IEBC

2016 GROUP B COMMITTEE ACTION HEARINGS

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2016 GROUP B – PROPOSED CHANGES TO THE INTERNATIONAL BUILDING CODE – STRUCTURAL

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TENTATIVE ORDER OF DISCUSSION
2016 PROPOSED CHANGES TO THE
INTERNATIONAL EXISTING BUILDING CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation does not necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some EB code change proposals may not be included on this list, as they are being heard by another committee.

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EB1-16

IEBC: 202 (New), 402.2 (New), 606.2.2 (New).

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new definition as follows:

SECTION 202 DEFINITIONS

DISPROPORTIONATE EARTHQUAKE DAMAGE. A condition of earthquake-related damage where:

1. The 0.3-second spectral acceleration at the building site as estimated by the United States Geological Survey for the earthquake in question is less than 0.40 g; and
2. The vertical elements of the lateral force resisting system have suffered damage such that the lateral load-carrying capacity of any story in any horizontal direction has been reduced by more than 10 percent from its predamage condition.

Add new text as follows:

402.2 Disproportionate earthquake damage A building assigned to seismic design category D, E, or F that has sustained disproportoinate earthquake damage shall be subject to the requirements for buildings with substantial structural damage to vertical elements of the lateral force-resisting system.

606.2.2 Disproportionate earthquake damage A building assigned to seismic design category D, E, or F that has sustained disproportoinate earthquake damage shall be subject to the requirements for buildings with substantial structural damage to vertical elements of the lateral force-resisting system.

Reason: This proposal complements and completes the code's current intent: To identify especially vulnerable buildings at critical points in their useful lives, and to require evaluation and possibly upgrade.
Current provisions already identify substantially damaged buildings and, for those found to be especially vulnerable, the code requires a seismic upgrade. The high damage threshhold (33 percent capacity loss) is appropriate, but it will only ever be reached where the earthquake shaking was also high. That is, the current provision fails to find other equally or even more vulnerable buildings in the same community that happened to be outside the area of strongest shaking.

This proposal uses an earthquake as an opportunity to find and proactively improve a community's most vulnerable buildings -- those prone to Disproportionate Earthquake Damage (DED). As proposed, DED exists where the building has significant damage in even a very small earthquake. This damage is an indicator of severe damage, possibly collapse, in a future larger event. Where DED is found, the building would be subject to evaluation with reduced loads and possibly a triggered retrofit, again with reduced loads.

The proposal is rational and measured. Note:

- It only applies in Seismic Design Category D, E, and F, so it will not have surprising effects in communities otherwise unprepared or unaware of earthquakes.
- It only applies where the measured shaking is low -- 0.3 second spectral acceleration under 0.4 g -- less than about 40 percent of design basis loads for new buildings.
- It applies where, even under these small loads, the damage is significant. The proposed capacity loss threshhold of 10 percent might appear small, but in SDC D-F, with spectral acceleration less than 0.4g, any decent bulding really should have zero structural damage.
- Reduced loads are allowed for any DED-triggered evaluation or retrofit.
- One- and two-family dwellings are completely exempt, as they are from retrofits triggered by substantial structural damage.

Cost Impact: Will increase the cost of construction
For buildings in regions of high seismicity that sustain unexpected, or "disproportionate," earthquake damage, the proposed provision will increase the costs associated with post-earthquake repair. It is also likely that the upgrades so triggered will significantly REDUCE repair costs in subsequent damaging events.

EB1-16 : 402.2 (NEW)-BONOWITZ12266

EB2-16

IEBC: , 202 (New), 403.12 (New), 403.12.1 (New), 403.12.2 (New), 403.12.3 (New), 403.3.1.1 (New), 403.3.2 (New), 807.3.1 (New), 807.4.1 (New), 808 (New), 808.1 (New), 808.2 (New), 808.3 (New), 808.4 (New).

Proponent : Joseph Cain, SunEdison, representing Solar Energy Industries Association (SEIA) (joecainpe@aol.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new definition as follows:

SECTION 202 DEFINITIONS

PHOTOVOLTAIC MODULE. A complete, environmentally protected unit consisting of solar cells, optics and other components, exclusive of tracker, designed to generate electricity when exposed to sunlight.

Add new text as follows:

SECTION 202 DEFINITIONS

PHOTOVOLTAIC PANEL. A collection of modules mechanically fastened together, wired and designed to provide a field-installable unit.

SECTION 202 DEFINITIONS

PHOTOVOLTAIC PANEL SYSTEM. A system that incorporates discrete photovoltaic panels, that converts radiation into electricity, including rack support systems.

403.3.1.1 Live load at photovoltaic panel systems. Where *photovoltaic panel systems* are to be installed over existing roofs, the roof live load need not be applied to the roof area covered by *photovoltaic panels* where the clear height between the *photovoltaic panels* and the roof is 42 in. (1067 mm) or less. In roof areas not covered by *photovoltaic panels,* live load shall be as specified in Section 403.3.1.

403.3.2 Existing structural elements carrying photovoltaic panel systems Where *photovoltaic panel systems* are installed on existing roof structures, structural elements that provide support for *photovoltaic panel systems* shall be designed, or analyzed, in accordance with the *International Building Code* for deflection and ponding.

403.12 Photovoltaic panel systems. Design and installation of *photovoltaic panel systems* shall comply with this section, the *International Fire Code,* and *NFPA 70.*

403.12.1 Roof live load. Where *photovoltaic panel systems* are installed on existing buildings, roof live load shall be permitted to be offset according to Section 403.3.1.1.

403.12.2 Snow load. Where applicable, snow drift loads created by the *photovoltaic panel system* shall be considered in the analysis and design.

403.12.3 Ballasted photovoltaic panel systems. Ballasted, roof-mounted *photovoltaic panel systems* need not be rigidly attached to the roof or supporting structure. Ballasted nonpenetrating systems shall be designed and installed only on roofs with slopes not more than one unit vertical in 12 units horizontal. Ballasted nonpenetrating systems shall be designed to resist sliding and uplift resulting from lateral and vertical forces as required by the *International Building Code,* using a coefficient of friction determined by acceptable engineering principles. In structures assigned to Seismic Design Category C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by *approved* analysis or shake table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.

807.3.1 Live load at photovoltaic panel systems. Where *photovoltaic panel systems* are to be installed over existing roofs, the roof live load need not be applied to the roof area covered by *photovoltaic panels* where the clear height between the *photovoltaic panels* and the roof is 42 in. (1067 mm) or less. In roof areas not covered by *photovoltaic panels,* live load shall be as specified in Section 807.3.

807.4.1 Existing structural elements carrying photovoltaic panel systems. Where *photovoltaic panel systems* are installed on existing roof structures, structural elements that provide support for *photovoltaic panel systems* shall be designed, or analyzed, in accordance with the *International Building Code* for deflection and ponding.

SECTION 808 PHOTOVOLTAIC PANEL SYSTEMS

808.1 General. Design and installation of *photovoltaic panel systems* shall comply with this section, the *International Fire Code,* and *NFPA 70.*

808.2 Roof live load. Where *photovoltaic panel systems* are installed on existing buildings, roof live load shall be permitted to be offset according to Section 807.3.1.

808.3 Snow load. Where applicable, snow drift loads created by the *photovoltaic panel system* shall be considered in the analysis and design.

808.4 Ballasted photovoltaic panel systems. Ballasted, roof-mounted *photovoltaic panel systems* need not be rigidly attached to the roof or supporting structure. Ballasted nonpenetrating systems shall be designed and installed only on roofs with slopes not more than one unit vertical in 12 units horizontal. Ballasted nonpenetrating systems shall be designed to resist sliding and uplift resulting from lateral and vertical forces as required by the *International Building Code,* using a coefficient of friction determined by acceptable engineering principles. In structures assigned to Seismic Design Category C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by *approved* analysis or shake table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.

Reason: This proposal is intended to introduce provisions for photovoltaic panel systems into the International Existing Building Code (IEBC) for the first time. Structural provisions first entered the International Building Code (IBC) in the 2012 edition. Additional structural provisions were added in the 2015 IBC and the 2015 International Residential Code. Still, the 2015 IEBC is silent on solar. In today's market, the vast majority of rooftop solar installations are on existing buildings, so it is important to begin to include provisions in the IEBC. The provisions in this proposal should not be considered as all-inclusive, but should serve as a suitable introduction of photovoltaic panel systems into the IEBC. The definitions proposed for IEBC Section 202 are based on the definitions already approved for the IBC and IRC. These definitions are consistent with NFPA 70, the National Electrical Code (NEC), with minor modifications. In this proposal, there is one deviation from the IBC and IRC (and NEC) definitions. In the definition of photovoltaic module, "DC power" (as occurs in IBC and IRC definitons) has been modified to "electricity," in recognition of innovation toward creating solar panels with integrated power electronics such that the panel produces AC power. In the IEBC, it is more important that the modules produce electricity than whether it is DC power or AC power.

In this proposal:

1. Sections 403.1.1 and 807.3.1 Live load are based on 2015 IBC Section 1607.12.5.1, with the exception of the height threshold for offset of live load. See separate discussion below for live load threshold.

2. Sections 403.3.2 and 807.4.1, including ponding check, are based on 2015 IBC Section 1607.12.5.4.

3. Sections 403.12 and 808.1 General are based on 2018 IBC Section 3111, as approved under ICC Group A development.

4. Sections 403.12.2 and 808.3 Snow load are based on 2015 IBC Section 1607.12.5.2.

5. Sections 403.12.3 and 808.4 Ballasted photovoltaic panel systems are based on 2015 IBC Sections 1607.12.5.4 and 1613.6.

If the reader is interested in the reason behind a 42 inch threshold for roof live load as opposed to the present 24 inch threshold in the 2015 IBC, additional information is provided below. This information is extracted from a parallel proposal to revise the IBC threshold.

This proposal seeks to revise the threshold for offset of live load from 24 inches to 42 inches. The Structural Engineers Association of California (SEAOC) PV Systems committee has conducted lengthy conversations on this topic, and is in agreement that 42 inches is a more reasonable threshold than 24 inches.

The following excerpt is from *Recommended Design Live Loads for Rooftop Solar Arrays,* by Colin Blaney, S.E. of ZFA Structural Engineers and Ron LaPlante, S.E. of the California Division of State Architect, Structural Safety (DSA SS):

The other significant question was whether or not live loads should be included under raised low to medium profile PV panel systems to account for either maintenance worker loads or other special loads. This would include loads such as storage, including temporary stacking of re-roofing materials. This question was discussed at length along with the term "inaccessible" that is used in DSA IR 16-8 and 2015 IBC Section 1607.12.5.1. The discussion centered around whether it is meant to be used to identify the local space below a PV system or the entire roof top area that may be only "accessible" through a locked stair tower or hatch. After lengthy deliberations, the Task Group agreed to set a clear height cut off of 42". Under arrays taller than the cut off, uniform and concentrated live loads must be considered on the covered roof areas where the below-panel dimension exceeds this limit in addition to the uncovered areas. The 42" cut off is similar to uninhabitable attic spaces where storage loads need not be considered per 2012 IBC Table 1607.1 footnotes i & j. The Task Group also felt that it would be highly unlikely that any building owners or maintenance workers would store items of any significance below such systems as they would be exposed to the weather and could easily block roof drainage. It was also agreed that the term "inaccessible" should not apply to general roof access when discussed in context of eliminating roof live loads from consideration.

Footnotes i and j of 2015 IBC Table 1607.1 read as follows:

i. Uninhabitable attics without storage are those where the maximum clear height between the joists and rafters is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.

j. Uninhabitable attics with storage are those where the maximum clear height between the joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.

This proposal strives to establish a reasonable threshold for live load. Roof live load is defined as: "A load on a roof produced: 1) During maintenance by workers, equipment and materials; 2) During the life of the structure by movable objects such as planters or other small decorative appurtenances that are not occupancy related; 3) By the use and occupancy of the roof such as for roof gardens or assembly areas." In this definition, item 1 is most relevant for the space beneath photovoltaic panel systems. It is unlikely a person will be beneath a photovoltaic panel system for maintenance if the clear vertical height is 24 inches or less. This would require a maintenance worker to slide under the panels on back or belly, and would not allow working space. It is more reasonable to assume a person could be beneath the system for maintenance if the clear vertical height is 42 inches or greater.

Bibliography: *Recommended Design Live Loads for Rooftop Solar Arrays,* Colin Blaney S.E. and Ronald W. LaPlante S.E., SEAOC Conference Proceedings, 2013.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction, as it is intended to harmonize the IEBC with structural provisions already established in the IBC.

EB2-16 : 403.3.1.1 (NEW)-CAIN11182

EB3-16

IEBC: [A] 101.6, 202, [BS] 404.2, [BS] 404.2.3, [BS] 404.3.1, [BS] 606.2.2, [BS] 606.2.2.3, [BS] 606.2.3.1, [BS] A101.1, [BS] A501.1, [BS] A503.1

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete without substitution:

SECTION 202 DEFINITIONS

~~**202 [BS] REHABILITATION, SEISMIC** Work conducted to improve the seismic lateral force resistance of an *existing building.*~~

Revise as follows:

[BS] 404.2 Substantial structural damage to vertical elements of the lateral force-resisting system. A building that has sustained *substantial structural damage*to the vertical elements of its lateral force-resisting system shall be evaluated and repaired in accordance with the applicable provisions of Sections 404.2.1 through 404.2.3.

Exceptions:

1. Buildings assigned to Seismic Design Category A, B or C whose substantial structural damage was not caused by earthquake need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.
2. One- and two-family dwellings need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.

[BS] 404.2.3 Extent of repair for noncompliant buildings. If the evaluation does not establish compliance of the predamage building in accordance with Section 404.2.1, then the building shall be ~~rehabilitated~~ retrofitted to comply with applicable provisions of the *International Building Code*for load combinations that include wind or seismic loads. The wind loads~~ for the repair~~ shall be as required by the building code in effect at the time of original construction, unless the damage was caused by wind, in which case the wind loads shall be as required by the *International Building Code*. ~~Earthquake~~ The earthquake loads~~ for this rehabilitation design~~ shall be those required for the design of the predamage building, but not less than 75 percent of those prescribed in Section 1613 of the *International Building Code*. New structural members and connections required by this ~~rehabilitation~~ retrofit design shall comply with the detailing provisions of the *International Building Code*for new buildings of similar structure, purpose and location. Alternatively, compliance with ASCE 41, using the performance objective in Table 301.1.4.2 for the applicable risk category, shall be deemed to meet the earthquake ~~rehabilitation~~ retrofit requirement.

[BS] 404.3.1 Lateral force-resisting elements. Regardless of the level of damage to vertical elements of the lateral force-resisting system, if *substantial structural damage*to gravity load-carrying components was caused primarily by wind or earthquake effects, then the building shall be evaluated in accordance with Section 404.2.1 and, if noncompliant, ~~rehabilitated~~ retrofitted in accordance with Section 404.2.3.

Exceptions:

1. One- and two-family dwellings need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.
2. Buildings assigned to Seismic Design Category A, B or C whose substantial structural damage was not caused by earthquake need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.

[BS] 606.2.2 Substantial structural damage to vertical elements of the lateral force-resisting system. A building that has sustained *substantial structural damage*to the vertical elements of its lateral force-resisting system shall be evaluated in accordance with Section 606.2.2.1, and either repaired in accordance with Section 606.2.2.2 or repaired and ~~rehabilitated~~ retrofitted in accordance with Section 606.2.2.3, depending on the results of the evaluation.

Exceptions:

1. Buildings assigned to Seismic Design Category A, B, or C whose substantial structural damage was not caused by earthquake need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.
2. One- and two-family dwellings need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.

[BS] 606.2.2.3 Extent of repair for noncompliant buildings. If the evaluation does not establish that the building in its predamage condition complies with the provisions of Section 606.2.2.1, then the building shall be ~~rehabilitated~~ retrofitted to comply with the provisions of this section. The wind loads for the *repair*and ~~*rehabilitation*~~ retrofit shall be those required by the building code in effect at the time of original construction, unless the damage was caused by

wind, in which case the wind loads shall be in accordance with the *International Building Code*. The seismic loads for this ~~*rehabilitation*~~ retrofit design shall be those required by the building code in effect at the time of original construction, but not less than the reduced *International Building Code*-level seismic forces.

[BS] 606.2.3.1 Lateral force-resisting elements. Regardless of the level of damage to gravity elements of the lateral force-resisting system, if substantial structural damage to gravity load-carrying components was caused primarily by wind or seismic effects, then the building shall be evaluated in accordance with Section 606.2.2.1 and, if noncompliant, ~~rehabilitated~~ retrofitted in accordance with Section 606.2.2.3.

Exceptions:

1. Buildings assigned to Seismic Design Category A, B, or C whose substantial structural damage was not caused by earthquake need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.
2. One- and two-family dwellings need not be evaluated or ~~rehabilitated~~ retrofitted for load combinations that include earthquake effects.

[A] 101.6 Appendices. The *code official*is authorized to require ~~rehabilitation and~~ retrofit of buildings, structures or individual structural members in accordance with the appendices of this code if such appendices have been individually adopted.

[BS] A101.1 Purpose. The purpose of this chapter is to promote public safety and welfare by reducing the risk of death or injury that may result from the effects of earthquakes on existing unreinforced masonry bearing wall buildings.

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

[BS] A501.1 Purpose. The purpose of this chapter is to promote public safety and welfare by reducing the risk of death or injury that may result from the effects of earthquakes on concrete buildings and concrete frame buildings.

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

[BS] A503.1 General. This chapter provides a three-tiered procedure to evaluate the need for *seismic* ~~*rehabilitation*~~ *retrofit*of existing concrete buildings. The evaluation shall show that the *existing building*is in compliance with the appropriate part of the evaluation procedure as described in Sections A505, A506 and A507, or shall be modified to conform to the respective acceptance criteria. This chapter does not preclude a building from being evaluated or modified to conform to the acceptance criteria using other well-established procedures, based on rational methods of analysis in accordance with principles of mechanics and approved by the authority having jurisdiction.

Reason: The proposal removes an unnecessary definition -- Seismic Rehabilitation -- and updates the related wording throughout the code from "rehabilitation" to "retrofit." (Sections where "rehabilitation" is used to mean anything other than seismic or wind upgrade remain unchanged, as does the definition of Rehabilitation as a stand-alone term.)
The term "rehabilitation" appears throughout the code, but almost always in the context of "seismic rehabilitation" -- but without the modifier "seismic." Thus, the existence of these two definitions is inconsistent with the code text and potentially confusing. The proposal removes this confusion by using the preferred term, "retrofit" wherever seismic or wind improvements are at issue.

The definition of Seismic Rehabilitation could have been changed to Seismic Retrofit, but frankly, such a definition is not needed, and in many cases the term "rehabilitation" (or, as proposed, "retrofit") is used without the extra word. Also, there is no parallel term for Wind Retrofit or Wind Rehabilitation.

Section 101.6 refers to the appendices. Appendices A and C use the term retrofit, not rehabilitation, for seismic and wind improvements respectively, so 101.6 can be revised accordingly.

The former standard for "seismic rehabilitation," ASCE 41-06, is no longer referenced by the code. Instead, the code references ASCE 41-13, which has changed its title to use "seismic retrofit."

Cost Impact: Will not increase the cost of construction
The change is editorial so there are not changes to construction requirements.

EB3-16 : [BS] 404.2-BONOWITZ12099

EB4-16

IEBC: 202, [BS] 301.1.4.1, TABLE [BS] 301.1.4.1, [BS] 301.1.4.2, TABLE [BS] 301.1.4.2

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE STRUCTURAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

SECTION 202 DEFINITIONS

[BS] SEISMIC ~~LOADING~~ FORCES The loads, forces, and related requirements prescribed herein, related to the response of the ~~structure~~ building to earthquake motions, to be used in the analysis and design of the structure and its components. Seismic forces are considered either full or reduced, as provided in Chapter 3.

[BS] 301.1.4.1 Compliance with ~~International Building Code-level~~ full seismic forces. Where compliance ~~with~~ requires the ~~seismic design provisions~~ use of ~~the International Building Code is required~~ full seismic forces, the criteria shall be in accordance with one of the following:

1. One-hundred percent of the values in the International Building Code. Where the existing seismic force-resisting system is a type that can be designated as "Ordinary," values of R, Ω_0 and C_d used for analysis in accordance with Chapter 16 of the International Building Code shall be those specified for structural systems classified as "Ordinary" in accordance with Table 12.2-1 of ASCE 7, unless it can be demonstrated that the structural system will provide performance equivalent to that of a "Detailed," "Intermediate" or "Special" system.
2. ASCE 41, using a Tier 3 procedure and the twolevel performance objective in Table 301.1.4.1 for the applicable risk category.

TABLE [BS] 301.1.4.1
PERFORMANCE OBJECTIVES FOR USE IN ASCE 41 FOR COMPLIANCE WITH ~~INTERNATIONAL BUILDING CODE-LEVEL~~ FULL SEISMIC FORCES

[BS] 301.1.4.2 Compliance with reduced ~~International Building Code-level~~ seismic forces. Where seismic evaluation and design is permitted to ~~meet~~ use reduced ~~*International Building Code*~~ seismic ~~force levels~~ forces, the criteria used shall be in accordance with one of the following:

1. The*International Building Code*using 75 percent of the prescribed forces. Values of R, Ω_0 and C_d used for analysis shall be as specified in Section 301.1.4.1 of this code.
2. Structures or portions of structures that comply with the requirements of the applicable chapter in Appendix A as specified in Items 2.1 through 2.5 and subject to the limitations of the respective Appendix A chapters shall be deemed to comply with this section.
    - 2.1. The seismic evaluation and design of unreinforced masonry bearing wall buildings in Risk Category I or II are permitted to be based on the procedures specified in Appendix Chapter A1.
    - 2.2. Seismic evaluation and design of the wall anchorage system in reinforced concrete and reinforced masonry wall buildings with flexible diaphragms in Risk Category I or II are permitted to be based on the procedures specified in Chapter A2.
    - 2.3. Seismic evaluation and design of cripple walls and sill plate anchorage in residential buildings of light-frame wood construction in Risk Category I or II are permitted to be based on the procedures specified in Chapter A3.
    - 2.4. Seismic evaluation and design of soft, weak, or open-front wall conditions in multiunit residential buildings of wood construction in Risk Category I or II are permitted to be based on the procedures specified in Chapter A4.
    - 2.5. Seismic evaluation and design of concrete buildings assigned to Risk Category I, II or III are permitted to be based on the procedures specified in Chapter A5.
3. ASCE 41, using the performance objective in Table 301.1.4.2 for the applicable risk category.

TABLE [BS] 301.1.4.2
PERFORMANCE OBJECTIVES FOR USE IN ASCE 41 FOR COMPLIANCE WITH REDUCED ~~INTERNATIONAL BUILDING CODE-LEVEL~~ SEISMIC FORCES

a. Tier 1 evaluation at the Damage Control performance level shall use the Tier 1 Life Safety checklists and Tier 1 Quick Check provisions midway between those specified for Life Safety and Immediate Occupancy performance.

Reason: This proposal simplifies the code's terminology, increasing usability and reducing potential errors.
The terms "International Building Code-level seismic forces" and "reduced International Building Code-level seismic forces" are unwieldy and potentially confusing. The long terms disrupt a reader's flow. The use of two long labels, one of which is entirely embedded in the other, is a recipe for confusion and error. Further, one could argue that neither term is actually technically accurate either, since the listed criteria actually allow sometimes significant departures from the IBC's prescriptive provisions (which themselves adopt ASCE 7).

Is there anything wrong with just saying "full seismic loads" or "reduced seismic loads"? That's how code users refer to the different options, and it would benefit the code to substitute these simpler terms.

The proposal also makes a coordinated change to the existing definition of "seismic loading." By itself, this term is unnecessary and could be deleted from the code entirely (it's not even used in 301.1.4, and there's no simiar "wind loading" or "snow loading"). However, the definition can be put to good use to formalize the "full" and "reduced" terminology proposed here. By revising the definition as proposed, IEBC provisions can now just refer to "full seismic loads" or "reduced seismic loads."

NOTE: The proposal does not show every place where one of the two current terms would need to be replaced. If the proposal is approved, this can be done by staff during the course of editing.

Cost Impact: Will not increase the cost of construction
This change is editorial, so there are no changes to construction requirements.

EB4-16 : [BS] 301.1.4.1-BONOWITZ12741

EB5-16

IEBC: 202

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete without substitution:

SECTION 202 DEFINITIONS

~~**202 [BS] SEISMIC LOADING** The forces prescribed herein, related to the response of the structure to earthquake motions, to be used in the analysis and design of the structure and its components.~~

Reason: The proposal removes an unneeded and generic definition. There is no similar definition for "wind loading" or "snow loading," etc. The IBC already includes an adequate definition of "loads" in general. The term "seismic loads" is used in various structural provisions, but always with reference to the applicable section in Chapter 3, where seismic evaluation and design criteria are already fully described.

Cost Impact: Will not increase the cost of construction
Proposal is editorial so there is no change in construction requirements.

EB5-16 : 202-[BS] SEISMIC LOADING-BONOWITZ12097

EB6-16

IEBC: 202 (New), [BS] 907.4.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new definition as follows:

SECTION 202 DEFINITIONS

SUBSTANTIAL STRUCTURAL ALTERATION. An alteration in which the gravity load-carrying structural elements altered within a 5-year period support more than 30 percent of the total floor and roof area of the building or structure. The areas to be counted toward the 30 percent shall include mezzanines, penthouses, and in-filled courts and shafts tributary to the altered structural elements.

Revise as follows:

[BS] 907.4.2 Substantial structural alteration. Where ~~more than 30 percent of~~ the ~~total floor and roof areas of the building or structure have been or are proposed to be involved in~~ work involves a substantial structural ~~*alteration* within a 5-year period~~ alteration, the evaluation and analysis shall demonstrate that the lateral load-resisting system of the altered building or structure complies with the *International Building Code*for wind loading and with reduced *International Building Code*-level seismic forces in accordance with Section 301.1.4.2. ~~The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load carrying components, such as joists, beams, columns, walls and other structural components that have been or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.~~

Reason: The proposal takes existing wording from Section 907.4.2 that is already written as a de facto definition and makes into an actual definition in Chapter 2. This simplifies Section 907.4.2 and improves the consistency of the code with respect to similar concepts and definitions. Section 907.4.4, which references the term already, need not be revised.
In making the change, some redundant commentary-like text (about tributary areas and listing types of gravity load carrying elements) is removed for clarity, with no loss of substance.

Cost Impact: Will not increase the cost of construction
The proposal is an editorial clarification so there are not changes in construction requirements.

EB6-16 : [BS] 907.4.2-BONOWITZ12098

EB7-16

IEBC: 301.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

301.1 General. The *repair*, *alteration*, *change of occupancy*, *addition*or relocation of all *existing buildings*shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other. Where this code requires consideration of the seismic forceresisting system of an *existing building*subject to *repair*, *alteration*, *change of occupancy*, *addition*or relocation of *existing buildings,* the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

> **Exception:**Subject to the approval of the *code official*, *alterations*complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code~~ unless the building is undergoing more than a limited structural *alteration* as defined in Section 907.4.4~~. New structural members added as part of the *alteration*shall comply with the *International BuildingCode*. ~~*Alterations of existing buildings*~~ This exception shall not apply to alterations that consitute substantial improvement in *flood hazardareas, which*shall comply with Section 701.3. This exception shall not apply to the structural provisions of Chapter 4 or to the structural provisions of Sections 707, 807, and 907.

Reason: This proposal retains the exception that allow s the code official to w aive certain architectural and other requirements that the IEBC w ould normally trigger in alteration projects. It removes that exception, how ever, regarding structural provisions.
The current exception already does not apply to alterations in flood hazard areas (w hich sometimes trigger structural improvements) or to substantial structural alterations. So the proposal does not change those cases at all.

Since the existing structural provisions for alterations are already measured, already allow reduced loads and alternative criteria in many cases, and already trigger structural improvements only in rare and severe cases, the proposed change to this exception should have little impact except to affirm that structural safety is fundamental to the code's intent.

By rolling back the blanket w aiver for structural safety issues, the proposal helps code officials enforce the code as intended. It prevents the IEBC's basic structural requirements from being undermined by a permit applicant's pressure to receive a discretionary w aiver.

As a secondary matter, it is w orth noting that the existing exception is unclear. It refers to "law s in existence at the time the building ... w as built." But if the intent is to w aive requirements triggered by alterations, this language ignores, or forgets, the fact that older codes for a long time had alteration provisions that triggered structural upgrade -- often w ith requirements more onerous than those in the current IEBC. So does a permit applicant claiming compliance w ith the "law s in existence" a generation ago also intend to comply w ith those outdated triggers? Thie proposal removes that potential confusion.

