CHAPTER 16 – STRUCTURAL DESIGN - AMENDMENTS

The ninth edition building code became first effective on October 20, 2017 and, with a shortened concurrency period, the new code came into full force and effect on January 1, 2018.

The new, ninth edition code is based on modified versions of the following ***2015 International Codes as published by the International Code Council*** (ICC).

- The International Building Code (IBC);
- International Residential Code (IRC);
- International Existing Building Code (IEBC);
- International Mechanical Code (IMC);
- International Energy Conservation Code (IECC);
- International Swimming Pool and Spa Code (ISPSC);
- Portions of the International Fire Code (IFC).

Massachusetts amends these code fairly significantly to accommodate for unique issues in the commonwealth. This package of amendments revise the IBC, IEBC, IMC, and IECC.

Please remember that the Massachusetts amendments posted on-line are ***unofficial versions*** and are meant for convenience only. Official versions of the Massachusetts amendments may be purchased from the State House Bookstore @ **Shop the Bookstore** and any of the I-Codes may be purchased from the International Code Council (ICC) @ **iccsafe.org**.

Additionally, the ICC publishes transition documents that identify changes from the 2009 to the 2015 I-Codes for those who may have interest.

- **International Building Code (IBC) Transition**
- **International Residential Code (IRC) Transition.**

780 CMR: MASSACHUSETTS AMENDMENTS TO THE *INTERNATIONAL BUILDING CODE 2015*

CHAPTER 16: STRUCTURAL DESIGN

1603.1.7 Revise subsection as follows:

1603.1.7 Flood Design Data. For buildings located in whole or in part in flood hazard areas as established in section 1612.3, the documentation pertaining to design, if required in section 1612.5, shall be included and the following information, referenced to the datum of the base flood elevation, shall be shown, regardless of whether flood loads govern the design of the building:

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

1604.11 and Table 1604.11 Add section and table as follows:

1604.11 Snow, Wind and Earthquake Design Factors. Ground snow load, p_g, ultimate design wind speed (three second gust), V_{ult}, and earthquake response accelerations for the maximum considered earthquake, S_S and S_1, for each city and town in the Commonwealth shall be as given in Table 1604.11.

TABLE 1604.11 SNOW LOADS, WIND SPEEDS ANS SEISMIC PARAMETERS

	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f^1 (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
Abington	35	30	122	132	143	0.196	0.065
Acton	50	35	114	124	134	0.213	0.070
Acushnet	30	30	129	138	149	0.172	0.059
Adams[2]	60	40	105	115	120	0.172	0.069
Agawam	35	35	109	120	128	0.174	0.065
Alford[2]	40	40	105	115	120	0.169	0.066
Amesbury	50	30	113	123	134	0.267	0.078
Amherst	40	35	106	118	125	0.172	0.066
Andover	50	30	114	124	135	0.247	0.075
Aquinnah (Gay Head)	25	25	133	140	154	0.141	0.052
Arlington	40	30	117	127	138	0.219	0.070
Ashburnham	60	35	108	118	128	0.200	0.071
Ashby	60	35	108	119	128	0.210	0.072
Ashfield	50	40	105	115	120	0.170	0.067
Ashland	40	35	116	127	137	0.190	0.066
Athol	60	35	106	117	125	0.183	0.069
Attleboro	35	30	122	132	143	0.181	0.063
Auburn	50	35	114	125	135	0.177	0.065
Avon	35	35	121	131	142	0.196	0.065
Ayer	50	35	111	122	132	0.212	0.071
Barnstable	30	25	132	140	152	0.152	0.055
Barre	50	35	109	120	130	0.180	0.067
Becket[2]	60	40	105	115	120	0.168	0.066
Bedford	50	30	115	125	136	0.221	0.071
Belchertown	40	35	109	119	129	0.173	0.066
Bellingham	40	35	118	129	139	0.181	0.064

