

# - READ FIRST -

## *Instructions for use:*

### *Code Analysis worksheet for the 2009 International Existing Building Code with Massachusetts Amendments*

The following template was prepared by engineers who are members of the Massachusetts Structural Advisory Committee (SAC) to the State Board of Building Regulations and Standards (BBRS.) This committee includes members of SEAMASS and the Board of Directors has endorsed the work of the SAC on the Massachusetts State Building Code. The authors found this template useful in applying the Existing Building provisions for the Massachusetts State Building Code 8<sup>th</sup> Edition, and want to share this template with the structural engineering community. This is not an official document, and comes with no guarantee of accuracy or completeness. We hope you find it useful in applying the new code provisions.

The first part of the work sheet is a summary sheet has two sections:

- The first describes the scope of the project. Filling this out with as much detail as possible will help in determining various triggers that occur within the code.
- The second part is a summary of the code analysis. This part gets filled out after you have gone through the worksheet and is intended to describe the structural scope of work required for the three compliance sections.

After filling out the scope of the project, the rest of the worksheet goes through the structural portions of the code starting with Chapter 1. The worksheet lists a code section reference, briefly describes the subject of the section and then has a third column for the engineer to input comments regarding the applicability of that section to the project. In some cases, the comments will be specific with a defined scope of work that must be performed. In other cases the comment may be that the section might apply or is not applicable. Following the worksheet to the end will help the engineer walk through the IEBC with MA amendments and develop a good understanding of the required, or potentially required, scope of structural work for each of the three compliance methods.

SEAMASS representatives continue to work collaboratively with the Structural Advisory Committee to assist the BBRS in developing code provisions. While SEAMASS will do its best to keep engineers informed of these changes, the Structural Advisory Committee and SEAMASS recommend that the engineer verify the current code when using the worksheet.

# ***Code Analysis worksheet for the 2009 International Existing Building Code with Massachusetts Amendments***

The following template was prepared by engineers who are members of the Massachusetts Structural Advisory Committee. The authors found this template useful in applying the Existing Building provisions for the Massachusetts State Building Code 8<sup>th</sup> Edition, and want to share this template with the structural engineering community. This is not an official document, and comes with no guarantee of accuracy or completeness. We hope you find it useful in applying the new code provisions.

## **[Project Name]**

### **Existing:**

- [Describe the existing conditions here. Include all relevant information needed to evaluate the code provisions.]

### **Planned:**

- [Describe the proposed modifications here. Include all relevant information needed to evaluate the code provisions.]

### **Summary**

#### Chapter 1 (Applicable to all three compliance methods):

- 

#### Prescriptive Compliance Method:

- 

#### Work Area Compliance Method:

- 

#### Performance Compliance Method:

-

## Chapter 1: Scope and Administration

Section	Title	N/A and comments
<b>101</b>	<b>GENERAL</b>	
<b>101.5.4.0</b>	<b>Mass amendment – Investigation and Evaluation.</b> Subject to Mass amendment 107.6 to the IBC, a written report is required to be submitted to the Building Official.	
<b>101.5.4.1</b>	<b>Mass amendment – IBC Level Seismic</b> Refer to Table 101.5.4.1.0	
<b>101.5.4.2 Exceptions</b>	<b>Mass amendment – Exceptions</b> 1. 50% 2009 IBC prescribed forces when directed to this section by 807.4.3 2a. 50% 2009 IBC prescribed forces when directed to this section by 1003.3.1 and the vertical addition increases the building area by 30% or less. 2b. 75% 2009 IBC prescribed forces when directed to this section by 1003.3.1 and the vertical addition increases the building area between 30% and 50%.	
<b>101.9</b>	<b>Mass amendment - Cumulative effects.</b>	
<b>101.9 Exceptions</b>	<b>Mass amendment - Cumulative effects must be considered except when <u>all</u>:</b> 1. Structural work does not involve more than 2% of the total tributary area of horizontal framing members of any existing framed floor or roof. 2. Structural work does not alter shear walls above the foundation. 3. Structural work does not alter columns or diagonal braces. 4. Structural work does not create an opening in any framed floor or roof that has an area more than 2% of the framed floor or roof. 5. Structural work does not alter any floor or roof diaphragm and its connections such that in-plane shear resistance is reduced by more than 5%. 6. Structural work does not remove or reconfigure lateral load resisting frames, or foundations supporting them.	
<b>101.10</b>	<b>Mass amendment - Masonry walls.</b> Must follow Appendix A1 where any of the following conditions exist: 1. Work area > 50% aggregate area 2. Occupancy increase by more than 25% <b>and</b> total occupancy is 100 or more. 3. Occupancy change to a relative hazard category of 1 or 2 per Table 912.5 or educational occupancy K to 12.	