Cost Impact: Will not increase the cost of construction
This proposal w ill not increase the cost of construction, but it could, hypothetically, limit the cases in w hich the code official could effectively reduce the cost of construction by w aiving structural safety requirements. In practice, no increase in the cost of construction should be expected, how ever, since the proposal does not change any of the code's provisions, but only changes w hat w as a discretionary w aiver.

EB7-16 : 301.1-BONOWITZ12189

EB8-16

IEBC: A501, A502, A503, A504, A505, A506, A507, [BS] 301.1.4.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 301.1.4.2 Compliance with reduced International Building Code-level seismic forces. Where seismic evaluation and design is permitted to meet reduced *International Building Code*seismic force levels, the criteria used shall be in accordance with one of the following:

1. The*International Building Code*using 75 percent of the prescribed forces. Values of R, Ω_0 and C_d used for analysis shall be as specified in Section 301.1.4.1 of this code.
2. Structures or portions of structures that comply with the requirements of the applicable chapter in Appendix A as specified in Items 2.1 through ~~2.5~~ 2.4 and subject to the limitations of the respective Appendix A chapters shall be deemed to comply with this section.
    - 2.1. The seismic evaluation and design of unreinforced masonry bearing wall buildings in Risk Category I or II are permitted to be based on the procedures specified in Appendix Chapter A1.
    - 2.2. Seismic evaluation and design of the wall anchorage system in reinforced concrete and reinforced masonry wall buildings with flexible diaphragms in Risk Category I or II are permitted to be based on the procedures specified in Chapter A2.
    - 2.3. Seismic evaluation and design of cripple walls and sill plate anchorage in residential buildings of light-frame wood construction in Risk Category I or II are permitted to be based on the procedures specified in Chapter A3.
    - 2.4. Seismic evaluation and design of soft, weak, or open-front wall conditions in multiunit residential buildings of wood construction in Risk Category I or II are permitted to be based on the procedures specified in Chapter A4.
    - ~~2.5. Seismic evaluation and design of concrete buildings assigned to Risk Category I, II or III are permitted to be based on the procedures specified in Chapter A5.~~
3. ASCE 41, using the performance objective in Table 301.1.4.2 for the applicable risk category.

APPENDIX A Guidelines for the Seismic Retrofit of Existing Buildings
Delete without substitution:

~~**CHAPTER PART A5 — EARTHQUAKE HAZARD REDUCTION IN EXISTING CONCRETE BUILDINGS**~~

~~**SECTION A501 PURPOSE**~~

~~**SECTION A502 SCOPE**~~

~~**SECTION A503 GENERAL REQUIREMENTS**~~

~~**SECTION A504 SITE GROUND MOTION**~~

~~**SECTION A505 TIER 1 ANALYSIS PROCEDURE**~~

~~**SECTION A506 TIER 2 ANALYSIS PROCEDURE**~~

~~**SECTION A507 TIER 3 ANALYSIS PROCEDURE**~~

Reason: This proposal deletes Chapter A5 from Appendix A.
With recent revisions to both Chapter A5 and ASCE 41, this appendix chapter is no longer needed and provides no benefit relative to the procedures in ASCE 41 that are already allowed by the IEBC.

Cost Impact: Will not increase the cost of construction
This is redundancy with reference standard, so there will be no change in construction.

EB8-16 : [BS] 301.1.4.2-BONOWITZ12880

EB9-16

IEBC: [BS] 301.1.4.2.

Proponent : Jennifer Goupil, AMERICAN SOCIETY OF CIVIL ENGINEERS, representing SELF (jgoupil@asce.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 301.1.4.2 Compliance with reduced International Building Code-level seismic forces. Where seismic evaluation and design is permitted to meet reduced *International Building Code*seismic force levels, the criteria used shall be in accordance with one of the following:

1. The*International Building Code*using 75 percent of the prescribed forces. Values of R, Ω_0 and C_d used for analysis shall be as specified in Section 301.1.4.1 of this code.
2. Structures or portions of structures that comply with the requirements of the applicable chapter in Appendix A as specified in Items 2.1 through 2.5 and subject to the limitations of the respective Appendix A chapters shall be deemed to comply with this section.
    - 2.1. The seismic evaluation and design of unreinforced masonry bearing wall buildings in Risk Category I or II are permitted to be based on the procedures specified in Appendix Chapter A1.
    - 2.2. Seismic evaluation and design of the wall anchorage system in reinforced concrete and reinforced masonry wall buildings with flexible diaphragms in Risk Category I or II are permitted to be based on the procedures specified in Chapter A2.
    - 2.3. Seismic evaluation and design of cripple walls and sill plate anchorage in residential buildings of light-frame wood construction in Risk Category I or II are permitted to be based on the procedures specified in Chapter A3.
    - 2.4. Seismic evaluation and design of soft, weak, or open-front wall conditions in multiunit residential buildings of wood construction in Risk Category I or II are permitted to be based on the procedures specified in Chapter A4.
    - 2.5. Seismic evaluation and design of concrete buildings assigned to Risk Category I, II or III are permitted to be based on the procedures specified in Chapter A5.
3. ASCE 41, using the performance objective in Table 301.1.4.2 for the applicable risk category.

TABLE [BS] 301.1.4.2
PERFORMANCE OBJECTIVES FOR USE IN ASCE 41 FOR COMPLIANCE WITH REDUCED INTERNATIONAL BUILDING CODE-LEVEL SEISMIC FORCES

RISK CATEGORY (Based on IBC Table 1604.5)	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-1E EARTHQUAKE HAZARD LEVEL	STRUCTURAL PERFORMANCE LEVEL FOR USE WITH BSE-2E EARTHQUAKE HAZARD LEVEL
I	Life Safety (S-3). See Note a	Collapse Prevention (S-5)
II	Life Safety (S-3). See Note a	Collapse Prevention (S-5)
III	Damage Control (S-2). See Note a	Limited Safety (S-4). See Note b
IV	Immediate Occupancy (S-1)	Life Safety (S-3). See Note c

~~a. Tier 1 evaluation at the Damage Control performance level shall use the Tier 1 Life Safety checklists and Tier 1 Quick Check provisions midway between those specified for Life Safety and Immediate Occupancy performance.~~

a. For Risk Category I, II, III buildings, the Tier 1 and Tier 2 procedures are not evaluated for the BSE-1E earthquake hazard level.
b. For Risk Category III, the Tier 1 screening checklists shall be based on the Collapse Prevention, except that checklist statements using the Quick Check provisions shall be based on M_S-factors based on a linear interpolation midway between Collapse Prevention and Life Safety.
c. For Risk Category IV, the Tier 1 screening checklists shall be based on the Collapse Prevention, except that checklist statements using the Quick Check provisions shall be based on M_S-factors for Life Safety.

Reason: This proposal updates the IEBC to be consistent with the revised performance objective definitions and terminology used in ASCE 41-17. For "reduced IBC-level seismic forces" the 2015 IEBC referenced the "Basic Performance Objective for Existing Buildings" (BPOE) using the BSE-1E level hazard and correlating performance levels by Risk Category. ASCE 41-17 has eliminated the BSE-1E level check for Tier 1 and 2 evaluations of buildings assigned to Risk Category I, II, and III, and instead defines the BPOE using the BSE-2E hazard level only. The Tier 1 and 2 procedures have been revised accordingly so the text in 2015 IEBC Table 301.1.4.2 is now inconsistent with ASCE 41-17. The changes to ASCE 41-17 addressed a concern that the BSE-1E hazard level is too low to provide a "deemed to comply" performance with the commensurate performance in the BSE-2E, in particular in the central and eastern United States. Thus, the Tier 1 and Tier 2 evaluation for Risk Category I and II structures was changed consider the Collapse Prevention at BSE-2E instead of Life Safety at BSE-1E. A similar change was made for Risk Category III buildings. If a building achieves the required performance level for the BSE-2E hazard, then in accordance with ASCE 41-17, the building is deemed to comply with the associated performance level at the BSE-1E level. Risk Category IV structures

require a dual-level check in Tier 1 and Tier 2 because it cannot be demonstrated that Immediate Occupancy in the BSE-1E will always provide Life Safety in the BSE-2E or vice versa. In ASCE 41-17, structural Life Safety is a margin against collapse, while Immediate Occupancy implies that there is a limitation of damage to the structural system such that the building would likely be able to be occupied following BSE-2E seismic hazard shaking intensity. The discrepancy between the BSE-1E and BSE-2E hazard intensity levels in many areas of the country is significant, so satisfying Immediate Occupancy in the BSE-1E may not provide sufficient reserve capacity in the structure to provide Life Safety structural performance in the BSE-2E hazard intensity.

The performance objectives for Tier 3 evaluations were not changed in ASCE 41-17, since ASCE 41-13 already required a two-level performance objective check for buildings in all Risk Categories.

The proposed revisions to the IEBC are intended to keep the IEBC as consistent with the intent of ASCE 41-17 as the 2015 IEBC was with ASCE 41-13. Achieving this consistency involves adding a two-level check for Tier 3 evaluations and for Tier 1 and 2 for Risk Category IV buildings. Requiring the two-level check will result in building performance more consistent and reliable across the country and more consistent among the Tier 1, 2 and 3 procedures. This revision could potentially involve more analysis work on the part of the evaluating engineer, but in many cases it is relatively easy to determine which of the two performance objectives will govern the analysis, and the difference between the two analysis levels is most often simple numerical scaling.

Cost Impact: Will not increase the cost of construction
The IEBC revisions and related revisions in ASCE 41-17 will not have a significant impact on construction cost except when compared to seismic evaluation and retrofit in the central and eastern United States performed using ASCE 41-13 as referenced in the 2015 IEBC.
However, due to the reduction in seismic hazard for the BSE-1E in ASCE 41-13 compared to the similar provisions in the previous editions of ASCE 31 and 41 (as referenced in the 2012 IEBC), the cost of construction using the 2018 IEBC with the proposed modifications is expected to be comparable to the 2012 IEBC.
ASCE 41 Seismic Evaluation and Retrofit of Existing Buildings will be updated from the 2013 edition as an Administrative Update to the 2018 I-Codes. The document designated *ASCE 41 -17 Seismic Evaluation and Retrofit of Existing Buildings* is expected to be completed, published, and available for purchase prior to December 2017 per ICC CP28.

EB9-16 : TABLE [BS] 301.1.4.2-GOUPIL12548

EB10-16

301.1.5 (New), Chapter 16

Proponent : Matthew Senecal, American Concrete Institute, representing American Concrete Institute (matthew.senecal@concrete.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

301.1.5 Concrete evaluation and design procedures Evaluation and design of structural concrete shall be in compliance with this code and ACI 562, except for seismic evaluation and design which shall be in compliance with Section 301.1.4.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:
ACI
562-16 Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures

Reason: The American Concrete Institute (ACI) is proposing to add ACI 562-16, Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures, as a new reference standard for the International Existing Building Code (IEBC). In 2006, the repair industry approached ACI asking for a concrete repair and rehabilitation code that would improve the overall quality of concrete repairs by establishing common requirements and establish clear responsibilities between owners, designers, and contractors. This code would also provide building code officials with a reference by which to evaluate rehabilitated concrete structures. ACI assembled a code committee with balanced representation and produced the first official code in 2013. The committee has received feedback from users of the code and have released this second version of the code, ACI 562-16.
ACI 562-16 complements the IEBC by providing specific direction on how to design concrete repairs and how to handle the unique construction problems associated with repair. This standard helps the designer assess the existing structure in accordance with the IEBC. The standard then provides the requirements that bridge the inconsistencies and gaps in acceptable criteria that occur from the two following situations that a designer must solve: one, repairing a structure according to the original building code used at the time it was built using current construction methods and materials; or, repairing a structure built according to an older building code but repaired according to the current building code. Note that ACI 562 does not address the evaluation of lateral-force resisting systems in high seismic areas. ASCE 41 is the appropriate referenced standard for this situation.

There are many benefits that ACI 562 provides for the designer, owner, contractor, and building code official. A few of these benefits are:

- Provides clearly defined, uniform requirements aimed at extending the service life of existing structures.
- Improves the efficiency, safety, and quality of concrete repair.
- Establishes clear responsibilities between owners, designers, and contractors.
- Provides building code officials with a means to evaluate rehabilitation designs.
- Provides specific repair requirements that often result in less costly repairs compared to repairs required to meet only new construction requirements.

Also, there are many resources that complement ACI 562. The "Guide to the Code for Evaluation, Repair, and Rehabilitation of Concrete Buildings," is available which provides greater understanding and case studies demonstrating its ease of use. Numerous technical notes, reports, guides, and specifications that provide background information and technical support are available through organizations, such as ACI, ASCE, BRE, CS, ICRI, NACE, PTI, RC, SSPC, and USACE. Many of these organizations publications related to concrete repair can be found in the Concrete Repair Manual.

Bibliography: Concrete Repair Manual - 4th Edition: 2-Volume Set, ACI and ICRI, 2013, 2093 pp.
https://www.concrete.org/store/productdetail.aspx?ItemID=RPMN13PACK&Format=HARD_COPY

Guide to the Code for Evaluation, Repair, and Rehabilitation of Concrete Buildings, ACI and ICRI, 2015, 140 pp.

https://www.concrete.org/store/productdetail.aspx?ItemID=MAN56213

Cost Impact: Will not increase the cost of construction
The use of this referenced standard should in many cases reduce the cost of repair. Too often in the process of repair, there is insufficient information to determine acceptance criteria that is amicable to both the owner and the building code official. The end result is the determination that the repair must meet the latest building code requirements for new construction. This standard increases the options available for repair and provides the acceptance criteria necessary to permit these options. A case study that illustrates this point is provided below:
"ACI 562 has been used by Denver-based J. R. Harris & Company as a standard in assessing damages in existing concrete structures.

As an approved consensus standard, according to American National Standards Institute (ANSI) procedures, ACI 562-13 has been accepted as the source standard to use for damage assessment and repair on individual projects by Greenwood Village and Pikes Peak Regional Building Departments in Colorado. Based on this acceptance, the consulting engineer was able to cite the code in their recommendation for structural remediation and determination of damages.

By applying the lesser of the demand to capacity ratio required by the original building code or the current building code, the costs to correct faulty construction were lower than if they are set strictly by current code requirements. In one case involving rehabilitation work on four buildings with faulty construction, J. R. Harris was able to reduce the repair costs from $12 million to $3 million, with a repair plan based on the lesser of the demand-capacity ratio based on either the original or current building code per ACI 562."

Analysis: A review of the standard(s) proposed for inclusion in the code, ACI 562, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

EB10-16 : 301.1.5 (NEW)-SENECAL12483

EB11-16

IEBC: 303 (New), 303.1 (New).

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

SECTION 303 Design Loads

303.1 Snow loads on adjacent buildings. Where an alteration or addition changes the potential snow drift effects on an adjacent building, the code official is authorized to enforce Secton 7.12 of ASCE 7.

Reason: This proposal addresses an important condition covered in ASCE 7. All of ASCE 7 Chapter 7 is already invoked by IBC Section 1608, but this provision for existing buildings is not yet invoked explicitly in the IEBC.
Secion 7.12 of ASCE 7 reads, "Existing roofs shall be evaluated for increased snow loads caused by additions or alterations. Owners or agents for owners of an existing lower roof shall be advised of the potential for increased snow loads where a higher roof is constructed within 20 ft (6.1 m)."

This proposal addresses the second sentence. (The first sentence is understood to refer to the building with the addition or alteration and is already covered by current IEBC sections 807.4 and 1103.4.)

We believe the details of enforcement and coordination between owners of adjacent buildings may be left to the discretion of the code official, so that all that is needed is the explicit reference to ASCE 7 Section 7.12.

Because the proposed provision applies to multiple methods and multiple project types, it is suitable for Chapter 3. Section 303 is proposed as a new section with subsections for each of the major load types. Thus, the seismic provisions moved to a new Section 303 in Group A should be made into a new subsection of 303 as well, so the organization of Section 303 might be 303.1 Live loads, 303.2 Seismic loads, 303.3 Wind loads, 303.4, Snow loads, etc., in which case what is shown here as 303.1 would become section 303.4.1. We look forward to working with ICC staff to coordinate the various Group A and Group B changes within the new Section 303.

Cost Impact: Will not increase the cost of construction
Though not explicitly stated, ASCE 7 Section 7.12 is already invoked by IBC Section 1608, so this is not really a new requirement.

EB11-16 : 303 (NEW)-BONOWITZ12773

EB12-16

IEBC: 303 (New), 303.1 (New), [BS] 402.3.1, [BS] 403.3.1, [BS] 807.3.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

SECTION 303 Design Loads

303.1 Live loads. Where new live loads are higher than previously approved design live loads, the new design live loads shall be based on Section 1607 of the *International Building Code*. Unless otherwise required, design live loads for other areas shall be permitted to use previously approved design live loads. Where a previously approved design live load is used and is less than that specified by Section 1607 of the *International Building Code*, the area with the nonconforming live load shall be posted with placards of approved design indicating the approved live load.

Delete without substitution:

~~**[BS] 402.3.1 Design live load.** Where the *addition* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads approved prior to the *addition*. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the *addition* does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.~~

~~**[BS] 403.3.1 Design live load.** Where the *alteration* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads approved prior to the *alteration*. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the *alteration* does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.~~

~~**[BS] 807.3 Minimum design loads.** The minimum design loads on existing elements of a structure that do not support additional loads as a result of an *alteration* shall be the loads applicable at the time the building was constructed.~~

Reason: This proposal reconciles differences between similar provisions in the Prescriptive and Work Area methods and moves the reconciled provision to Chapter 3.
The proposal replaces three sections, generally implementing the preferred and more complete provisions from Sections 402.3.1 and 403.3.1 (and 404.3, made moot by Group A EB 10). Because the reconciled provision applies to multiple methods and to multiple project types, and because it contains no project-specific triggers or exceptions, it is suitable for Chapter 3. Notes:

- The brief text in current 807.3 appears to cover all load types but is really only about live loads. Snow, wind, and earthquake loads are all addressed more specifically by other provisions, especially in the current Work Area method to which 807.3 applies. So this proposal represents no loss of substance relative to current 807.3.
- The placard requirement from current 402.3.1 and 403.3.1 is retained.
- The important concept of "previously approved design live load" from current 402.3.1 and 403.3.1 is retained. This ensures that the comparison is made between the new intended design and the original design (for which the design live loads might have been less than what Table 1607.1 now requires for new buildings).
- In the second sentence, "Unless otherwise required" is necessary because the Change of Occupancy provisions actually do not allow the use of original live loads in the CoO area. However, in areas adjacent to and possibly affected by a CoO, this general provision may still be reasonaby used.

(In concept, the seismic provisions moved in Group A to a new Section 303 should be made a subsection of this new more general Section 303, but we leave that to ICC's staff and code correlating committees to do.)

Cost Impact: Will not increase the cost of construction
Reorganization and consolidation only. The cost of placarding might increase, but it is not included as part of the cost of construction.

EB12-16 : 303 (NEW)-BONOWITZ12660

EB13-16

IEBC: 303 (New), 303.1 (New).

Proponent : Gwenyth Searer, Wiss, Janney, Elstner Associates, Inc.

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

SECTION 303 In-Situ Load Tests

303.1 General. In-situ load tests shall be conducted in accordance with Section 1708 of the *International Building Code*.

Reason: The in-situ load test provisions in the IBC are used for both new and existing buildings. The IEBC does not currently contain provisions for load tests of existing buildings but needs to, as in-situ load testing is a valid means of assessing an existing structure's or an existing component's strength. This reference to the IBC incorporates the test provisions in the IBC without requiring duplication of the provision. This is a cleaner solution that trying to copy the text from the IBC and then modifying it to fit within the structure of the IEBC, which has its own requirements for analysis as well as repair and hazard mitigation.

Cost Impact: Will not increase the cost of construction
This proposal has no cost implications, as the provisions in IBC Section 1708 were already intended to apply to both new and existing buildings. This proposal simply clarifies that the in-situ load test provisions of IBC Section 1708 can still be used to assess existing structures.

EB13-16 : 303 (NEW)-SEARER12060

EB14-16

IEBC: 401.3, [BS] 606.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

~~**401.3**~~ **302.2 Dangerous conditions.** The ~~building~~ code official shall have the authority to require the elimination of conditions deemed *dangerous*.

[BS] 606.1 General. Structural repairs shall be in compliance with this section and Section 601.2~~. Regardless of the extent of structural or nonstructural damage, *dangerous* conditions shall be eliminated~~. Regardless of the scope of *repair*, new structural members and connections used for *repair*or *rehabilitation*shall comply with the detailing provisions of the *International Building Code*for new buildings of similar structure, purpose and location.

Reason: This proposal relocates the key provision for Dangerous buildings.
Current section 401.3 says really all that needs to be said about Dangerous conditions. The provision applies to all project types and methods; therefore, to the extent that it even needs to be stated, it belongs in Chapter 3. (The change to "code official" is consistent with Group A EB 2).

In current section 606.1, the second sentence, about dangerous conditions, would be covered by moving current 401.3 to proposed 302.2. The portion about the extent of damage is immaterial; dangerous conditions do not necessarily require damage (they can be due to overload, under-design, or construction defect) and they are not only related to Repairs. Thus, this provision belongs in Chapter 3 where it will apply to all project types.

Cost Impact: Will not increase the cost of construction
This proposal is editorial, therefore there is not change in construction requirements.

EB14-16 : 401.3-BONOWITZ13323

EB15-16

IEBC: [BS] 1103.2, [BS] 1103.4, [BS] 402.3.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 402.3 Existing structural elements carrying gravity load. Any existing gravity load-carrying structural element for which an *addition*and its related alterations cause an increase in design ~~gravity~~ dead, live, and/or snow load, including snow drift effects, of more than 5 percent shall be ~~strengthened, supplemented,~~ replaced or ~~otherwise~~ altered as needed to carry the ~~increased~~ gravity ~~load~~ loads required by the *International Building Code*for new structures. Any existing gravity load-carrying structural element whose gravity ~~loadcarrying~~ load-carrying capacity is decreased as part of the addition and its related alterations shall be considered an altered element subject to the requirements of Section 403.3. Any existing element that will form part of the lateral load path for any part of the *addition*shall be considered an existing lateral load-carrying structural element subject to the requirements of Section 402.4.

> **Exception:** Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the existing building and the addition together comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.

[BS] 1103.2 Additional gravity loads. ~~Existing~~
Any existing gravity load-carrying structural ~~elements supporting~~ element for which an addition and its related alterations cause an increase in design dead, live, and/or snow load, including snow drift effects, of more than 5 percent shall be replaced or altered as needed to carry the gravity load loads required by the International Building Code for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased as part of the addition and its related alterations shall be considered an altered element subject to the requirements of Section 807.4. Any existing element that will form part of the lateral load path for any ~~additional gravity loads as a result~~ part of ~~additions~~ the addition shall ~~comply with~~ be considered an existing lateral load- carrying structural element subject to the ~~*International Building Code*~~requirements of Section 1103.3.

> ~~**Exceptions**~~ **Exception:**
> ~~1. Structural elements whose stress is not increased by more than 5 percent.~~
> 2. Buildings of Group R occupancy with ~~no~~ not more than five dwelling units or sleeping units used solely for residential purposes where the *existing building*and the *addition*together comply with the conventional ~~lightframe~~ light-frame construction methods of the *International Building Code*or the provisions of the *International Residential Code*.

Delete without substitution:

~~**[BS] 1103.4 Snow drift loads.** Any structural element of an *existing building* subjected to additional loads from the effects of snow drift as a result of an *addition* shall comply with the *International Building Code*.~~

> ~~**Exceptions:**~~
> ~~1. Structural elements whose stress is not increased by more than 5 percent.~~
> ~~2. Buildings of Group R occupancy with no more than five dwelling units or sleeping units used solely for residential purposes where the *existing building* and the *addition* comply with the conventional lightframe construction methods of the *International Building Code* or the provisions of the *International Residential Code*.~~

Reason: The basic intent of these three sections is the same: Gravity load increases of 5% or more, as well as capacity reductions, require redesign. However, the three sections differ in their wording, in their explicit inclusion of snow drift effects, and in their exceptions.
This proposal reconciles the Prescriptive and Work Area methods and adds consistency to the code's language. In general, the structure, logic, and completeness of Section 402.3 is preferred. However, the light-frame exceptions of 1103.2 and 1103.4, as well as the explicit consideration of snow drift effects in 1103.4 are retained and added to 402.3 for consistency. Thus, the changes include:

- Replacing the 5% exception in 1103.2 and 1103.4 with the structure of the 5% rule from 402.3.
- Adding the light frame exception from 1103.2 and 1103.4 to 402.3.
- Combining the snow drift provision of 1103.4 with the more general D+L provisions in 1103.2 and 402.3.
- Rewording, with editorial revisions, for clarity and consistency.

Cost Impact: Will not increase the cost of construction
Could REDUCE the cost of construction, since an exception is added to the Prescriptive method.

EB15-16 : [BS] 402.3-BONOWITZ12716

EB16-16

IEBC: 301.1, [BS] 402.3, [BS] 402.3.1, [BS] 402.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

301.1 General. The *repair*, *alteration*, *change of occupancy*, *addition*or relocation of all *existing buildings*shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other except where specifically prescribed. Where this code requires consideration of the seismic forceresisting system of an *existing building*subject to *repair*, *alteration*, *change of occupancy*, *addition*or relocation of *existing buildings,* the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

> **Exception:**Subject to the approval of the *code official*, *alterations*complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural *alteration*as defined in Section 907.4.4. New structural members added as part of the *alteration*shall comply with the *International BuildingCode*. *Alterations* of *existing buildings*in *flood hazardareas*shall comply with Section 701.3.

Delete and substitute as follows:

[BS] 402.3 ~~Existing structural elements carrying gravity load.~~ Structural ~~Any existing gravity load-carrying structural element for which an *addition* and its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased gravity load required by the *International Building Code* for new structures. Any existing gravity load-carrying structural element whose gravity loadcarrying capacity is decreased shall be considered an altered element subject to the requirements of Section 403.3. Any existing element that will form part of the lateral load path for any part of the *addition* shall be considered an existing lateral load-carrying structural element subject to the requirements of Section 402.4.~~
All work shall comply with the structural provisions of Section 1103.

Delete without substitution:

~~**[BS] 402.3.1 Design live load.** Where the *addition* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads approved prior to the *addition*. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the *addition* does result in increased design live load, the live load required by Section 1607 of the *International Building Code* shall be used.~~

~~**[BS] 402.4 Existing structural elements carrying lateral load.** Where the *addition* is structurally independent of the existing structure, existing lateral load-carrying structural elements shall be permitted to remain unaltered. Where the *addition* is not structurally independent of the existing structure, the existing structure and its *addition* acting together as a single structure shall be shown to meet the requirements of Sections 1609 and 1613 of the *International Building Code.* For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 301.1.4.1 for the applicable risk category, shall be deemed to meet the requirements of Section 1613.~~

> ~~**Exception:** Any existing lateral load-carrying structural element whose demand-capacity ratio with the *addition* considered is no more than 10 percent greater than its demand-capacity ratio with the *addition* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.~~

Reason: This proposal follow s the precedent set by several proposals approved in Group A and simplifies the process of reconciling structural provisions betw een the Prescriptive and Work Area methods. The proposal eliminates duplication and inconsistency.
In brief: Just use the Work Area method's structural provisions. There is no reason w hy the structural provisions of the tw o methods should be different. In fact, in nearly all cases, the structural provisions are already nearly identical. Where they differ slightly, the Work Area method's provisions are generally preferred, and other small differences w ill be reconciled through separate proposals.

As a result of proposals approved in Group A, using the IEBC w ill no longer be as simple as 1. Pick your method, 2. Find your project type. In 2018, the steps w ill be more like 1. Find your project type, 2A. For some projects, go to a specific chapter, or 2B. For some projects, pick your method, and 3. If you have multiple project types (like an Alteration being done ogether w ith a Repair), do both 2A and 2B. Specifically:

- Due to EB 10, all methods w ill use the same provisions for Repairs.

- Due to EB 11, all methods will use the same provisions for Relocations.
- Due to EB 33, all methods will use the same provisions for Accessibility, setting the precedent for reconciling one discipline independent of method or project type.
- For Additions, Alterations, and Change of Occupancy you will still have to / get to pick a method.
- There are even new provisions that cross reference between methods. EB 68, for example, added provisions to the Prescriptive and Performance methods that require compliance with Section 1106 within the Work Area method.

With these new precedents, there is no longer any reason to painstakingly revise two different methods if they can more easily be reconciled by a simple cross-reference, as proposed.

Cost Impact: Will increase the cost of construction
A significant cost increase is unlikely but possible, as there are some small differences between the two methods. Some might increase the cost, and some might decrease the cost.