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City/Town	SNOW LOADS: Ground Snow Load, P_g (psf)	SNOW LOADS: Minimum Flat Roof Snow Load, P_f[1] (psf)	BASIC WIND SPEED, V_{ult} (mph): Risk Category I	BASIC WIND SPEED, V_{ult} (mph): Risk Category II	BASIC WIND SPEED, V_{ult} (mph): Risk Category III or IV	SEISMIC PARAMETERS (g): S_s	SEISMIC PARAMETERS (g): S_1
Belmont	40	30	117	127	138	0.215	0.070
Berkley	30	30	125	135	146	0.181	0.061
Berlin	50	35	113	124	134	0.193	0.068
Bernardston	60	35	105	115	120	0.176	0.069
Beverly	50	30	117	127	138	0.245	0.073
Billerica	50	30	114	124	135	0.229	0.073
Blackstone	40	35	119	129	140	0.177	0.063
Blandford	50	40	105	116	122	0.171	0.065
Bolton	50	35	113	123	134	0.199	0.069
Boston	40	30	118	128	139	0.217	0.069
Bourne	30	25	130	139	150	0.168	0.058
Boxborough	50	35	113	123	134	0.208	0.070
Boxford	50	30	115	125	136	0.252	0.075
Boylston	50	35	113	123	134	0.191	0.068
Braintree	35	30	120	131	142	0.203	0.066
Brewster	25	25	132	140	152	0.147	0.054
Bridgewater	30	30	124	134	145	0.188	0.063
Brimfield	40	35	112	123	133	0.173	0.065
Brockton	35	30	122	132	143	0.193	0.064
Brookfield	50	35	112	122	132	0.174	0.065
Brookline	40	30	118	128	139	0.211	0.068
Buckland[2]	60	40	105	115	120	0.171	0.068
Burlington	50	30	115	125	136	0.227	0.072
Cambridge	40	30	117	128	139	0.216	0.069
Canton	40	35	120	130	141	0.195	0.065
Carlisle	50	30	114	124	135	0.222	0.072
Carver	30	30	127	136	147	0.182	0.061
Charlemont[2]	60	40	105	115	120	0.172	0.068
Charlton	50	35	114	124	135	0.174	0.064
Chatham	25	25	134	140	154	0.135	0.051
Chelmsford	50	30	113	123	134	0.229	0.073
Chelsea	40	30	118	128	139	0.221	0.070
Cheshire[2]	60	40	105	115	120	0.171	0.068
Chester	60	40	105	115	120	0.169	0.066
Chesterfield	50	40	105	115	120	0.169	0.067
Chicopee	35	35	108	119	127	0.172	0.065
Chilmark	25	25	134	140	154	0.140	0.052
Clarksburg[2]	60	40	105	115	120	0.175	0.069
Clinton	50	35	113	123	133	0.194	0.068
Cohasset	35	30	122	131	142	0.211	0.067
Colrain[2]	60	40	105	115	120	0.174	0.069
Concord	50	35	114	125	136	0.214	0.070
Conway	50	40	105	115	120	0.171	0.067
Cummington[2]	60	40	105	115	120	0.169	0.067
Dalton[2]	60	40	105	115	120	0.169	0.067
Danvers	50	30	116	126	137	0.245	0.074
Dartmouth	30	30	129	139	150	0.169	0.058
Dedham	40	35	119	129	140	0.201	0.067
Deerfield	50	35	105	115	120	0.172	0.068
Dennis	30	25	132	140	152	0.150	0.054
Dighton	30	30	125	135	146	0.180	0.061