	4. A Level 2 Alteration to Occupancy Category IV per ASCE 7-05 table 1-1.	
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<b>Chapter 3: Prescriptive Compliance Method</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>302</b>	<b>ADDITIONS</b>	
<b>302.1</b>	<b>General.</b>	
<b>302.2</b>	<b>Mass amendment - Flood hazard area.</b>	
<b>302.3</b>	<b>Mass amendment - Existing structural elements carrying gravity loads.</b>	
<b>302.3.1</b>	<b>Design live load</b>	
<b>302.4</b>	<b>Existing structural elements carrying lateral load</b>	
<b>302.4 Exception</b>	Is increase in demand capacity ratio (DCR) of existing lateral load-carrying elements with addition considered $\leq 10\%$ ?	
<b>302.4.1</b>	<b>Seismic</b>	
<b>303</b>	<b>ALTERATIONS</b>	
<b>303.1</b>	<b>General.</b>	
<b>303.2</b>	<b>Flood hazard area.</b>	
<b>303.3</b>	<b>Existing structural elements carrying gravity loads.</b>	
<b>303.3.1</b>	<b>Design live load</b>	
<b>303.4</b>	<b>Mass amendment - Existing structural elements carrying lateral load</b> Does the alteration: <ul style="list-style-type: none"> <li>▪ increase design lateral loads? or</li> <li>▪ create a structural irregularity? or</li> <li>▪ decrease the capacity?</li> </ul>	
<b>303.4 Exception</b>	Increase in demand capacity ratio (DCR) of existing lateral load-carrying elements with addition considered $\leq 10\%$ ?	
<b>303.4.1</b>	<b>Seismic</b>	
<b>303.5</b>	<b>Voluntary seismic improvements</b>	
<b>304</b>	<b>REPAIRS</b>	
<b>304.1</b>	<b>General.</b>	
<b>304.2</b>	<b>Substantial structural damage to vertical elements of the lateral-force resisting system.</b> (refer to definition of “substantial structural damage” in Chapter 2)	
<b>304.3</b>	<b>Substantial structural damage to gravity load-carrying components.</b>	
<b>304.4</b>	<b>Less than substantial structural damage.</b>	
<b>304.5</b>	<b>Mass amendment - Flood hazard area.</b>	
<b>307</b>	<b>CHANGE OF OCCUPANCY</b>	
<b>307.1</b>	<b>Conformance</b>	
<b>307.4</b>	<b>Structural</b>	

<b>307.4 Exceptions</b>	1. Level of performance and seismic safety equivalent to a new structure? 2. Occupancy category I or II to III and $S_{DS} < 0.33$ ?	
<b>308</b>	<b>HISTORIC BUILDINGS</b>	
<b>308.1</b>	<b>Historic buildings.</b>	
<b>308.2</b>	<b>Flood hazard areas</b>	

<b>Chapter 4: Classification of Work (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>402</b>	<b>REPAIRS</b>	
<b>403</b>	<b>ALTERATIONS—LEVEL 1</b>	
<b>404</b>	<b>ALTERATIONS—LEVEL 2</b>	
<b>405</b>	<b>Mass amendment - ALTERATIONS— LEVEL 3</b>	
<b>406</b>	<b>CHANGE OF OCCUPANCY</b>	
<b>407</b>	<b>ADDITIONS</b>	
<b>408</b>	<b>HISTORIC BUILDINGS</b>	
<b>409</b>	<b>RELOCATED BUILDINGS</b>	