EB16-16 : 301.1-BONOWITZ12287

EB17-16

IEBC: [BS] 1103.3, [BS] 1103.3.1, [BS] 1103.3.2, [BS] 1103.3.3, [BS] 402.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 402.4 Existing structural elements carrying lateral load. Where the *addition* is structurally independent of the existing structure, existing lateral load-carrying structural elements shall be permitted to remain unaltered. Where the *addition* is not structurally independent of the existing structure, the existing structure and its *addition* acting together as a single structure shall ~~be shown to~~ meet the requirements of Sections 1609 and 1613 of the *International Building Code*~~. For purposes of this section, compliance with ASCE 41,~~using *International Building Code*-level seismic forces. ~~a Tier 3 procedure and the two-level performance objective in Table 301.1.4.1 for the applicable risk-category, shall be deemed to meet the requirements of Section 1613.~~

~~**Exception:**~~ **Exceptions:**

1. Any existing lateral load-carrying structural element whose demand-capacity ratio with the *addition* considered is not more than 10 percent greater than its demand-capacity ratio with the *addition* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.
2. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and the *addition* together comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.

[BS] 1103.3 Lateral force-resisting system. ~~The~~
Where the addition is structurally independent of the existing structure, existing lateral ~~force-resisting system~~ load-carrying structural elements shall be permitted to remain unaltered. Where the addition is not structurally independent of ~~*existing buildings* to which additions are made~~ the existing structure, the existing structure and its addition acting together as a single structure shall ~~comply with~~ meet the requirements of Sections ~~1103.3.1, 1103.3.2~~ 1609 and ~~1103.3.3~~ 1613 of the International Building Code using International Building Code-level seismic forces.

Exceptions:

1. Buildings of Group R occupancy with ~~no~~ not more than five dwelling or sleeping units used solely for residential purposes where the *existing building*and the *addition*together comply with the conventional light-frame construction methods of the *International Building Code*or the provisions of the *International Residential Code*.
2. Any existing lateral load-carrying structural element whose demand-capacity ratio with the addition considered is not more than 10 percent greater than its demand-capacity ratio with the addition ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of additions and alterations since original construction. ~~For purposes of calculating demandcapacity ratios, the demand shall consider applicable load combinations involving *International Building Code* level seismic forces in accordance with Section 301.1.4.1.~~

Delete without substitution:

~~**[BS] 1103.3.1 Vertical addition.** Any element of the lateral force-resisting system of an *existing building* subjected to an increase in vertical or lateral loads from the vertical *addition* shall comply with the *International Building Code* wind provisions and the *International Building Code* level seismic forces specified in Section 301.1.4.1 of this code.~~

~~**[BS] 1103.3.2 Horizontal addition.** Where horizontal *additions* are structurally connected to an existing structure, all lateral force-resisting elements of the existing structure affected by such *addition* shall comply with the *International Building Code* wind provisions and the IBClevel seismic forces specified in Section 301.1.4.1 of this code.~~

~~**[BS] 1103.3.3 Voluntary addition of structural elements to improve the lateral force-resisting system.** Voluntary addition of structural elements to improve the lateral force-resisting system of an *existing building* shall comply with Section 807.6.~~

Reason: This proposal makes corresponding sections of the Prescriptive and Work Area methods identical.
The only substantive difference between the current provisions is that the current WAM provision includes the light-frame exception, so this

is added to the Prescriptive provision. Otherwise, all of the revisions shown are editorial:

402.4:

- The logic and construction of 402.4 is more technically correct and is consistent with that used for alterations. It is therefore preferred to the multi-part structure in 1103.3.1 through 3.
- Use the simpler consistent terminology to refer to IBC-level forces.
- Add the light-frame exception from 1103.3.

1103.3:

- Replace this brief introductory provision with the preferred version from 402.4.
- In Exception 2, re-order the sentence to match 402.4.

1103.3.1 and 1103.3.2:

- Replace with the preferred construction proposed for 1103.3. Rather than "vertical" or "horizontal," the important distinction is between those additions that are structurally independent of the existing structure and those that are not.

1103.3.3:

- Delete. This short provision is redundant (it merely points unnecessarily to 807.6) and in any case does not belong in Chapter 11. The "addition of structural elements" is not an Addition.

Cost Impact: Will not increase the cost of construction
Could REDUCE the cost of construction through a new exception to the Prescriptive method.

EB17-16 : [BS] 402.4-BONOWITZ12734

EB18-16

IEBC: [BS] 403.3, [BS] 707.2, [BS] 807.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.3 Existing structural elements carrying gravity load. Any existing gravity load-carrying structural element for which an *alteration*causes an increase in design ~~gravity~~ dead, live, and/or snow load, including snow drift effects, of more than 5 percent shall be ~~strengthened, supplemented,~~ replaced or ~~otherwise~~ altered as needed to carry the ~~increased~~ gravity ~~load~~ loads required by the *International Building Code*for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased as part of the *alteration*shall be shown to have the capacity to resist the applicable design ~~gravity~~ dead, live, and/or snow loads, including snow drift effects, required by the *International Building Code*for new structures.

Exceptions:

1. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the International Building Code or the provisions of the International Residential Code.
2. Buildings in which the increased dead load is due entirely to the addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m2) or less over an existing single layer of roof covering.

Delete and substitute as follows:

[BS] 707.2 Addition or replacement of roofing or replacement of equipment. ~~Where addition or replacement of roofing or replacement of equipment results in additional dead loads, structural components supporting such reroofing or equipment shall comply with the gravity load requirements of the *International Building Code*.~~

~~**Exceptions:**~~

1. ~~Structural elements where the additional dead load from the roofing or equipment does not increase the force in the element by more than 5 percent.~~
2. ~~Buildings constructed in accordance with the *International Residential Code* or the conventional lightframe construction methods of the *International Building Code* and where the dead load from the roofing or equipment is not increased by more than 5 percent.~~
3. ~~Addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m^2) or less over an existing, single layer of roof covering.~~

Any existing gravity load-carrying structural element for which an alteration causes an increase in design dead, live, and/or snow load, including snow drift effects, of more than 5 percent shall be replaced or altered as needed to carry the gravity loads required by the *International Building Code* for new structures.

Exceptions:
1. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.
2. Buildings in which the increased dead load is due entirely to the addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m2) or less over an existing single layer of roof covering.

[BS] 807.4 Existing structural elements carrying gravity loads. ~~*Alterations* shall not reduce the capacity of existing gravity load-carrying structural elements unless it is demonstrated that the elements have the capacity to carry the applicable design gravity loads required by the *International Building Code*. Existing structural elements supporting any additional gravity loads as a result of the *alterations*, including the effects of snow drift, shall comply with the *International Building Code*.~~

~~**Exceptions:**~~

1. ~~Structural elements whose stress is not increased by more than 5 percent.~~
2. ~~Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the *existing building* and its *alteration* comply with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.~~

Any existing gravity load- carrying structural element for which an alteration causes an increase in design gravity dead,

live, and/or snow load, including snow drift effects, of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the gravity loads required by the International Building Code for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased as part of the alteration shall be shown to have the capacity to resist the applicable design gravity dead, live, and/or snow loads, including snow drift effects, required by the *International Building Code* for new structures.

Exceptions:

1. Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.
2. Buildings in which the increased dead load is due entirely to the addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m2) or less over an existing single layer of roof covering.

Reason: The basic intent of these three sections is the same: Gravity load increases of 5% or more, as well as capacity reductions, require redesign. However, the three sections differe in their wording, in their explicit inclusion of snow drift effects, and in their exceptions.
This proposal reconciles the Prescriptive and Work Area methods and adds consistency to the WAM's Level 1 and Level 2 provisions. In general, the structure, logic, and completeness of Section 403.3 is preferred. However, the exceptions of 707.2 and 807.4, as well as the explicit consideration of snow drift effects in 807.4 are retained and added to 403.3 for consistency. Thus, the changes include:

- Replacing the 5% exception in 707.2 and 807.4 with the structure of the 5% rule from 403.3.
- Adding the light frame exception from 807.4 to 403.3 and modifying the corresponding exception in 707.2 to match.
- Adding the reroof exception from 707.2 to both 807.4 and 403.3.
- Rewording, with editorial revisions, for clarity and consistency.

Thus, 403.3 and 807.4 become identical. Section 707.2 is nearly identical, but it does not require the second sentence because any decrease in member capacity would not be allowed as a Level 1 alteration.

Since Level 2 Alts must comply with both Chapter 8 and Chapter 7, there will be some duplication between 707.2 and 807.4 (for example, 807.4 does not really need the reroof exception since it is already in 707.2), but no more than there is already, and with this change, the matching language ensures no conflict.

Cost Impact: Will increase the cost of construction
The proposed change could increase OR DECREASE the cost of construction. By reconciling the two methods, a common-sense snow provision has been added to the Prescriptive method, but two exceptions have been added as well.

EB18-16 : [BS] 403.3-BONOWITZ12378

EB19-16

IEBC: 403.3.2 (New).

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

403.3.2 Construction loads during reroofing. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

Reason: This proposal reconciles a difference between the Prescriptive and Work Area methods.
The proposals adds matching language from 706.2 to 403.3.

In concept, perhaps neither provision is needed if Chapter 15 is deemed adequate, but if 706.2 is retained, then 403.3 should have a matching provision.

Cost Impact: Will not increase the cost of construction
This is a clarification of intent, therefore there will be no change in construction requirements.

EB19-16 : 403.3.2 (NEW)-BONOWITZ13373

EB20-16

IEBC: [BS] 403.4, [BS] 807.5.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.4 Existing structural elements carrying lateral load. Except as permitted by Section ~~403.5~~ 403.9, where the *alteration*increases design lateral loads~~ in accordance with Section 1609 or 1613 of the *International Building Code*~~, or where the *alteration*results in a prohibited structural irregularity as defined in ASCE 7, or where the *alteration*decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall ~~be shown to~~ meet the requirements of Sections 1609 and 1613 of the *International Building Code*. ~~For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 301.1.4.1 for the applicable risk category,~~ Reduced International Building Code-level seismic forces shall be ~~deemed to meet the requirements of Section 1613 of the *International Building Code*~~permitted.

> **Exception:**Any existing lateral load-carrying structural element whose demand-capacity ratio with the *alteration*considered is ~~no~~ not more than 10 percent greater than its demand-capacity ratio with the *alteration*ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. Reduced International Building Code-level seismic forces shall be permitted. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of *additions*and *alterations*since original construction.

[BS] 807.5 Existing structural elements resisting lateral loads. Except as permitted by Section 807.6, where the alteration increases design lateral loads, or where the alteration results in prohibited structural irregularity as defined in ASCE 7, or where the alteration decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall ~~be shown to~~ meet the ~~wind~~ requirements of Sections 1609 and ~~seismic provisions~~ 1613 of the *International Building Code*. Reduced *International Building Code*-level seismic forces ~~in accordance with Section 301.1.4.2~~ shall be permitted.

> **Exception:**Any existing lateral load-carrying structural element whose demand-capacity ratio with the alteration considered is not more than 10 percent greater than its demand-capacity ratio with the alteration ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with ~~*International Building Code*~~ Sections 1609 and 1613 of the *International Building Code*. Reduced *International Building Code*level seismic forces~~ in accordance with Section 301.1.4.2~~ shall be permitted. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces , and capacities shall account for the cumulative effects of additions and alterations since original construction.

Reason: This proposal makes corresponding sections of the Prescriptive and Work Area methods identical. It makes a number of editorial revisions (listed below) and one substantive change. The substantive change is this: Currently, for exactly the same situations, Section 807.5 allows the use of reduced seismic loads, while Section 403.4 does not. Reduced loads are appropriate in these cases, so the proposal revises 403.4 to match 807.5.
The editorial changes simply make the wording match, applying the preferred language from the two parallel sections:

- In 403.4, the reference to the section on voluntary retrofit should be to 403.9, not 403.5. This is errata.
- In 807.5, instead of referring to "wind and seismic provisions," the text should refer more specifically to Sectons 1609 and 1613.

Cost Impact: Will not increase the cost of construction
Could actually REDUCE the cost of certain triggered upgrades. Otherwise, editorial.

EB20-16 : [BS] 403.4-BONOWITZ12281

EB21-16

IEBC: [BS] 403.4.1, [BS] 403.6, [BS] 403.7.

Proponent : Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

[BS] 403.4.1 Seismic Design Category F. Where the work area portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall be shown to meet the earthquake design provisions of the *International Building Code*. For purposes of this section, the earthquake loads need not be taken greater than 75 percent of those prescribed in Section 1613 of the *International Building Code*for new buildings of similar occupancy, purpose and location. New structural members and connections required by this section shall comply with the detailing provisions of this code for new buildings of similar structure, purpose and location.

[BS] 403.6 Wall anchorage for unreinforced masonry walls in major alterations. Where the work area portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, the building is assigned to Seismic Design Category C, D, E or F, and the building's structural system includes unreinforced masonry walls, the alteration work shall include installation of wall anchors at the roof line to resist seismic forces, unless an evaluation demonstrates compliance of existing wall anchorage. For purposes of this section, design seismic forces need not be taken greater than 75 percent of those that would be required for the design of new buildings of similar structure, purpose and location.

[BS] 403.7 Bracing for unreinforced masonry parapets in major alterations. Where the work area portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, and where the building is assigned to Seismic Design Category C, D, E or F, parapets constructed of unreinforced masonry shall have bracing installed as needed to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. For purposes of this section, design seismic forces need not be taken greater than 75 percent of those that would be required for the design of similar nonstructural components in new buildings of similar purpose and location.

Reason: This proposal revises these provisions more consistent with the work area method which would only address alterations that have reconfigured space over 50% of the building. This proposal limits the area of alterations to the defined term; "work area". This will prevent the inclusion of other areas, such as portions of the building where incidental work is being performed.
This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: **BCAC**

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction as it limits the area of alteration to the work area.

EB21-16 : [BS] 403.4.1-KULIK10977

EB22-16

IEBC: [BS] 403.4.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.4.1 Seismic Design Category F. Where the portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall ~~be shown to~~ meet the ~~earthquake design provisions~~ requirements of Sections 1609 and 1613 of the *International Building Code*. For purposes of this section, the earthquake loads need not be taken greater than 75 percent of those prescribed in Section 1613 of the *International Building Code*for new buildings of similar occupancy, purpose and location. New structural members and connections required by this section shall comply with the detailing provisions of this code for new buildings of similar structure, purpose and location.

Reason: This proposal reconciles a substantive difference between the Work Area and Prescriptive methods.
Current section 403.4.1 already has a seismic evaluation/retrofit trigger that matches section 907.4.3, but 907.4.3 also has a wind requirement. This proposal adds a matching wind requirement to the Prescriptive provision.

Since the provision only applies in high seismic areas (SDC F), it is unlikely that a wind requirement will govern over the seismic requirement, but IEBC provisions traditionally treat wind and seismic together, so the Work Area method is preferred, and the Prescriptive method is revised to match.

Cost Impact: Will increase the cost of construction
Cost-beneficial cost increase, only for SDC F buildings with high wind loads undergoing major alterations.

EB22-16 : [BS] 403.4.1-BONOWITZ13079

EB23-16

IEBC: [BS] 403.4.1, [BS] 907.4.3.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] ~~403.4.1~~ 403.5 Seismic Design Category F. Where the~~ portion of the building undergoing the intended alteration~~ work area exceeds 50 percent of the ~~aggregate~~ building area~~ of the building~~, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall ~~be shown to~~ meet the ~~earthquake design provisions~~ requirements of~~ the *International Building Code*. For purposes of this section, the earthquake loads need not be taken greater than 75 percent of those prescribed in~~ Section 1613 of the *International Building Code*~~for new buildings of similar occupancy, purpose and location~~. ~~New structural members and connections required by this section~~ Reduced *International Building Code*-level seismic forces shall ~~comply with the detailing provisions of this code for new buildings of similar structure, purpose and location~~ be permitted.

[BS] ~~907.4.3~~ 907.5 Seismic Design Category F. Where the building is assigned to Seismic Design Category F, the ~~evaluation and analysis shall demonstrate that the lateral load resisting system~~ structure of the altered building ~~or structure complies with reduced~~ shall meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced*International Building Code*-level seismic forces ~~in accordance with Section 301.1.4.2 and with the wind provisions applicable to a limited structural alteration~~ shall be permitted.

Reason: This proposal simplifies and clarifies the wording of corresponding proposals in the Work Area and Prescriptive methods.
Current 403.4.1:

- Renumber to 403.5. This can and should be a stand-alone provision, independent of the basic alteration check and 10% rule in 403.4.
- Use the defined terms "work area" and "building area."
- Replace the "75% of code" wording with the simpler call out for reduced seismic loads.
- Omit the sententence about "new structural members and connections," as this is now covered by the general provisions in Chapter 3.

Current 907.4.3:

- Renumber to 907.5. Each of the lateral system provisions in 907.4 should be independent to avoid confusion over the exceptions in 907.4. A more complete reorganization of 907.4 is being proposed separately.
- Simplify the call out for reduced seismic loads.

Note that the current Work Area provision triggers a wind evaluation/retrofit, while the Prescriptive provision does not. Because this is an editorial proposal, reconciliation, while recommended, will be left to a separate proposal.

Cost Impact: Will not increase the cost of construction
This proposal is editorial, therefore there is no change in construction requriements.

EB23-16 : [BS] 403.4.1-BONOWITZ13074

EB24-16

IEBC: [BS] 403.4.1, [BS] 403.5, [BS] 403.6, [BS] 403.7.

Proponent : Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.4.1 Seismic Design Category F. Where the portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall ~~be shown~~ comply with reduced *International Building Code*-level seismic forces in accordance with Section 301.1.4.2 and with the wind provisions applicable to ~~meet the earthquake design provisions of the *International Building Code*~~a limited structural alteration. ~~For purposes of this section, the earthquake loads need not be taken greater than 75 percent of those prescribed in Section 1613 of the *International Building Code* for new buildings of similar occupancy, purpose and location.~~ New structural members and connections required by this section shall comply with the detailing provisions of this code for new buildings of similar structure, purpose and location.

[BS] 403.5 Bracing for unreinforced masonry parapets upon reroofing. Where the intended alteration requires a permit for reroofing and involves removal of roofing materials from more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing to resist ~~out-of-plane~~ the reduced *International Building Code*-level seismic forces as specified in Section 301.1.4.2, unless an evaluation demonstrates compliance of such items. ~~For purposes of this section, design seismic forces need not be taken greater than 75 percent of those that would be required for the design of similar nonstructural components in new buildings of similar purpose and location.~~

[BS] 403.6 Wall anchorage for unreinforced masonry walls in major alterations. Where the portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, the building is assigned to Seismic Design Category C, D, E or F, and the building's structural system includes unreinforced masonry walls, the alteration work shall include installation of wall anchors at the roof line to resist the reduced International Building Code-level seismic forces in accordance with Section 301.1.4.2, unless an evaluation demonstrates compliance of existing wall anchorage. ~~For purposes of this section, design seismic forces need not be taken greater than 75 percent of those that would be required for the design of new buildings of similar structure, purpose and location.~~

[BS] 403.7 Bracing for unreinforced masonry parapets in major alterations. Where the portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, and where the building is assigned to Seismic Design Category C, D, E or F, parapets constructed of unreinforced masonry shall have bracing installed as needed to resist ~~out-of-plane~~ the reduced International Building Code-level seismic forces in accordance with Section 301.1.4.2, unless an evaluation demonstrates compliance of such items. ~~For purposes of this section, design seismic forces need not be taken greater than 75 percent of those that would be required for the design of similar nonstructural components in new buildings of similar purpose and location.~~

Reason: The purpose of this proposal is to revise language in the Prescriptive Method (IEBC Chapter 4) allowing seismic evaluation of certain buildings being altered, or unreinforced masonry parapets and unreinforced masonry walls of certain buildings being altered, using 75% of the seismic forces obtained from the IBC for a new building. A similar allowance was part of the Work Area methods and was relocated in recent code cycles to Chapter 3 with the intent it could then be used by any of the Compliance Methods in the IEBC. Where it appears in Chapter 4, the reduced seismic force language is replaced with pointers to where the allowance for designing to reduced IBC-level forces now resides in Chapter 3. The practical effect is no change in seismic evaluation requirements for buildings or masonry elements where the Prescriptive Method is used.
This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: **BCAC**

Cost Impact: Will not increase the cost of construction
No cost impact as IEBC Section 301.1.4.2 includes the traditional allowance to design for 75% of the seismic forces for a new building, so for users of the method the change is editorial and has no cost impact. Users of the Prescriptive Method for alterations will now clearly be able to opt for an ASCE 41 analysis or the Appendix A retrofits, which may be more cost-effective for some buildings.

EB24-16 : [BS] 403.4.1-KULIK10978

EB25-16

[BS] 403.4.1, TABLE 403.5 (New), [BS] 907.4.3, TABLE 907.5 (New)

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete and substitute as follows:

[BS] ~~403.4.1~~ 403.5 ~~Seismic Design Category F~~ Mitigation priorities. ~~Where the portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, and where the building is assigned to Seismic Design Category F, the structure of the altered building shall be shown to meet the earthquake design provisions of the *International Building Code*. For purposes of this section, the earthquake loads need not be taken greater than 75 percent of those prescribed in Section 1613 of the *International Building Code* for new buildings of similar occupancy, purpose and location. New structural members and connections required by this section shall comply with the detailing provisions of this code for new buildings of similar structure, purpose and location.~~
Where the work area exceeds 50 percent of the building area, and where the building is of any type listed in Table 403.5, the structure of the altered building shall meet the requirements of Sections 1609 and 1613 of the *International Building Code*. Reduced International Building Code-level seismic forces shall be permitted.

TABLE 403.5
Mitigation Priorities for Major Alterations

Priority Type	Occupancy	Risk Category	Seismic Design Category	Size	Location	Structural Attribute	Age	Other
SDC F	-	IV	F	-	-	-	-	-

[BS] ~~907.4.3~~ 907.5 ~~Seismic Design Category F~~ Mitigation Priorities. ~~Where the building is assigned to Seismic Design Category F, the evaluation and analysis shall demonstrate that the lateral load-resisting system of the altered building or structure complies with reduced *International Building Code* level seismic forces in accordance with Section 301.1.4.2 and with the wind provisions applicable to a limited structural alteration.~~
Where the building is of any type listed in Table 907.5, the structure of the altered building shall meet the requirements of Sections 1609 and 1613 of the International Building Code. Reduced *International Building Code*-level seismic forces shall be permitted.

TABLE 907.5
Mitigation Priorities for Level 3 Alterations

Priority Type	Occupancy	Risk Category	Seismic Design Category	Size	Location	Structural Attribute	Age	Other
SDC F	-	IV	F	-	-	-	-	-

Reason: This proposal offers an alternate presentation for the current wind and seismic upgrade trigger for essential facilities in high seismic areas (SDC F).
There is no change in intent, substance, or effect relative to the current provisions (see * below).

So if it's just editorial, why do it? To clarify the larger intent of these two code sections: That for certain buildings -- which might vary by jurisdiction -- a Level 3 alteration should come with a lateral system evaluation or retrofit. The current provisions do this for essential facilities in high seismic areas (SDC F buildings). But as demonstrated and proposed in a recent report by the Earthquake Engineering Research Institute (see Bibliography), building owners, code officials, and emergency planners expect the code to do more. When the life of a building is substanially extended through a major architectural renovation or mechanical upgrade, all at significant expense, owners, tenants, and the public expect that the building department will have reviewed the building's safety for earthquakes and hurricanes too. Some large jurisdictions do have such triggers for "major alterations," but they are mostly holdovers from local amendments developed before the old "25-50 rule" was removed in the late 1970s. Other jurisdictions large and small would like to do the same, but with limited resources and amendment-free adoption policies in place, their task is difficult.

The new format proposed here will help them. A single table is provided, and it is easily revised by adding one or more rows. There is no need to write new (and possibly flawed) code language, to figure out where it goes in the code, to write corresponding technical criteria and administrative regs, to match the local priority to some precedent already in the code, etc. All the benefits of the I-codes come with the proposed table.

The table format allows a jurisdiction to identify the buildings of greatest interest to local mitigation and resilience plans. We find that in some jurisdictions the concern is about a particularly vulnerable structure type (like URM, or non-ductile concrete), in some it is about school safety and recovery, in some it is about protecting senior or low-income housing, for some it is about revitalizing a commercial district. A uniform, one-size-fits-all approach no longer suits the needs of communities thinking about natural disaster recovery and resilience. Building code triggers are part of the emergency manager's toolkit. To the extent that a jurisdiction finds them useful or necessary, this proposal will help

them.

The alternative, given the growing interest in resilience and disaster recovery planning, might be to extend the "major alteration" trigger for SDC F down to all buildings in SDC E or even D. We believe that is too broad a brush, and the targeted approach suggested by this proposal would be better.

But even if a jurisdiction does nothing to customize these provisions, there is no harm in approving the proposed format. It changes nothing substantive, but it actually clarifies the current code.

* Two versions are provided to ensure consistency between the Prescriptive and Work Area methods. There is no change in intent, substance, or effect relative to the current Work Area provision. Since the current Prescriptive provision does not include a wind requirement, the inclusion of that requirement here for consistency does represent a change of scope. But reconciliation of the methods is being addressed more directly by a separate proposal; here, the focus is on the presentation and structure of the provision, not the wind trigger. If this proposal is approved for its purposes, and that separate reconciliation proposal is disapproved, we will modify this proposal to ensure consistency with the current code with no substantive effect.

Bibliography: "Alterations and Seismic Upgrade: The Building Code as Mitigation Policy," by David Bonowitz, David McCormick, and Peter Somers, 2014.
https://www.eeri.org/products-page/endowment-fund-reports/alterations-and-seismic-upgrade-the-building-code-as-mitigation-policy/

Cost Impact: Will not increase the cost of construction
Reorganization and alternate presentation only. MIGHT increase the cost of construction if using the Prescriptive method in an area of high seismicity where wind loads nevertheless control. But that change is proposed here only to ensure consistency between the IEBC compliance methods. Whether to add a wind trigger to the Prescriptive method is being proposed separately, and in that proposal, the cost impact is shown as "Will increase."

EB25-16 : [BS] 403.4.1-BONOWITZ13175

EB26-16

IEBC: 907.4.6 (New), [BS] 403.5, [BS] 403.6, [BS] 403.7, [BS] 707.3.1, [BS] 907.4.5, [BS] 907.4.6.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.5 Bracing for unreinforced masonry parapets upon reroofing. Where the intended alteration requires a permit for reroofing and involves removal of roofing materials from more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. ~~For purposes of this section, design~~ Reduced *International Building Code*-level seismic forces ~~need not~~ shall be ~~taken greater than 75 percent of those that would be required for the design of similar nonstructural components in new buildings of similar purpose and location~~ permitted.

[BS] 403.6 ~~Wall anchorage~~ Anchorage for unreinforced masonry walls in major alterations. Where the ~~portion of the building undergoing the intended alteration~~ work area exceeds 50 percent of the ~~aggregate~~ building area ~~of the building~~, the building is assigned to Seismic Design Category C, D, E or F, and the building's structural system includes unreinforced masonry bearing walls, the alteration work shall include installation of wall anchors at the roof line ~~to resist seismic forces~~, unless an evaluation demonstrates compliance of existing wall anchorage. ~~For purposes of this section, design~~ Reduced *International Building Code*-level seismic forces ~~need not~~ shall be ~~taken greater than 75 percent of those that would be required for the design of new buildings of similar structure, purpose and location~~ permitted.

[BS] 403.7 Bracing for unreinforced masonry parapets in major alterations. Where the ~~portion of the building undergoing the intended alteration~~ work area exceeds 50 percent of the ~~aggregate~~ building area ~~of the building~~, and where the building is assigned to Seismic Design Category C, D, E or F, parapets constructed of unreinforced masonry shall have bracing installed as needed to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. ~~For purposes of this section, design~~ Reduced *International Building Code*-level seismic forces ~~need not~~ shall be ~~taken greater than 75 percent of those that would be required for the design of similar nonstructural components in new buildings of similar purpose and location~~ permitted.

[BS] 707.3.1 Bracing for unreinforced masonry bearing wall parapets. Where a permit is issued for reroofing for more than 25 percent of the roof area of a building assigned to Seismic Design Category D, E or F that has parapets constructed of unreinforced masonry, the work shall include installation of parapet bracing ~~to resist the reduced *International Building Code* level seismic forces as specified in Section 301.1.4.2 of this code~~, unless an evaluation demonstrates compliance of such items. Reduced *International Building Code*-level seismic forces shall be permited.

[BS] 907.4.5 ~~Wall anchors~~ Anchorage for concrete and reinforced masonry ~~buildings~~ walls. For any building assigned to Seismic Design Category D, E or F with a structural system ~~consisting of~~ that includes concrete or reinforced masonry walls with a flexible ~~roof diaphragm and any building assigned to Seismic Design Category C, D, E or F with a structural system consisting of unreinforced masonry walls with any type of~~ roof diaphragm, the alteration work shall include installation of wall anchors at the roof line ~~to resist the reduced *International Building Code* level seismic forces in accordance with Section 301.1.4.2~~, unless an evaluation demonstrates compliance of existing wall anchorage. Reduced *International Building Code*-level seismic forces shall be permitted.