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	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f[1] (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
Douglas	40	35	117	127	138	0.175	0.064
Dover	40	35	118	128	139	0.196	0.067
Dracut	50	30	112	122	133	0.240	0.075
Dudley	50	35	116	126	136	0.173	0.064
Dunstable	50	35	111	121	132	0.231	0.074
Duxbury	30	30	125	135	146	0.192	0.063
E. Bridgewater	35	30	123	133	144	0.191	0.064
E. Brookfield	50	35	112	122	133	0.175	0.065
E. Longmeadow	35	35	110	121	130	0.174	0.065
Eastham	25	25	132	140	152	0.146	0.054
Easthampton	40	35	106	117	124	0.171	0.066
Easton	35	30	122	132	143	0.187	0.064
Edgartown	25	25	135	140	155	0.136	0.051
Egremont[2]	40	40	105	115	120	0.169	0.065
Erving	50	35	105	116	122	0.178	0.069
Essex	50	30	117	127	138	0.253	0.075
Everett	40	30	117	128	139	0.222	0.070
Fairhaven	30	30	129	139	150	0.169	0.058
Fall River	30	30	126	137	148	0.176	0.060
Falmouth	30	25	132	140	152	0.154	0.055
Fitchburg	60	35	110	120	130	0.202	0.071
Florida[2]	60	40	105	115	120	0.173	0.069
Foxborough	35	35	120	131	142	0.186	0.064
Framingham	40	35	116	127	137	0.194	0.067
Franklin	40	35	119	129	140	0.183	0.064
Freetown	30	30	126	137	147	0.178	0.060
Gardner	60	35	108	119	128	0.191	0.070
Georgetown	50	30	114	124	135	0.258	0.076
Gill	50	35	105	115	120	0.177	0.069
Gloucester	50	30	118	128	139	0.252	0.074
Goshen	50	40	105	115	120	0.169	0.067
Gosnold	30	25	132	140	152	0.153	0.055
Grafton	50	35	115	126	136	0.180	0.065
Granby	35	35	108	119	127	0.172	0.066
Granville	50	40	106	117	125	0.173	0.065
Great Barrington[2]	50	40	105	115	120	0.169	0.066
Greenfield	50	35	105	115	120	0.173	0.068
Groton	60	35	111	121	132	0.218	0.072
Groveland	50	30	113	123	134	0.259	0.077
Hadley	40	35	106	117	124	0.171	0.066
Halifax	30	30	124	134	145	0.189	0.063
Hamilton	50	30	116	126	137	0.253	0.075
Hampden	35	35	111	122	131	0.173	0.065
Hancock[2]	50	40	105	115	120	0.172	0.068
Hanover	35	30	123	133	144	0.198	0.065
Hanson	35	30	123	133	144	0.195	0.064
Hardwick	50	35	110	120	130	0.176	0.066
Harvard	50	35	112	123	133	0.206	0.070
Harwich	25	25	133	140	153	0.141	0.053
Hatfield	40	35	106	117	124	0.171	0.066

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	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f^1 (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
Haverhill	50	30	112	123	134	0.260	0.077
Hawley[2]	60	40	105	115	120	0.171	0.068
Heath[2]	60	40	105	115	120	0.173	0.069
Hingham	35	30	121	131	142	0.210	0.067
Hinsdale[2]	60	40	105	115	120	0.169	0.067
Holbrook	35	30	121	131	142	0.198	0.065
Holden	50	35	112	122	133	0.183	0.067
Holland	40	35	114	124	134	0.173	0.064
Holliston	40	35	117	128	138	0.188	0.066
Holyoke	35	35	107	118	126	0.172	0.065
Hopedale	40	35	117	128	138	0.181	0.065
Hopkinton	40	35	116	127	137	0.186	0.066
Hubbardston	50	35	109	120	130	0.185	0.068
Hudson	50	35	114	124	135	0.197	0.068
Hull	35	30	120	130	141	0.215	0.068
Huntington	50	40	105	116	122	0.170	0.066
Ipswich	50	30	116	126	137	0.257	0.076
Kingston	30	30	125	135	146	0.188	0.062
Lakeville	30	30	126	136	147	0.181	0.061
Lancaster	50	35	112	122	133	0.197	0.069
Lanesborough[2]	50	40	105	115	120	0.171	0.068
Lawrence	50	30	113	123	134	0.250	0.076
Lee[2]	50	40	105	115	120	0.169	0.066
Leicester	50	35	113	123	134	0.178	0.066
Lenox[2]	50	40	105	115	120	0.169	0.066
Leominster	60	35	111	121	131	0.199	0.070
Leverett	40	35	105	117	124	0.173	0.067
Lexington	40	30	116	126	137	0.218	0.070
Leyden[2]	60	40	105	115	120	0.176	0.069
Lincoln	40	35	115	126	136	0.213	0.070
Littleton	50	35	112	123	133	0.214	0.071
Longmeadow	35	35	109	120	129	0.174	0.065
Lowell	50	30	112	123	134	0.235	0.074
Ludlow	35	35	109	120	129	0.173	0.065
Lunenburg	60	35	110	120	131	0.207	0.071
Lynn	40	30	117	128	139	0.233	0.071
Lynnfield	50	30	116	126	137	0.237	0.073
Malden	40	30	117	127	138	0.224	0.070
Manchester	50	30	117	128	139	0.249	0.074
Mansfield	35	30	121	131	142	0.186	0.064
Marblehead	40	30	118	128	139	0.239	0.072
Marion	30	30	129	139	150	0.170	0.058
Marlborough	50	35	114	125	135	0.194	0.068
Marshfield	35	30	124	134	145	0.196	0.064
Mashpee	30	25	131	140	152	0.156	0.055
Mattapoisett	30	30	129	139	150	0.169	0.058
Maynard	50	35	114	124	135	0.206	0.069
Medfield	40	35	118	129	139	0.191	0.066
Medford	40	30	117	127	138	0.221	0.070