<b>Chapter 5: Repairs (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>501</b>	<b>GENERAL</b>	
<b>501.1</b>	<b>Scope</b>	
<b>501.2</b>	<b>Conformance</b>	
<b>501.3</b>	<b>Flood hazard areas</b>	
<b>502</b>	<b>BUILDING ELEMENTS AND MATERIALS</b>	
<b>502.1</b>	<b>Existing building materials</b>	
<b>502.2</b>	<b>New and replacement materials</b>	
<b>506</b>	<b>STRUCTURAL</b>	
<b>506.1</b>	<b>General</b>	
<b>506.2.1</b>	<b>Repairs for less than substantial structural damage</b> (refer to definition of “substantial structural damage” in Chapter 2)	
<b>506.2.2</b>	<b>Repairs for substantial structural damage to vertical elements of the lateral-force-resisting system</b>	
<b>506.2.2.1</b>	<b>Evaluation</b> (determine whether building in predamaged state would comply with the IBC with reduced seismic forces per 101.5.4.2) (see Section 506.2.3.1 for additional trigger)	
<b>506.2.2.2</b>	<b>Extent of repair for compliant buildings</b> (if predamaged building was compliant with IBC per the evaluation, may repair to the predamaged state)	

<b>506.2.2.3</b>	<b>Extent of repair for noncompliant buildings</b> (specific requirements depending upon reason for damage)	
<b>506.2.3</b>	<b>Substantial structural damage to gravity load-carrying components</b> (repaired gravity components must comply with dead and live load requirements of IBC; snow loads must be considered if snow caused damage; undamaged gravity-load components that receive loads from damaged components must also comply)	
<b>506.2.3.1</b>	<b>Lateral-force resisting elements</b> (if damage was caused to the gravity load-carrying system by wind or seismic effects, then the building shall be evaluated in accordance with Section 506.2.2.1)	
<b>506.2.4</b>	<b>Flood hazard areas</b>	

### Chapter 6: Alterations—Level 1 (Work Area Compliance Method)

Section	Title	N/A and comments
<b>601</b>	<b>GENERAL</b>	
<b>601.3</b>	<b>Flood hazard areas</b>	
<b>606</b>	<b>STRUCTURAL</b>	
<b>606.1</b>	<b>General</b>	
<b>606.2</b>	<b>Mass amendment - Addition or replacement of roofing or replacement of equipment</b>	
<b>606.2 Exceptions</b>	<b>Mass amendment - Exceptions</b> 1. Dead load increase $\leq 5\%$ ? (need to include cumulative effects) 2. Conventional light-frame construction and dead load increase $\leq 5\%$ ? (need to include cumulative effects) 3. Second layer of roofing $\leq 3$ psf?	
<b>606.2.1</b>	<b>Mass amendment - Wall anchors for concrete and masonry buildings</b>	
<b>606.3</b>	<b>Additional requirements for reroof permits</b>	
<b>606.3.1</b>	<b>Mass amendment - Bracing for unreinforced masonry bearing wall parapets</b>	
<b>606.3.2</b>	<b>Mass amendment - Roof diaphragms resisting wind loads in high-wind regions</b> 1. Basic wind speed greater than 90 mph and occupancy category type III or IV 2. Basic wind speed is greater than or equal to 105 mph	

### Chapter 7: Alterations—Level 2 (Work Area Compliance Method)

Section	Title	N/A and comments
<b>701</b>	<b>GENERAL</b>	
<b>701.2</b>	<b>Alteration Level 1 compliance</b> (all Level 2 work must also comply with Level 1)	

	requirements)	
<b>701.3</b>	<b>Compliance</b> (all new construction must comply with IBC)	
<b>707</b>	<b>STRUCTURAL</b>	
<b>707.2</b>	<b>New structural members</b>	
<b>707.3</b>	<b>Minimum design loads</b>	
<b>707.4</b>	<b>Existing structural elements carrying gravity load</b>	
<b>707.4 Exceptions</b>	<b>Mass amendment - Exceptions</b> 1. Stress increase $\leq 5\%$ ? (need to include cumulative effects) 2. Group R? Less than 6 units? And conventional light-frame construction?	
<b>707.5</b>	<b>Existing structural elements resisting lateral load</b>	
<b>707.5.1</b>	<b>Mass amendment - Irregularities</b>	
<b>707.6</b>	<b>Voluntary lateral-force-resisting system alterations</b>	

