780 CMR: MASSACHUSETTS AMENDMENTS TO THE *INTERNATIONAL BUILDING CODE 2009*

CHAPTER 16: STRUCTURAL DESIGN

1603.1 Add a third sentence as follows:

> When structural components, assemblies, or systems are designed by a *registered design professional* under the control of the contractor, and said designs are not included with the application for permit, said designs shall be submitted to the *building official* with an application for amendment to the permit.

1603.1.7 Replace 'on the community's Flood Insurance Rate Map (FIRM)' with 'of the *base flood elevation*'.

Modify existing MA amendment 1604.11 as follows:

1604.11 Add subsection:

> **1604.11 Snow, Wind and Earthquake Design Factors.** Ground snow load, p_g, minimum design flat roof snow load, p_f, basic wind speed (three second gust speed), V, and earthquake response accelerations for the maximum considered earthquake, S_S and S_1, for each city and town in Massachusetts shall be as given in Table 1604.11.
>
> **Exception.** For ground snow load and basic wind speeds for R-3 one- and two-family dwellings of three stories or less, *see* 780 CMR 51, Residential Volume.

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

(For R-3 of three stories or less one- and two-family stand alone buildings, *see* 780 CMR 51.00, Residential Volume)

City/Town	p_g	p_f[1]	V	Ss	S_1	City/Town	p_g	p_f	V	Ss	S_1
Abington	35	30	110	0.26	0.064	Medford	40	30	105	0.29	0.070
Acton	50	35	100	0.29	0.071	Medway	40	35	105	0.25	0.065
Acushnet	30	30	115	0.23	0.058	Melrose	40	30	105	0.30	0.070
Adams	60	40	90	0.22	0.068	Mendon	40	35	105	0.24	0.064
Agawam	35	35	95	0.23	0.065	Merrimac	50	30	100	0.35	0.077
Alford	40	40	90	0.22	0.066	Methuen	50	30	100	0.34	0.076
Amesbury	50	30	100	0.35	0.077	Middleborough	30	30	110	0.24	0.061
Amherst	40	35	95	0.23	0.067	Middlefield	60	40	90	0.22	0.066
Andover	50	30	100	0.32	0.075	Middleton	50	30	105	0.32	0.073
Aquinnah (see Gay Head)						Milford	40	35	105	0.24	0.065
Arlington	40	30	105	0.29	0.069	Millbury	50	35	100	0.24	0.065
Ashburnham	60	35	95	0.27	0.072	Millis	40	35	105	0.25	0.065
Ashby	60	35	95	0.28	0.072	Millville	40	35	105	0.24	0.064
Ashfield	50	40	90	0.22	0.068	Milton	40	30	105	0.27	0.066
Ashland	40	35	100	0.25	0.066	Monroe	60	40	90	0.22	0.069
Athol	60	35	95	0.25	0.070	Monson	40	35	95	0.23	0.065
Attleboro	35	30	105	0.24	0.062	Montague	50	35	90	0.23	0.068
Auburn	50	35	100	0.23	0.065	Monterey	50	40	90	0.22	0.066
Avon	35	35	110	0.26	0.064	Montgomery	40	40	90	0.23	0.066
Ayer	50	35	100	0.28	0.071	Mnt Washington	40	40	90	0.23	0.066
Barnstable	30	25	115	0.20	0.054	Nahant	40	30	110	0.30	0.070
Barre	50	35	95	0.24	0.068	Nantucket	25	25	120	0.15	0.047
Becket	60	40	90	0.22	0.066	Natick	40	35	105	0.26	0.067
Bedford	50	30	100	0.29	0.071	Needham	40	35	105	0.27	0.067
Belchertown	40	35	95	0.23	0.066	New Ashford	50	40	90	0.22	0.068
Bellingham	40	35	105	0.24	0.064	New Bedford	30	30	115	0.23	0.058
Belmont	40	30	105	0.28	0.069	New Braintree	50	35	95	0.23	0.067
Berkley	30	30	110	0.24	0.061	New Marlborough	50	40	90	0.23	0.066
Berlin	50	35	100	0.26	0.068	New Salem	50	35	95	0.24	0.068
Bernardston	60	35	90	0.23	0.070	Newbury	50	30	105	0.35	0.076
Beverly	50	30	105	0.32	0.072	Newburyport	50	30	105	0.35	0.077
Billerica	50	30	100	0.30	0.072	Newton	40	30	105	0.27	0.068