16.00: continued

	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f^1 (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
Medway	40	35	118	129	139	0.185	0.065
Melrose	40	30	117	127	138	0.227	0.071
Mendon	40	35	118	128	138	0.179	0.064
Merrimac	50	30	112	123	133	0.265	0.078
Methuen	50	30	112	122	133	0.251	0.076
Middleborough	30	30	125	135	146	0.183	0.062
Middlefield	60	40	105	115	120	0.169	0.066
Middleton	50	30	115	125	136	0.245	0.074
Milford	40	35	117	128	138	0.182	0.065
Millbury	50	35	115	125	136	0.178	0.065
Millis	40	35	118	129	139	0.188	0.065
Millville	40	35	118	129	139	0.177	0.063
Milton	40	30	119	130	141	0.205	0.067
Monroe[2]	60	40	105	115	120	0.174	0.069
Monson	40	35	111	122	132	0.173	0.065
Montague	50	35	105	116	122	0.173	0.068
Monterey	50	40	105	116	122	0.170	0.065
Montgomery	40	40	105	117	123	0.171	0.066
Mount Washington[2]	40	40	105	115	120	0.171	0.065
Nahant	40	30	118	128	139	0.229	0.071
Nantucket	25	25	139	140	158	0.113	0.047
Natick	40	35	117	127	138	0.197	0.067
Needham	40	35	118	128	139	0.201	0.067
New Ashford[2]	50	40	105	115	120	0.173	0.068
New Bedford	30	30	129	139	150	0.170	0.058
New Braintree	50	35	111	121	131	0.176	0.066
New Marlborough	50	40	105	115	120	0.171	0.065
New Salem	50	35	106	117	125	0.177	0.068
Newbury	50	30	114	125	136	0.263	0.077
Newburyport	50	30	114	124	135	0.265	0.078
Newton	40	30	117	127	138	0.208	0.068
Norfolk	40	35	119	129	140	0.186	0.065
North Adams[2]	60	40	105	115	120	0.175	0.069
North Andover	50	30	113	123	134	0.251	0.076
North Attleborough	35	30	121	131	142	0.180	0.063
North Brookfield	50	35	112	122	132	0.176	0.066
North Reading	50	30	115	125	136	0.240	0.073
Northampton	40	35	106	117	124	0.171	0.066
Northborough	50	35	114	124	135	0.188	0.067
Northbridge	40	35	116	127	137	0.179	0.065
Northfield	60	35	105	115	120	0.179	0.069
Norton	35	30	122	133	144	0.184	0.063
Norwell	35	30	123	133	144	0.203	0.065
Norwood	40	35	119	129	140	0.195	0.066
Oak Bluffs	25	25	133	140	154	0.144	0.053
Oakham	50	35	111	121	131	0.179	0.067
Orange	60	35	106	117	124	0.180	0.069
Orleans	25	25	132	140	152	0.144	0.053
Otis	50	40	105	115	120	0.170	0.066
Oxford	50	35	115	125	136	0.174	0.064