<b>Chapter 8: Alterations—Level 3 (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>801</b>	<b>GENERAL</b>	
<b>801.2</b>	<b>Compliance</b> (all Level 3 work must also comply with Levels 1 and 2 requirements)	
<b>807</b>	<b>STRUCTURAL</b>	
<b>807.1</b>	<b>General</b>	
<b>807.2</b>	<b>New structural elements</b>	
<b>807.3</b>	<b>Existing structural elements carrying gravity load</b>	
<b>807.4</b>	<b>Structural alterations</b>	
<b>807.4 Exceptions</b>	1. Group R? Less than 6 units? And conventional light-frame construction? 2. Alterations on lowest story only? And no change of occupancy?	
<b>807.4.1</b>	<b>Evaluation and analysis</b>	
<b>807.4.2</b>	<b>Substantial structural alterations</b>	
<b>807.4.3</b>	<b>Mass amendment - Limited structural alteration</b>	

<b>Chapter 9: Change of Occupancy (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>902</b>	<b>SPECIAL USE AND OCCUPANCY</b>	
<b>902.1</b>	<b>Mass amendment - Compliance with the building code</b> (changes to certain occupancies require full compliance with the IBC)	
<b>902.2</b>	<b>Underground buildings</b>	
<b>907</b>	<b>STRUCTURAL</b>	
<b>907.1</b>	<b>Gravity loads</b>	

<b>907.1 Exception</b>	<b>Mass amendment - Exceptions</b> Stress increase $\leq 5\%$ ? (need to include cumulative effects)	
<b>907.2</b>	Snow or wind loads	
<b>907.2 Exception</b>	Is new occupancy with higher importance factor $\leq 10\%$ of the total floor area?	
<b>907.3</b>	<b>Seismic loads</b>	
<b>907.3.1</b>	Compliance with the IBC level seismic forces	
<b>907.3.1 Exceptions</b>	<ol style="list-style-type: none"> <li>1. Group M building to start with and is <math>&lt;</math> six stories and in Seismic Design Category A, B, or C?</li> <li>2. Equivalent level of performance and seismic safety approved by the building official?</li> <li>3. Is occupancy with the higher hazard category <math>\leq 10\%</math> of total building floor area and not classified as Occupancy Category IV?</li> <li>4. Unreinforced masonry in Occupancy Category III and in Seismic Design Category A or B? If so may use Appendix A1.</li> </ol>	
<b>907.3.2</b>	<b>Access to Occupancy Category IV</b>	

<b>Chapter 10: Additions (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>1001</b>	<b>GENERAL</b>	
<b>1001.1</b>	<b>Scope</b> (additions to comply with IBC; only that portion of existing building impacted by addition needs to comply with IEBC unless otherwise specified in IEBC)	
<b>1003</b>	<b>STRUCTURAL</b>	
<b>1003.1</b>	<b>Compliance with the IBC</b>	
<b>1003.2</b>	<b>Additional gravity loads</b>	
<b>1003.2 Exceptions</b>	<b>Mass amendment - Exceptions</b> <ol style="list-style-type: none"> <li>1. Stress increase <math>\leq 5\%</math>? (need to include cumulative effects)</li> <li>2. Group R? Less than 6 units? And conventional light-frame construction?</li> </ol>	
<b>1003.3</b>	<b>Lateral force-resisting system.</b>	
<b>1003.3 Exceptions</b>	<ol style="list-style-type: none"> <li>1. Group R? Less than 6 units? And conventional light-frame construction?</li> <li>2. Lateral-force story shear increase in any story <math>\leq 10\%</math> cumulative</li> </ol>	
<b>1003.3.1</b>	<b>Mass amendment - Vertical additions</b>	
<b>1003.3.2</b>	<b>Horizontal additions</b>	
<b>1003.3.3</b>	<b>Mass amendment - Voluntary addition of</b>	



	<b>structural elements to improve the lateral-force-resisting system</b>	
<b>1003.3.4</b>	<b>Mass amendment - Irregularities</b>	
<b>1003.4</b>	<b>Snow drift loads</b>	
<b>1003.4 Exceptions</b>	<b>Mass amendment - Exceptions</b> 1. Element stress increase $\leq 5\%$ ? (need to include cumulative effects) 2. Group R? Less than 6 units? And conventional light-frame construction?	
<b>1003.5</b>	<b>Mass amendment - Flood hazard area.</b>	