16.00: continued

City/Town	p_g	p_f[1]	V	Ss	S_1	City/Town	p_g	p_f	V	Ss	S_1
Blackstone	40	35	105	0.24	0.064	Norfolk	40	35	105	0.25	0.065
Blandford	50	40	90	0.23	0.066	N. Adams	60	40	90	0.22	0.069
Bolton	50	35	100	0.26	0.069	N. Andover	50	30	100	0.33	0.075
Boston	40	30	105	0.29	0.068	N. Attleborough	35	30	105	0.24	0.063
Bourne	30	25	115	0.21	0.056	N. Brookfield	50	35	95	0.23	0.066
Boxborough	50	35	100	0.28	0.070	N. Reading	50	30	105	0.32	0.073
Boxford	50	30	105	0.33	0.075	Northampton	40	35	90	0.22	0.066
Boylston	50	35	100	0.25	0.067	Northborough	50	35	100	0.25	0.067
Braintree	35	30	110	0.27	0.066	Northbridge	40	35	100	0.24	0.065
Brewster	25	25	115	0.18	0.052	Northfield	60	35	90	0.24	0.070
Bridgewater	30	30	110	0.24	0.062	Norton	35	30	110	0.24	0.063
Brimfield	40	35	95	0.23	0.065	Norwell	35	30	110	0.26	0.064
Brockton	35	30	110	0.25	0.064	Norwood	40	35	105	0.26	0.065
Brookfield	50	35	95	0.23	0.065	Oak Bluffs	25	25	120	0.18	0.051
Brookline	40	30	105	0.28	0.068	Oakham	50	35	95	0.24	0.067
Buckland	60	40	90	0.22	0.068	Orange	60	35	90	0.24	0.070
Burlington	50	30	100	0.30	0.071	Orleans	25	25	115	0.18	0.051
Cambridge	40	30	105	0.28	0.068	Otis	50	40	90	0.23	0.066
Canton	40	35	105	0.26	0.066	Oxford	50	35	100	0.23	0.065
Carlisle	50	30	100	0.29	0.071	Palmer	40	35	95	0.23	0.066
Carver	30	30	115	0.24	0.060	Paxton	50	35	100	0.24	0.067
Charlemont	60	40	90	0.22	0.068	Peabody	50	30	105	0.31	0.072
Charlton	50	35	100	0.23	0.065	Pelham	40	35	95	0.23	0.067
Chatham	25	25	115	0.17	0.050	Pembroke	30	30	110	0.25	0.063
Chelmsford	50	30	100	0.30	0.073	Pepperell	60	35	95	0.30	0.073
Chelsea	40	30	105	0.29	0.069	Peru	60	40	90	0.22	0.067
Cheshire	60	40	90	0.22	0.068	Petersham	50	35	95	0.24	0.068
Chester	60	40	90	0.22	0.066	Phillipston	60	35	95	0.24	0.069
Chesterfield	50	40	90	0.22	0.067	Pittsfield	50	40	90	0.22	0.067
Chicopee	35	35	95	0.23	0.066	Plainfield	60	40	90	0.22	0.068
Chilmark	25	25	120	0.18	0.051	Plainville	40	35	105	0.24	0.063
Clarksburg	60	40	90	0.22	0.069	Plymouth	25	30	115	0.24	0.060
Clinton	50	35	100	0.26	0.068	Plympton	30	30	110	0.24	0.061
Cohasset	35	30	110	0.27	0.066	Princeton	50	35	95	0.25	0.069
Colrain	60	40	90	0.23	0.069	Provincetown	25	25	115	0.22	0.058
Concord	50	35	100	0.29	0.070	Quincy	40	30	110	0.27	0.067
Conway	50	40	90	0.22	0.068	Randolph	35	30	110	0.26	0.065
Cummington	60	40	90	0.22	0.067	Raynham	35	30	110	0.24	0.062
Dalton	60	40	90	0.22	0.067	Reading	50	30	105	0.31	0.072
Danvers	50	30	105	0.32	0.073	Rehoboth	35	30	110	0.24	0.062
Dartmouth	30	30	115	0.23	0.058	Revere	40	30	105	0.30	0.070
Dedham	40	35	105	0.26	0.066	Richmond	50	40	90	0.22	0.067
Deerfield	50	35	90	0.23	0.068	Rochester	30	30	115	0.23	0.059
Dennis	30	25	115	0.19	0.052	Rockland	35	30	110	0.26	0.064
Dighton	30	30	110	0.24	0.061	Rockport	50	30	110	0.33	0.073
Douglas	40	35	100	0.23	0.064	Rowe	60	40	90	0.22	0.069
Dover	40	35	105	0.26	0.066	Rowley	50	30	105	0.34	0.075
Dracut	50	30	100	0.33	0.075	Royalston	60	35	90	0.25	0.070
Dudley	50	35	100	0.23	0.064	Russell	40	40	90	0.23	0.066
Dunstable	50	35	100	0.31	0.074	Rutland	50	35	95	0.24	0.068
Duxbury	30	30	110	0.25	0.062	Salem	50	30	105	0.31	0.071
E. Bridgewater	35	30	110	0.25	0.063	Salisbury	50	30	105	0.35	0.077
E. Brookfield	50	35	100	0.23	0.066	Sandisfield	50	40	90	0.23	0.066
E. Longmeadow	35	35	95	0.23	0.065	Sandwich	30	25	115	0.22	0.058
Eastham	25	25	115	0.19	0.052	Saugus	40	30	105	0.30	0.070
Easthampton	40	35	90	0.23	0.066	Savoy	60	40	90	0.22	0.068

