing members to exterior walls or other framing members shall be designed for both of the following:

1. The reactions resulting from the dead load and live load specified in Table 1607.1, or the snow load specified in Section 1608, in accordance with Section 1605, acting on all portions of the deck.
2. The reactions resulting from the dead load and live load specified in Table 1607.1, or the snow load specified in Section 1608, in accordance with Section 1605, acting on the cantilevered portion of the deck, and no live load or snow load on the remaining portion of the deck.

**1604.9 Counteracting structural actions.** Structural members, systems, components and cladding shall be designed to resist forces due to earthquake and wind, with consideration of overturning, sliding and uplift. Continuous load paths shall be provided for transmitting these forces to the foundation. Where sliding is used to isolate the elements, the effects of friction between sliding elements shall be included as a force.

**1604.10 Wind and seismic detailing.** Lateral-force-resisting systems shall meet seismic detailing requirements and limitations prescribed in this code and ASCE 7, excluding Chapter 14 and Appendix 11A, even when wind *load effects* are greater than seismic *load effects*.

**TABLE 1604.5**
**OCCUPANCY CATEGORY OF BUILDINGS AND OTHER STRUCTURES**

| OCCUPANCY CATEGORY | NATURE OF OCCUPANCY |
|---|---|
| I | Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to:<br>• Agricultural facilities.<br>• Certain temporary facilities.<br>• Minor storage facilities. |
| II | Buildings and other structures except those listed in Occupancy Categories I, III and IV |
| III | Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to:<br>• Buildings and other structures whose primary occupancy is public assembly with an occupant load greater than 300.<br>• Buildings and other structures containing elementary school, secondary school or day care facilities with an occupant load greater than 250.<br>• Buildings and other structures containing adult education facilities, such as colleges and universities, with an occupant load greater than 500.<br>• Group I-2 occupancies with an occupant load of 50 or more resident patients but not having surgery or emergency treatment facilities.<br>• Group I-3 occupancies.<br>• Any other occupancy with an occupant load greater than 5,000[a].<br>• Power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Occupancy Category IV.<br>• Buildings and other structures not included in Occupancy Category IV containing sufficient quantities of toxic or explosive substances to be dangerous to the public if released. |
| IV | Buildings and other structures designated as essential facilities, including but not limited to:<br>• Group I-2 occupancies having surgery or emergency treatment facilities.<br>• Fire, rescue, ambulance and police stations and emergency vehicle garages.<br>• Designated earthquake, hurricane or other emergency shelters.<br>• Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.<br>• Power-generating stations and other public utility facilities required as emergency backup facilities for Occupancy Category IV structures.<br>• Structures containing highly toxic materials as defined by Section 307 where the quantity of the material exceeds the maximum allowable quantities of Table 307.1(2).<br>• Aviation control towers, air traffic control centers and emergency aircraft hangars.<br>• Buildings and other structures having critical national defense functions.<br>• Water storage facilities and pump structures required to maintain water pressure for fire suppression. |

a. For purposes of occupant load calculation, occupancies required by Table 1004.1.1 to use gross floor area calculations shall be permitted to use net floor areas to determine the total occupant load.

## Appendix A: Guidelines for the Seismic Retrofit of Existing Buildings
## CHAPTER A1

# SEISMIC STRENGTHENING PROVISIONS FOR UNREINFORCED MASONRY BEARING WALL BUILDINGS

### SECTION A101
### PURPOSE

The purpose of this chapter is to promote public safety and welfare by reducing the risk of death or injury that may result from the effects of earthquakes on existing unreinforced masonry bearing wall buildings.

The provisions of this chapter are intended as minimum standards for structural seismic resistance, and are established primarily to reduce the risk of life loss or injury. Compliance with these provisions will not nec essarily prevent loss of life or injury, or prevent earthquake damage to rehabilitated buildings.

### SECTION A102
### SCOPE

**A102.1 General.** The provisions of this chapter shall apply to all existing buildings having at least one unreinforced masonry bearing wall. The elements regulated by this chapter shall be determined in accordance with Table A1-A. Except as provided herein, other structural provisions of the building code shall apply. This chapter does not apply to the *alteration* of existing electrical, plumbing, mechanical or fire safety systems.