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	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f^1 (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
Palmer	40	35	111	121	131	0.173	0.065
Paxton	50	35	112	122	133	0.180	0.066
Peabody	50	30	117	127	138	0.240	0.073
Pelham	40	35	107	118	126	0.173	0.067
Pembroke	30	30	124	134	145	0.195	0.064
Pepperell	60	35	110	120	131	0.223	0.073
Peru[2]	60	40	105	115	120	0.169	0.067
Petersham	50	35	108	118	127	0.180	0.068
Phillipston	60	35	108	118	127	0.185	0.069
Pittsfield[2]	50	40	105	115	120	0.170	0.067
Plainfield[2]	60	40	105	115	120	0.170	0.067
Plainville	40	35	121	131	142	0.182	0.063
Plymouth	30	30	126	136	147	0.185	0.061
Plympton	30	30	125	135	146	0.187	0.062
Princeton	50	35	111	121	131	0.188	0.068
Provincetown	25	25	128	138	148	0.177	0.060
Quincy	40	30	120	130	141	0.208	0.067
Randolph	35	30	121	131	142	0.198	0.066
Raynham	35	30	123	134	145	0.185	0.063
Reading	50	30	116	126	137	0.234	0.072
Rehoboth	35	30	124	134	145	0.179	0.062
Revere	40	30	118	128	139	0.224	0.070
Richmond[2]	50	40	105	115	120	0.169	0.067
Rochester	30	30	128	138	149	0.176	0.059
Rockland	35	30	122	132	143	0.198	0.065
Rockport	50	30	118	128	139	0.255	0.074
Rowe[2]	60	40	105	115	120	0.173	0.069
Rowley	50	30	115	125	136	0.259	0.076
Royalston	60	35	106	116	123	0.188	0.070
Russell	40	40	105	116	123	0.171	0.065
Rutland	50	35	111	121	132	0.182	0.067
Salem	50	30	117	127	138	0.240	0.073
Salisbury	50	30	113	124	134	0.266	0.078
Sandisfield	50	40	105	115	120	0.171	0.065
Sandwich	30	25	130	139	150	0.165	0.057
Saugus	40	30	117	127	138	0.230	0.071
Savoy[2]	60	40	105	115	120	0.170	0.068
Scituate	35	30	123	133	144	0.207	0.066
Seekonk	35	30	123	134	145	0.177	0.061
Sharon	35	35	120	130	141	0.191	0.065
Sheffield[2]	40	40	105	115	120	0.171	0.065
Shelburne	50	40	105	115	120	0.172	0.068
Sherborn	40	35	117	127	138	0.192	0.066
Shirley	60	35	111	121	132	0.207	0.071
Shrewsbury	50	35	114	124	135	0.184	0.066
Shutesbury	40	35	106	117	125	0.174	0.067
Somerset	30	30	126	136	147	0.178	0.061
Somerville	40	30	117	127	139	0.218	0.070
South Hadley	35	35	107	118	126	0.171	0.066