16.00: continued

City/Town	p_g	p_f[1]	V	Ss	S_1	City/Town	p_g	p_f	V	Ss	S_1
Easton	35	30	110	0.25	0.064	Scituate	35	30	110	0.27	0.065
Edgartown	25	25	120	0.18	0.050	Seekonk	35	30	110	0.24	0.062
Egremont	40	40	90	0.23	0.066	Sharon	35	35	105	0.25	0.065
Erving	50	35	90	0.23	0.069	Sheffield	40	40	90	0.23	0.066
Essex	50	30	110	0.33	0.073	Shelburne	50	40	90	0.23	0.068
Everett	40	30	105	0.29	0.069	Sherborn	40	35	105	0.26	0.066
Fairhaven	30	30	115	0.22	0.057	Shirley	60	35	95	0.28	0.072
Fall River	30	30	110	0.23	0.059	Shrewsbury	50	35	100	0.25	0.067
Falmouth	30	25	115	0.20	0.054	Shutesbury	40	35	90	0.23	0.068
Fitchburg	60	35	95	0.27	0.071	Somerset	30	30	110	0.23	0.060
Florida	60	40	90	0.22	0.069	Somerville	40	30	105	0.28	0.069
Foxborough	35	35	105	0.25	0.064	South Hadley	35	35	95	0.23	0.066
Framingham	40	35	100	0.26	0.067	Southampton	40	35	90	0.23	0.066
Franklin	40	35	105	0.24	0.064	Southborough	40	35	100	0.26	0.067
Freetown	30	30	110	0.23	0.060	Southbridge	40	35	100	0.23	0.064
Gardner	60	35	95	0.26	0.070	Southwick	40	35	95	0.23	0.065
Gay Head (Aquinnah)	25	25	120	0.18	0.051	Spencer	50	35	100	0.23	0.066
Georgetown	50	30	105	0.34	0.075	Springfield	35	35	95	0.23	0.065
Gill	50	35	90	0.23	0.069	Sterling	50	35	100	0.26	0.069
Gloucester	50	30	110	0.33	0.073	Stockbridge	50	40	90	0.22	0.066
Goshen	50	40	90	0.22	0.067	Stoneham	40	30	105	0.30	0.071
Grafton	50	35	100	0.24	0.066	Stoughton	35	35	110	0.26	0.065
Gosnold	30	25	120	0.19	0.053	Stow	50	35	100	0.27	0.069
Granby	35	35	95	0.23	0.066	Sturbridge	40	35	100	0.23	0.065
Granville	50	40	95	0.23	0.066	Sudbury	40	35	100	0.27	0.069
Great Barrington	50	40	90	0.22	0.066	Sunderland	40	35	90	0.23	0.068
Greenfield	50	35	90	0.23	0.069	Sutton	50	35	100	0.24	0.065
Groton	60	35	100	0.30	0.073	Swampscott	40	30	105	0.30	0.070
Groveland	50	30	100	0.34	0.076	Swansea	30	30	110	0.24	0.061
Hadley	40	35	90	0.23	0.067	Taunton	35	30	110	0.24	0.062
Halifax	30	30	110	0.25	0.062	Templeton	60	35	95	0.25	0.070
Hamilton	50	30	105	0.33	0.074	Tewksbury	50	30	100	0.31	0.073
Hampden	35	35	95	0.23	0.065	Tisbury	25	25	120	0.18	0.052
Hancock	50	40	90	0.22	0.068	Tolland	50	40	90	0.23	0.066
Hanover	35	30	110	0.26	0.064	Topsfield	50	30	105	0.33	0.074
Hanson	35	30	110	0.25	0.063	Townsend	60	35	95	0.28	0.072
Hardwick	50	35	95	0.23	0.067	Truro	25	25	115	0.22	0.057
Harvard	50	35	100	0.28	0.070	Tyngsborough	50	30	100	0.31	0.074
Harwich	25	25	115	0.18	0.051	Tyringham	50	40	90	0.22	0.066
Hatfield	40	35	90	0.22	0.067	Upton	40	35	100	0.24	0.065
Haverhill	50	30	100	0.35	0.077	Uxbridge	40	35	105	0.24	0.064
Hawley	60	40	90	0.22	0.068	Wakefield	50	30	105	0.31	0.071
Heath	60	40	90	0.22	0.069	Wales	40	35	100	0.23	0.065
Hingham	35	30	110	0.27	0.066	Walpole	40	35	105	0.25	0.065
Hinsdale	60	40	90	0.22	0.067	Waltham	40	30	105	0.28	0.069
Holbrook	35	30	110	0.26	0.065	Ware	40	35	95	0.23	0.066
Holden	50	35	100	0.25	0.068	Wareham	25	30	115	0.23	0.058
Holland	40	35	100	0.23	0.064	Warren	40	35	95	0.23	0.066
Holliston	40	35	105	0.25	0.066	Warwick	60	35	90	0.24	0.070
Holyoke	35	35	95	0.23	0.066	Washington	60	40	90	0.22	0.067
Hopedale	40	35	105	0.24	0.065	Watertown	40	30	105	0.28	0.068
Hopkinton	40	35	100	0.25	0.066	Wayland	40	35	100	0.27	0.068
Hubbardston	50	35	95	0.25	0.069	Webster	50	35	100	0.23	0.064
Hudson	50	35	100	0.26	0.068	Wellesley	40	35	105	0.27	0.067
Hull	35	30	110	0.28	0.067	Wellfleet	25	25	115	0.20	0.054
Huntington	50	40	90	0.22	0.066	Wendell	50	35	90	0.23	0.069