Add new text as follows:

907.4.6 Anchorage for unreinforced masonry walls. For any building assigned to Seismic Design Category C, D, E or F with a structural system that includes unreinforced masonry bearing walls, the alteration work shall include installation of wall anchors at the roof line, unless an evaluation demonstrates compliance of existing wall anchorage. Reduced *International Building Code*-level seismic forces shall be permitted.

Revise as follows:

[BS] ~~907.4.6~~ 907.4.7 Bracing for unreinforced masonry parapets. Parapets constructed of unreinforced masonry in buildings assigned to Seismic Design Category C, D, E or F shall have bracing installed ~~as needed to resist the reduced *International Building Code* level seismic forces in accordance with Section 301.1.4.2~~, unless an evaluation demonstrates compliance of such items. Use of reduced *International Building Code*-level seismic forces shall be permitted.

Reason: This proposal makes editorial improvements to matching provisions from the Prescriptive and Work Area methods.
403.5: Replace the "75 percent" design criteria with a simpler and more correct call out for reduced seismic loads. The intent is to match the use of reduced loads already in the Work Area method (907.4.5).

403.6:

- Use the defined term "work area." Both the current text and the proposal intend to match the work area trigger to Level 3 Alterations.
- Simplify the call out for reduced seismic loads.

403.7:

- Use "work area" as in 403.6.
- Simplify the call out for reduced seismic loads.

707.3.1: Simplify the call out for reduced seismic loads.

907.4.5:

- Split the provision into two for clarity and ease of revision. 907.4.5 will remain for concrete and reinforced masonry walls. 907.4.6 will be added for unreinforced masonry walls.
- Simplify the call out for reduced seismic loads.

New 907.4.6:

- Create a new section from the URM portion of current 907.4.5.
- Simplify the call out for reduced seismic loads.

Current 907.4.6:

- Renumber.
- Simplify the call out for reduced seismic loads.

Cost Impact: Will not increase the cost of construction
These requirements are editorial, therefore there will be no change in construction requirements.

EB26-16 : [BS] 403.5-BONOWITZ12928

EB27-16

IEBC: [BS] 403.6, [BS] 907.4.5.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.6 Wall anchorage for unreinforced masonry walls in major alterations. Where the portion of the building undergoing the intended alteration exceeds 50 percent of the aggregate area of the building, the building is assigned to Seismic Design Category C, D, E or F, and the building's structural system includes unreinforced masonry walls, the alteration work shall include installation of wall anchors at the floor and roof ~~line~~ lines to resist seismic forces, unless an evaluation demonstrates compliance of existing wall anchorage. For purposes of this section, design seismic forces need not be taken greater than 75 percent of those that would be required for the design of new buildings of similar structure, purpose and location.

[BS] 907.4.5 Wall anchors for concrete and masonry buildings. For any building assigned to Seismic Design Category D, E or F with a structural system consisting of concrete or reinforced masonry walls with a flexible roof diaphragm and any building assigned to Seismic Design Category C, D, E or F with a structural system consisting of unreinforced masonry walls with any type of roof diaphragm, the alteration work shall include installation of wall anchors at the roof line of all subject buildings and at the floor lines of unreinforced masonry buildings to resist the reduced *International Building Code*-level seismic forces in accordance with Section 301.1.4.2, unless an evaluation demonstrates compliance of existing wall anchorage.

Reason: This proposal extends the URM mitigation requirement for Level 3 alteration projects.
Currently, Level 3 alterations trigger URM parapet bracing and anchors at the roof line in both the Work Area and Prescriptive methods. However, experience in Christchurch and standard, feasible practice in Massachusetts and California indicate that URM walls should be anchored at floor levels as well, in order to achieve even basic collapse prevention performance. (IEBC Appendix A1 and ASCE 41 Chapter 15 say the same.)

An alteration that already involves more than half of the building (a Level 3 Alteration in WAM terms) justifies this proactive mitigation, which not only protects the subject building and adjacent spaces and property, but also makes the essential parapet and roof level work more reliable.

Note: A separate proposal would split 907.4.5 into two sections for editorial clarity. If that proposal is approved, this proposal can be effected simply by changing "roof line" to "floor and roof lines" in the new URM section, to match proposd 403.6 shown here.

Cost Impact: Will increase the cost of construction
A small additional cost with a high benefit-cost ratio for URM buildings with major alterations. No additional cost for lesser alterations.

EB27-16 : [BS] 403.6-BONOWITZ12929

EB28-16

IEBC: 403.7 (New).

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

403.7 Anchorage for concrete and reinforced masonry walls. Where the work area exceeds 50 percent of the building area, the building is assigned to Seismic Design Category D, E or F, and the building's structural system includes concrete or reinforced masonry walls with a flexible roof diaphragm, the alteration work shall include installation of wall anchors at the roof line, unless an evaluation demonstrates compliance of existing wall anchorage. Use of reduced International Building Code-level seismic forces shall be permitted.

Reason: This proposal resolves an inconsistency between the Work Area method and the Prescriptive method.
Currently, the Work Area method has a sensible provision that requires roof-to-wall anchors in Level 3 Alterations for concrete and reinforced masonry walls as well as URM walls (907.4.5) but the Prescriptive method addresses only URM walls (403.6). This proposal adds a matching proposal for concrete and RM walls to the Prescriptive method.

Cost Impact: Will increase the cost of construction
For certain buildings, including vulnerable tilt-ups, undergoing major alterations. No change for other buildings or lesser alterations.

EB28-16 : 403.7 (NEW)-BONOWITZ12932

EB29-16

IEBC: 403.8 (New), 907.4.7 (New).

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

403.8 Anchorage of unreinforced masonry partitions in major alterations. Where the work area exceeds 50 percent of the building area, and where the building is assigned to Seismic Design Category C, D, E, or F, unreinforced masonry partitions and nonstructural walls within the work area and adjacent to egress paths from the work area shall be anchored, removed, or altered to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Use of reduced *International Building Code*-level seismic forces shall be permitted.

907.4.7 Anchorage of unreinforced masonry partitions. Where the building is assigned to Seismic Design Category C, D, E, or F, unreinforced masonry partitions and nonstructural walls within the work area and adjacent to egress paths from the work area shall be anchored, removed, or altered to resist out-of-plane seismic forces, unless an evaluation demonstrates compliance of such items. Use of reduced *International Building Code*-level seismic forces shall be permitted.

Reason: This proposal adds a proactive mitigation trigger to address a common nonstructural falling hazard.
Currently, both the Prescriptive and Work Area methods include mitigation requirements for URM parapets and bearing walls, triggered by major (Level 3) alterations. A related hazard involves the failure of interior unreinforced masonry partitions, especially around stairwells and egress corridors.

Mitigation of this well-understood and common hazard is justified by a Level 3 alteration. Still, to avoid disproporionate impacts not associated with the intended work, the proposal would require the mitigation only within the work area and along egress paths from the work area to building exits. In many cases, an alteration project that involves 50 percent of a building's area will already have some partition removal or replacement in its scope.

Cost Impact: Will increase the cost of construction
The cost increase is for URM partitions only, and only within the work area and egress paths. Where the intended work already involves partition alteration, there is no cost increase.

EB29-16 : 403.8 (NEW)-BONOWITZ12956

EB30-16

IEBC: [BS] 403.8, [BS] 707.3.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.8 Roof diaphragms resisting wind loads in highwind regions. Where the intended alteration requires a permit for reroofing and involves removal of roofing materials from more than 50 percent of the roof diaphragm of a building or section of a building located where the ultimate design wind speed is greater than ~~115~~ 155 mph (~~51~~ 69 m/s) in accordancewith Figure 1609.3(1) of the *International Building Code*or in a special wind region as defined in Section 1609 of the *International Building Code*, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-towall connections shall be evaluated for the wind loads specified in Section 1609 of the *International Building Code*, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting at least 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the loads specified in Section 1609 of the *International Building Code*.

Exception: Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code*.

[BS] 707.3.2 Roof diaphragms resisting wind loads in high-wind regions. Where roofing materials are removed from more than 50 percent of the roof diaphragm of a building or section of a building located where the ultimate design wind speed, V_{ult}, determined in accordance with Figure 1609.3(1) of the *International Building Code,*is greater than ~~115~~ 155 mph (~~51~~ 69 m/s) or in a special wind region, as defined in Section 1609 of the *International Building Code*, roof diaphragms, connections of the roof diaphragm to roof framing members, and roof-to-wall connections shall be evaluated for the wind loads specified in the *International Building Code*, including wind uplift. If the diaphragms and connections in their current condition are not capable of resisting at least 75 percent of those wind loads, they shall be replaced or strengthened in accordance with the loads specified in the *International Building Code.*

Exception: Buildings of Group R occupancy with not more than five dwelling or sleeping units used solely for residential purposes where the altered building complies with the conventional light-frame construction methods of the *International Building Code* or the provisions of the *International Residential Code.*

Reason: This proposal limits the retrofit requirement for Level 1 reroofing projects to high wind areas.
The proposal makes two substantive changes to the corresponding provisions of each method:

- It raises the triggering wind speed from 115 to 155 mph. The current value of 115 mph has the effect of triggering costly retrofit work in many inland areas, without historical basis. The proposed value of 155 mph is considered adequate, as it covers the critical coastal areas. (Note that with either value, using a single value automatically covers different areas for buidings in different risk categories, which is appropriate.)
- It adds the IEBC's typical exception for IRC-compliant dwellings.

The proposal also makes an editorial correction to 707.2. As shown by the current text of 403.8, this is actually the intended wording, and this change should be made as errata even if the proposal is disapproved.

Cost Impact: Will not increase the cost of construction
By raising the triggering wind speed, will actually DECREASE the cost in moderate wind areas.

EB30-16 : [BS] 403.8-BONOWITZ13064

EB31-16

IEBC: 403.8 (New), [BS] 907.4, [BS] 907.4.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

403.8 Substantial structural alteration. Where the work area exceeds 50 percent of the building area and where more than 30 percent of the total floor and roof areas of the building or structure have been or are proposed to be involved in structural *alteration* within a 5-year period, the lateral load-resisting system of the altered building shall satisfy the requirements of Sections 1609 and 1613 of the *International Building Code.* Reduced *International Building Code*-level seismic forces shall be permitted. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

Exceptions:

1. Buildings of Group R occupancy with no more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light-frame construction methods of the *International Building Code* or in compliance with the provisions of the *International Residential Code.*
2. Where the intended *alteration* involves only the lowest story of a building, only the lateral load-resisting components in and below that story need comply with this section.

Revise as follows:

[BS] 907.4 Existing structural elements resisting lateral loads. All existing elements of the lateral force-resisting system shall comply with this section.

Exceptions:

1. Buildings of Group R occupancy with no more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light-frame construction methods of the *International Building Code*or in compliance with the provisions of the *International Residential Code*.
2. Where ~~such~~ the intended~~*alterations*~~ *alteration*~~involve~~ involves only the lowest story of a building~~ and the *change of occupancy* provisions of Chapter 10 do not apply~~, only the lateral ~~force~~ load-resisting components in and below that story need comply with this section.

[BS] 907.4.2 Substantial structural alteration. Where more than 30 percent of the total floor and roof areas of the building or structure have been or are proposed to be involved in structural *alteration*within a 5-year period, the ~~evaluation and analysis shall demonstrate that the~~ lateral load-resisting system of the altered building ~~or structure complies with~~ shall satisfy the requirements of Sections 1609 and 1613 of the *International Building Code.* ~~for wind loading and with reduced~~ Reduced*International Building Code*-level seismic forces ~~in accordance with Section 301.1.4.2~~ shall be permitted. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

Reason: This proposal reconciles a significant diference between the Prescriptive method and the Work Area method.
Currently, the Work Area method triggers a potential seismic upgrade for a Level 3 Alteration project whose intended scope includes a substantial alteration (as defined in 907.4.2). The Prescriptive method has no such trigger. This proposal adds the identical trigger to the prescriptive method.

Note the limited scope, to match the Work Area method provisions from 907.4 and 907.4.2:

- It applies only to a major (or Level 3) alteration, where the intended work area exceeds 50 percent of the building area.
- It applies ony where the intended alteration already involves substantial structural scope.
- Reduced seismic forces are allowed.
- The entire trigger is waived for small residential buildings where the work complies with the IRC or light frame requirements.
- The entire trigger is waived above the first story when the intended alteration would affect only the first story.

In addition, a few editorial clarifications to Sections 907.4 and 907.4.2 are proposed so that the provisions in the different methods will match. For example, Exception 2 omits the unnecessary phrase regarding change of occupancy; this phrase is meant to confirm that any change of occupancy requirements would override the exception, but such a statement is not needed because the IEBC applies requirements for multiple project types independently and cumulatively.

Finally, if the quasi-definition of a Substantial Structural Alteration from current 907.4.2 can be moved to the Chapter 2 definitions (as is being proposed separately), both 907.4.2 and proposed 403.8 can be simplified by simply using that defined term

Cost Impact: Will increase the cost of construction

For a major alteration with substantial structural alteration as part of its intended scope, the cost will increase as needed to do a seismic upgrade with reduced loads. The additional cost could be zero, or it could be more than zero.

EB31-16 : 403.8 (NEW)-BONOWITZ12374

EB32-16

IEBC: 403.10 (New), 403.9 (New), 707.3.3 (New), 707.3.4 (New).

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

403.9 Roof insulation thermal effects. Where reroofing increases the thermal resistance (R-value) from less than 25 Fxhxft^2/BTU to 25 Fxhxft^2/BTU or higher, the structural elements to which the reroofed area is tributary shall meet the requirements of Section 1608 of the *International Building Code*, using a thermal coefficient, C_t, of at least 1.1.

403.10 Roof ventilation effects. Where reroofing changes the roof from non-ventilated to ventilated, the structural elements to which the altered roof is tributary shall meet the requirements of Section 1608 of the *International Building Code*.

707.3.3 Roof insulation thermal effects. Where reroofing increases the thermal resistance (R-value) from less than 25 Fxhxft^2/BTU to 25 Fxhxft^2/BTU or higher, the structural elements to which the reroofed area is tributary shall meet the requirements of Section 1608 of the *International Building Code*, using a thermal coefficient, C_t, of at least 1.1.

707.3.4 Roof ventilation effects. Where reroofing changes the roof from non-ventilated to ventilated, the structural elements to which the altered roof is tributary shall meet the requirements of Section 1608 of the *International Building Code*.

Reason: This proposal adds two provisions to protect existing roof structures from excessive snow loads resulting from improved thermal performance.
Improved thermal performance, while often beneficial to a building, often results in far less snow melt than was assumed or experienced by past codes and conventional framing rules. This can make a newly insulated or ventilated roof vulnerable to snow loads significantly higher than those for which they were designed or conventionally sized.

The proposal adds two triggers to each of the Prescriptive and Work Area methods.

The cited R-value and C_t value are from ASCE 7 Table 7-3, referenced by IBC Section 1608. These values were selected to flag uninsulated or poorly insulated roofs for which new insulation will have the greatest effect on unanticipated snow load.

Changing from a non-ventilated roof to a ventilated roof results in a different C_t factor, which leads to higher snow loads. In theory, this could represent the kind of increased load that the IEBC already requires to be checked against the 5% trigger. However, most practicing engineers and code officals do not read the generic provision this way, and in any case, reroofing projects often don't involve registered design professionals, so that provision is overlooked. The proposed section ensures that the potential effects are considered.

As an alternative to structural retrofit, implementation of an approved Snow Event Response Plan prepared in accordance with FEMP-957 Chapter 5 might be satisfactory, but such programmatic solutions are best left to local jurisdictions to develop and implement and might not be enforceable through model code provisions.

Cost Impact: Will increase the cost of construction
Potential retrofit is cost-beneficial in the long run but has higher initial cost.

EB32-16 : 403.9 (NEW)-BONOWITZ13492

EB33-16

IEBC: [BS] 403.9, [BS] 807.6.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 403.9 Voluntary ~~seismic improvements~~ lateral force-resisting system alterations. ~~*Alterations* to existing structural elements or *additions* of new structural elements~~
Structural alterations that are intended exclusively to improve the lateral force-resisting system and are not ~~otherwise~~ required by other sections of this ~~chapter and are initiated for~~ code shall not be required to meet the ~~purpose~~ requirements of ~~improving the performance~~ Section 1609 or Section 1613 of the ~~seismic force-resisting system of an existing structure or the performance of seismic bracing or anchorage of existing nonstructural elements shall be permitted~~ *International Building Code*, provided that ~~an engineering analysis is submitted demonstrating the following~~:

1. The ~~altered structure and the altered nonstructural elements are no less conforming~~ capacity of existing structural systems to ~~the provisions of the *International Building Code* with respect to earthquake design than they were prior to the *alteration*.~~ resist forces is not reduced;
2. New structural elements are detailed and connected to existing or new structural elements as required by the *International Building Code* for new construction~~.~~ ;
3. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by the *International Building Code* for new construction~~.~~ ; and
4. The *alterations* do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.

[BS] 807.6 Voluntary lateral force-resisting system alterations. Structural ~~*Alterations*~~ *alterations* ~~of existing structural elements and additions of new structural elements~~ that are ~~initiated for the purpose of increasing~~ intended exclusively to improve the lateral force-resisting ~~strength or stiffness of an existing structure~~ system and ~~that~~ are not required by other sections of this code shall not be required to ~~be designed for forces conforming to~~ meet the requirements of Section 1609 or Section 1613 of the *International Building Code*, provided that ~~an engineering analysis is submitted to show that~~:

1. The capacity of existing structural ~~elements required~~ systems to resist forces is not reduced;
~~2. The lateral loading to existing structural elements is not increased either beyond its capacity or more than 10 percent;~~
2~~3~~. New structural elements are detailed and connected to ~~the existing~~ existing or new structural elements as required by the *International Building Code* for new construction;
3~~4~~. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by the *International Building Code* for new construction; and
4. The alterations do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.
~~5. A *dangerous* condition as defined in this code is not created.~~

~~Voluntary *alterations* to lateral force-resisting systems conducted in accordance with Appendix A and the referenced standards of this code shall be permitted.~~

Reason: This proposal reconciles differences between the voluntary retrofit provisions in the Prescriptive and Work Area methods. In general, since neither provision actually relieves a voluntary retrofit project from any other code requirements (for example regarding egress, accessibility, or fire safety), an argument can be made that these provisions are not even needed, as any of the work they contemplate should already be covered by more general provisions for alterations. However, these provisions are considered useful for encouraging this voluntary work.

The main purpose of the proopsal is to provide identical wording in each method. To do this, the proposal simplifies the base provision in each case and borrows bits from each current provision, with two objectives:

- The work cannot make the building worse.
- New structural elements should meet IBC standards for materials and detailing, but not necessarily design force levels or drift limits.

Note that the current IEBC improperly shows the final sentence of 807.6 as part of list item 5. Both that list item (regarding dangerous conditions) and the final sentence (regarding the acceptability of IEBC Appendix A) are deleted by this proposal."

Cost Impact: Will not increase the cost of construction
This proposal is a clarification of intent, with editorial changes. There is no change to construction requirements.

Staff note: There is a published errata to Section 807.6 that has been incorporated into this text.

EB33-16 : [BS] 403.9-BONOWITZ13377

EB34-16

IEBC: [BS] 404.3, [BS] 404.3.1, [BS] 606.2.3, [BS] 606.2.3.1.

Proponent : Gwenyth Searer, Wiss, Janney, Elstner Associates, Inc.

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 404.3 Substantial structural damage to vertically-oriented, gravity ~~loadcarrying~~ load-carrying components. ~~Gravity~~
Vertically-oriented, gravity load-carrying components that have sustained *substantial structural damage*shall be rehabilitated to comply with the applicable provisions of the *International Building Code*for dead and live loads. Snow loads shall be considered if the substantial structural damage was caused by or related to snow load effects. Existing gravity load-carrying structural elements shall be permitted to be designed for live loads approved prior to the damage. If the approved live load is less than that required by Section 1607 of the *International Building Code*, the area designed for the nonconforming live load shall be posted with placards of *approved*design indicating the *approved*live load. Nondamaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated or shown to have the capacity to carry the design loads of the *rehabilitation*design. New structural members and connections required by this rehabilitation design shall comply with the detailing provisions of the *International Building Code*for new buildings of similar structure, purpose and location.

[BS] 404.3.1 Lateral force-resisting elements. Regardless of the level of damage to vertical elements of the lateral force-resisting system, if *substantial structural damage*to vertically-oriented, gravity load-carrying components was caused primarily by wind or earthquake effects, then the building shall be evaluated in accordance with Section 404.2.1 and, if noncompliant, rehabilitated in accordance with Section 404.2.3.

Exceptions:

1. One- and two-family dwellings need not be evaluated or rehabilitated for load combinations that include earthquake effects.
2. Buildings assigned to Seismic Design Category A, B or C whose substantial structural damage was not caused by earthquake need not be evaluated or rehabilitated for load combinations that include earthquake effects.

[BS] 606.2.3 Substantial structural damage to vertically-oriented, gravity load-carrying components. ~~Gravity~~
Vertically-oriented, gravity load-carrying components that have sustained *substantial structural damage*shall be rehabilitated to comply with the applicable provisions for dead and live loads in the *International Building Code*. Snow loads shall be considered if the *substantial structural damage*was caused by or related to snow load effects. Undamaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated if required to comply with the design loads of the *rehabilitation*design.

[BS] 606.2.3.1 Lateral force-resisting elements. Regardless of the level of damage to ~~gravity~~ vertical elements of the lateral force-resisting system, if substantial structural damage to vertically-oriented, gravity load-carrying components was caused primarily by wind or seismic effects, then the building shall be evaluated in accordance with Section 606.2.2.1 and, if noncompliant, rehabilitated in accordance with Section 606.2.2.3.

Exceptions:

1. Buildings assigned to Seismic Design Category A, B, or C whose substantial structural damage was not caused by earthquake need not be evaluated or rehabilitated for load combinations that include earthquake effects.
2. One- and two-family dwellings need not be evaluated or rehabilitated for load combinations that include earthquake effects.

Reason: These are editorial changes only, intended to improve the clarity of the existing provisions without changing their intent.
In Section 404.3, the title omits the term "vertical", making it more likely for users of the code to mistake damage to horizontal members as something that could trigger upgrades. Similarly, in the text of this section, the word "vertical" has been omitted, making misinterpretation more likely. Addition of "vertically-oriented" to both the title and the first sentence of this section will improve the clarity of this section without changing the intent.

In Section 404.3.1, a similar change is proposed.

In Section 606.2.3, both the title and the first sentence are similarly changed.

In Section 606.2.3.1, a similar change is proposed. Furthermore, since the phrase "gravity elements of the lateral force-resisting system" is undefined, the word "gravity" is proposed to be replaced with "vertical" to match the wording in Section 404.3.1.

Cost Impact: Will not increase the cost of construction
As this proposal contains purely editorial changes, no changes to the cost of construction are anticipated.

EB34-16 : [BS] 404.3-SEARER12084

EB35-16

IEBC: 406.1, 602.3.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete without substitution:

~~**406.1 Replacement glass.** The installation or replacement of glass shall be as required for new installations.~~

Revise as follows:

~~**602.3**~~ **302.4.1 Glazing in hazardous locations.** Replacement glazing in hazardous locations shall comply with the safety glazing requirements of the *International Building Code* or *International Residential Code* as applicable.

Exception: Glass block walls, louvered windows, and jalousies repaired with like materials.

Reason: This proposal resolves a discrepancy between the Work Area and Prescriptive methods and builds on the reorganization of Chapter 3 from the last cycle and from Group A.
Section 406.1 is about allowable materials, does not contain a trigger, and is independent of project type. Thus, it is out of place in Section 406 and should be in Section 302 instead.

But 406.1 also conflicts with 602.3, which is a more nuanced provision consistent with the philosophy of the IEBC regarding existing materials. The broad requirement in 406.1 that all replacement glass must be as new is problematic; ASCE 7 requires annealed or tempered glass in many cases, and that sometimes brings a requirement for drift capable frames that won't work with existing conditions. Thus, 406.1 should be superseded by 602.3.

But 602.3 appears only in the Repairs chapter of the Work Area method. It has just as much relevance to Alterations. Therefore, 602.3 should be moved to Section 302 as proposed.

Thus, this proposal does two things:

- It moves 602.3 to Section 302, where it will have its proper applicability to all methods and and all project types.
- It eliminates 406.1, replacing it with the relocated 602.3.

Cost Impact: Will not increase the cost of construction
More limited provision could REDUCE costs.

EB35-16 : 602.3-BONOWITZ13294

EB36-16

IEBC: 407.1, 407.4 (New), 407.4.1 (New), 407.4.2 (New), 407.4.4 (New), [BS] 407.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

407.1 Conformance. No change shall be made in the use or occupancy of any building unless such building is made to comply with the requirements of the *International Building Code*for the use or occupancy. Changes in use or occupancy in a building or portion thereof shall be such that the existing building is no less complying with the provisions of this code than the existing building or structure was prior to the change. Subject to the approval of the building official, the use or occupancy of *existing buildings*shall be permitted to be changed and the building is allowed to be occupied for purposes in other groups without conforming to all of the requirements of this code for those groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

> **Exception:**The building need not be made to comply with Chapter 16 of the ~~seismic requirements for a new structure~~*International Building Code* unless required by Section 407.4.

Add new text as follows:

407.4 Structural. Any building undergoing a change of occupancy shall satisfy the requirements of this section.

407.4.1 Live loads. Structural elements carrying tributrary live loads from an area with a change of occupancy shall satisfy the requirements of Section 1607 of the International Building Code. Design live loads for areas of new occupancy shall be based on Section 1607 of the International Building Code. Design live loads for other areas shall be permitted to use previously approved design live loads.
Exception: Structural elements whose demand-capacity ratio considering the change of occupancy is not more than 5 percent greater than the demand-capacity ratio based on previously approved live loads need not comply with this section.

407.4.2 Snow and wind loads. When a change of occupancy results in a structure being assigned to a higher risk category, the structure shall satisfy the requirements of Sections 1608 and 1609 of the *International Building Code* for the new risk category.
Exception: Where the area of the new occupancy is less than 10 percent of the building area, compliance with this section is not required. The cumulative effect of occupancy changes over time shall be considered.

Revise as follows:

[BS] ~~407.4~~ 407.4.3 ~~Structural~~ Seismic loads. When a *change of occupancy*results in a structure being reclassified to a higher risk category, the structure shall conform to the seismic requirements for a new structure of the higher risk category. For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 301.1.4.1 for the applicable risk category, shall be deemed to meet the requirements of Section 1613 of the *International Building Code*..

> **Exceptions:**
> 1. Specific seismic detailing requirements of Section 1613 of the *International Building Code*for a new structure shall not be required to be met where the seismic performance is shown to be equivalent to that of a new structure. A demonstration of equivalence shall consider the regularity, overstrength, redundancy and ductility of the structure.
> 2. When a change of use results in a structure being reclassified from Risk Category I or II to Risk Category III and the structure is located where the seismic coefficient, SDS,is less than 0.33, compliance with the seismic requirements of Section 1613 of the *International Building Code*is not required.

Add new text as follows:

407.4.4 Access to Risk Category IV. Any structure that provides operational access to an adjacent structure assigned to Risk Category IV as the result of a change of occupancy shall itself satisfy the requirements of Sections 1608, 1609, and 1613 of the *International Building Code*. For compliance with Section 1613, *International Building Code*-level seismic forces shall be used. Where operational access to the Risk Category IV structure is less than 10 feet (3048 mm) from either an interior lot line or from another structure, access protection from potential falling debris shall be provided.

Reason: This proposal reconciles substantive differences between the Prescriptive method and the Work Area method.
Currently, the Prescriptive method has only one load-specific structural provision related to change of occupancy -- 407.4, which triggers a seismic upgrade (with exceptions) when the risk category increases. Otherwise, the upgrades are triggered generally by current Section 407.1, which simply requires any building with any change of occupancy to meet all requirements -- with NO exceptions -- for the new occupancy.

Thus, while the proposal looks like it is adding new upgrade requirements, it is actually substantially reducing upgrade requirements for wind and snow by loosening the trigger and by adding exceptions. In doing so, it is also recognizing the way the current code is actually being implemented.

The proposed wording matches the editorial revisions being proposed separately to corresponding sections of 1007.

Proposed section 407.4.4 matches a substantive change being proposed separately to section 1007.3. If this proposal is approved and the proposal to change 1007.3 is disapproved, we will submit a public comment to this proposal to ensure that the Prescriptive and Work Area provisions remain identical.

Cost Impact: Will not increase the cost of construction
It will actually decrease the cost of construction by introducing exceptions not currently available to users of the prescriptive method.