16.00: continued

	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f^1 (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
Southampton	40	35	106	117	124	0.171	0.066
Southborough	40	35	115	125	136	0.191	0.067
Southbridge	40	35	114	125	135	0.173	0.064
Southwick	40	35	107	118	126	0.174	0.065
Spencer	50	35	113	123	133	0.176	0.066
Springfield	35	35	109	120	128	0.173	0.065
Sterling	50	35	112	122	132	0.192	0.068
Stockbridge[2]	50	40	105	115	120	0.169	0.066
Stoneham	40	30	116	126	137	0.229	0.071
Stoughton	35	35	121	131	142	0.194	0.065
Stow	50	35	114	124	135	0.204	0.069
Sturbridge	40	35	114	124	134	0.173	0.064
Sudbury	40	35	115	125	136	0.203	0.069
Sunderland	40	35	105	116	122	0.172	0.067
Sutton	50	35	115	126	136	0.177	0.065
Swampscott	40	30	118	128	139	0.234	0.072
Swansea	30	30	126	136	147	0.177	0.061
Taunton	35	30	124	134	145	0.183	0.062
Templeton	60	35	108	118	127	0.187	0.069
Tewksbury	50	30	113	124	135	0.237	0.074
Tisbury	25	25	133	140	153	0.146	0.053
Tolland	50	40	105	115	122	0.172	0.065
Topsfield	50	30	115	125	136	0.251	0.075
Townsend	60	35	109	119	130	0.216	0.073
Truro	25	25	129	139	149	0.164	0.057
Tyngsborough	50	30	111	121	132	0.234	0.074
Tyringham[2]	50	40	105	115	120	0.169	0.066
Upton	40	35	116	127	137	0.181	0.065
Uxbridge	40	35	117	128	138	0.177	0.064
Wakefield	50	30	116	126	137	0.232	0.072
Wales	40	35	113	123	133	0.173	0.064
Walpole	40	35	119	130	141	0.190	0.065
Waltham	40	30	116	127	138	0.211	0.069
Ware	40	35	110	120	131	0.174	0.066
Wareham	30	30	129	138	149	0.173	0.059
Warren	40	35	111	121	132	0.173	0.065
Warwick	60	35	105	115	121	0.183	0.070
Washington[2]	60	40	105	115	120	0.168	0.066
Watertown	40	30	117	127	138	0.213	0.069
Wayland	40	35	116	126	137	0.203	0.068
Webster	50	35	116	126	136	0.173	0.064
Wellesley	40	35	117	127	138	0.200	0.067
Wellfleet	25	25	130	140	150	0.157	0.056
Wendell	50	35	105	117	123	0.177	0.068
Wenham	50	30	116	126	137	0.249	0.074
W. Boylston	50	35	112	123	133	0.186	0.067
W. Bridgewater	35	30	123	133	144	0.189	0.063
W. Brookfield	40	35	112	122	132	0.174	0.065
W. Newbury	50	30	113	123	134	0.263	0.078
W. Springfield	35	35	108	119	128	0.173	0.065

16.00: continued

	SNOW LOADS		BASIC WIND SPEED, V_{ult} (mph)			SEISMIC PARAMETERS (g)	
City/Town	Ground Snow Load, P_g (psf)	Minimum Flat Roof Snow Load, P_f^1 (psf)	Risk Category I	Risk Category II	Risk Category III or IV	S_s	S_1
W. Stockbridge[2]	40	40	105	115	120	0.169	0.066
W. Tisbury	25	25	134	140	154	0.141	0.052
Westborough	50	35	115	125	136	0.186	0.066
Westfield	40	35	107	118	125	0.172	0.065
Westford	50	35	112	123	133	0.223	0.072
Westhampton	50	40	105	116	122	0.170	0.066
Westminster	60	35	109	120	130	0.194	0.069
Weston	40	35	116	126	137	0.207	0.069
Westport	30	30	128	139	149	0.172	0.059
Westwood	40	35	119	129	140	0.196	0.066
Weymouth	35	30	121	131	142	0.206	0.067
Whately	50	35	105	116	122	0.171	0.067
Whitman	35	30	123	133	144	0.194	0.064
Wilbraham	35	35	110	121	130	0.173	0.065
Williamsburg	50	40	105	116	121	0.170	0.067
Williamstown[2]	50	40	105	115	120	0.176	0.070
Wilmington	50	30	115	125	136	0.233	0.073
Winchendon	60	35	107	117	125	0.197	0.071
Winchester	40	30	116	126	137	0.224	0.071
Windsor[2]	60	40	105	115	120	0.169	0.067
Winthrop	40	30	118	129	140	0.222	0.070
Woburn	50	30	116	126	137	0.226	0.071
Worcester	50	35	114	124	134	0.180	0.066
Worthington	60	40	105	115	120	0.169	0.067
Wrentham	40	35	120	130	141	0.184	0.064
Yarmouth	30	25	132	140	152	0.149	0.054

NOTES:

1. The design flat roof snow load shall be the larger of the calculated flat roof snow load using P_g or the value of P_f listed in this table.
2. Special Wind Region. Local conditions may cause higher wind speeds than the tabulated values. *See* ASCE/SEI 7.