16.00: continued

City/Town	P_g	P_f^1	V	Ss	S_1	City/Town	P_g	P_f	V	Ss	S_1
Ipswich	50	30	105	0.34	0.074	Wenham	50	30	105	0.32	0.073
Kingston	30	30	110	0.24	0.061	W. Boylston	50	35	100	0.25	0.067
Lakeville	30	30	110	0.24	0.061	W. Bridgewater	35	30	110	0.25	0.063
Lancaster	50	35	100	0.27	0.070	W. Brookfield	40	35	95	0.23	0.066
Lanesborough	50	40	90	0.22	0.068	W. Newbury	50	30	100	0.35	0.077
Lawrence	50	30	100	0.33	0.075	W. Springfield	35	35	95	0.23	0.065
Lee	50	40	90	0.22	0.066	W. Stockbridge	40	40	90	0.22	0.066
Leicester	50	35	100	0.24	0.066	W. Tisbury	25	25	120	0.18	0.052
Lenox	50	40	90	0.22	0.067	Westborough	50	35	100	0.25	0.067
Leominster	60	35	95	0.26	0.070	Westfield	40	35	95	0.23	0.066
Leverett	40	35	90	0.23	0.068	Westford	50	35	100	0.30	0.073
Lexington	40	30	105	0.29	0.070	Westhampton	50	40	90	0.22	0.066
Leyden	60	40	90	0.23	0.069	Westminster	60	35	95	0.26	0.071
Lincoln	40	35	100	0.28	0.069	Weston	40	35	105	0.27	0.068
Littleton	50	35	100	0.29	0.071	Westport	30	30	115	0.23	0.058
Longmeadow	35	35	95	0.23	0.065	Westwood	40	35	105	0.26	0.066
Lowell	50	30	100	0.31	0.074	Weymouth	35	30	110	0.27	0.066
Ludlow	35	35	95	0.23	0.066	Whately	50	35	90	0.22	0.067
Lunenburg	60	35	95	0.28	0.071	Whitman	35	30	110	0.25	0.063
Lynn	40	30	105	0.31	0.071	Wilbraham	35	35	95	0.23	0.065
Lynnfield	50	30	105	0.31	0.072	Willamsburg	50	40	90	0.22	0.067
Malden	40	30	105	0.29	0.069	Williamstown	50	40	90	0.23	0.069
Manchester	50	30	110	0.32	0.072	Wilmington	50	30	100	0.31	0.073
Mansfield	35	30	105	0.25	0.063	Winchendon	60	35	95	0.26	0.071
Marblehead	40	30	110	0.31	0.071	Winchester	40	30	105	0.29	0.070
Marion	30	30	115	0.22	0.057	Windsor	60	40	90	0.22	0.067
Marlborough	50	35	100	0.26	0.068	Winthrop	40	30	105	0.29	0.068
Marshfield	35	30	110	0.26	0.064	Woburn	50	30	105	0.30	0.071
Mashpee	30	25	115	0.20	0.054	Worcester	50	35	100	0.24	0.067
Mattapoisett	30	30	115	0.22	0.057	Worthington	60	40	90	0.22	0.067
Maynard	50	35	100	0.27	0.069	Wrentham	40	35	105	0.24	0.064
Medfield	40	35	105	0.25	0.065	Yarmouth	30	25	115	0.19	0.052