<b>Chapter 11: Historic Buildings (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>1101</b>	<b>GENERAL</b>	
<b>1101.1</b>	<b>Mass amendment - Scope</b>	
<b>1101.2</b>	<b>Report</b> (report to building official required if necessary in the opinion of the code official)	
<b>1101.4</b>	<b>Mass amendment - Flood hazard areas</b> (historical buildings are exempt)	
<b>1102</b>	<b>REPAIRS</b>	
<b>1102.1</b>	<b>General</b> (repairs may be made with original or like materials subject to provisions of Ch. 11)	
<b>1102.5</b>	<b>Mass amendment – Replacement</b>	
<b>1106</b>	<b>STRUCTURAL</b>	
<b>1106.1</b>	<b>Mass amendments - General</b> (must satisfy requirements for non-historical buildings, except code official may accept operational controls that limit live loads on floors that do not meet IBC LL requirements)	

<b>Chapter 12: Relocated or Moved Buildings (Work Area Compliance Method)</b>		
<b>Section</b>	<b>Title</b>	<b>N/A and comments</b>
<b>1201</b>	<b>GENERAL</b>	
<b>1201.2</b>	<b>Conformance</b> (Any repair, alteration, change of occupancy, field-fabricated items?)	
<b>1202</b>	<b>REQUIREMENTS</b>	
<b>1202.2</b>	<b>Foundation</b> (foundations and building connections to foundations must comply with IBC or IRC.)	
<b>1202.3</b>	<b>Wind loads</b> (comply with IBC or IRC except for exceptions.)	
<b>1202.4</b>	<b>Seismic loads</b> (comply with IBC or IRC except for exceptions.)	
<b>1202.5</b>	<b>Snow loads</b> (comply with IBC or IRC except for exceptions.)	
<b>1202.6</b>	<b>Flood hazard areas</b>	
<b>1202.7</b>	<b>Required inspection and repairs</b>	

### Chapter 13: Performance Compliance Method

Section	Title	N/A and comments
<b>1301</b>	<b>GENERAL</b> (Editorial Note: Refer to ATC-58: Next Generation Performance-Based Seismic Design Procedures for New and Existing Buildings)	
<b>1301.1</b>	<b>Scope</b> Maintain or Increase the current degree of public safety without requiring full compliance w/ Chapter 3 or Chapters 4-12	
<b>1301.2</b>	<b>Mass amendment - Applicability</b>	
<b>1301.3.4</b>	<b>Mass amendment - Peer review</b>	
<b>1301.4</b>	<b>Investigation and evaluation</b>	
<b>1301.4.1</b>	<b>Structural Analysis</b> Analysis of existing building and proposed alteration shall comply with IBC Chapter 16	
<b>1301.4.2</b>	<b>Submittal</b> Structural investigation and evaluation submitted to code official for review and approval	

### Appendix Chapter A1: Seismic Strengthening Provisions for Unreinforced Masonry Bearing Wall Buildings.

Section	Title	N/A and comments
<b>A102</b>	<b>SCOPE</b>	
<b>A102.1</b>	<b>Mass amendment - Scope</b> MA amendment 101.10 defines the scope as buildings with masonry walls – not just buildings with at least one unreinforced masonry bearing wall. Elements affected are listed in MA amended Table A1-A.	
<b>A102.2</b>	<b>Essential and hazardous facilities</b>	
<b>A105</b>	<b>GENERAL REQUIREMENTS</b>	
<b>A105.2</b>	<b>Alterations and repairs</b>	
<b>A105.3</b>	<b>Requirements for plans</b> Nine listed requirements for information to be shown on the construction documents including locations where testing is performed.	
<b>A105.4</b>	<b>Structural observation, testing and inspection</b> Seismic retrofit work New construction	
<b>A106</b>	<b>MATERIAL REQUIREMENTS</b>	
<b>A106.2</b>	<b>Mass amendment - Existing Materials</b> Condition of existing vertical-load or lateral-force carrying materials Other URM requirements: <ol style="list-style-type: none"> <li>1. Lay-up of masonry units</li> <li>2. Load-bearing units</li> <li>3. Compressive strength of plain concrete</li> </ol>	