EB36-16 : 407.1-BONOWITZ12536

EB37-16

IEBC: 301.1, [BS] 407.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

301.1 General. The *repair*, *alteration*, *change of occupancy*, *addition*or relocation of all *existing buildings*shall comply with one of the methods listed in Sections 301.1.1 through 301.1.3 as selected by the applicant. Sections 301.1.1 through 301.1.3 shall not be applied in combination with each other except where specifically prescribed. Where this code requires consideration of the seismic forceresisting system of an *existing building*subject to *repair*, *alteration*, *change of occupancy*, *addition*or relocation of *existing buildings,* the seismic evaluation and design shall be based on Section 301.1.4 regardless of which compliance method is used.

> **Exception:**Subject to the approval of the *code official*, *alterations*complying with the laws in existence at the time the building or the affected portion of the building was built shall be considered in compliance with the provisions of this code unless the building is undergoing more than a limited structural *alteration*as defined in Section 907.4.4. New structural members added as part of the *alteration*shall comply with the *International BuildingCode*. *Alterations* of *existing buildings*in *flood hazardareas*shall comply with Section 701.3.

[BS] 407.4 Structural. ~~When a *change of occupancy* results in a structure being reclassified to a higher risk category, thestructure shall conform to the seismic requirements for a new structure of the higher risk category. For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two level performance objective in Table 301.1.4.1 for the applicable risk category, shall be deemed to meet the requirements of Section1613 of the *International Building Code*~~. All work shall comply with the structural provisions of Section 1007.

> ~~**Exceptions:**~~
>
> ~~1. Specific seismic detailing requirements of Section 1613 of the *International Building Code* for a new structure shall not be required to be met where the seismic performance is shown to be equivalent to that of a new structure. A demonstration of equivalence shall consider the regularity, overstrength, redundancy and ductility of the structure.~~
>
> ~~2. When a change of use results in a structure being reclassified from Risk Category I or II to Risk Category III and the structure is located where the seismic coefficient, SDS, is less than 0.33, compliance with the seismic requirements of Section 1613 of the *International Building Code* is not required.~~

Reason: This proposal follow s the precedent set by several proposals approved in Group A and simplifies the process of reconciling structural provisions betw een the Prescriptive and Work Area methods. The proposal eliminates duplication and inconsistency. In brief: Just use the Work Area method's structural provisions. There is no reason w hy the structural provisions of the tw o methods should be different. In fact, in nearly all cases, the structural provisions are already nearly identical. Where they differ slightly, the Work Area method's provisions are generally preferred, and other small differences w ill be reconciled through separate proposals.
As a result of proposals approved in Group A, using the IEBC w ill no longer be as simple as 1. Pick your method, 2. Find your project type. In 2018, the steps w ill be more like 1. Find your project type, 2A. For some projects, go to a specific chapter, or 2B. For some projects, pick your method, and 3. If you have multiple project types (like an Alteration being done together w ith a Repair), do both 2A and 2B. Specifically:

- Due to EB 10, all methods w ill use the same provisions for Repairs.
- Due to EB 11, all methods w ill use the same provisions for Relocations.
- Due to EB 33, all methods w ill use the same provisions for Accessibility, setting the precedent for reconciling one discipline independent of method or project type.
- For Additions, Alterations, and Change of Occupancy you w ill still have to / get to pick a method.
- There are even new provisions that cross reference betw een methods. EB 68, for example, added provisions to the Prescriptive and Performance methods that require compliance w ith Section 1106 w ithin the Work Area method.

With these new precedents, there is no longer any reason to painstakingly revise tw o different methods if they can more easily be reconciled by a simple cross-reference, as proposed.

Cost Impact: Will increase the cost of construction
A significant cost increase is unlikely but possible, as there are some small differences betw een the tw o methods. Some might increase the cost, and some might decrease the cost.

EB37-16 : 301.1-BONOWITZ12288

EB38-16

IEBC: [BS] 1007.3.1, [BS] 407.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 407.4 ~~Structural~~ Seismic force-resisting system. When a *change of occupancy* results in a ~~structure~~ building being ~~reclassified~~ assigned to a higher risk category, the ~~structure~~ building shall ~~conform to the seismic requirements for a new structure of the higher risk category. For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 301.1.4.1 for the applicable risk category, shall be deemed to meet~~ satisfy the requirements of Section 1613 of the *International Building Code* for the new risk category using International Building Code-level seismic forces.

Exceptions:

1. ~~Specific seismic detailing requirements of Section 1613 of the *International Building Code* for a new structure shall not be required to be met where the seismic performance is shown to be equivalent to that of a new structure. A demonstration of equivalence shall consider the regularity, overstrength, redundancy and ductility of the structure.~~ Where the area of the new occupancy is less than 10 percent of the building area and the new occupancy is not assigned to Risk Category IV, compliance with this section is not required. The cumulative effect of occupancy changes over time shall be considered.
2. When a change of use results in a ~~structure~~ building being reclassified from Risk Category I or II to Risk Category III and the ~~structure is located where the~~ seismic coefficient, ~~SDS~~ S_{DS}, is less than 0.33, compliance with ~~the seismic requirements of Section 1613 of the *International Building Code*~~ this section is not required.
3. Unreinforced masonry bearing wall buildings assigned to Risk Category III, when assigned to Seismic Design Category A or B, shall be permited to use Appendix Chapter A1 of this code.

[BS] 1007.3.1 ~~Compliance with International Building Code-level seismic forces.~~ Seismic force-resisting system. ~~Where~~
When a ~~building or portion thereof is subject to a~~ *change of occupancy* ~~that~~ results in ~~the~~ a building being assigned to a higher risk category ~~based on Table 1604.5 of the *International Building Code*~~, the building shall ~~comply with~~ satisfy the requirements ~~for~~ *of Section 1613 of the International Building Code* ~~level seismic forces as specified in Section 301.1.4.1~~ for the new risk category using International Building Code-level seismic forces.

Exceptions:

1. ~~Where approved by the *code official*, specific detailing provisions required for a new structure are not required to be met where it can be shown that an equivalent level of performance and seismic safety is obtained for the applicable risk category based on the provision for reduced *International Building Code* level seismic forces as specified in Section 301.1.4.2.~~ When a change of use results in a building being reclassified from Risk Category I or II to Risk Category III and the seismic coefficient, S_{DS}, is less than 0.33, compliance with this section is not required.
2. Where the area of the new occupancy ~~with a higher hazard category~~ is less than ~~or equal to~~ 10 percent of the ~~total~~ building ~~floor~~ area and the new occupancy is not ~~classified as~~ assigned to Risk Category IV~~. For the purposes of~~ , compliance with this ~~exception, buildings occupied by two or more occupancies~~ section is not ~~included in the same risk category, shall be subject to the provisions of Section 1604.5.1 of the *International Building Code*~~required. The cumulative effect of ~~the area of~~ occupancy changes over time shall be considered ~~for the purposes of this exception~~.
3. Unreinforced masonry bearing wall buildings ~~in~~ assigned to Risk Category III, when assigned to Seismic Design Category A or B, shall be ~~allowed~~ permitted to ~~be strengthened to meet the requirements of~~ use Appendix Chapter A1 of this code ~~[Guidelines for the Seismic Retrofit of Existing Buildings (GSREB)]~~.

Reason: This proposal reconciles, clarifies, and simplifies the provisions for seismic upgrade triggered by a change of risk category, found in Section 407.4 in the Prescriptive method and Section 1007.3.1 in the Work Area method.
For the main provision, the proposal provides editorial clarification and simplification, ensuring identical wording for each method. For the exceptions, the proposal also ensures that the two methods will have identical content and wording. Here are the changes to the exceptions for each method:

Prescriptive method (407.4):

- Delete current Exception 1, which is obsolete. By citing "regularity, overstrength" etc. (in 407.4) and "equivalent level of performance" (in 1007.3.1), these exceptions were intended to allow performance-based retrofit criteria like ASCE 41 as an alternative to IBC Section 1613. This allowance is no longer needed for either method because IEBC Chapter 3 already allows ASCE 41 as an explicit alternative to Section 1613.
- Add a new Exception 1, matching current Exception 2 from 1007.3.1. There is no reason why this exception should be available in only one method.

- Revise current Exception 2 for clarity and simplification.
- Add a new Exception 3, matching Exception 3 from current 1007.3.1. There is no reason why this exception should be available in only one method.

Work Area method (1007.3.1):

- Delete current Exception 1. Same reason as the deletion of 407.4 Exception 1.
- Add a new Exception 1, matching current Exception 2 from 407.4. There is no reason why this exception should be available in only one method.
- Revise current Exception 2 for clarity and simplification. Note that it is not necessary to refer to IBC Section 1604.5.1, since that is already the only place where "risk category" is provided. For completeness, however, a definition of risk category will be added to the IEBC to match the IBC, as a separate proposal (or may be done by staff).
- Revise current Exception 3 for clarity and simplification.

The numbering shown for the two methods does not match due to cdpaccess limitations, but since the numbering is immaterial, I have been assured by staff that the numbering can be made identical when the code is published.

Cost Impact: Will not increase the cost of construction
By adding more exceptions to each method, the proposal will actually REDUCE the cost of construction.

EB38-16 : [BS] 407.4-BONOWITZ12386

EB39-16

IEBC: [BS] 1007.3.1, [BS] 407.4.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 407.4 Structural. When a *change of occupancy* results in a structure being reclassified to a higher risk category, or where the change is from a Group S or Group U occupancy to any occupancy other than Group S or Group U, the structure shall conform to the seismic requirements for a new structure of the higher risk category. For purposes of this section, compliance with ASCE 41, using a Tier 3 procedure and the two-level performance objective in Table 301.1.4.1 for the applicable risk category, shall be deemed to meet the requirements of Section 1613 of the *International Building Code*.

Exceptions:

1. Specific seismic detailing requirements of Section 1613 of the *International Building Code* for a new structure shall not be required to be met where the seismic performance is shown to be equivalent to that of a new structure. A demonstration of equivalence shall consider the regularity, overstrength, redundancy and ductility of the structure.
2. When a change of use results in a structure being reclassified from Risk Category I or II to Risk Category III and the structure is located where the seismic coefficient, SDS, is less than 0.33, compliance with the seismic requirements of Section 1613 of the *International Building Code* is not required.
3. Where the change is from a Group S or Group U occupancy, reduced *International Building Code*-level seismic forces shall be permitted.

[BS] 1007.3.1 Compliance with International Building Code-level seismic forces. Where a building or portion thereof is subject to a *change of occupancy* that results in the building being assigned to a higher risk category based on Table 1604.5 of the *International Building Code,* or where the change is from a Group S or Group U occupancy to any occupancy other than Group S or Group U, the building shall comply with the requirements for *International Building Code*-level seismic forces as specified in Section 301.1.4.1 for the new risk category.

Exceptions:

1. Where approved by the *code official*, specific detailing provisions required for a new structure are not required to be met where it can be shown that an equivalent level of performance and seismic safety is obtained for the applicable risk category based on the provision for reduced *International Building Code*-level seismic forces as specified in Section 301.1.4.2.
2. Where the area of the new occupancy with a higher hazard category is less than or equal to 10 percent of the total building floor area, the occupant load of the area with the new occupancy is not increased, and the new occupancy is not classified as Risk Category IV. For the purposes of this exception, buildings occupied by two or more occupancies not included in the same risk category, shall be subject to the provisions of Section 1604.5.1 of the *International Building Code*. The cumulative effect of the area of occupancy changes shall be considered for the purposes of this exception.
3. Unreinforced masonry bearing wall buildings in Risk Category III when assigned to Seismic Design Category A or B shall be allowed to be strengthened to meet the requirements of Appendix Chapter A1 of this code [Guidelines for the Seismic Retrofit of Existing Buildings (GSREB)].
4. Where the change is from a Group S or Group U occupancy, reduced *International Building Code*-level seismic forces shall be permitted.

Reason: This proposal re-introduces a common sense seismic upgrade trigger of the type the code had until 2012, but with the allowance of reduced loads.

For the 2012 code, the seismic upgrade triggers for change of occupancy projects were greatly simplified so that an upgrade is triggered only when the change is so significant that it bumps the building into a higher risk category. This was a useful improvement to the previous set of triggers, but it was a bit of an over-reach in one regard. Quite often, the ground floor of a residential building is converted from a storage, parking, or utility area, often unfinished, to an occupied residential unit or leasable office or commercial space. In a seismically deficient building, such a change represents a significant increase in risk that the code should not ignore.

In the 2009 IEBC (Work Area method), such a change of occupancy would have triggered a full-building seismic upgrade with full code-level loads. Since 2012, however, since such a change would not affect the risk category (it would be II before and after), no evaluation or upgrade is triggered for these cases. (The alteration normally associated with such a change of occupancy also would not trigger any seismic work.) San Francisco, which is trying to encourage both seismic retrofit and the conversion of accessory dwelling units, has recognized this problem and is implementing a similar solution.

This proposal would re-introduce the seismic upgrade trigger for these specific cases. Notes:

- Matching provisions are proposed for the Prescriptive and Work Area methods.
- The 10% "small area" exception is modified to prevent gaming, since the cases in question often involve only part of the first story.
- An exception to the full-code criteria is added. Since these occupancy changes are less significant than a wholesale shift in risk category, we suggest that the use of reduced seismic loads is appropriate. For many woodframe apartment buildings, the use of

reduced loads also allows IEBC Appendix A4, which would effectively limit any retrofit work to the first story, making the triggered retrofit quite feasible.

Cost Impact: Will increase the cost of construction
The cost of converting an unfinished space to a functional residential unit would be increased by the cost of a retrofit with reduced forces.

EB39-16 : [BS] 407.4-BONOWITZ12544

EB40-16

IEBC: 408.2, 805.2.

Proponent : Gwenyth Searer, Wiss, Janney, Elstner Associates, Inc., representing self

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

408.2 Life safety hazards. The provisions of this code shall apply to historic buildings judged by the building official to ~~constitute a distinct life safety hazard~~ be *unsafe*.

805.2 General. The means of egress shall comply with the requirements of this section.

Exceptions:

1. Where the *work area*and the means of egress serving it complies with NFPA 101.
2. Means of egress conforming to the requirements of the building code under which the building was constructed shall be considered compliant means of egress if, in the opinion of the *code official*, they ~~do~~ are not ~~constitute a distinct hazard to life~~*unsafe*.

Reason: The terms "distinct life safety hazard" and "distinct hazard to life safety" are not defined. The term "unsafe" *is* defined, however, and covers a vast swath of dangerous and unsafe conditions:
"UNSAFE. Buildings, structures or equipment that are unsanitary, or that are deficient due to inadequate means of egress facilities, inadequate light and ventilation, or that constitute a fire hazard, or in which the structure or individual structural members meet the definition of "Dangerous," or that are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance shall be deemed unsafe."

Unsafe Buildings and Equipment are also covered under Section 115, which helps place these provisions into context as administrative tools that may be used by the code official to require abatement of unsafe conditions.

Cost Impact: Will not increase the cost of construction
This is a clarification to replace an undefined term in the code with a much better defined term. No change in the cost of construction is expected to result from this clarification.

EB40-16 : 408.2-SEARER12346

EB41-16

IEBC: 408.4 (New), [BS] 1206.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

408.4 Structural. Historic buildings shall comply with the applicable structural provisions in this Chapter.
Exception: The code official shall be authorized to accept existing floors and existing live loads and to approve operational controls that limit the live load on any floor.

Revise as follows:

[BS] 1206.1 General. *Historic buildings* shall comply with the applicable structural provisions for the work as classified in Chapter 5.

> **Exception:** The *code official* shall be authorized to accept existing floors and existing live loads and to approve operational controls that limit the live load on any ~~such~~ floor.

Reason: This proposal reconciles a significant difference between the Prescriptive and Work Area methods.
In the current Prescriptive method, Section 408.1 says that improvements to the existing building need be made only if they are specifically required. The balance of Section 408 has no specific structural checks or upgrade triggers -- not even for added dead load or removal of a structural element -- so depending on interpretation, 408.1 has the effect of saying that historic buildings are exempt from any structural work.

By contrast, in the current Work Area method, Section 1206.1 says specifically that the code's common sense structural provisions do apply to historic buildings.

This proposal would match the Prescriptive method to the Work Area method, clarifying that the Chapter 4 structural requirements are safety-related and therefore should be enforced in historic buildings. The proposed wording of new section 408.4 is borrowed directly from 1206.1.

The proposed revision to Section 1206.1 is merely an editorial clarification.

In concept, one could argue that historic structures should be exempt from the code's few wind and seismic upgrade triggers. We might be open to that, but at the very least all checks of dead, live, and snow load, as well as confirmations of adequacy when the de facto structure is altered, should be enforced. And in any case, there is no reason for the Prescriptive and Work Area methods to differ in their structural provisions.

Cost Impact: Will increase the cost of construction
If you read current 408.1 to exclude structural work, this proposal could increase construction costs. If you read current 408.2 to mean that safety-related structural provisions already apply, then this proposal will have no effect on costs.

EB41-16 : 408.4 (NEW)-BONOWITZ12779

EB42-16

IEBC: 302.4.1 (New), 801.3, [BS] 606.1, [BS] 807.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

302.4.1 New structural members and connections. New structural members and connections shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose, and location.

Exception: Where alternative design criteria are specifically permitted.

Revise as follows:

[BS] 606.1 General. Structural repairs shall be in compliance with this section and Section 601.2. Regardless of the extent of structural or nonstructural damage, *dangerous*conditions shall be eliminated. ~~Regardless of the scope of *repair*, new structural members and connections used for *repair* or *rehabilitation* shall comply with the detailing provisions of the *International Building Code* for new buildings of similar structure, purpose and location.~~

801.3 Compliance. All new construction elements, components, systems, and spaces shall comply with the requirements of the *International Building Code*.

Exceptions:

1. Windows may be added without requiring compliance with the light and ventilation requirements of the *International Building Code*.
2. Newly installed electrical equipment shall comply with the requirements of Section 808.
3. The length of dead-end corridors in newly constructed spaces shall only be required to comply with the provisions of Section 805.6.
4. The minimum ceiling height of the newly created habitable and occupiable spaces and corridors shall be 7 feet (2134 mm).
5. New structural members and connections shall comply with alternative design criteria in accordance with Section 302.

Delete without substitution:

~~**[BS] 807.2 New structural elements.** New structural elements in *alterations*, including connections and anchorage, shall comply with the *International Building Code*.~~

Reason: This proposal relocates multiple overlapping provisions to Chapter 3 and provides a necessary exception to account for alternative seismic criteria.
Proposed section 302.4.1 replaces duplicate and overlapping provisions in 606.1 and 807.2.

The proposed exception accounts for a nuance that even 606.1 and 807.2 did not explicitly account for. The performance-based seismic criteria in ASCE 41, as well as the reduced seismic criteria allowed in numerous cases, do not explicitly meet the IBC's strength, stiffness, or detailing provisions for new construction.

Since Section 801.3 makes a similar code-based requirement, an exception is added to the list.

Cost Impact: Will not increase the cost of construction
Clarification of current intent, with some possible cost decrease.

EB42-16 : 302.4.1 (NEW)-BONOWITZ13345

EB43-16

IEBC: 606.2.1.1 (New), [BS] 606.2.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 606.2.1 Repairs for less than substantial structural damage. ~~For~~
Unless otherwise required by this section, for damage less than *substantial structural damage*, the damaged elements shall be permitted to be restored to their predamage condition.

Add new text as follows:

606.2.1.1 Snow damage Structural components whose damage was cause by or related to snow load effects shall be repaired, replaced, or altered to satisfy the requirements of Section 1608 of the *International Building Code*.

Reason: This proposal adds a limited and minor upgrade requirement for structural damage caused by snow.
Instead of allowing repair to the predamage condition, the proposal would require any repaired or replaced elements -- but not any other similar elements that escaped damage -- to be designed for the requirements for new construction.

This requirement is justified because snow loads, especially with the effects of climate change, are different from dead, live, earthquake, and wind loads that are otherwise addressed in Chapter 6. Existing framing carrying dead and live loads generally does not require upgrade even when it's non-conforming because it has a history of adequate service. Design level snow loads don't have that history. And unlike wind or earthquake loads, snow loads at damaging or design levels are likely to occur again within a few years. Thus, it is folly to allow deficient components to be repaired only to the state in which we can expect them to be damaged again next winter.

Cost Impact: Will increase the cost of construction
There will be a slight increase in the cost of construction, but only the damaged elements.

EB43-16 : [BS] 606.2.1-BONOWITZ13003

EB44-16

IEBC: [BS] 606.2.3.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 606.2.3.1 Lateral force-resisting elements. Regardless of the level of damage to ~~gravity~~ vertical elements of the lateral force-resisting system, if substantial structural damage to gravity load-carrying components was caused primarily by wind or seismic effects, then the building shall be evaluated in accordance with Section 606.2.2.1 and, if noncompliant, rehabilitated in accordance with Section 606.2.2.3.

Exceptions:

1. Buildings assigned to Seismic Design Category A, B, or C whose substantial structural damage was not caused by earthquake need not be evaluated or rehabilitated for load combinations that include earthquake effects.
2. One- and two-family dwellings need not be evaluated or rehabilitated for load combinations that include earthquake effects.

Reason: This is a simple correction. The provision intends to refer to the vertical elements of the LFRS, as covered in 606.2.2.

Cost Impact: Will not increase the cost of construction
This is an editorial correction, therefore there is no change to construction requirements.

EB44-16 : [BS] 606.2.3.1-BONOWITZ13365

EB45-16

IEBC: [BS] 706.1.

Proponent : Mike Fischer, Kellen Company, representing the Ventilation Task Force of the Asphalt Roofing Manufacturers Association and the Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 706.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 of the *International Building Code*. Roof assemblies shall meet the roof ventilation requirements of Section 1203.2 of the *International Building Code*, or the unvented attic and unvented enclosed rafter assemblies requirements of Section 1203.3 of the *International Building Code.*

> **Exception:**Reroofing shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 of the *International Building Code*for roofs that provide positive roof drainage.

Reason: There have been significant changes to ventilation requirements in the IBC over the past several code cycles. As existing buildings are reroofed, the opportunity to provide proper ventilation to attic spaces should not be lost. Insulation retrofits that have not been properly installed on existing buildings can sometimes create restricted air flow beneath the roof deck. This condition can lead to ice damming and can inhibit the normal drying of roof attic components due to blocking of air flow.
Additionally the IBC now contains detailed provisions for unvented attics. This proposal will provide clear guidance to the user that either strategy- vented or unvented attics- can be used, but the provisions of whichever path is chosen are mandatory.

Cost Impact: Will not increase the cost of construction
The proposal is a clarification of existing requirements in the IBC and therefore will not change construction requirements.

EB45-16 : [BS] 706.1-FISCHER4040

EB46-16

[BS] 706.1, [BS] 706.3, 706.3 (New), 706.3.1 (New), 706.3.1.1 (New)

Proponent : Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org); Maureen Traxler (maureen.traxler@seattle.gov)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 706.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15 of the *International Building Code*.

Exceptions.
~~**Exception:** Reroofing~~ 1. Roof replacement or roof recover of existing low sloperoof coverings shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 of the *International Building Code*for roofs that provide positive roof drainage.
2. Recovering or replacing an existing roof covering shall not be required to meet the requirement for secondary (emergency overflow) drains or scuppers in Section 1503.4 of the *International Building Code* for roofs that provide for positive roof drainage. For the purposes of this exception, existing secondary drainage or scupper systems required in accordance with this code shall not be removed unless they are replaced by secondary drains or scuppers designed and installed in accordance with Section 1503.4 of the *International Building Code*.

[BS] 706.2 Structural and construction loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

Delete without substitution:

~~**[BS] 706.3 Recovering versus replacement.** New roof coverings shall not be installed without first removing all existing layers of roof coverings down to the roof deck where any of the following conditions occur:~~

~~1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.~~
~~2. Where the existing roof covering is wood shake, slate, clay, cement or asbestos-cement tile.~~
~~3. Where the existing roof has two or more applications of any type of roof covering.~~

~~**Exceptions:**~~

~~1. Complete and separate roofing systems, such as standing seam metal roof systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.~~
~~2. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 706.4.~~
~~3. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear off of existing roof coverings.~~
~~4. Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507 of the *International Building Code*.~~

Add new text as follows:

706.3 Roof replacement. Roof replacement shall include the removal of all existing layers of roof coverings down to the roof deck.

Exception: Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional

706.3.1 Roof recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:
1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 706.4.

4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear off of existing roof coverings.

706.3.1.1 Exceptions. A roof recover shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

Reason: Kulik - This proposal is simply editorial and matches the IEBC Reroofing sections with the IBC.
This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: **BCAC**

Traxler - Section 706 was added to the IEBC last code cycle by EB23-13 which copied Section 1510 from the 2012 IBC into the IEBC. However, revisions to the IBC Section that had also been approved last code cycle were not included. This proposal makes IEBC Section 706 identical to IBC Section 1511. ("Reroofing" was Section 1510 in the 2012 IBC, and is Section 1511 in the 2015 IBC.)

Cost Impact: Will not increase the cost of construction
Since this proposal is intended to be editorial to coordinate the IEBC reroofing sections with the IBC there will be no increase in the cost of construction.

EB46-16 : [BS] 706.1-KULIK10982

EB47-16

IEBC: 706.7 (New).

Proponent : Mike Fischer, Kellen Company, representing the Ventilation Task Force of the Asphalt Roofing Manufacturers Association and the Center for the Polyurethanes Industry of the American Chemistry Council (mfischer@kellencompany.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

706.7 Roof ventilation. When *reroofing*, roof assemblies shall meet the roof ventilation requirements of Section 1203.2 or the unvented attic and unvented enclosed rafter assemblies requirements of Section 1203.3 of the *International Building Code.*

Reason: There have been significant changes to the roof ventilation requirements in the IBC, IRC and IEBC over the past several code cycles. As existing buildings are reroofed, the opportunity to provide proper ventilation to attic spaces should not be lost. Insulation retrofits that have not been properly installed on existing buildings can sometimes create restricted air flow beneath the roof deck. This condition can lead to ice damming and can inhibit the normal drying of roof attic components due to blocking of air flow.
Additionally the IBC now contains detailed provisions for unvented attics. This proposal will provide clear guidance to the user that either strategy- vented or unvented attics- can be used, but the provisions of whichever path is chosen are mandatory. The proposal will also help create consistency between the codes.

Cost Impact: Will not increase the cost of construction
The proposal is a clarification of existing requirements in the IBC and therefore will not change construction requirements.

EB47-16 : 706.7 (New)-FISCHER4004

EB48-16

IEBC: [BS] 907.1.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 907.1 General. Where buildings are undergoing Level 3 ~~*alterations* including structural *alterations*~~alterations, the provisions of this section shall apply.

Reason: This proposal clarifies the intended application of section 907.
As written, 907 applies to "Level 3 alterations including structural alterations." This wording is unclear:

- Does it mean that 907 applies only to Level 3 alterations that happen to include major structural work?
- Or does it mean that all "structural alterations" should always be considered Level 3 Alterations to which 907 generally applies?

Certainly the second choice is incorrect, as that meaning would improperly re-define what it means to be a Level 3 Alteration. It would be wrong to say that moving one post or cutting one hole should be deemed Level 3.

But even the first choice fails to reflect most users' expectation that 907 applies to any Level 3 project whether or not the intended work involves any structural alteration. Certainly this was the understanding when the proactive provisions in 907.4.3, 907.4.5, and 907.4.6 were added. Those provisions recognize that when a building gets essentially a new life through an extensive renovation, some basic structural mitigation should be triggered. It makes no sense, and it destroys the intent of these these sensible provisions, to say that they can be avoided by restricting the scope of your major alteration project to architectural, accessibility, mechanical, electrical, cladding, and energy conservation improvements.

This proposal deletes the three problematic words, eliminating confusion and confirming the applicability of 907.4.3, 907.4.5, and 907.4.6.

Are there any implications to the rest of 907, specifically to 907.4.2 and 907.4.4, which address the structural systems as a whole? Answer: No. With respect to these provisions, the question of whether 907 applies to alterations with or without structural scope is moot. Consider:

- Assume 907 is meant to apply only to Level 3 Alterations with structural scope. Then a project with structural scope would trigger upgrade by 907.4.2 if the scope was SSA, and would not trigger upgrade otherwise. The lesser structural scope would still have to comply with Chapter 8 (per 907.4.4).
- Now assume that 907 is meant to apply as proposed, to all Level 3 Alterations, with or without structural scope. If there is structural scope, then the result is the same as in the previous assumption. If there is no structural scope, then you get the same result (i.e. comply with Chapter 8) as in the previous assumption with less than SSA.

The same result means the question is moot, so the proposal has no effect on the SSA trigger at the heart of Section 907.

Now, with this proposal, 907.1 would read, "Where buildings ar eundergoing Level 3 alterations, the provisions of this section shall apply." This is harmless, but one might also argue that it is unnecessary, since Section 907, by being in Chapter 9, already applies to any Level 3 Alteration by definition. So we are open to a modfication that simply deletes Section 907.1 in its entirety.