1605.3.2 Delete.

Table 1607.1 Item 5. Revise to read as follows:

Balconies (exterior and interior) and decks[h]

1607.5 Add a last sentence as follows:

Partition loads are non-reducible live load.

1607.9.2 Delete.

1608.2 Replace as follows:

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 Table 1604.11.

1608.3 to 1608.11 Add subsections:

1608.3 Concave Curved Roofs. Section 7.4.3 of ASCE 7 applies to convex curved roofs only. The effective loaded area of a concave curved roof shall be that area of the surface of the roof where the tangents to the surface have a slope of 50 degrees or less. The total uniform snow load for concave curved roofs shall be Pf multiplied by the total horizontal projected area of the roof. This total load shall be applied uniformly over the effective loaded area of the roof.

16.00: continued

1608.4 Drifts on Multiple Level Roofs. For multiple stepped roofs similar to that shown in Figure 1608.4.1, the sum of all the roof lengths upwind above the drift under consideration, l_u*, in Figure 1608.4.1, shall replace l_u in Figure 7-8 of ASCE 7. For multiple level roofs similar to that shown in Figure 1608.4.2, if the total calculated height of a drift and the underlying uniform snow layer on the upwind side of a higher roof ($h_d + h_b$) is equal to or greater than $0.7(h_b + h_c)$, then the length, l_u*, as shown in Figure 1608.4.2, shall be used in place of l_u in Figure 7-8 of ASCE 7.

FIGURE 1608.4.1

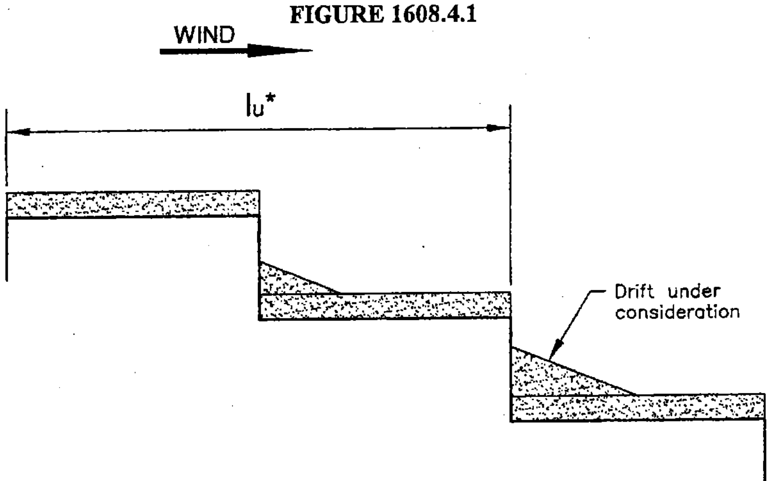
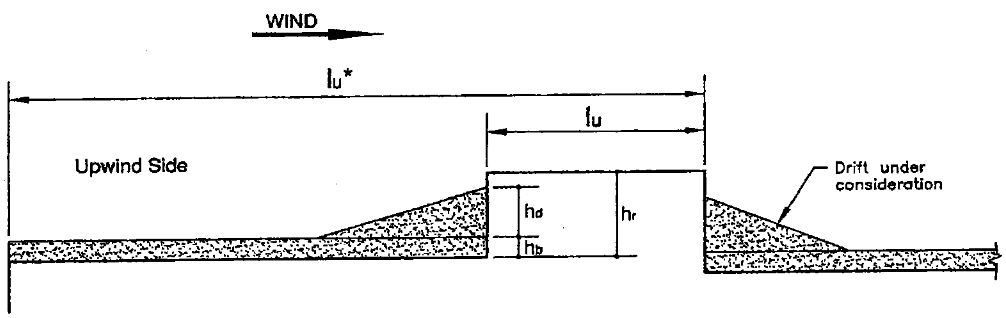


FIGURE 1608.4.2



1608.5 Very High Roof Separations. When the ratio h_r/L_T is greater than 1.0, where L_T is the dimension in feet of the upper roof perpendicular to the wind flow (perpendicular to l_u in Figure 7-8 of ASCE 7) and $h_r = h_b + h_c$, the drift surcharge load on the lower roof due to drifting of snow from the upper roof may be reduced. The reduced height of the drift surcharge, h_{dr}, shall be not less than: $h_{dr} = h_r (2 - h_r/L_T)$, except that when h_r/L_T is greater than 2.0, h_{dr} shall be equal to zero.