**A102.2 Essential and hazardous facilities.** The provisions of this chapter shall not apply to the strengthening of buildings or structures in Occupancy Category III when assigned to Seismic Design Category C, D, or E or buildings or structures in Occupancy Category IV. Such buildings or structures shall be strengthened to meet the requirements of the *International Building Code* for new buildings of the same occupancy category or other such criteria that have been established by the jurisdiction.

### SECTION A103
### DEFINITIONS

For the purpose of this chapter, the applicable definitions in the building code shall also apply.

**BUILDING CODE.** The code currently adopted by the jurisdiction for new buildings.

**COLLAR JOINT.** The vertical space between adjacent wythes. A collar joint may contain mortar or grout.

**CROSSWALL.** A new or existing wall that meets the requirements of Section A111.3 and the definition of Section A111.3. A crosswall is not a shear wall.

**CROSSWALL SHEAR CAPACITY.** The unit shear value times the length of the crosswall, $v_c L_c$.

**DIAPHRAGM EDGE.** The intersection of the horizontal diaphragm and a shear wall.

**DIAPHRAGM SHEAR CAPACITY.** The unit shear value times the depth of the diaphragm, $v_u D$.

**INTERNATIONAL BUILDING CODE.** The *2009 International Building Code* (IBC).

**NORMAL WALL.** A wall perpendicular to the direction of seismic forces.

**OPEN FRONT.** An exterior building wall line without vertical elements of the lateral-force-resisting system in one or more stories.

**POINTING.** The partial reconstruction of the bed joints of an unreinforced masonry wall as defined in UBC Standard 21-8.

**RIGID DIAPHRAGM.** A diaphragm of reinforced concrete construction supported by concrete beams and columns or by structural steel beams and columns.

**UNREINFORCED MASONRY.** Includes burned clay, concrete or sand-lime brick; hollow clay or concrete block; plain concrete; and hollow clay tile. These materials shall comply with the requirements of Section A106 as applicable.

**UNREINFORCED MASONRY BEARING WALL.** A URM wall that provides the vertical support for the reaction of floor or roof-framing members.

**UNREINFORCED MASONRY (URM) WALL.** A masonry wall that relies on the tensile strength of masonry units, mortar and grout in resisting design loads, and in which the area of reinforcement is less than 25 percent of the minimum ratio required by the building code for reinforced masonry.

**YIELD STORY DRIFT.** The lateral displacement of one level relative to the level above or below at which yield stress is first developed in a frame member.

### SECTION A104
### SYMBOLS AND NOTATIONS

For the purpose of this chapter, the following notations supplement the applicable symbols and notations in the building code.

$a_n$ = Diameter of core multiplied by its length or the area of the side of a square prism.

$A$ = Cross-sectional area of unreinforced masonry pier or wall, square inches ($10^{-6}$ m$^2$).

$A_b$ = Total area of the bed joints above and below the test specimen for each in-place shear test, square inches ($10^{-6}$ m$^2$).