Cost Impact: Will not increase the cost of construction
This is a clarification of current intent so there is no change to consturction requirements.

EB48-16 : [BS] 907.1-BONOWITZ12325

EB49-16

IEBC: [BS] 907.2, [BS] 907.3, [BS] 907.4, [BS] 907.4.1, [BS] 907.4.2, [BS] 907.4.3, [BS] 907.4.4, [BS] 907.4.5, [BS] 907.4.6.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete without substitution:

~~**[BS] 907.2 New structural elements.** New structural elements shall comply with Section 807.2.~~

~~**[BS] 907.3 Existing structural elements carrying gravity loads.** Existing structural elements carrying gravity loads shall comply with Section 807.4.~~

Revise as follows:

[BS] 907.4 Existing ~~structural elements resisting~~ lateral ~~loads~~ load-resisting system. ~~All existing elements~~ Where more than 30 percent of the total floor and roof areas of the building or structure have been or are proposed to be involved in structural *alteration* within a 5-year period, the lateral ~~force resisting~~ load-resisting system of the altered building shall ~~comply with this section.~~ be shown to satisfy the requirements of Sections 1609 and 1613 of the *International Building Code.* Reduced *International Building Code*-level seismic forces shall be permitted. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.

> **Exceptions:**
> 1. Buildings of Group R occupancy with no more than five dwelling or sleeping units used solely for residential purposes that are altered based on the conventional light frame construction methods of the *International Building Code* or in compliance with the provisions of the *International Residential Code*.
> 2. Where ~~such *alterations* involve~~ the intended alterationinvolves only the lowest story of a building ~~and the *change of occupancy* provisions in Chapter 10 do not apply~~, only the lateral force resisting components in and below that story need comply with this section.

Delete without substitution:

~~**[BS] 907.4.1 Evaluation and analysis.** An engineering evaluation and analysis that establishes the structural adequacy of the altered structure shall be prepared by a registered design professional and submitted to the *code official.*~~

~~**[BS] 907.4.2 Substantial structural alteration.** Where more than 30 percent of the total floor and roof areas of the building or structure have been or are proposed to be involved in structural *alteration* within a 5-year period, the evaluation and analysis shall demonstrate that the lateral load resisting system of the altered building or structure complies with the *International Building Code* for wind loading and with reduced *International Building Code* level seismic forces in accordance with Section 301.1.4.2. The areas to be counted toward the 30 percent shall be those areas tributary to the vertical load-carrying components, such as joists, beams, columns, walls and other structural components that have been or will be removed, added or altered, as well as areas such as mezzanines, penthouses, roof structures and in-filled courts and shafts.~~

Revise as follows:

[BS] ~~907.4.3~~ 907.5 Seismic Design Category F. Where the building is assigned to Seismic Design Category F, the evaluation and analysis shall demonstrate that the lateral load-resisting system of the altered building or structure complies with reduced *International Building Code*-level seismic forces in accordance with Section 301.1.4.2 and with the wind provisions ~~applicable to a limited structural alteration~~ of the International Building Code.

Delete without substitution:

~~**[BS] 907.4.4 Limited structural alteration.** Where the work does not involve a substantial structural *alteration* and the building is not assigned to Seismic Design Category F, the existing elements of the lateral load-resisting system shall comply with Section 807.5.~~

Revise as follows:

[BS] ~~907.4.5~~ 907.6 Wall anchors for concrete and masonry buildings. *No change to text.*

[BS] ~~907.4.6~~ 907.7 Bracing for unreinforced masonry parapets. *No change to text.*

Reason: This proposal simplifies Section 907, removing duplication and clarifying the intent.
Here is the current intent of Section 907, retained but clarified by this proposal:

- Section 907 applies to any Level 3 alteration, whether or not the intended work involves structural elements (this will be confirmed

and clarified by a separate proposal).

- If the intended alteration involves a Substantial Structural Alteration (SSA), the lateral system must be evaluated for wind and reduced seismic loads. If deficient, the lateral system must be retrofitted. (current 907.4.1 and 907.4.2)
    - Small residential buildings are exempt if altered by light frame provisions or IRC. (907.4 Exc 1)
    - Retrofit above the first story is not required if the intended alteration is to the first story only. (907.4 Exc 2)
- If the intended alteration does NOT involve SSA, then only the Level 2 Alteration structural provisions apply, except for the special cases in the following bullets. (907.2, 907.3, 907.4.4)
- In addition to the overall lateral system assessment based on SSA, the following proactive mitigations apply to all Level 3 alterations. The two exceptions in 907.4 do NOT apply, as these pre-dated the following proactive provisions:
    - Essential facilities in high seismic areas (SDC F) shall be evaluated, and retrofitted if deficient. (907.4.3)
    - In certain vulnerable buildings in moderate or high seismic areas, roof-to-wall anchors shall be provided. (907.4.5)
    - In moderate or high seismic areas, URM parapets shall be braced. (907.4.6)

Based on the foregoing intent, this proposal makes the following clarifying and editorial revisions:

Current 907.1: Revise by separate proposal. The words "including structural alterations" are problematic, but they can be left as is for purposes of this reorganization.

Current 907.2: Delete. Unnecessary, since per 505.2 and 901.2, structural provisions for Level 2 Alterations already apply.

Current 907.3: Delete. Unnecessary, since per 505.2 and 901.2, structural provisions for Level 2 Alterations already apply.

Current 907.4: Retain the exceptions, but otherwise combine with current 907.4.2. In exception 2, delete the unnecessary phrase about "change of occupancy provisions." This phrase means to say that the exception is overruled by any applicable change of occupancy trigger, but it is not necessary to say that because in the IEBC, provisions for each project type apply independently and cumulatively.

Current 907.4.1: Delete. This is the only part of the proposal that might (but, we submit, does not) represent a substantive change. A plain reading suggests that 907.4.1 requires a full structural evaluation (lateral and gravity, all load cases) for any Level 3 Alt (or at least for any Level 3 Alt that involves any structural work, depending on how you read 907.1). We submit that was never the intent. Rather, "evaluation and analysis that establishes the structural adequacy of the altered structure," should be read to mean "establishes which of the subsections to follow, 907.4.2 or 907.4.4, applies, and confirms that the work will satisfy them." In other words, 907.4.1 really means only that you have demonstrate compliance with the appropriate provisions. Since this is always true, this requirement can be deleted. (Alternatively, if you believe that 907.4.1 really does intend to require submittal and approval of a full structural evaluation report for every Level 3 Alt project, then the provision is incomplete and unclear; the code can make such a requirement, but it will need much clearer triggers, scope, and criteria.)

Current 907.4.2: Retain, combined with the exceptions of 907.4.

Current 907.4.3: Retain, but renumber as 907.X, since this proactive measure applies regardless of SSA and without the 907.4 exceptions. The last sentence of current 907.4.3 refers to "limited structural alteration," an unnecessary term used only in current 907.4.4. Since 907.4.4 is being deleted as unnecessary, the wording is changed to what the requirement actually is, which is simply the full wind loads of IBC Section 1609.

Current 907.4.4: Delete. Unnecessary, since per 505.2 and 901.2, structural provisions for Level 2 Alterations already apply.

Current 907.4.5: Retain, but renumber as 907.Y, since this proactive measure applies regardless of SSA and without the 907.4 exceptions.

Current 907.4.6: Retain, but renumber as 907.Z, since this proactive measure applies regardless of SSA and without the 907.4 exceptions.

Cost Impact: Will not increase the cost of construction
This is an editorial clarification of current intent, therefore there will be not change in construction requirements.

EB49-16 : [BS] 907.2-BONOWITZ12315

EB50-16

IEBC: 202 (New), [BS] 1007.1, [BS] 1007.2, [BS] 1007.3.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new definition as follows:

SECTION 202 DEFINITIONS

RISK CATEGORY. A categorization of buildings and other structures for determination of flood, wind, snow, ice and earthquake loads based on the risk associated with unacceptable performance, as provided in Section 1604.5 of the *International Building Code*.

Revise as follows:

[BS] 1007.1 ~~Gravity~~ Live loads. ~~Buildings or portions thereof subject to~~
Structural elements carrying tributrary live loads from an area with a *change of occupancy*~~where such change in~~ shall satisfy the ~~nature~~ requirements of ~~occupancy results in higher uniform or concentrated loads based on Table 1607.1 of the *International Building Code* shall comply with the gravity load provisions~~ Section 1607 of the *International Building Code*. Design live loads for areas of new occupancy shall be based on Section 1607 of the *International Building Code*. Design live loads for other areas shall be permitted to use previously approved design live loads.

> **Exception:**Structural elements whose ~~stress~~ demand-capacity ratio considering the change of occupancy is not ~~increased by~~ more than 5 percent greater than the demand-capacity ratio based on previously approved live loads need not comply with this section.

[BS] 1007.2 Snow and wind loads. ~~Buildings and structures subject to~~
When a ~~*change of occupancy* where such~~ change ~~in the nature~~ of occupancy results in a structure being assigned to a higher ~~wind or snow~~ risk ~~categories based on Table 1604.5~~ category, the structure shall satisfy the requirements of Sections 1608 and 1609 of the *International Building Code*~~shall be analyzed and shall comply with~~ for the ~~applicable wind or snow load provisions~~ new risk category.

> **Exception:** Where the area of the ~~*International Building Code*~~new occupancy is less than 10 percent of the building area, compliance with this section is not required.
>
> > ~~**Exception:** Where the new occupancy with a higher risk category is less than or equal to 10 percent of the total building floor area. The cumulative effect of the area of occupancy changes shall be considered for the purposes of this exception.~~
>
> The cumulative effect of occupancy changes over time shall be considered.

[BS] 1007.3.2 Access to Risk Category IV. ~~Where a *change of occupancy* is such~~
Any structure that ~~compliance with Section 1007.3.1 is required and the building is~~ provides operational access to an adjacent structure assigned to Risk Category IV~~,~~ as the ~~operational access to the building~~ result of a change of occupancy shall ~~not be through an adjacent structure, unless that structure conforms to~~ itself satisfy the requirements of Section 1613 of the *International Building Code* for Risk Category IV structures using *International Building Code*-level seismic forces. Where operational access to the Risk Category IV structure is less than 10 feet (3048 mm) from either an interior lot line or from another structure, access protection from potential falling debris shall be provided ~~by the owner of the Risk Category IV structure~~.

Reason: This proposal makes editorial changes for consistency, clarity, and simplification. The revisions use the preferred wording and logic approved for other sections in recent code cycles, so as to make the structural provisions more uniformly understandable and enforceable throughout the IEBC. The revisions by section:
202:

- Add the definition of Risk Category, identical to that provided in the IBC, but with reference to IBC Section 1604.5. This makes it unnecessary to refer repeatedly to Table 1604.5 and other rules for mixed occupancies and risk categories.

1007.1:

- Change title to Live loads. The code does not define "gravity loads," which could be construed to include snow and rain. More important, any change in dead load would indicate an alteration, not a change of occupancy.
- There is no need to determine whether the CoO has increased the design live loads. Instead, just design for the new design loads and use the 5% exception where it applies. This is the effect of the current provision in any case. More important, we believe it is not the intent of the code to permit a new occupancy in an under-designed space. Therefore, to compare the Table 1607.1 design loads for the new occupancy and the previous occupancy might not be sufficient if the actual structure was designed originally for much smaller design live loads than Table 1607.1 would require today.
- The allowance for "previously approved design live loads" outside the Change of Occupancy area is consistent with the allowance for alterations in 807.3 and 403.3.1.
- The 5 percent rule is retained, with the comparison clarified.

1007.2:

- Update the wording. There is no longer a "wind or snow risk category."
- Retain the 10% exception for a small area of changed occupancy. Note that 1007.3.1 allows this exception only for a change to RC II or III, not to RC IV. If that is sensible for seismic loads, it is probably also sensible for wind and snow, but this proposal is meant to be editorial only.

1007.3 and 1007.3.1: No changes proposed here. Since the Prescriptive method has a similar seismic provision (but no wind, snow, or live load provision yet), editorial revisions to 1007.3 and 1007.3.1 will be proposed separately in tandem with revisions to 407.4

1007.3.2:

- Clarify the logic.
- Clarify the applicable seismic criteria consistent with similar sections.
- Delete the reference to the owner. The owner or permit applicant is always responsible for compliance; there is nothing about this provision that requires a special charge to the owner.

Cost Impact: Will not increase the cost of construction
This is an editorial change, so there will be no change to construction requirements.

EB50-16 : [BS] 1007.1-BONOWITZ12523

EB51-16

IEBC: [BS] 1007.2.

Proponent : Kathleen Petrie, representing City of Seattle, Department of Planning and Development (kathleen.petrie@seattle.gov)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 1007.2 Snow and wind loads.

Buildings and structures subject to a ~~*change of occupancy*~~ *change of occupancy* where such change in the nature of occupancy results in higher ~~wind or snow~~ risk categories based on Table 1604.5 of the ~~*International Building Code*~~ *International Building Code* shall be analyzed and shall comply with the applicable wind or snow load provisions of the ~~*International Building Code*~~*International Building Code*.

> ~~**Exception:**~~ **Exception:** Where the new occupancy with a higher risk category is less than or equal to 10 percent of the total building floor area. The cumulative effect of the area of occupancy changes shall be considered for the purposes of this exception.

Reason: Table 1604.5 of the IBC is not about wind or snow categories; it is entitled "Risk Category of Buildings and Other Structures". To say that a change in the nature of the occupancy results in a higher wind or snow category is inaccurate, so this proposal deletes that language.

Cost Impact: Will not increase the cost of construction
The proposed modification does not change the requirement, so cost is not impacted

EB51-16 : [BS] 1007.2-PETRIE3427

EB52-16

IEBC: [BS] 1007.3, [BS] 1007.3.1, [BS] 1007.3.2.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete without substitution:

~~**[BS] 1007.3 Seismic loads.** *Existing buildings* with a *change of occupancy* shall comply with the seismic provisions of Sections 1007.3.1 and 1007.3.2.~~

Revise as follows:

[BS] ~~1007.3.1~~ 1007.3 ~~Compliance with International Building Code-level seismic forces~~ Seismic loads. Where a building or portion thereof is subject to a *change of occupancy* that results in the building being assigned to a higher risk category based on Table 1604.5 of the *International Building Code,* the building shall comply with the requirements for *International Building Code*-level seismic forces as specified in Section 301.1.4.1 for the new risk category..

Exceptions:

1. Where approved by the *code official*, specific detailing provisions required for a new structure are not required to be met where it can be shown that an equivalent level of performance and seismic safety is obtained for the applicable risk category based on the provision for reduced *International Building Code*-level seismic forces as specified in Section 301.1.4.2.
2. Where the area of the new occupancy with a higher hazard category is less than or equal to 10 percent of the total building floor area and the new occupancy is not classified as Risk Category IV. For the purposes of this exception, buildings occupied by two or more occupancies not included in the same risk category, shall be subject to the provisions of Section 1604.5.1 of the *International Building Code*. The cumulative effect of the area of occupancy changes shall be considered for the purposes of this exception.
3. Unreinforced masonry bearing wall buildings in Risk Category III when assigned to Seismic Design Category A or B shall be allowed to be strengthened to meet the requirements of Appendix Chapter A1 of this code [Guidelines for the Seismic Retrofit of Existing Buildings (GSREB)].

[BS] ~~1007.3.2~~ 1007.4 Access to Risk Category IV. ~~Where~~
Any structure that provides operational access to an adjacent structure assigned to risk category IV as the result of a ~~*change of occupancy* is such that~~ change of occupancy shall itself satisfy the requirements of Sections 1608, 1609, and 1613 of the International Building Code. For compliance with Section ~~1007.3.1 is required and the building is assigned to Risk Category IV~~ 1613, ~~the~~ International Building Code-level seismic forces shall be used. Where operational access to the ~~building shall not be through an adjacent structure, unless that structure conforms to the requirements for~~ Risk Category IV ~~structures. Where operational access~~ structure is less than 10 feet (3048 mm) from either an interior lot line or from another structure, access protection from potential falling debris shall be provided ~~by the owner of the Risk Category IV structure~~.

Reason: This proposal makes Section 1007.3.2 more general. It recognizes that access to a newly reclassified Risk Category IV building is important with respect to wind and snow damage as well as earthquake damage.
By re-numbering 1007.3.2 as its own section, it will now apply to more than just seismic loads. Hence the additional edits.

Once current 1007.3.2 becomes 1007.4, the current introductory section 1007.3 is no longer needed and should be deleted, and the renumbereed section 1007.3.1 should be re-titled just "Seismic loads" for consistency with 1007.1 and 1007.2.

Cost Impact: Will increase the cost of construction
In the rare cases where an existing RC I, II or III building is reclassified to RC IV and is served by an adjacent RC I, II, or III structure, this proposal might lead to increase costs to improve resistance to wind and snow.

EB52-16 : [BS] 1007.3.1-BONOWITZ12532

EB53-16

IEBC: [BS] 1103.1, [BS] 1103.3.3.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Delete without substitution:

~~**[BS] 1103.1 Compliance with the International Building Code.** *Additions* to *existing buildings* or structures are new construction and shall comply with the *International Building Code*.~~

~~**[BS] 1103.3.3 Voluntary addition of structural elements to improve the lateral force-resisting system.** Voluntary addition of structural elements to improve the lateral force-resisting system of an *existing building* shall comply with Section 807.6.~~

Reason: This proposal removes two small sections that are entirely redundant.
Current 1103.1 is redundant with respect to 1101.1.

Current 1103.3.3 is redundant with respect to 807.6, to which it points. In addition, 1103.3.3 should be removed from Chapter 11 because "addition of structural elements" is not about Additions.

Cost Impact: Will not increase the cost of construction
This proposal is editorial, so there will be no change in construction requirements.

EB53-16 : [BS] 1103.1-BONOWITZ12715

EB54-16

IEBC: [BS] 1201.2.

Proponent : Gwenyth Searer, Wiss, Janney, Elstner Associates, Inc.

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 1201.2 Report. A *historic building*undergoing ~~*repair*~~ *alteration*~~, *alteration*,~~ or *change of occupancy*shall be investigated and evaluated. If it is intended that the building meet the requirements of this chapter, a written report shall be prepared and filed with the *code official*by a registered design professional when such a report is necessary in the opinion of the *code official*. Such report shall be in accordance with Chapter 1 and shall identify each required safety feature that is in compliance with this chapter and where compliance with other chapters of these provisions would be damaging to the contributing historic features. For buildings assigned to Seismic Design Category D, E or F, a structural evaluation describing, at a minimum, the vertical and horizontal elements of the lateral force-resisting system and any strengths or weaknesses therein shall be prepared. Additionally, the report shall describe each feature that is not in compliance with these provisions and shall demonstrate how the intent of these provisions is complied with in providing an equivalent level of safety.

Reason: There is no need for a report regarding the safety features or the lateral force resisting systems of a historic building in the event of a repair to a historic building. According to Section 601.1, repairs need only comply with Chapter 12; this wording effectively bypassess all of the upgrade triggers in Chapter 6. Furthermore, according to Section 1202.1, repairs shall be permitted with original or like materials and original methods of construction, and according to Section 1202.4, replacement of existing or missing features using original materials shall be permitted.

In short, all of the existing language that governs repairs of historc buildings specifically exlcudes triggering of upgrades; thus a report that details all of the non-conformances of the safety features and lateral force resisting system is not needed. Furthermore, the requirement in 1201.2 that mandates the report list each feature of the historic building that is not in compliance with "these provisions" and requires demonstration of "how the intent of these provisions is complied with" is contradictory and confusing when it comes to repairs. Including repairs in the requirements of Section 1201.2 is thus both circular and confusing.

Cost Impact: Will not increase the cost of construction
This is an editorial change that will either not affect the cost of construction, or may lower it slightly because reports that are not required will not be mandated.

EB54-16 : [BS] 1201.2-SEARER12086

EB55-16

IEBC: [BS] 1201.2, [BS] 1206.1.

Proponent : Edward Kulik, representing Building Code Action Committee (bcac@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

[BS] 1201.2 Report. A *historic building*undergoing *repair*, *alteration*, or *change of occupancy*shall be investigated and evaluated. If it is intended that the building meet the requirements of this ~~chapter~~ code, a written report shall be prepared and filed with the *code official*by a registered design professional when such a report is necessary in the opinion of the *code official*. Such report shall be in accordance with Chapter 1 and shall identify each required safety feature that is in compliance with this chapter and where compliance with other chapters of these provisions would be damaging to the contributing historic features. For buildings assigned to Seismic Design Category D, E or F, a structural evaluation describing, at a minimum, the vertical and horizontal elements of the lateral force-resisting system and any strengths or weaknesses therein shall be prepared. Additionally, the report shall describe each feature that is not in compliance with these provisions and shall demonstrate how the intent of these provisions is complied with in providing an equivalent level of safety.

[BS] 1206.1 General. *Historic buildings*shall comply with the applicable structural provisions for the work as classified in Chapter 5.

> **Exceptions:**
> ~~**Exception:**~~ 1. The *code official*shall be authorized to accept existing floors and approve operational controls that limit the live load on any such floor.
> 2. Where compliance with the intent of this code is accomplished and documented in accordance with Section 1201.2

Reason: There is a very weak link in Chapter 12 between the report that is required in Section 1201.2 and flexibility given to the structural aspect of historic buildings. Currently Section 1206.1 gives the impression that full compliance with the work area method is required regardless of any report in Section 1201.2 being developed.
This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2014 and 2015 the BCAC has held 5 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: **BCAC**

Cost Impact: Will not increase the cost of construction
This proposal is a clarification of the requirements and may reduce costs by providing for proper application.

EB55-16 : [BS] 1201.2-KULIK10984

EB56-16

IEBC: [BS] 1302.3, [BS] 1302.4, [BS] 1302.5.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 1302.3 Wind loads. Buildings shall comply with wind provisions for new construction at the new location using the*International Building Code* or *International Residential Code*,~~wind provisions~~ as applicable.

> ~~**Exceptions**~~ **Exception:**
> ~~1.~~ Detached one- and two-family dwellings and Group U occupancies where wind loads for new construction at the new location are not higher than those at the previous location.
> ~~2. Structural elements whose stress is not increased by more than 10 percent.~~

[BS] 1302.4 Seismic loads. Buildings shall comply with seismic provisions for new construction at the new location using the*International Building Code* or *International Residential Code*,~~seismic provisions at the new location~~ as applicable.

> ~~**Exceptions**~~ **Exception:**
> ~~1.~~ Structures assigned to Seismic Design Category A or B and detached one- and two-family dwellings assigned to Seismic Design Category A, B, or C where the seismic loads for new construction at the new location are not higher than those at the previous location.
> ~~2. Structural elements whose stress is not increased by more than 10 percent.~~

[BS] 1302.5 Snow loads. Structures shall comply with ~~*International Building Code* or *International Residential Code*~~ snow ~~loads as applicable where snow loads~~ provisions for new construction at the new location ~~are higher than those at~~ using the ~~previous location~~*International Building Code* or *International Residential Code,* as applicable.

> **Exception:**~~Structural elements whose stress is~~ Structures for which the snow loads for new construction at the new location are not ~~increased by more~~ higher than ~~5 percent~~ those at the previous location.

Reason: This proposal clarifies the structural upgrade exceptions for relocated buildings and restores some of the intent of the Prescriptive provision (Section 409.1) that was simply eliminated without Structural Committee input in Group A.
For wind, seismic, and snow loads, current Section 1302 generally requires relocated buildings to meet requirements for similar new buildings. It provides two types of exceptions:

1. Exceptions where the loads in the new location are no higher than in the old location, for specific buildings and occupancies.
2. A "10% rule" for wind and seismic, and a "5% rule" for snow.

This proposal retains the first set of exceptions (with editorial revisions) and removes the second set of exceptions because they are unclear in intent and application. For example, what does it mean to have a "stress increase" due to seismic loads associated with a relocation? Does the exception intend to compare current loads at the new location with current loads at the old location? If so, that is what Exception 1 already does, without the need for percentages. Or does it intend to compare the original design loads at the old location with current design loads at the new location, as if the relocated structure were a new building to be compared with the old one? That would be inconsistent with any other IEBC provision. In short, the "10% rule" exception for relocated buildings is unclear and unnecessary.

More important, while a "10% rule" is appropriate for an addition or a typical alteration as a way of keeping upgrade costs proportional to intended project costs, such a rule should not apply to the wholesale relocation of a building. A relocation should be considered on par with a Level 3 alteration with substantial structural scope, for which the IEBC does require wind and seismic upgrade. That is why the Prescriptive provision in Section 409 (prior to its removal in Group A) simply said that a relocated building should be treated like a new structure, without exceptions.

The proposal also makes editorial clarifications for consistent wording and structure. Thus, the "no higher" snow load provision is moved to an exception to match the structure used for wind and seismic.

Cost Impact: Will increase the cost of construction
Might increase the cost of relocation for some buildings, depending on whether loads in the new location are higher, and on how the unclear 10% exceptions were interpreted. For users of the Prescriptive method, the proposal represents a reduction in cost.

EB56-16 : [BS] 1302.3-BONOWITZ12825

EB57-16

IEBC: [BS] 1302.3, [BS] 1302.4, [BS] 1302.5.

Proponent : David Bonowitz, representing National Council of Structural Engineers Associations (dbonowitz@att.net)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] 1302.3 Wind loads. Buildings shall comply with wind provisions for new construction at the new location using the *International Building Code*or *International Residential Code*, ~~wind provisions~~ as applicable.

~~**Exceptions:**~~

1. ~~Detached one- and two family dwellings and Group U occupancies where wind loads at the new location are not higher than those at the previous location.~~
2. ~~Structural elements whose stress is not increased by more than 10 percent.~~

[BS] 1302.4 Seismic loads. Buildings shall comply with ~~*International Building Code* or *International Residential Code*~~ seismic provisions for new construction at the new location using the *International Building Code* or *International Residential Code,* as applicable.

Exceptions:

1. Structures ~~in~~ assigned to Seismic Design ~~Categories~~ Category A ~~and~~ or B ~~and detached one- and two family dwellings in Seismic Design Categories A~~, ~~B and C where the seismic loads at~~ based on the new location ~~are not higher than those at the previous location~~.
2. ~~Structural elements whose stress is not increased by more than 10 percent~~ Detached one- and two-family dwellings assigned to Seismic Design Category C, based on the new location.

[BS] 1302.5 Snow loads. Structures shall comply with ~~*International Building Code* or *International Residential Code*~~ snow ~~loads as applicable where snow loads~~ provisions for new construction at the new location ~~are higher than those at the previous location~~ using *International Building Code* or *International Residential Code,* as applicable.

~~**Exception:** Structural elements whose stress is not increased by more than 5 percent.~~

Reason: This proposal makes editorial clarifications and deletes the highly unconservative exceptions, matching three two Work Area provisions to the Prescriptive provision (409.1) that was removed without Structural Committee input in Group A.
The intent of these exceptions is apparently to avoid the cost of sensible, safety upgrades -- even for the wholesale relocation of an entire building. However, for wind and snow, they do not waive the upgrade for, say, historic buildings where such costs might be destructive, they do not waive the upgrade only for moves within the same lot, which maintain the existing risk, and they do not waive the upgrade based on an low risk, as the exception to 1302.4 does for areas of low seismicity. Any of those approaches might be more reasonable.

Rather, these exceptions effectively say that while it is not acceptable to build a deficient new house in your jurisdiction, it is completely ok to move an even worse one in from the neighboring town or suburb. That makes no sense, and it is no way to manage the risk of an existing building stock. Section 409 did not provide these exceptions, and the Work Area method shouldn't either. (We are open to exceptions based on low risk, as in 1302.4, but such a revision is beyond the scope of this proposal.)

Exceptions to structural safety upgrades make sense for a small addition or alteration; they look for significant risk increases and keep upgrade costs proportional to intended project costs. But such rules should not apply to the wholesale relocation of a building. A relocation should be considered on par with a Level 3 alteration with substantial structural scope, for which the IEBC does require wind and seismic upgrade (see Section 907.4). That is why the Prescriptive provision in Section 409 (prior to its removal in Group A) simply said that a relocated building should be treated like a new structure, without exceptions.

Thus, appropriate exceptions for relocation should exempt low risks, not small changes to already risky buildings. Therefore, this proposal does the following:

- In 1302.3, for wind, remove both exceptions as they inappropriately allow high-risk buildings to be relocated without risk reduction.
- In 1302.5, for snow, remove the exception and part of the provision, as they inappropriately allow high risk buildings to be relocated without risk reduction.
- In 1302.4, for seismic:
  - Maintain the exception for buildings in SDC A or B. These are already low risk regardless of whether the seismicity changes.
  - Maintain the exception for dwellings in SDC C. These are riskier than similar houses in SDC A or B, but the exception seems consistent with other exceptions for IRC-eligible dwellings in other IEBC sections.
  - Remove the part of the exception about "seismic loads ... not higher than those at the previous location" because this is unnecessary once the exception is already limited by SDC.

