

780 CMR 3408.0 STRUCTURAL REQUIREMENTS FOR EXISTING BUILDINGS

3408.1 General Requirements.

3408.1.1 Basic Requirement. The structural work for alterations, repairs, and additions to existing buildings shall be designed and constructed in accordance with the Code requirements for new construction for the loads specified in 780 CMR 3408.0, except as otherwise provided in 780 CMR 3408.0.

3408.1.2 Prior Building Codes. The structural systems of existing buildings shall, as a minimum, conform to the basic code. Structural systems and elements that do not so comply shall be reinforced so that they do so comply or, alternatively, so that they comply with the requirements for new construction of 780 CMR.

3408.1.3 Structurally Separate Additions. Additions to existing buildings which are structurally separate therefrom shall comply with the requirements for new construction.

3408.1.4 Structurally Separate Portions of Existing Buildings. Where portions of an existing building are structurally separate, each portion shall be considered a separate building for the purposes of 780 CMR 3408.0.

3408.2 Definitions

Basic Design Code. The building code in-force on the date of the application for the building permit for the original building. If subsequent changes have been made to the lateral force resisting system of the building and the changed lateral force resisting system conforms to the requirements for new construction of the building code in-force on the date of the application for the building permit for said changes, the basic code shall be the building code for the latest of such structural changes.

Box System. Term used in the seismic provisions of the 1st to 5th Editions of the State Building Code. The meaning is the same as *Wall System, Bearing* as defined in ASCE 7, Section 9.2.1.

Cladding. Elements of the building envelope at the sides of a building which do not support any gravity load other than their own weight and are not designed to resist imposed in-plane forces.

Dual Bracing System. Term used in the seismic provisions of the 1st to 5th Editions of the State Building Code. The meaning is the same as *Frame System, Dual frame system*, as defined in ASCE 7, Section 9.2.1.

Effective Seismic Weight. Effective seismic weight shall be as defined by 780 CMR 1615.0, except as provided in 780 CMR 3408.4.1.

Space Frame. Term used in the seismic provisions of the 1st to 5th Editions of the State Building Code.

The meaning is the same as *Frame System, Space frame system*, as defined in ASCE 7, Section 9.2.1. (Used in definition of *Frame System, Building frame system* in ASCE 7, Section 9.2.1).

Structural Engineer of Record (SER). A registered design professional qualified in the structural design of buildings who is responsible for the structural engineering design of a construction project and whose professional seal and signature appear on the structural design documents submitted with the application for building permit.

URM. Unreinforced masonry.

3408.3 Classification of Existing Buildings.

Post-1975 - Buildings whose basic code has an effective date on or after January 1, 1975. (Governed by 780 CMR: *the Massachusetts State Building Code*).

Pre-1975 - Buildings whose basic code has an effective date prior to January 1, 1975, or for which there was no building code. (Prior to 780 CMR: *the Massachusetts State Building Code*).

3408.4 Levels of Work on Existing Buildings.

The work involved in alterations, repairs, and additions to existing buildings, and changes of use of existing buildings, shall be classified as described in 780 CMR 3408.4. For an existing building where more than one level of work applies, the requirements for the highest level of work shall apply.

3408.4.1 Explanation of Terms. The explanation of terms that follow are for the purposes of classifying the levels of work in 780 CMR 3408.4 and for use in Figure 3408-1, only.

1. Floor or roof area shall be measured to the inside face of exterior masonry or concrete walls, to the inside face of exterior wood stud walls, or to the inside face of the principal framing members of curtain walls.
2. *Effective seismic weight* shall include only that effective seismic weight above mean exterior grade, exclusive of slabs on grade, foundation walls, and framed floors that are laterally braced by foundation walls.
3. Effective seismic weight of existing buildings previously used for storage or manufacturing. For the purpose of determining the seismic weight before any renovations, the following allowances shall be used in lieu of both the 25% of storage live load and the operating weight of equipment. 30 psf of floor area if the unreduced live load capacity of the floor is 100 psf or more; 20 psf of floor area if the unreduced live load capacity of the floor is less than 100 psf but at least 80 psf; or zero, otherwise. Neither a partition allowance nor the weight of any in-place partitions shall be included if any of these allowances are taken, except when zero is used.