16.00: continued

**TABLE 1604.11 GROUND SNOW LOADS; BASIC WIND SPEEDS; EARTHQUAKE DESIGN FACTORS** - continued

| City/Town | $p_g$ | V | Ss | $S_1$ | City/Town | $p_g$ | V | Ss | $S_1$ |
|---|---|---|---|---|---|---|---|---|---|
| Hudson | 55 | 100 | 0.26 | 0.068 | Wellesley | 55 | 100 | 0.27 | 0.067 |
| Hull | 45 | 110 | 0.28 | 0.067 | Wellfleet | 35 | 120 | 0.20 | 0.054 |
| Huntington | 65 | 100 | 0.22 | 0.066 | Wendell | 65 | 100 | 0.23 | 0.069 |
| Ipswich | 45 | 110 | 0.34 | 0.074 | Wenham | 45 | 110 | 0.32 | 0.073 |
| Kingston | 45 | 110 | 0.24 | 0.061 | W. Boylston | 55 | 100 | 0.25 | 0.067 |
| Lakeville | 45 | 110 | 0.24 | 0.061 | W. Bridgewater | 45 | 110 | 0.25 | 0.063 |
| Lancaster | 55 | 100 | 0.27 | 0.070 | W. Brookfield | 55 | 100 | 0.23 | 0.066 |
| Lanesborough | 65 | 90 | 0.22 | 0.068 | W. Newbury | 55 | 110 | 0.35 | 0.077 |
| Lawrence | 55 | 110 | 0.33 | 0.075 | W. Springfield | 55 | 100 | 0.23 | 0.065 |
| Lee | 65 | 90 | 0.22 | 0.066 | W. Stockbridge | 65 | 90 | 0.22 | 0.066 |
| Leicester | 55 | 100 | 0.24 | 0.066 | W. Tisbury | 35 | 120 | 0.18 | 0.052 |
| Lenox | 65 | 90 | 0.22 | 0.067 | Westborough | 55 | 100 | 0.25 | 0.067 |
| Leominster | 65 | 100 | 0.26 | 0.070 | Westfield | 55 | 100 | 0.23 | 0.066 |
| Leverett | 65 | 100 | 0.23 | 0.068 | Westford | 55 | 100 | 0.30 | 0.073 |
| Lexington | 55 | 105 | 0.29 | 0.070 | Westhampton | 65 | 100 | 0.22 | 0.066 |
| Leyden | 65 | 100 | 0.23 | 0.069 | Westminster | 65 | 100 | 0.26 | 0.071 |
| Lincoln | 55 | 100 | 0.28 | 0.069 | Weston | 55 | 100 | 0.27 | 0.068 |
| Littleton | 55 | 100 | 0.29 | 0.071 | Westport | 45 | 110 | 0.23 | 0.058 |
| Longmeadow | 55 | 100 | 0.23 | 0.065 | Westwood | 55 | 100 | 0.26 | 0.066 |
| Lowell | 55 | 100 | 0.31 | 0.074 | Weymouth | 45 | 105 | 0.27 | 0.066 |
| Ludlow | 55 | 100 | 0.23 | 0.066 | Whately | 65 | 100 | 0.22 | 0.067 |
| Lunenburg | 65 | 100 | 0.28 | 0.071 | Whitman | 45 | 110 | 0.25 | 0.063 |
| Lynn | 45 | 110 | 0.31 | 0.071 | Wilbraham | 55 | 100 | 0.23 | 0.065 |
| Lynnfield | 45 | 110 | 0.31 | 0.072 | Willamsburg | 65 | 100 | 0.22 | 0.067 |
| Malden | 45 | 105 | 0.29 | 0.069 | Williamstown | 65 | 90 | 0.23 | 0.069 |
| Manchester | 45 | 110 | 0.32 | 0.072 | Wilmington | 55 | 105 | 0.31 | 0.073 |
| Mansfield | 55 | 110 | 0.25 | 0.063 | Winchendon | 65 | 100 | 0.26 | 0.071 |
| Marblehead | 45 | 110 | 0.31 | 0.071 | Winchester | 55 | 105 | 0.29 | 0.070 |
| Marion | 45 | 110 | 0.22 | 0.057 | Windsor | 65 | 90 | 0.22 | 0.067 |
| Marlborough | 55 | 100 | 0.26 | 0.068 | Winthrop | 45 | 105 | 0.29 | 0.068 |
| Marshfield | 45 | 110 | 0.26 | 0.064 | Woburn | 55 | 105 | 0.30 | 0.071 |
| Mashpee | 35 | 120 | 0.20 | 0.054 | Worcester | 55 | 100 | 0.24 | 0.067 |
| Mattapoisett | 45 | 110 | 0.22 | 0.057 | Worthington | 65 | 100 | 0.22 | 0.067 |
| Maynard | 55 | 100 | 0.27 | 0.069 | Wrentham | 55 | 100 | 0.24 | 0.064 |
| Medfield | 55 | 100 | 0.25 | 0.065 | Yarmouth | 35 | 120 | 0.19 | 0.052 |

**1605.3.1** Replace Equation 16-13 as follows:

$2/3[1.2D + (1.6W \text{ or } 1.0E) + f_1L + 0.5(L_r \text{ or } S \text{ or } R) + 1.6H]$ where $f_1$ is defined in section 1605.2.1

**1605.3.2** Delete.

**Table 1607.1 Item 5.** Revise to read as follows:

Balconies (exterior and interior) and decks[h]

**Table 1607.1 Item 30.** Revise 'Classroom' uniform loading as follows: 50 psf

**1607.5** Add a last sentence as follows:

Partition loads are non-reducible live load.

**1607.9.1.6** Add section:

**1607.9.1.6 Hangers.** Live load shall not be reduced for hangers.