	4. Use of NEW Table A106.2	
<b>Table A106.2</b>	<b>Mass amendment -Table 106.2</b>	
<b>A106.3</b>	<b>Existing unreinforced masonry</b>	
<b>A106.3.1</b>	<b>General</b>	
<b>A106.3.2</b>	<b>Lay-up of walls</b>	
<b>A106.3.2.1</b>	<b>Multiwythe solid brick</b>	
<b>A106.3.2.2</b>	<b>Grouted or ungrouted hollow concrete or clay block and structural hollow clay tile</b>	
<b>A106.3.2.3</b>	<b>Other lay-up patterns</b>	
<b>A106.3.3</b>	<b>Testing of masonry</b>	
<b>A106.3.3.1</b>	<b>Mortar tests</b> In-place shear tests Alternate procedures	
<b>A106.3.3.2</b>	<b>Alternate procedures for testing masonry</b> Solid masonry Hollow unit masonry Estimation	
<b>A106.3.3.3</b>	<b>Location of tests</b>	
<b>A106.3.3.4</b>	<b>Number of tests</b>	
<b>A106.3.3.5</b>	<b>Minimum quality of mortar</b> Minimum values (not requiring re-pointing or replacement of structural function) Retesting after re-pointing	
<b>A106.3.3.6</b>	<b>Minimum quality of masonry</b> Minimum average value of tensile-splitting strength	
<b>A106.3.3.7</b>	<b>Collar joints</b>	
<b>A106.3.3.8</b>	<b>Unreinforced masonry classes</b>	
<b>A106.3.3.9</b>	<b>Pointing</b>	
<b>A107</b>	<b>QUALITY CONTROL</b>	
<b>A107.1</b>	<b>Pointing</b>	
<b>A107.2</b>	<b>Masonry shear tests</b>	
<b>A107.3</b>	<b>Existing wall anchors</b>	
<b>A107.4</b>	<b>New bolts</b>	
<b>A107.4 Exception</b>	Special inspection of bolt installation	
<b>A108</b>	<b>DESIGN STRENGTHS</b>	
<b>A108.1</b>	<b>Values</b> Strength values for existing materials Capacity reduction factors Use of new materials	
<b>A108.2</b>	<b>Masonry shear strength</b> Using mortar shear strength Using tensile splitting strength Using estimated strength	
<b>A108.3</b>	<b>Masonry compression</b>	
<b>A108.4</b>	<b>Masonry tension</b>	
<b>A108.5</b>	<b>Existing tension anchors</b>	

<b>A108.6</b>	<b>Foundations</b>	
<b>A109</b>	<b>ANALYSIS AND DESIGN PROCEDURE</b>	
<b>A109.1</b>	Mass amendment – <b>General</b> (Table A1-A is modified.)	
<b>A109.2</b>	<b>Selection of procedure</b>	
<b>A110</b>	<b>GENERAL PROCEDURE</b>	
<b>A110.1</b>	<b>Minimum design lateral forces</b>	
<b>A110.2</b>	<b>Lateral forces on elements of structures</b>	
<b>A110.2</b> <b>Exceptions</b>	<b>Mass amendment – Exceptions</b> URM walls with h/t less than Table A1-B. (Table A1-B is modified.) Parapets complying with Section A113.6. Walls anchored to floor and roof diaphragms in accordance with A113.1.	
<b>A110.3</b>	<b>In-plane loading of URM shear walls and frames</b>	
<b>A110.4</b>	<b>Redundancy and overstrength factors</b>	
<b>A111</b>	<b>SPECIAL PROCEDURE</b>	
<b>A111.1</b>	<b>Limits for the application of the procedure</b> Flexible diaphragms. Masonry or concrete shear walls. A minimum of two lines of LFRS in each direction (except for 1-story buildings with an open front.)	
<b>A111.2</b>	<b>Lateral forces on elements of structures</b>	
<b>A111.3</b>	<b>Crosswalls</b>	
<b>A111.3.1</b>	<b>Crosswall definition</b>	
<b>A111.3.1</b> <b>Exceptions</b>	Crosswalls at all levels. Crosswalls below wood diaphragms within 4 feet of grade.	
<b>A111.3.2</b>	<b>Crosswall shear capacity</b>	
<b>A111.3.3</b>	<b>Existing crosswalls</b>	
<b>A111.3.4</b>	<b>New crosswalls</b>	
<b>A111.3.5</b>	<b>Other crosswall systems</b>	
<b>A111.4</b>	<b>Wood diaphragms</b>	
<b>A111.4.1</b>	<b>Acceptable diaphragm span</b>	
<b>A111.4.2</b>	<b>Demand-capacity ratios</b> Equations A1-9 through A1-12	
<b>A111.4.3</b>	<b>Chords</b>	
<b>A111.4.4</b>	<b>Collectors</b>	
<b>A111.4.5</b>	<b>Diaphragm openings</b> Corners of openings. Demand-capacity ratio adjacent to an opening. Openings in end quarter of diaphragm span.	
<b>A111.5</b>	<b>Diaphragm shear transfer</b> Lesser of equations A1-13 and A1-14	
<b>A111.6</b>	<b>Shear walls (In-plane loading)</b>	
<b>A111.6.1</b>	<b>Wall story force</b> Lesser of equations A1-15 and A1-16	