1608.6 Snow Pockets or Wells. Account shall be taken of the load effects of potentially excessive snow accumulation in pockets or wells of roofs or decks.

1608.7 Roof Projections. The term roof projections used herein and in section 7.8 of ASCE 7 shall be interpreted to include screen walls, parapets, fire wall projections, and mechanical equipment. Drift loads at roof projections shall be in accordance with section 7.8 of ASCE 7.

1608.8 Sliding Snow. In addition to the sliding snow load on a lower roof as required in section 7.9 of ASCE 7, the lower roof shall be designed for a windward drift surcharge at the wall separating the upper and lower roofs in accordance with Figure 1608.4.1 and section 7.8 of ASCE 7. The sliding snow load and the windward drift surcharge need not be considered to act concurrently.

16.00: continued

1608.9 Snow Guards. Sliding snow from an adjacent sloping high roof need not be considered on the low roof if snow guards, as specified herein, are provided on the high roof. In this case, the sloping roof with snow guards shall be designed for the unit snow loads required for a flat roof. The roof area(s) requiring snow guards shall be indicated on the construction documents. Snow guards shall be designed by a *registered design professional*. The *registered design professional* shall insure that there are adequate load paths from the snow guards into the supporting members and from the supporting members into the primary structure. The structural design of snow guards shall account for the impact of the sliding snow. The effectiveness in preventing the sliding of snow of proprietary snow guard systems shall be demonstrated by tests.

1608.10 Snow Storage and Collection Areas. Consideration of potentially excessive snow accumulation shall be given to portions of structures designated or used as snow collection or storage areas during and after snow removal operations (*e.g.* temporary snow collection areas when mechanically removing snow from a roof; snow storage areas for parking structures).

1609.1.1 Revise the second sentence to read as follows:

The type of opening protection required, and the exposure category for a site is permitted to be determined in accordance with section 1609 or ASCE 7. *See* section 1609.3 for the basic wind speed.

1609.3 Replace the first paragraph with the following:

The basic wind speed, V in mph, shall be determined in accordance with Table 1604.11.

1610 Replace section as follows:

SECTION 1610 LATERAL SOIL AND HYDROSTATIC LOADS

1610.1 General. Basement, foundation, and retaining walls shall be designed to resist lateral loads due to soil and water pressure. Lateral soil pressure on said walls shall be determined in accordance with the principles of soil mechanics and as provided in Chapter 18. Floors or similar elements below the water table shall be designed to resist the upward pressure of the water.

Exception. Uninhabitable spaces with concrete floors on the ground with an under-slab drainage system, including sump pits and sump pumps, designed to keep the water level a minimum of 1 foot below the bottom of the floor slab need not be designed to resist water pressure.

1610.2 Seismic Loads on Foundation Walls and Retaining Walls. Exterior foundation walls and retaining walls shall be designed to resist an earthquake force, F_w, for horizontal backfill surface, equal to:

$$F_w = 0.100(S_S)(F_a)(\gamma_t)(H)^2$$

where S_S is the maximum considered earthquake spectral response acceleration from Table 1604.11, F_a is the site coefficient from Table 1613.5.3(1), γ_t is the total unit weight of the soil, and H is the height of the wall measured as the difference in elevation of finished ground surface or floor in front of and behind the wall. The earthquake force from the backfill shall be distributed as an inverted triangle over the height of the wall.

Surcharges that are applied over extended periods of time shall be included in the total static lateral soil pressure and their earthquake lateral force shall be computed and added to the force determined above. The point of application of the earthquake force from extended duration surcharge shall be determined on an individual case basis.

If the backfill or the existing soil behind the backfill consists of loose saturated granular soil, the potential for liquefaction of the backfill or existing soil adjacent to the wall during seismic loading shall be evaluated in accordance with the requirements of section 1806.4. If the backfill or existing soil beyond the backfill is potentially subject to liquefaction, the increase in design lateral load on the foundation wall or retaining wall shall be determined by a *registered design professional*.

For wall strength design, a load factor of 1.43 shall be applied to the earthquake force calculated above.