Regarding 1302.4: The current wording is unclear, and redundant. Once SDC A and B buidings are exempt, there is no need to call out SDC A and B dwellings separately. Also, it is unclear whether the "where the seismic loads ..." phrase applies to both sets of buildings or just the second set. Therefore, the proposal splits the two sets into separate exceptions for clarity, and the troublesome phrase is deleted as unnecessary, as explained above.

Cost Impact: Will increase the cost of construction
Cost increases for the upgrades made necessary by eliminating some exceptions. But will decrease the cost of future repair and recovery associated with damage to deficient relocated buildings.

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APPENDIX A, Chapter A1, Chapter A6

Proponent : James Lai, David Ojala, S.E., Chair, SEAOC Existing Building Committee; Fred Turner, S.E., Chair Ad Hoc committee; James S. Lai, S.E., Member, Ad Hoc Committee, representing Structural Engineers Association of Callifornia (dojala@exponent.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

APPENDIX A Guidelines for the Seismic Retrofit of Existing Buildings
CHAPTER PART A1—SEISMIC STRENGTHENING PROVISIONFOR UNREINFORCED MASONRY BEARING WALL BUILDINGS
Revise as follows:

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

Add new definition as follows:

BED JOINT. The horizontal layer of mortar on which a masonry unit is laid.

Revise as follows:

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

Add new definition as follows:

DETAILED BUILDING SYSTEM ELEMENTS.
The localized elements and the inter-connections of these elements that define the design of the building.

Revise as follows:

[BS] FLEXIBLE DIAPHRAGM.
A diaphragm of wood or untopped metal deck construction in which the horizontal deformation along its length is at least two times the average story drift.

Add new definition as follows:

HEAD JOINT.
The vertical mortar joint placed between masonry units within the wythe.

Revise as follows:

[BS] OPEN FRONT.
An exterior building wall line on one side only without vertical elements of the ~~lateral~~ seismic force-resisting system in one or more stories.

[BS] RIGID DIAPHRAGM.
A diaphragm of concrete construction or concrete filled metal deck construction.

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

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

[BS] UNREINFORCED MASONRY BEARING WALL.
A URM wall that provides the vertical support for the reaction of floor or roof-framing members for which the total superimposed vertical load exceeds 100 lbs. per linear foot of wall length..

SECTION A104 SYMBOLS AND NOTATIONS
For the purpose of this chapter, the following notations supplement the applicable symbols and notations in the building code.

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

A	=	Cross-sectional area of unreinforced masonry pier or wall, square inches (10^{-6} m ^{2}).
A_b	=	Total area of the bed joints above and below the test specimen for each in-place shear test, square inches (10^{-6} m ^{2}).
A_n	=	Area of net mortared or grouted section of a wall or wall pier
D	=	In-plane width dimension of pier, inches (10^{-3} m), or depth of diaphragm, feet (m).
DCR	=	Demand-capacity ratio specified in Section A111.4.2.
f''_m	=	~~Compressive~~ Lower bound masonry compressive strength~~ of masonry~~.
f_{sp}	=	Tensile-splitting strength of masonry.
F_{wx}	=	Force applied to a wall at level x, pounds (N).
H	=	Least clear height of opening on either side of a pier, inches (10^{-3} m).
h/t	=	Height-to-thickness ratio of URM wall. Height, h, is measured between wall anchorage levels and/or slab-on-grade
L	=	Span of diaphragm between shear walls, or span between shear wall and open front, feet (m).
L_c	=	Length of crosswall, feet (m).
L_i	=	Effective diaphragm span for an open-front building specified in Section A111.8, feet (m).
P	=	Applied force as determined by standard test method of ASTM C 496 or ASTM E 519, pounds (N).
P_D	=	Superimposed dead load at the location under consideration, pounds (kN). For determination of the rocking shear capacity, dead load at the top of the pier under consideration shall be used.
P_{D+L}	=	~~Press~~ Stress resulting from the dead plus actual live load in place at the time of testing, pounds per square inch (kPa).
P_{test}	=	Splitting tensile test load determined by standard test method ASTM C496, pounds (N)
P_w	=	Weight of wall, pounds (N).
R	=	Response modification factor for Ordinary plain masonry shear walls in Bearing Wall System from Table 12.2-1 of ASCE 7, where R = 1.5.
~~S_{DS}~~	~~=~~	~~Design spectral acceleration at short period, in g units.~~
S_{D1} ~~$_{DS}$~~	=	Design spectral acceleration at ~~1-second~~ short period, in g units.
S_{D1}	=	Design spectral acceleration at 1-second period, in g units.
v_a	=	The shear strength of any URM pier, v_m A/1.5 pounds (N).
v_c	=	Unit shear ~~capacity value~~ strength for a crosswall sheathed with any of the materials given in Table A1-D or A1-E, pounds per foot (N/m).
v_m	=	Shear strength of unreinforced masonry, pounds per square inch (kPa).
V_{aa}	=	The shear strength of any URM pier or wall, pounds (N).
~~V_{ca}~~	~~=~~	~~Total shear capacity of crosswalls in the direction of analysis immediately above the diaphragm level being investigated, $v_c L_c$, pounds (N).~~
V_{cb} ~~$_{ca}$~~	=	Total shear capacity of crosswalls in the direction of analysis immediately ~~below~~ above the diaphragm level being investigated, $v_c L_c$, pounds (N).
V_{cb}	=	Total shear capacity of crosswalls in the direction of analysis immediately below the diaphragm level being investigated, $v_c L_c$, pounds (N).
V_p	=	Shear force assigned to a pier on the basis of its relative shear rigidity, pounds (N).
V_r	=	Pier rocking shear capacity of any URM wall or wall pier, pounds (N).
~~v_t~~	~~=~~	~~Mortar shear strength as specified in Section A106.3.3.5, pounds per square inch (kPa).~~
~~V_{test}~~	~~=~~	~~Load at incipient cracking for each in-place shear test performed in accordance with Section A106.3.3.1, pounds (kN).~~
v_{to} t	=	Mortar (bed joint) shear ~~test values~~ strength as specified in Section A106.3.3.5, pounds per square inch (kPa).
V_{test}	=	Load at incipient cracking for each in-place shear test performed in accordance with Section A106.3.3.1, pounds (kN).
V_{tL}	=	Lower bound mortar shear strength, pounds per square inch (kPa)
v_{to}	=	Mortar shear test values as specified in Section A106.3.3.5, pounds per square inch (kPa).
		Unit shear capacity value for a diaphragm sheathed with any of

v_u	=	the materials given in Table A1-D or A1-E, pounds per foot (N/m).
V_{wx}	=	Total shear force resisted by a shear wall at the level under consideration, pounds (N).
W	=	Total seismic dead load as defined in the building code, pounds (N).
W_d	=	Total dead load tributary to a diaphragm level, pounds (N).
W_w	=	Total dead load of a URM wall above the level under consideration or above an open-front building, pounds (N).
W_{wx}	=	Dead load of a URM wall assigned to level x halfway above and below the level under consideration, pounds (N).
$\Sigma\ v_uD$	=	Sum of diaphragm shear capacities of both ends of the diaphragm, pounds (N).
v_uD	=	For diaphragms coupled with crosswalls, v_uD includes the sum of shear capacities of both ends of diaphragms coupled at and above the level under consideration, pounds (N).
$\Sigma\ W_d$	=	Total dead load of all the diaphragms at and above the level under consideration, pounds (N).

SECTION A105 GENERAL REQUIREMENTS

[BS] A105.1 General. The seismic force-resisting system specified in this chapter shall comply with the building code and referenced standards, except as modified herein.

[BS] A105.3 Requirements for plans. The following construction information shall be included in the plans required by this chapter:

1. Dimensioned floor and roof plans showing existing walls and the size and spacing of floor and roof-framing members and sheathing materials. The plans shall indicate all existing ~~and~~ URM walls, new crosswalls and shear walls, and their materials of construction. The location of these walls and their openings shall be fully dimensioned and drawn to scale on the plans.
2. Dimensioned URM wall elevations showing openings, piers, wall classes as defined in Section A106.3.3.8, thickness, heights, wall shear test locations, cracks or damaged portions requiring repairs, the general condition of the mortar joints, and if and where pointing is required. Where the exterior face is veneer, the type of veneer, its thickness and its bonding and/or ties to the structural wall masonry shall also be noted.
3. The type of interior wall and ceiling materials, and framing.
4. The extent and type of existing wall anchorage to floors and roof when used in the design.
5. The extent and type of parapet corrections that were previously performed, if any.
6. *Repair*details, if any, of cracked or damaged unreinforced masonry walls required to resist forces specified in this chapter.
7. All other plans, sections and details necessary to delineate required retrofit construction.
8. The design procedure used shall be stated on both the plans and the permit application.
9. Details of the anchor prequalification program required by Section A107.5.3, if used, including location and results of all tests.
10. Construction quality assurance requirements of special inspection for all new construction materials and for retrofit construction including: anchor tests, pointing or repointing of mortar joints, installation of adhesive or mechanical anchors, and other elements as deemed necessary to ensure compliance with this Appendix.

[BS] A105.4 Structural observation, testing and inspection. Structural observation, in accordance with Section ~~1708~~ 1704.5 of the *International Building Code*, shall be required for all structures in which seismic retrofit is being performed in accordance with this chapter. Structural observation shall include visual observation of work for conformance with the approved construction documents and confirmation of existing conditions assumed during design.

Structural testing and inspection for new and existing construction materials shall be in accordance with the building code, except as modified by this chapter.

Special inspection as described in Section A105.3 Item 10 shall be provided equivalent to Level 3 as prescribed in TMS 402 Table 3.1(2), Minimum *Special Inspection Requirements*.

SECTION A106 MATERIALS REQUIREMENTS

Delete without substitution:

~~**[BS] A106.1 General.** Materials permitted by this chapter, including their appropriate strength design values and those existing configurations of materials specified herein, may be used to meet the requirements of this chapter.~~

Delete and substitute as follows:

[BS] ~~A106.2~~ A106.1 Condition of Existing materials. ~~Existing materials used as part of the required vertical load-carrying or lateral forceresisting system shall be in sound condition, or shall be repaired or removed and replaced with~~

~~new materials. All other unreinforced masonry materials shall comply with the following requirements:~~

1. ~~The lay-up of the masonry units shall comply with Section A106.3.2, and the quality of bond between the units has been verified to the satisfaction of the building official;~~
2. ~~Concrete masonry units are verified to be load-bearing units complying with ASTM C 90 or such other standard as is acceptable to the building official; and~~
3. ~~The compressive strength of plain concrete walls shall be determined based on cores taken from each class of concrete wall. The location and number of tests shall be the same as those prescribed for tensile-splitting strength tests in Sections A106.3.3.3 and A106.3.3.4, or in Section A108.1.~~

~~The use of materials not specified herein or in Section A108.1 shall be based on substantiating research data or engineering judgment, with the approval of the building official.~~

Existing materials used as part of the required vertical load-carrying or seismic force-resisting system shall be evaluated by on-site investigation and determined not to be in poor condition including degraded mortar, degraded masonry units, or significant cracking; or shall be repaired, enhanced, retrofitted or removed and replaced with new materials. Mortar joint deterioration shall be patched by pointing or re-pointing of the eroded joint in accordance with Section A106.2.3.9. Existing significant cracks in solid unit unreinforced and in solid grouted hollow unit masonry shall be repaired by epoxy pressure injection and/ or by fiber sheets bonded by epoxy to masonry surface.

Revise as follows:

[BS] ~~A106.3~~ A106.2 Existing unreinforced masonry.

[BS] ~~A106.3.1~~ A106.2.1 General. Unreinforced masonry walls used to ~~carry~~ support vertical loads or seismic forces parallel and perpendicular to the wall plane shall be tested as specified in this section. ~~All masonry~~ Masonry that does not meet the minimum ~~standards~~ requirements established by this chapter shall be repaired, enhanced, removed and replaced with new materials, or alternatively, shall have its structural functions replaced with new materials and shall be anchored to supporting elements.

[BS] ~~A106.3.2~~ A106.2.2 Lay-up of walls. Unreinforced masonry walls shall be laid in a running bond pattern.

[BS] ~~A106.3.2.1~~ A106.2.2.1 ~~Multiwythe~~ Header in multi-wythe solid brick. The facing and backing wythes of multi-wythe walls shall be bonded so that not less than 10 percent of the exposed face area is composed of solid headers extending not less than 4 inches (102 mm) into the backing wythes. The clear distance between adjacent ~~fulllength headers~~ header courses shall not exceed 24 inches (610 mm) vertically or horizontally. Where ~~the~~ backing consists of two or more wythes, the headers shall extend not less than 4 inches (102 mm) into the most distant wythe, or the backing wythes shall be bonded together with separate headers ~~with their~~ for which the area and spacing ~~conforming~~ conform to the foregoing. Wythes of walls not ~~bonded as described above~~ meeting these requirements shall be considered veneer~~. Veneer wythes~~ , and shall not be included in the effective thickness used in calculating the height-to-thickness ratio and the shear ~~capacity~~ strength of the wall.

> **Exception:** Where S_{D1} is ~~not more than 0.3~~ 0.3g or less, veneer wythes anchored ~~as specified in the building code~~ and made composite with backup masonry ~~may~~ are permitted to be used for calculation of the effective thickness.

[BS] ~~A106.3.2.2~~ A106.2.2.2 ~~Grouted or ungrouted hollow concrete or clay block~~ Concrete masonry units and structural ~~hollow~~ clay load-bearing tile. Grouted or ungrouted hollow concrete masonry units shall be tested in accordance with ASTM C140. Grouted or ungrouted structural clay ~~block and structural hollow clay~~ load-bearing tile shall be ~~laid~~ tested in ~~a running bond pattern~~ accordance with ASTM C34.

[BS] ~~A106.3.2.3~~ A106.2.2.3 Other lay-up patterns. Lay-up patterns other than those specified in ~~Sections A106.3.2.1 and A106.3.2.2 above are~~ Section A106.2.2.1 is allowed if their performance can be justified.

[BS] ~~A106.3.3~~ A106.2.3 Testing of masonry.

Delete and substitute as follows:

[BS] ~~A106.3.3.1~~ A106.2.3.1 ~~Mortar~~ In-place mortar tests. ~~The quality of mortar in all masonry walls shall be determined by performing in-place shear tests in accordance with the following:~~

1. ~~The bed joints of the outer wythe of the masonry shall be tested in shear by laterally displacing a single brick relative to the adjacent bricks in the same wythe. The head joint opposite the loaded end of the test brick shall be carefully excavated and cleared. The brick adjacent to the loaded end of the test brick shall be carefully removed by sawing or drilling and excavating to provide space for a hydraulic ram and steel loading blocks. Steel blocks, the size of the end of the brick, shall be used on each end of the ram to distribute the load to the brick. The blocks shall not contact the mortar joints. The load shall be applied horizontally, in the plane of the wythe. The load recorded at first movement of the test brick as indicated by spalling of the face of the mortar bed joints is *Vtest* in Equation A1-3.~~
2. ~~Alternative procedures for testing shall be used where in-place testing is not practical because of crushing~~

~~or other failure mode of the masonry unit (see Section A106.3.3.2).~~

Mortar shear test values, v_{to}, shall be obtained by one of the following:

1. ASTM C1531.

2. For masonry walls that have high shear strength mortar, or where in-place testing is not practical because of crushing or other failure mode of the masonry, alternative procedures for testing shall be used in accordance with Section A106.2.3.2.

Revise as follows:

[BS] ~~A106.3.3.2~~ A106.2.3.2 Alternative procedures for testing masonry. The tensile-splitting strength of existing masonry, f_{sp}, or the prism strength of existing masonry, f''_m, ~~may~~ is permitted to be determined in accordance with ~~one of~~ ASTM C496 and calculated by the following ~~procedures~~ equation:

~~1. Wythes of solid masonry units shall be tested by sampling the masonry by drilled cores of not less than 8 inches (203 mm) in diameter. A bed joint intersection with a head joint shall be in the center of the core. The tensile splitting strength of these cores should be determined by the standard test method of ASTM C 496. The core should be placed in the test apparatus with the bed joint 45 degrees (0.79 rad) from the horizontal. The tensile-splitting strength should be determined by the following equation:~~

$$f_{sp} = \frac{2P}{\pi a_n}$$ ~~(Equation A1-1)~~

~~2. Hollow unit masonry constructed of through-thewall units shall be tested by sampling the masonry by a sawn square prism of not less than 18 inches square (11 613 mm^2). The tensile-splitting strength should be determined by the standard test method of ASTM E 519. The diagonal of the prism should be placed in a vertical position. The tensile splitting strength should be determined by the following equation:~~

$$f_{sp} = \frac{0.494P}{a_n}$$ ~~(Equation A1-2)~~

~~3. An alternative to material testing is estimation of the f''_m of the existing masonry. This alternative should be limited to recently constructed masonry. The determination of f''_m requires that the unit correspond to a specification of the unit by an ASTM standard and classification of the mortar by type.~~

$$f_{sp} = \frac{0.494P}{a_n}$$ **(Equation A1-1)**

[BS] ~~A106.3.3.3~~ A106.2.3.3 Location of tests. The shear tests shall be taken at locations representative of the mortar conditions throughout the ~~entire building, taking into account variations in workmanship at different building height levels, variations in weathering of the exterior surfaces, and variations in the condition of the interior surfaces due to deterioration caused by leaks and condensation of water and/or by the deleterious effects of other substances contained within the~~ building. ~~The exact test~~ Test locations shall be determined at the building site by the ~~engineer or architect~~ registered design professional in ~~responsible~~ charge ~~of the structural design work~~. ~~An accurate record~~ Results of all ~~such~~ tests and their locations ~~in the building~~ shall be recorded~~, and these results shall be submitted to the building department for approval as part of the structural analysis~~.

[BS] ~~A106.3.3.4~~ A106.2.3.4 Number of tests. The minimum number of tests per masonry class shall be determined as follows:

1. At each of both the first and top stories, not less than two tests per wall or line of wall elements providing a common line of resistance to ~~lateral~~ seismic forces.
2. At each of all other stories, not less than one test per wall or line of wall elements providing a common line of resistance to ~~lateral~~ seismic forces.
3. In any case, not less than one test per 1,500 square feet (139.4 m^2) of wall surface and not less than a total of eight tests.

[BS] ~~A106.3.3.5~~ A106.2.3.5 Minimum quality of mortar.

1. Mortar shear test values, v_{to}, in pounds per square inch (kPa) shall be obtained for each in-place shear test in accordance with the following equation:

$v_{to} = (V_{test}/A_b) - P_{D+L}$ **(Equation A1-~~3~~ 2)**

Where, V_{test} = Load at first observed movement;

A_b = Total area of the bed joints above and below the test specimen;

P_{D+L} = Stress resulting from actual dead plus live loads in place at the time of testing

2. Individual unreinforced masonry walls with more than 50% of mortar test values, v_{to} ~~consistently~~ less than 30 pounds per square inch (207 kPa) shall be ~~entirely~~ pointed prior to and retested ~~retesting~~.
3. The lower-bound mortar shear strength, v_{tL}, is ~~the value in pounds per square inch (kPa) that is exceeded by 80 percent~~ defined as he mean minus one standard deviation of the mortar shear test values, v_{to}.
4. Unreinforced masonry with mortar shear strength, v_{tL} less than 30 pounds per square inch (207 kPa) shall be ~~removed,~~ pointed and retested or shall have its structural function replaced, and shall be anchored to supporting elements in accordance with Sections A106.3.1 and A113.8. When existing mortar in any wythe is pointed to increase its shear strength and is retested, the condition of the mortar in the adjacent bed joints of the inner wythe or wythes and the opposite outer wythe shall be examined for extent of deterioration. The shear strength of any wall class shall be no greater than that of the weakest wythe of that class.

[BS] ~~A106.3.3.6~~ A106.2.3.6 Minimum quality of masonry.

1. The minimum average value of tensile-splitting strength ~~determined~~ , f_{sp}, as calculated by Equation A1-1 ~~or A1-2~~ shall be 50 pounds per square inch (344.7 kPa). ~~The minimum value of f''_m determined by categorization of the masonry units and mortar should be 1,000 pounds per square inch (6895 kPa).~~
2. Individual unreinforced masonry walls with average tensile-splitting strength, f_{sp}, of less than 50 pounds per square inch (344.7 kPa) shall be ~~entirely~~ pointed ~~prior to retesting~~ and retested.
3. ~~Hollow unit unreinforced masonry walls with estimated prism compressive~~ The lower-bound mortar shear strength, f_{spL}, is defined as the mean minus one standard deviation of the tensile-splitting strength ~~of less than 1,000 pounds per square inch (6895 kPa) shall be grouted to increase the average net area compressive strength~~ test values, f_{sp}.

[BS] ~~A106.3.3.7~~ A106.2.3.7 Collar joints. The collar joints shall be inspected at the test locations during each in-place shear test, and estimates of the percentage of surfaces of the adjacent ~~wythe surfaces~~ wythes that are covered with mortar shall be reported along with the results of the in-place shear tests.

[BS] ~~A106.3.3.8~~ A106.2.3.8 Unreinforced masonry classes. Existing unreinforced masonry shall be categorized into one or more classes based on shear strength, quality of construction, state of *repair*, deterioration and weathering. A class shall be characterized by the ~~allowable~~ masonry shear ~~stress~~ strength determined in accordance with Section A108.2. Classes ~~shall be~~ are defined for whole walls, not for small areas of masonry within a wall. Discretion in the definition of classes of masonry is permitted to avoid unnecessary testing.

[BS] ~~A106.3.3.9~~ A106.2.3.9 Pointing. Deteriorated mortar joints in unreinforced masonry walls shall be pointed in accordance with the following requirements:

1. **Joint preparation.** ~~The deteriorated~~ Deteriorated mortar shall be cut out by means of a toothing chisel or non- impact power tool ~~to a depth at which~~ until sound mortar is reached but to a depth of not less than $^3/_4$ inch (19.1 mm) or twice the thickness of the joint, whichever is less, and 2 inches (50 mm) maximum. Care shall be taken not to damage the ~~brick~~ masonry edges. After cutting is complete, all loose material shall be removed with a brush, air ~~stream~~ or water stream.
2. **Mortar preparation**. The mortar mix shall be proportioned as required by the ~~registered design professional~~ construction specifications. The pointing mortar shall be ~~prehydrated~~ prepared by first thoroughly mixing all ingredients dry and then mixing again, adding only enough water to produce a damp ~~workable~~ unworkable mix ~~which will retain~~ that retains its form when pressed into a ball. The mortar shall be kept in a damp condition for not less than one hour and not more than $1^1/_2$ hours for pre-hydration; then sufficient water shall be added to bring it to a workable consistency ~~that~~ for pointing, which is somewhat drier than conventional masonry mortar. Use mortar within one and two and one-half hours from its initial mixing.
3. **Packing**. The joint into which the mortar is to be packed shall be ~~damp~~ dampened but without freestanding water. The mortar shall be tightly packed into the joint in layers not exceeding $^1/_4$ inch (6.4 mm) ~~in depth~~ deep until it is filled; then it shall be tooled to a smooth surface to match the original profile.

Nothing shall prevent pointing of any ~~deteriorated~~ masonry wall joints before testing is performed in accordance with Section ~~A106.3.3~~ A106.2.3, except as required in Section A107.1.

SECTION A107 QUALITY CONTROL

[BS] A107.3 Existing wall anchors. Existing wall anchors used as all or part of the required tension anchors shall be tested in pullout according to Section A107.5.1. ~~The~~ A minimum ~~number~~ of four anchors tested per floor shall be ~~four per floor~~ tested in pullout, with a minimum of two tests at walls with joists framing into the wall and two tests at walls with joists parallel to the wall, but not less than 10 percent of the total number of existing tension anchors at each level.

[BS] A107.4 New ~~bolts~~ wall anchors. All new wall anchors embedded ~~bolts~~ in URM walls shall be subject to ~~periodic~~ special inspection ~~in accordance with the building code~~, prior to placement of the ~~bolt~~ anchor and grout or adhesive in the drilled hole. Five percent of all ~~bolts~~ anchors that do not extend through the wall shall be subject to a direct-tension test, and an additional 20 percent shall be tested using a calibrated torque wrench. Testing shall be performed in accordance with Section A107.5. ~~New bolts that extend through the wall with steel plates on the far side of the wall need not be tested.~~

> ~~**Exception:** Special inspection in accordance with the building code may be provided during installation of new anchors in lieu of testing.~~

All new wall anchors embedded ~~bolts~~ in URM walls resisting tension forces or a combination of tension and shear forces shall be subject to ~~periodic~~ special inspection ~~in accordance with the building code~~, prior to placement of the ~~bolt~~ anchor and grout or adhesive in the drilled hole. Five percent of all ~~bolts~~ anchors resisting tension forces shall be subject to a direct-tension test, and an additional 20 percent shall be tested using a calibrated torque wrench. Testing shall be performed in accordance with Section A107.5.

Exception: New ~~through bolts~~ bolts that extend through the wall with steel plates on the far side of the wall need not be tested.

[BS] A107.5 Tests of anchors in unreinforced masonry walls. Tests of anchors in unreinforced masonry walls shall be in accordance with Sections A107.5.1 through A107.5.4. Results of all tests shall be reported to the authority having jurisdiction. The report shall include the test results of maximum load for each test, pass-fail results and also include: corresponding anchor size and type, orientation of loading, details of the anchor installation, testing apparatus, and embedment, wall thickness, and joist orientation and proximity to the tested anchor.

[BS] A107.5.1 Direct tension testing of existing anchors and new ~~bolts~~ anchors. The test apparatus shall be supported by the masonry wall. The ~~distance between the anchor~~ test procedure for pre-qualification of tension and ~~the test apparatus support~~ shear anchors shall ~~be not less than one half the wall thickness for existing anchors and 75 percent of the embedment for new embedded bolts~~ comply with ASTM E488. Existing wall anchors shall be given a preload of 300 pounds (1335 N) ~~prior to~~ before establishing a datum for recording elongation. The tension test load reported shall be recorded at $^{1}/_{8}$ inch (3.2 mm) relative movement between the existing anchor and the adjacent masonry surface. New embedded tension ~~bolts~~ anchors shall be subject to a direct tension load of not less than 2.5 times the design load but not less than 1,500 pounds (6672 N) for five minutes ~~(10 percent deviation)~~.

Exception: Where obstructions occur, the distance between the anchor and the test apparatus support shall be not less than one-half the wall thickness for existing anchors and 75 percent of the embedment length for new embedded anchors.

[BS] A107.5.2 Torque testing of new ~~bolts~~ anchors. ~~Bolts~~ Anchors embedded in unreinforced masonry walls shall be tested using a torque-calibrated wrench to the following minimum torques:

$^{1}/_{2}$ -inch-diameter (12.7 mm) bolts: 40 foot pounds (54.2 N-m).

$^{5}/_{8}$ -inch-diameter (15.9 mm) bolts: 50 foot pounds (67.8 N-m).

$^{3}/_{4}$-inch-diameter (19.1 mm) bolts: 60 foot pounds (81.3 N-m).

[BS] A107.5.3 Prequalification ~~test~~ tests for ~~bolts and other types of~~ non-conforming anchors. ~~This section~~ ASTM E488 or the test procedure in Section A107.5.1 is ~~applicable when it is desired~~ permitted to ~~use~~ be used to determine tension or shear strength values for anchors greater than those permitted by Table A1-E. ~~The direct-tension test procedure set forth in Section A107.5.1 for existing anchors shall be used to determine the allowable tension values for new embedded through bolts, except that no preload is required. Bolts~~ Anchors shall be installed in the same manner and using the same materials as will be used in the actual construction. A minimum of five tests for each bolt size and type shall be performed for each class of masonry in which they are proposed to be used. The ~~allowable~~ tension and shear strength values for such anchors shall be the lesser of the average ultimate load divided by ~~a safety factor of~~ 5.0 or the average load at which $^{1}/_{8}$ inch (3.2 mm) elongation occurs for each size and type of ~~bolt~~ anchor and class of masonry.

~~The test procedure for prequalification of shear bolts shall comply with ASTM E 488 or another approved procedure.~~

~~The allowable values determined in this manner shall be permitted to exceed those set forth in Table A1-E.~~

Delete without substitution:

~~**[BS] A107.5.4 Reports.** Results of all tests shall be reported. The report shall include the test results as related to anchor size and type, orientation of loading, details of the anchor installation and embedment, wall thickness and joist orientation.~~

SECTION A108 DESIGN STRENGTHS

Revise as follows:

[BS] A108.1 Strength Values.

1. Strength values for existing materials are given in Table A1-D and for new materials in Table A1-E.
2. ~~Capacity~~ The strength reduction ~~factors need not~~ factor, Φ , shall be ~~used~~ taken equal to 1.0.
3. The use of ~~new~~ materials not specified herein shall be ~~based on substantiating research data or engineering judgment, with~~ subjected to the discretion and approval of the ~~building official~~ authority having jurisdiction.