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3408.4.2 Level 1 Work. Work involving any of the following:

1. Removal or repair of ceilings, partitions, or interior facing of exterior walls; new ceilings, partitions, or interior facing of exterior walls; reconstruction or repair of floors; new mechanical or electrical distribution systems within an area; or new elevators, escalators, or stairs within an area or serving an area, when the new openings in any framed floor or roof are 5% or less of the area of the framed floor or roof.
2. Work that is not specified for Levels 2, 3, 4, or 5.

3408.4.3 Level 2 Work. Work involving any of the following:

1. Cumulative increase in total framed floor and roof area due to structurally attached additions up to a lifetime limit of 10% of the total framed floor and roof area of the building that existed on February 28, 1997, or on the date of the certificate of occupancy if the building was built thereafter.
2. Cumulative increase in effective seismic weight, with or without structurally attached additions, from 2.0% for one-story buildings and from 1.0% for buildings with more than one-story, to a lifetime limit of 10% of the effective seismic weight of the building that existed on February 28, 1997, or on the date of the certificate of occupancy if the building was built thereafter.
3. Structural work involving any of the following:

- A. More than 25% of the total existing framed floor and roof area or 20,000 sf of existing framed floor and roof area, whichever is less. Where the work involves existing beams or girders, the tributary area of the beams and girders shall be included in the count for framed floor and roof area.
- B. More than 25% of the total area of shear walls above the foundation.
- C. More than 25% of the total length of columns and diagonal braces measured to the intersection of the member centerlines.
- D. Openings in any framed floor or roof that have an area more than 5% of the area of the framed floor or roof.
- E. Changes to any structural wall that reduce its in-plane shear resistance by more than 15%.
- F. Changes to any floor or roof diaphragm that reduce its in-plane shear resistance by more than 15%.
- G. Removal or reconfiguration of lateral load resisting frames, or foundations supporting them.

4. **Exemption for Pile Foundations.** Structural repairs of pile foundations are exempt from Level 2 Work.

3408.4.4 Level 3 Work. Structural work involving any of the following:

1. Removal, or removal and reconstruction, of between 15% and 40% of the total existing framed floor and roof area. Where this work involves existing beams or girders, the tributary area of the beams and girders shall be included in the count of framed floor and roof area.

Exception. Demolition of a previous addition to the building; demolition of an appendage to the building such as a loading dock outside of the exterior wall line; or demolition of a mechanical penthouse; with the condition that the demolition does not reduce the existing lateral load resistance of the remaining portion of the building below that provided before demolition.

2. New shear walls and vertical frames which provide more than 35% of the lateral force resistance required for Level 2 Work, in either of two orthogonal directions.

3408.4.5 Level 4 Work. Work involving any of the following:

1. Increase in total framed floor and roof area due to structurally attached additions that is more than 10% of the total framed floor and roof area of the building that existed on February 28, 1997, or on the date of the certificate of occupancy if the building was built thereafter.
2. Increase in effective seismic weight, with or without structurally attached additions, that is more than 10% of the effective seismic weight of the building that existed on February 28, 1997, or on the date of the certificate of occupancy if the building was built thereafter.

3408.4.6 Level 5 Work. Work involving any of the following:

1. The removal, or the removal and reconstruction, of more than 40% of the total existing framed floor and roof area. Where this work involves existing beams or girders, the tributary area of the beams and girders shall be included in the count of framed floor and roof area.

Exception. Demolition of a previous addition to the building; demolition of an appendage to the building such as a loading dock outside of the exterior wall line; or demolition of a mechanical penthouse; with the condition that the demolition does not reduce the existing lateral load resistance of the remaining portion of the building below that provided before demolition.

2. Structurally attached additions that have a total framed floor and roof area greater than 100% of the total framed floor and roof area of the building that existed on February 28, 1997, or on the date of the certificate of occupancy if the building was built thereafter.

3. Increase in effective seismic weight, with or without structurally attached additions, that is more than 100% of the effective seismic weight of the building that existed on Febru-