1604.12 Add section as follows:

1604.12 Revisions to AISC 341-10.

F1.1 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.

1605.3.2 Delete subsection.

1607.10.2 Delete subsection.

1608.2 Revise section 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. Ground snow loads for sites at elevations above the limits indicated in Table 1604.11 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% annual probability of being exceeded (50-year mean recurrence interval).

16.00: continued

1608.4 through 1608.11 Add sections as follows:

1608.4 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° 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.

1608.5 Drifts on Multiple Level Roofs. For multiple stepped roofs similar to that shown in Figure 1608.5.1, the sum of all the roof lengths upwind above the drift under consideration, l_u*, in Figure 1608.5.1, shall replace l_u in Figure 7-8 of ASCE 7. For multiple level roofs similar to that shown in Figure 1608.5.2, 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 1608.5.2, shall be used in place of l_u in Figure 7-8 of ASCE 7.

FIGURE 1608.5.1

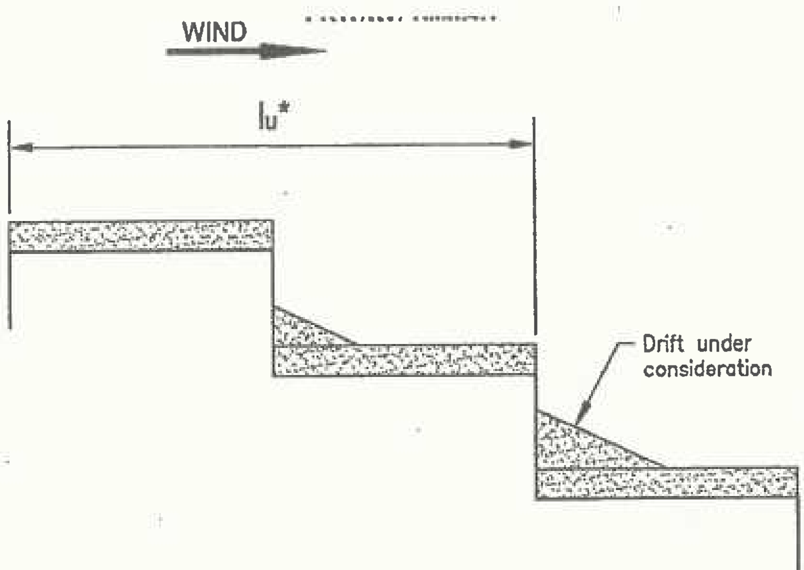
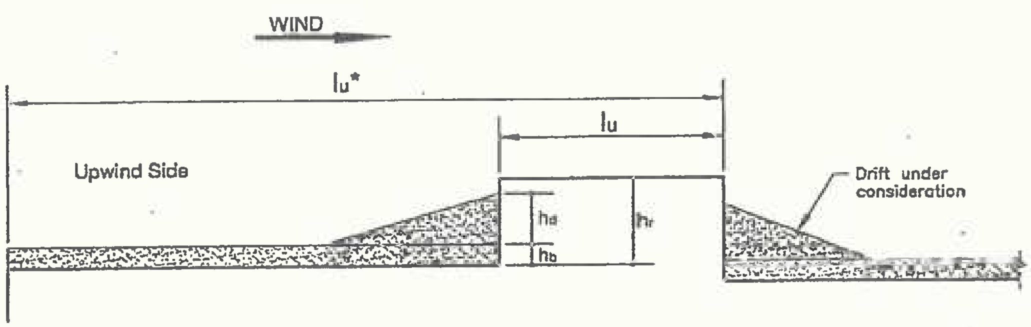


FIGURE 1608.5.2



1608.6 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.

1608.7 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.

16.00: continued

1608.8 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.

1608.9 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 1608.5.1 and section 7.8 of ASCE 7. The sliding snow load and the windward drift surcharge need not be considered to act concurrently.