16.00: continued

1612.1 At the end of the first sentence add this text: 'in accordance with this section and Appendix G.'

1612.2 Add or revise definitions as follows:

BASE FLOOD ELEVATION. The elevation of the *base flood.*

BASEMENT. Add after 'section 1612' the text 'and Appendix G'

COASTAL WETLAND RESOURCE AREA. Any coastal wetland resource are a subject to protection under the Wetlands Protection Act, M.G.L. c. 131, § 40, and the Wetlands Protection Act regulations, 310 CMR 10.21 through 10.35. Coastal Wetland Resource Areas include barrier beaches, coastal beaches, coastal dunes, rocky intertidal shores, tidal flats, land subject to 100 year coastal storm flowage, coastal banks, land containing shellfish, lands subject to tidal action, and lands under an estuary, salt pond or certain streams, ponds, rivers, lakes or creeks within the coastal zone that are anadromous/catadromous fish runs.

DESIGN FLOOD. *See base flood.*

DESIGN FLOOD ELEVATION. *See base flood elevation.*

FLOOD HAZARD AREA. The greater of the flowing two areas:

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

Note. A *flood hazard area subject to high-velocity wave action* is also considered a *flood hazard area.*

1612.3 Replace text with '*See* section 1612.2 for *flood hazard areas*'.

1612.3.1 Replace '*design flood*' with '*base flood*'.

1612.3.2 Delete subsection.

1612.4 Add last sentence and Note as follows:

Plans shall be prepared by a *registered design professional.*

Note. In using ASCE 24, delete Tables 1-1, 2-1, 4-1, 5-1, 6-1 and 7-1. For elevation requirements use section 1612 and Chapter 115 Appendix G. Also, delete references to Coastal A zones and instead use requirements for A zones in section 1612 and Appendix G.

1612.5 At the end of this section add items 3. and 4. as follows:

Notes:

3. For construction in a *coastal wetland resource area:*

3.1 For buildings or structures, including new or replacement manufactured homes, lateral additions, foundations that are replaced in total, replaced so as to constitute new construction or substantially repaired or improved of a building or structure that has incurred substantial damage as a result of flooding and/or storms, proposed on a parcel of land that is located wholly or partially within a *coastal wetland resource area* shown on the map entitled "Map of Coastal Wetland Resources For Building Officials", the *building official* shall require submission of one of the construction documents specified in (a) through (d) along with a notarized statement by the applicant that the Order, Determination or Notice is in effect and is not the subject of any administrative appeals before the Department of Environmental Protection or the Division of Administrative Law Appeals. No building permit shall be issued unless and until a construction document that conforms to the requirements this section is submitted.

16.00: continued

(a) An Order of Conditions establishing the boundaries of all *coastal wetland resource areas* in a plan referenced in and accompanying the Order. The Order shall determine whether the *coastal wetland resource areas* are significant to any of the interests identified in the Wetlands Protection Act, M.G.L. c. 131, § 40 including the interests of flood control and storm damage prevention. If the Order indicates that the proposed construction work is located within a *coastal dune* that is significant to the interests of flood control and/or storm damage prevention, the Order of Conditions must allow the proposed construction.

(b) An Order of Resource Area Delineation stating that the proposed construction work is outside the boundaries of all *coastal wetland resource areas* as shown on a plan referenced in and accompanying the Order.

(c) A Determination of Applicability stating that the proposed construction work is outside the boundaries of all *coastal wetland resource areas* as shown on a plan referenced in and accompanying the Determination or will not fill, dredge or alter a *coastal wetland resource area.*

(d) A Notice of Non-significance evidencing that the proposed construction work is within a *coastal wetland resource area* as shown on a plan referenced in and accompanying the Notice and stating that the *coastal wetland resource area* is not significant to any of the interests identified in the Wetlands Protection Act.

3.2 The elevation of the bottom of the lowest horizontal structural member, as required by the lowest floor elevation inspection in section 110.3.3

4. Documentation for buildings located in more than one zone shall meet the requirements of all zones.

1613.1 Replace the first paragraph with the following:

Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with ASCE 7, excluding Chapter 14 and Appendix 11A, but including Massachusetts Amendments to Tables 12.2-1 and 12.14-1.

Note. Seismic design category A shall not be used in Massachusetts. Any structure that could satisfy the requirements of seismic design category A in section 1613 or ASCE 7 shall be assigned to seismic design category B for purposes of implementing this Code.

1613.1 Add, after the exceptions, this text:

Section 1613 presents criteria for the design and construction of buildings and nonbuilding structures subject to earthquake ground motion. The specified earthquake loads rely on post-elastic energy dissipation in the structure, and because of this fact, the provisions for design, detailing and construction shall be satisfied even for structures and members for which load combinations containing earthquake load produce lesser effects than other load combinations.