<b>A111.6.2</b>	<b>Wall story shear</b> Equation A1-17	
<b>A111.6.3</b>	<b>Shear wall analysis</b>	
<b>A111.6.4</b>	<b>Moment frames</b>	
<b>A111.7</b>	<b>Out-of-plane forces – unreinforced masonry walls</b>	
<b>A111.7.1</b>	<b>Mass amendment - Allowable unreinforced masonry wall height-to-thickness ratios</b> (Table A1-B is modified.)	
<b>A111.7.2</b>	<b>Walls with diaphragms in different regions</b>	
<b>A111.8</b>	<b>Open-front design procedure</b> Effective diaphragm span Diaphragm demand-capacity ratio	
<b>A112</b>	<b>ANALYSIS AND DESIGN</b>	
<b>A112.1</b>	<b>General</b> Applies to both Sections A110 and A111.	
<b>A112.2</b>	<b>Existing unreinforced masonry walls</b>	
<b>A112.2.1</b>	<b>Flexural rigidity</b>	
<b>A112.2.2</b>	<b>Shear walls with openings</b> Pier shear capacity and rocking shear capacity Rocking controlled and shear controlled modes of behavior Masonry pier tension stress	
<b>A112.2.3</b>	<b>Shear walls without openings</b> Equation A1-25	
<b>A112.3</b>	<b>Plywood-sheathed shear walls</b>	
<b>A112.4</b>	<b>Combinations of vertical elements</b>	
<b>A112.4.1</b>	<b>Lateral-force distribution</b>	
<b>A112.4.2</b>	<b>Moment-resisting frames</b>	
<b>A113</b>	<b>DETAILED SYSTEM DESIGN REQUIREMENTS</b>	
<b>A113.1</b>	<b>Wall anchorage</b>	
<b>A113.1.1</b>	<b>Anchor locations</b>	
<b>A113.1.2</b>	<b>Anchor requirements</b>	
<b>A113.1.3</b>	<b>Minimum wall anchorage</b>	
<b>A113.1.4</b>	<b>Anchors at corners</b>	
<b>A113.2</b>	<b>Diaphragm shear transfer</b>	
<b>A113.3</b>	<b>Collectors</b>	
<b>A113.4</b>	<b>Ties and continuity</b>	
<b>A113.5</b>	<b>Wall bracing</b>	
<b>A113.5.1</b>	<b>General</b>	
<b>A113.5.2</b>	<b>Vertical bracing members</b>	
<b>A113.5.3</b>	<b>Intermediate wall bracing</b>	
<b>A113.6</b>	<b>Mass amendment - Parapets</b> (Table A1-F is modified.) (See exception)	
<b>A113.7</b>	<b>Veneer</b> Anchor ties (see exception) Location and condition	

<b>A113.8</b>	<b>Nonstructural masonry walls</b>	
<b>A113.9</b>	<b>Truss and beam supports</b> (See exception)	
<b>A113.10</b>	<b>Mass amendment - Adjacent buildings</b> (Table A1-B is modified.)	
<b>A114</b>	<b>WALLS OF UNBURNED CLAY, ADOBE OR STONE MASONRY</b>	
<b>A114.1</b>	<b>Mass amendment - General</b> Height/Length to thickness ratios Maximum values Mortar for repointing (Table A1-G is modified.)	