1608.10 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.

1608.11 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).

1609.3 Replace the first paragraph with the following:

1609.3 Ultimate Wind Speed. The ultimate design wind speed, V_{ult} 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 780 CMR 18.00: *Soils and Foundations*. 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 one 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 1613.3.3(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.

16.00: continued

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.

1612.1 Revise as follows:

1612.1 General. Within flood hazard areas as established in section 1612.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, and substantial repair of a foundation shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

1612.2 Revise as follows:

1612.2 Definitions. The following terms are defined in 780 CMR 2.00: *Definitions* and are in addition to those shown in the IBC:

COASTAL DUNE
COASTAL WETLAND RESOURCE AREA
SUBSTANTIAL REPAIR OF A FOUNDATION

1612.3 Revise section as follows:

1612.3 Establishment of Flood Hazard Areas. *See* 780 CMR 2.00: *Definitions* for definition of flood hazard areas.

1612.3.2 Revise subsection as follows:

1612.3.2 Determination of Impacts. Reserved

1612.4 Revise section as follows:

1612.4 Design and Construction. The design and construction of buildings and structures located in flood hazard areas, including coastal high hazard areas shall be in accordance with Chapter 5 of ASCE 7 and ASCE 24. In using ASCE 24-14, delete all references to coastal A zone standards. For minimum elevation requirements for lowest floor, bottom of lowest horizontal structural member, utilities, flood-resistant materials and wet and dry flood-proofing refer to tables in ASCE 24 which are to be amended as shown below. The design and construction of buildings and structures located in coastal dunes shall be in accordance with Appendix G.

ASCE 24 Tables for flood-resistant materials and wet and dry flood-proofing - Revised

		Flood Design Class 1	Flood Design Class 2	Flood Design Class 3	Flood Design Class 4
Minimum Elevation* of Lowest Floor (Zone A: ASCE 24-14 Table 2-1)	Zone A	BFE + 1 ft	BFE + 1 ft	BFE + 1ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
Minimum Elevation of Bottom of Lowest Horizontal Structural Member (Zone V: ASCE 24-14 Table 4-1)	Zone V	BFE + 2 ft	BFE + 2 ft	BFE + 2 ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
Minimum Elevation Below Which Flood-Damage-Resistant Materials Shall be Used (Table ASCE 24-14 5-1)	Zone A	BFE + 1 ft	BFE + 1 ft	BFE + 1ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
	Zone V	BFE + 2 ft	BFE + 2 ft	BFE + 2 ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
Minimum Elevation** of Utilities and Equipment (ASCE 24-14 Table 7-1)	Zone A	BFE + 1 ft	BFE + 1 ft	BFE + 1ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
	Zone V	BFE + 2 ft	BFE + 2 ft	BFE + 2 ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
Minimum Elevation of Dry Floodproofing of non-residential structures and non-residential portions of mixed-use buildings (ASCE 24-14 Table 6-1)	Zone A	BFE + 1 ft	BFE + 1 ft	BFE + 1ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
	Zone V	Not Permitted	Not Permitted	Not Permitted	Not Permitted
Minimum Elevation of Wet Floodproofing*** (ASCE 24-14 Table 6-1)	Zone A	BFE + 1 ft	BFE + 1 ft	BFE + 1ft	BFE + 2 ft or 500-year flood elevation, whichever is higher
	Zone V	Not Permitted	Not Permitted	Not Permitted	Not Permitted

*Flood Design Class 1 structures shall be allowed below the minimum elevation if the structure meets the wet floodproofing requirements of ASCE 24-14 Section 6.3.
**Unless otherwise permitted by ASCE 24-14 Chapter 7.
***Only if permitted by ASCE 24-14 Section 6.3.1.

Note: In V zones location of utilities and equipment to the indicated level is required. Protection of utilities and equipment below the indicated level is not accepted.

1613.1 Revise section as follows:

1613.1Scope. 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. The seismic design category for a structure is permitted to be determined in accordance with section 1613 or ASCE 7, but seismic design category A shall not be used in the Commonwealth. 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 780 CMR.