The purpose of section 1613 is to minimize the hazard to life of occupants of all buildings and nonbuilding structures, to increase the expected performance of high occupancy assembly and education buildings as compared to ordinary buildings, and to improve the capability of essential facilities to function during and after an earthquake. Because of the complexity of and the great number of variables involved in seismic design (*e.g.* variability in ground motion, soil types, dynamic characteristics of the structure, material strength properties, and construction practice), section 1613 presents only minimum criteria in general terms. These minimum criteria are considered to be prudent and economically justified for the protection of life safety in buildings subject to earthquakes and for improved capability of essential facilities to function immediately following an earthquake.

Absolute safety and prevention of damage, even in an earthquake event with a reasonable probability of occurrence, cannot be achieved economically in most buildings. The "design earthquake" ground motion specified in section 1613 may result in both structural and non-structural damage. For most buildings designed and constructed according to the minimum requirements of section 1613, it is expected that structural damage from a major earthquake may be repairable, but the repair may not be economically feasible. For ground motions larger than the design earthquake, the intent of section 1613 is that there will be a low likelihood of building collapse.

16.00: continued

1613.5.1 Replace as follows:

1613.5.1 Mapped Acceleration Parameters. The parameters S_S and S_1 shall be determined from Table 1604.11.

Note to reader: The following amendments pertain to ASCE 7

ASCE 7, TABLE 12.2-1 Revise as follows:

Note f. Replace 'ordinary moment frame' with 'ordinary steel moment frame'

Limitations: Amend as follows:

Seismic Force-Resisting System	Seismic Design Category
A.3	B is NP
A.4	B is NP
A.9	B and C are NP
A.10	B is NP.
A.11	B is NP
A.14	B and C are limited to 35 ft. and note 1.
B.4	B and C are NP for K-type configuration only.
B.7	B is NP
B.8	B is NP
B.19	B and C are NP
B.20	B is NP
B.21	B is NP
B.24	B and C are limited to 35 ft. and note 1.
C.7	B is NP
E.3	B and C are NP
F	B is NP
H	B and C are limited to 100 ft. and 65 ft., respectively and note 2

Note 1. Permitted only at exterior walls and fire-rated walls and not permitted for buildings in Occupancy Category IV and not permitted for buildings where the dead load of any laterally supported floor or roof exceeds 25 psf.

The following amendments pertain to AISC 341-05

14.1 Scope. Add last sentence as follows:

Eccentricities less than the beam depth are permitted if they are accounted for in the member design by determination of eccentric moments using the amplified seismic load.

14.3 Special Bracing Configuration Requirements. Replace note (1)(a) as follows:

The forces in braces in tension shall be assumed to be equal to the lesser of the load effect based upon the amplified seismic load or $R_yF_yA_g$. For V-type and inverted V-type OCBF, the forces in braces in tension need not exceed the maximum force that can be developed by the system.

Note 2. Connections shall be designed for two times the computed forces and moments resulting from seismic loads, in combination with other loads, as applicable, but need not be designed for forces greater than the expected nominal yield strength ($R_yF_yA_g$) of diagonal braces in braced frames or 1.1 times the expected flexural capacity of beams ($1.1R_yM_p$) in moment frames. Columns that are part of the seismic force-resisting system shall satisfy the requirements of section 8.3 Column Strength of ANSI/AISC 341 Seismic Provisions for Structural Steel Buildings. K-Braced Frames shall not be permitted. Beams in V-Type and Inverted V-Type Braced Frames shall meet the following additional requirements:

a. A beam that is intersected by braces shall be continuous between columns.
b. A beam that is intersected by braces shall be designed to support the effects of all tributary dead and live loads from load combinations stipulated by the Building Code, assuming that braces are not present.

16.00: continued

c. Top and bottom flanges of the beam at the point of intersection of braces shall be designed to support a horizontal force perpendicular to the longitudinal axis of the beam that is equal to 2% of the nominal beam flange strength: $F_y b_f t_{bf}$.

ASCE 7, TABLE 12.14-1 Revise as follows:

Limitations: Amend as follows:

Seismic Force-Resisting System	Seismic Design Category
A.3	B is NP
A.4	B is NP
A.9	B is NP
A.10	B is NP.
A.11	B is NP
A.14	*See* note 1.
B.4	B and C are NP for K-type configuration only.
B.7	B is NP
B.8	B is NP
B.19	B is NP
B.20	B is NP
B.21	B is NP
B.24	*See* note 1.

Note 1. Permitted only at exterior walls and fire-rated walls and not permitted for buildings in Occupancy Category IV and not permitted for buildings where the dead load of any laterally supported floor or roof exceeds 25 psf.