[BS] A108.2 Masonry shear strength. The unreinforced masonry shear strength, v_m, shall be determined for each masonry class from one of the following equations:

1. ~~The~~ When testing is performed in accordance with section A106.2.3.1, the unreinforced masonry shear strength, $v_{\cancel{m}\,mL}$, shall be determined by Equation A1-~~4 when the mortar shear strength has been determined by Section A106.3.3.1.~~ 3:

   (Equation A1-~~4~~ 3)

   The mortar shear strength values, $v_{\cancel{t}\;tL}$, shall be determined in accordance with Section ~~A106.3.3~~ A106.2.3.5.
2. ~~The~~ When alternate testing is performed in accordance with Section A106.2.3.2, unreinforced masonry shear, $v_{\cancel{m}\,mL}$, shall be determined by Equation A1-~~5 when tensile~~ 4.

   ~~(Equation A1-splitting strength has been determined in accordance with Section A106.3.3.2, Item 1 or 2.~~

   - c) $v + 0.75\frac{P_D}{A}$ ~~(Equation A1-5)~~

   4)
3. ~~When f'_m has been estimated by categorization of the units and mortar in accordance with Section 2105.1 of the International Building Code, the unreinforced masonry shear strength, v_m, shall not exceed 200 pounds per square inch (1380 kPa) or the lesser of the following:a) 2.5~~

   ~~or b) 200 psi or~~

   c) $v + 0.75\frac{P_D}{A}$ ~~(Equation A1-6)~~

   ~~For SI: 1 psi = 6.895 kPa.where:~~

   ~~v = 62.5 psi (430 kPa) for running bond masonry not grouted solid.~~

   ~~v = 100 psi (690 kPa) for running bond masonry grouted solid.~~

   ~~v = 25 psi (170 kPa) for stack bond grouted solid~~

[BS] A108.3 Masonry compression. Where any increase in wall dead plus live load compression stress occurs, the maximum compression stress in unreinforced masonry, Q_G/A_n, shall not exceed 300 pounds per square inch (2070 kPa).

[BS] A108.4 Masonry tension. Unreinforced masonry shall be assumed to have no tensile capacity.

[BS] A108.5 ~~Existing~~ Wall tension anchors. The ~~resistance values~~ tension strength of ~~the existing~~ wall anchors shall be the average of the tension ~~tests of existing~~ test values for anchors having the same wall thickness and ~~joist~~ framing orientation.

[BS] A108.6 Foundations. For existing foundations, new total dead loads ~~may~~ are permitted to be increased over the existing dead load by 25 percent. New total dead load plus live load plus seismic forces may be increased over the existing dead load plus live load by 50 percent. Higher values may be justified only in conjunction with a geotechnical investigation.

SECTION A109 ANALYSIS AND DESIGN PROCEDURE

[BS] A109.1 General. The elements of buildings hereby required to be analyzed are specified in Table A1-A.

[BS] A109.2 Selection of procedure. Buildings with rigid diaphragms shall be analyzed by the general procedure of Section A110~~, which is based on the building code~~. Buildings with flexible diaphragms shall be analyzed by the general procedure or, when applicable, ~~may~~ are permitted to be analyzed by the special procedure of Section A111. ASCE 41 is permitted to be used as an alternate procedure for both rigid diaphragm or flexible diaphragm buildings.

SECTION A110 GENERAL PROCEDURE

[BS] A110.1 Minimum design lateral forces. Buildings shall be analyzed to resist minimum lateral forces assumed to act nonconcurrently in the direction of each of the main axes of the structure in accordance with the following:

$$V = \frac{0.75S_{DS}W}{R}$$ **(Equation A1-~~7~~ 5)**

[BS] A110.2 ~~Lateral~~ Seismic forces on elements of structures. Parts and portions of a structure not covered in Section A110.3 shall be analyzed and designed per the current building code, using force levels defined in Section A110.1.

Exceptions:

1. Unreinforced masonry walls for which height ~~tothickness~~ to thickness ratios do not exceed ratios set forth in Table A1-B need not be analyzed for out-of-plane loading. Unreinforced masonry walls that exceed the allowable *h/t*ratios of Table A1-B shall be braced according to Section A113.5.
2. Parapets complying with Section A113.6 need not be analyzed for out-of-plane loading.
3. Where walls are to be anchored to flexible floor and roof diaphragms, the anchorage shall be in accordance with Section A113.1.

[BS] A110.3 In-plane loading of URM shear walls and frames. Vertical ~~lateral load-resisting~~ seismic force-resisting elements shall be analyzed in accordance with Section A112.

[BS] A110.4 Redundancy and overstrength factors. Any redundancy or overstrength factors contained in the building code may be taken as unity. The vertical component of ~~earthquake load~~ seismic force (~~*Ev*~~ E_v) may be taken as zero.

SECTION A111 SPECIAL PROCEDURE

[BS] A111.1 Limits for the application of this procedure. The special procedures of this section may be applied only to buildings having the following characteristics:

1. Flexible diaphragms at all levels above the base of the structure.
2. Vertical elements of the ~~lateral~~ seismic force-resisting system consisting predominantly of masonry or combination of masonry and concrete shear walls.
3. Except for single-story buildings with an open front on one side only, a minimum of two lines of vertical elements of the ~~lateral~~ seismic force-resisting system parallel to each axis of the building (see Section A111.8 for ~~openfront~~ open-front buildings).

[BS] A111.2 ~~Lateral~~ Seismic forces on elements of structures. With the exception of the provisions in Sections A111.4 through A111.7, elements of structures and nonstructural elements shall comply with ~~Sections A110.2 through A110.4~~ the reduced level seismic forces prescribed in IEBC section 301.1.4.2.

[BS] A111.3 Crosswalls. Crosswalls shall meet the requirements of this section.

[BS] A111.3.1 Crosswall definition. A crosswall is a wood-framed wall sheathed with any of the materials described in Table A1-D or A1-E or other system as defined in Section A111.3.5. Crosswalls shall be spaced no more than 40 feet (12 192 mm) on center measured perpendicular to the direction of consideration, and shall be placed in each story of the building. Crosswalls shall extend the full story height between diaphragms.

Exceptions:

1. Crosswalls need not be provided at all levels when used in accordance with Section A111.4.2, Item 4.
2. Existing crosswalls need not be continuous below a wood diaphragm at or within 4 feet (1219 mm) of grade, provided:
   - 2.1. Shear connections and anchorage requirements of Section A111.5 are satisfied at all edges of the diaphragm.
   - 2.2. Crosswalls with total shear capacity of $0.5S_{D1}\Sigma W_d$ interconnect the diaphragm to the foundation.
   - 2.3. The demand-capacity ratio of the diaphragm between the crosswalls that are continuous to their foundations does not exceed 2.5, calculated as follows:

$$DCR = \frac{(2.1S_{D1}W_d + V_{ca})}{2v_u D}$$ **(Equation A1-~~8~~ 6)**

(Equation A1-8)

[BS] A111.4 Wood diaphragms.

[BS] A111.4.1 Acceptable diaphragm span. A diaphragm is acceptable if the point (*L,DCR*) on Figure A1-1 falls within Region 1, 2 or 3.

[BS] A111.4.2 Demand-capacity ratios. Demand-capacity ratios shall be calculated for the diaphragm at any level according to the following formulas:

1. For a diaphragm without qualifying crosswalls at levels immediately above or below:

   $DCR = 2.1S_{D1} W_d / \Sigma v_u D$ **(Equation A1-~~9~~ 7)**

2. For a diaphragm in a single-story building with qualifying crosswalls, or for a roof diaphragm coupled by crosswalls to the diaphragm directly below:

   $DCR = 2.1S_{D1} W_d / \Sigma v_u D + V_{cb}$ **(Equation A1-~~10~~ 8)**

3. For diaphragms in a multistory building with qualifying crosswalls in all levels:

   $DCR = 2.1S_{D1} \Sigma W_d / (\Sigma\Sigma\, v_u D + V_{cb})$ **(Equation A1-~~11~~ 9)**

   DCR shall be calculated at each level for the set of diaphragms at and above the level under consideration. In addition, the roof diaphragm shall also meet the requirements of Equation A1-~~10~~ 8.

4. For a roof diaphragm and the diaphragm directly below, if coupled by crosswalls:

   $DCR = 2.1\, S_{D1}\, \Sigma\, W_d / \Sigma\Sigma\, v_u D$ **(Equation A1-~~12~~ 10)**

[BS] A111.5 Diaphragm shear transfer. Diaphragms shall be connected to shear walls and new vertical seismic force-resisting elements with connections capable of developing the diaphragm-loading tributary to the shear wall or new seismic force-resisting elements given by the lesser of the following formulas:

$V = 1.2\, S_{D1} C_p W_d$ **(Equation A1-~~13~~ 11)**

using the C_p values in Table A1-C, or

$V = v_u D$ **(Equation A1-~~14~~ 12)**

[BS] A111.6 Shear walls (In-plane loading).

[BS] A111.6.1 Wall story force. The wall story force distributed to a shear wall at any diaphragm level shall be the lesser value calculated as:

$F_{wx} = 0.8\, S_{D1} (W_{wx} + W_d / 2)$ **(Equation A1-~~15~~ 13)**

but need not exceed

$F_{wx} = 0.8\, S_{D1} (W_{wx} + v_u D)$ **(Equation A1-~~16~~ 14)**

[BS] A111.6.2 Wall story shear. The wall story shear shall be the sum of the wall story forces at and above the level of consideration.

$V_{wx} = \Sigma\, F_{wx}$ **(Equation A1-~~17~~ 15)**

[BS] A111.6.3 Shear wall analysis. Shear walls shall comply with Section A112.

[BS] A111.6.4 ~~Moment frames~~ New seismic force-resisting elements. ~~Moment~~ New seismic force-resisting elements such as moment frames, braced frames ~~used in place of~~ or shear walls shall be designed as required by the building code, except that the seismic forces shall be as specified in Section A111.6.1, and the story drift ratio shall be limited to 0.015, except as further limited by Section A112.4.2 for moment frames.

[BS] A111.8 Open-front design procedure. A single-story building with an open front on one side and crosswalls parallel to the open front may be designed by the following procedure:

1. Effective diaphragm span, L_i, for use in Figure A1-1 shall be determined in accordance with the following formula:

   $L_i = 2[(W_w / W_d)\, L + L]$ **(Equation A1-~~18~~ 16)**

2. Diaphragm demand-capacity ratio shall be calculated as:

   $DCR = 2.1\, S_{D1}(W_d + W_w)/[(v_u D) + V_{cb}]$ **(Equation A1-~~19~~ 17)**

SECTION A112 ANALYSIS AND DESIGN

[BS] A112.1 General. The following requirements are applicable to both the general procedure and the special procedure for analyzing vertical elements of the lateral force-resisting system.

[BS] A112.2 ~~Existing~~ In-plane shear of unreinforced masonry walls.

[BS] A112.2.1 Flexural rigidity. Flexural components of deflection may be neglected in determining the rigidity of an unreinforced masonry wall.

[BS] A112.2.2 Shear walls with openings. Wall piers shall be analyzed according to the following procedure, which is diagrammed in Figure A1-2.

1. For any pier,
   1.1. The pier shear capacity shall be calculated as:

   $V_a = v_m A_n$ ~~/1.5~~ **(Equation A1-~~20~~ 18)**

   Where A_n=area of net mortared or grouted section of a wall or wall pier

   1.2. The pier rocking shear capacity shall be calculated as:

$V_r = 0.9\ P_D D/H$ **(Equation A1-~~21~~ 19)**

2. The wall piers at any level are acceptable if they comply with one of the following modes of behavior:
   2.1. Rocking controlled mode. When the pier rocking shear capacity is less than the pier shear capacity, i.e., $V_r V_a$ for each pier in a level, forces in the wall at that level, V_{wx}, shall be distributed to each pier in proportion to $P_D D/H$.For the wall at that level:

   $0.7V_{wx}r$ **(Equation A1-~~22~~ 20)**

   2.2. Shear controlled mode. Where the pier shear capacity is less than the pier rocking capacity, i.e., $V_a r$ in at least one pier in a level, forces in the wall at the level, V_{wx}, shall be distributed to each pier in proportion to D/H.For each pier at that level:

   $V_p V_a$ **(Equation A1-~~23~~ 21)**

   and

   $V_p V_r$ **(Equation A1-~~24~~ 22)**

   If $V_p a$ for each pier and $V_p > V_r$ for one or more piers, such piers shall be omitted from the analysis, and the procedure shall be repeated for the remaining piers, unless the wall is strengthened and reanalyzed.
3. Masonry pier tension stress. Unreinforced masonry wall piers need not be analyzed for tension stress.

[BS] A112.2.3 Shear walls without openings. Shear walls without openings shall be analyzed the same as for walls with openings, except that V_r shall be calculated as follows:

$V_r = 0.9(P_D + 0.5\ P_W)\ D/H$ **(Equation A1-~~25~~ 23)**

[BS] A112.3 Plywood-sheathed shear walls. ~~Plywoodsheathed~~
Plywood-sheathed shear walls may be used to resist lateral forces for URM buildings with flexible diaphragms analyzed according to provisions of Section A111. Plywood-sheathed shear walls may not be used to share lateral forces with other materials along the same line of resistance.

[BS] A112.4 Combinations of vertical elements.

[BS] A112.4.1 ~~Lateral-force~~ Seismic-force distribution. ~~Lateral~~
Seismic forces shall be distributed among the vertical-resisting elements in proportion to their relative rigidities, except that moment-resisting frames shall comply with Section A112.4.2.

[BS] A112.4.2 Moment-resisting frames. ~~Momentresisting~~
Moment-resisting frames shall not be used with an unreinforced masonry wall in a single line of resistance unless the wall has piers that have adequate shear capacity to sustain rocking in accordance with Section A112.2.2. The frames shall be designed in accordance with the building code to ~~carry~~ resist 100 percent of the ~~lateral~~ seismic forces tributary to that line of resistance, as determined from ~~Equation A1-7~~ Section A111.2. The story drift ratio shall be limited to 0.0075.

SECTION A113 DETAILED BUILDING SYSTEM DESIGN REQUIREMENTS

[BS] A113.1.2 Anchor requirements. Anchors shall consist of bolts installed through the wall as specified in Table A1-E, or an approved equivalent at a maximum anchor spacing of 6 feet (1829 mm). All wall anchors shall be secured to the ~~joists~~ framing members parallel or perpendicular to the wall to develop the required forces.

[BS] A113.1.3 Minimum wall anchorage. Anchorage of masonry walls to each floor or roof shall resist a minimum force determined as $0.9S_{DS}$ times the tributary weight or 200 pounds per linear foot (2920 N/m), whichever is greater, acting normal to the wall at the level of the floor or roof. Existing wall anchors, if used, must be tested and meet the requirements of ~~this chapter~~ Section A107.5.1 or must be upgraded.

[BS] A113.2 Diaphragm shear transfer. ~~Bolts~~
Anchors transmitting shear forces shall have a maximum ~~bolt~~ spacing of 6 feet (1829 mm) and shall have nuts installed over malleable iron or plate washers when bearing on wood, and heavy-cut washers when bearing on steel.

[BS] A113.6 Parapets. Parapets and exterior wall appendages not conforming to this chapter shall be removed, or stabilized or braced to ensure that the parapets and appendages remain in their original positions.

The maximum height of an unbraced unreinforced masonry parapet above the lower of either the level of tension anchors or the roof sheathing shall not exceed the ~~height-tothickness~~ height-to-thickness ratio shown in Table A1-F. If the required parapet height exceeds this maximum height, a bracing system designed for the forces determined in accordance with the building code shall support the top of the parapet. Parapet corrective work must be performed in conjunction with the installation of tension roof anchors.

The minimum height of a URM parapet above any wall anchor shall be 12 inches (305 mm).

Exception: If a reinforced concrete beam is provided at the top of the wall, the minimum height above the wall anchor ~~may~~ is permitted to be 6 inches (152 mm).

TABLE ~~0~~ A1-B
ALLOWABLE VALUE OF HEIGHT-TO-THICKNESS RATIO OF UNREINFORCED MASONRY WALLS

WALL TYPES	$0.13g \le S_{D1}g$	$0.25g \le S_{D1}g$	$S_{D1} \ge 0.4g$ BUILDINGS WITH CROSSWALLS[a]	$S_{D1} \ge 0.4g$ ALL OTHER BUILDINGS
Walls of one-story buildings	20	16	16[b,c]	13
First-story wall of multistory building	20	18	16	15
Walls in top story of multistory building	14	14	14[b,c]	9
All other walls	20	16	16	13

a. Applies to the special procedures of Section A111 only. See Section A111.7 for other restrictions.

b. This value of height-to-thickness ratio may be used only where mortar shear tests establish a tested mortar shear strength, v_t, of not less than 100 pounds per square inch (690 kPa). This value may also be used where the tested mortar shear strength is not less than 60 pounds per square inch (414 kPa), and where a visual examination of the collar joint indicates not less than 50-percent mortar coverage.

c. Where a visual examination of the collar joint indicates not less than 50-percent mortar coverage, and the tested mortar shear strength, v_t, is greater than 30 pounds per square inch (207 kPa) but less than 60 pounds per square inch (414 kPa), the allowable height-to-thickness ratio may be determined by linear interpolation between the larger and smaller ratios in direct proportion to the tested mortar shear strength.

TABLE ~~0~~ A1-E
STRENGTH VALUES OF NEW MATERIALS USED IN CONJUNCTION WITH EXISTING CONSTRUCTION

NEW MATERIALS OR CONFIGURATION OF MATERIALS		STRENGTH VALUES
Horizontal diaphragms	Plywood sheathing applied directly over existing straight sheathing with ends of plywood sheets bearing on joists or rafters and edges of plywood located on center of individual sheathing boards.	675 lbs. per ft.
Crosswalls	Plywood sheathing applied directly over wood studs; no value should be given to plywood applied over existing plaster or wood sheathing.	1.2 times the value specified in the current building code.
	Drywall or plaster applied directly over wood studs.	The value specified in the current building code.
	Drywall or plaster applied to sheathing over existing wood studs.	50 percent of the value specified in the current building code.
Tension ~~bolts~~[e] anchors[f]	~~Bolts~~Anchors extending entirely through unreinforced masonry wall secured with bearing plates on far side of a ~~three-wythe minimum~~ wall with at least 30 square inches of area.[b,c]	5,400 lbs. per ~~bolt~~anchor for three wythe the minimum walls. 2,700 lbs. for two-wythe walls.
Shear ~~bolts~~[e] anchors[f]	~~Bolts~~Anchors embedded a minimum of 8 inches into unreinforced masonry walls; ~~bolts~~ anchors should be centered in $2^1/_2$-inch-diameter holes with dry-pack or nonshrink grout around the circumference of the ~~bolt~~ anchor.	The value for plain masonry specified for solid masonry in the ~~current building code~~ TMS 402;no value larger than those given for $^3/_4$-inch bolts should be used.
	Through ~~bolts~~anchors ~~bolts~~anchors meeting the requirements for shear and for tension ~~bolts~~anchors.[b,c]	Tension—same as for tension ~~bolts~~anchors. Shear—same as for shear ~~bolts~~anchors.

Combined tension and shear ~~bolts~~anchors[f]	Embedded ~~bolts~~anchors ~~bolts~~anchorsextending to the exterior face of the wall with a 21/2 -inch round plate under the head and drilled at an angle of 221/2 degrees to the horizontal; installed as specified for shear ~~bolts~~anchors.[a,b,c]	Tension—3,600 lbs. per ~~bolt~~anchor. Shear—same as for shear ~~bolts~~anchors.
Infilled walls	Reinforced masonry infilled openings in existing unreinforced masonry walls; provide keys or dowels to match reinforcing.	Same as values specified for unreinforced masonry walls.
Reinforced masonry[d]	Masonry piers and walls reinforced per the current building code.	The value specified in the current building code for strength design.
Reinforced concrete[d]	Concrete footings, walls and piers reinforced as specified in the current building code.	The value specified in the current building code for strength design.

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm ^{2} , 1 pound = 4.4 N.

a. Embedded ~~bolts~~ anchors to be tested as specified in Section A107.4.

b. ~~Bolts to~~ Anchors shall be $^1/_2$ inch minimum in diameter.

c. Drilling for ~~bolts and dowels~~ anchors shall be done with an electric rotary drill; impact tools should not be used for drilling holesor tightening anchors and shear bolt nuts.

d. No load factors or capacity reduction factor shall be used.

e. Other bolt sizes, values and installation methods may be used, provided a testing program is conducted in accordance with Section A107.5.3. The strength value shall be determined by multiplying the calculated allowable value, determined in accordance with Section A107.5.3, by 3.0, and the usable value shall be limited to a maximum of 1.5 times the value given in the table. Bolt spacing shall not exceed 6 feet on center and shall be not less than 12 inches on center.
f. An alternative adhesive anchor bolt system is permitted to be used providing: a) Its properties and installation conform to an ICC Evaluation Service Report; and b) The Report states that the system's use is in unreinforced masonry as an acceptable alternative to Sections A107.4, A113.1, or TMS 402 Section 2.1.4. The Report's allowable values shall be multiplied by a factor of 3 to obtain strength values and the strength reduction factor Φ shall be taken equal to 1.0.

Reference standards type: This reference standard is new to the ICC Code Books

Add new standard(s) as follows:

ASTM C1531-15, Standard Test Methods for In Situ Measurement Of Masonry Mortar Joint Shear Strength Index

Reason: Appendix A1 was first introduced to the legacy code UCBC by the proponent (SEAOC) in or about 1990. During the intervening years, varies standards have been developed with practical considerations to users of the Appendix A1 in retrofitting URM buildings. Appendix A1 closely aligns with the ASCE 41-13 in Reduced Performance Objective, a Collapse Prevention Performance level (S-5) for BSE-1E Seismic Hazard Level demands. The special procedure under Appendix A1 is consistent with the Tier 2 deficiency-based procedures of ASCE 41-13 Chapter 5 for this Performance Objective. An *Ad Hoc* Committee was convened under the direction of SEAOC Exisiting Building Committee. The *Ad* Hoc Committee was chaired by Fred Turner, Staff Structural Engineer with the California Alfred E. Alquist Seismic Safety Commission, and who also chairs ASCE 41-17 Masonry Team. Participants in the Ad Hoc Committee includes delegates from Structural Engineers Associations of California and of Washington. The proposed modifications are essentially editorial, including removal of text where ASTM standards are available, and coordination between the Appendix A1 and ASCE 41 chapter 15. A brief summary of the proposed modifications are listed below:

Section A102, Scope. Proposes adding a story height restriction to be consistent with ASCE 41 Chapter 15 and Table 3-2..

Section A103, Definitions. Revisions proposed to improve consistency and eliminate discrepancies with ASCE 41 and TMS 402 definitions.

Section A104, Symbols and Notations. Revisions proposed for consistency and elimination of discrepancies with ASCE 41 and TMS 402 definitions.

Section A105, General Requirements. Added "and referenced standards" to be complied with for clarification. Added construction quality assurance requirements for the plans for consistency with ASCE 41 and TMS 402.

Section A106, Material Requirements. Changes proposed for consistency with condition assessments and materials provisions in ASCE 41 Chapters 15 and 11. In A106.2.3.1 and .2, replaced text with a reference to ASTM C1531 and C496 which have more current sets of provisions. Replaced reference to ASTM C90 for concrete masonry unit buildings with C140 to broaden the options available to users, and, in particular, to address concrete masonry units that don't necessarily comply with C90; and edit sections to eliminate clauses covered in the Standards.

Section A107, Quality Control. Changes proposed for consistency with quality control provisions in ASCE 41 Chapters 15 and 11. Added reference to ASCE E488 which has a more current set of provisions than current provisions. Proposed deletion of Reports requirements in A107.5.4 since it would be addressed in new provisions of Section A105.

Section A108, Design strength. Changes proposed for consistency with design strength requirements of ASCE 41 Chapter 15. Added a 1.5 factor in the denominator of Equations A1-3 and A1-4 to be consistent with strength design, Chapters 11 and 15 of ASCE 41 to replace the 0.67 factor that is proposed to be deleted in the numerator of Equation A1-18 of Section A112, so there is no substantive effect for this change. Deletes the alternate method in Section A108.2 for estimating strength for consistency with ASCE 41 Chapters 11 and 15 since such methods are no longer considered reliable for older masonry walls.

Section A109, Analysis and Design Procedure. Proposes adding a reference to ASCE 41 as an acceptable alternate procedure and deleting the phrase "based on the building code" since it is no longer needed. ASCE 41 is a national standard for the seismic evaluation and retrofit of existing buildings. In time, ASCE 41 will be harmonized to adhere to provisions in Appendix A1.

Section A110, General Procedure. Editorial.

Section A111, Special Procedure. Proposes changes for consistency with special procedure in ASCE 41 Chapter 15. Clarifies that lateral forces on certain elements of structures are permitted to comply with reduced IBC level forces of IEBC Section 301. In Section A111.6.4 expanded the provisions to permit use of other types of vertical resisting systems than moment frames.

Section A112, Analysis and Design. Proposed minor editorial changes and revised equation A1-18 to be consistent with ASCE 41 Chapters 15 and 11 to address corresponding changes in A108 and to address conditions where masonry is partially grouted.

Section A113, Detailed System Design Requirements. Proposed minor changes for consistency with ASCE 41 Chapter 15.

Bibliography

The following resource materials are referenced in this chapter or are relevant to the subject matter addressed in this chapter.

ASCE 41, *Seismic Evaluation and Retrofit of Existing Buildings,* American Society of Civil Engineers, 2017.

ABK-84, *Methodology for Mitigation of Seismic Hazards in Existing Unreinforced Masonry Buildings: The Methodology*. Topical Report 08, National Science Foundation, Contract No. NSF-C-PFR78-19200. Washington, DC: Applied Science and Research Applications, 1984.

ABK-86, Guidelines for the Evaluation of Historic Brick Masonry Buildings in Earthquake Hazard Zones. ABK, A Joint Venture, Funded by the Department of Parks and Recreation of the State of California and the National Park Service, United States Government, January 1986.

ATC-78, *Tentative Provisions for the Development of Seismic Regulations for Buildings*, Report ATC 3-16. Redwood City, CA: Applied Technology Council, 1978.

ATC-87, *Evaluating the Seismic Resistance of Existing Buildings*, Report ATC-14. Redwood City, CA: Applied Technology Council, 1987.

ICBO-1988 through 1997, *Uniform Code for Building Conservation*. Whittier, CA: International Conference of Building Officials, 1988-1997.

ICBO-01, *Guidelines for the Seismic Retrofit of Existing, Buildings*. Whittier, CA: International Conference of Building Officials, 2006.

Preservation Brief 2, *Repointing Mortar Joints in Historic Masonry Buildings*. Robert C. Mack, FAIA, and John P. Spweik for the National Park Service, United States Government, October 1998.

TN 46, *Technical Note on Maintenance of Brick Masonry*, pp. 3-5, *Mortar Joint Repair*. Reston, VA: The Brick Industry Association, December 2005.

Getty 2003. *Planning and Engineering Guidelines for the Seismic Retrofitting of Historic Adobe Structures*.

Cost Impact: Will increase the cost of construction
No cost impact for URM buildings six stories or less. For buildings taller than six stories, the explicit limit serves to guide user to use the body of International Existing Building Code. The updated definition for unreinforced masonry wall, based on whether wall reinforcement meets the building code requirements for reinforced masonry walls, will have a cost impact. As a minimum, lightly reinforced masonry walls need to be evaluated by a design professional in meeting the minimum life-safety and performance objectives intended in the building code. This will increase the cost to engage a design professional, but will have no overall impact on construction cost.

Analysis: Staff note: A review of the standard(s) proposed for inclusion in the code, ASTM C1531-09, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.
ASCE 41-2017 is part of the update proposal for all standards currently referenced in the codes.

ASTM C140 is currently referenced in IBC and IRC, and ASTM C34 is currently referenced in the IRC.

EB58-16 : APPENIX A-LAI12765

EB59-16

Appendix A [BS] A106.3.3.1, Chapter A6

Proponent : Donald Harvey, Atkinson-Noland & Associates, representing Atkinson-Noland & Associates (dharvey@ana-usa.com)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Add new text as follows:

[BS] A106.3.3.1 Mortar tests. The quality of mortar in all masonry walls shall be determined by performing in-place shear tests in accordance with ASTM C1531.

Reference standards type: This reference standard is new to the ICC Code Books
Add new standard(s) as follows:

ASTM C1531-15, Standard Test Methods for In Situ Measurement Of Masonry Mortar Joint Shear Strength Index

Reason: The IEBC describes a test for which there is an established ASTM Standard: ASTM C1531 *Standard Test Methods for In Situ Measurement Of Masonry Mortar Joint Shear Strength Index*. The ASTM Standard provides a much more thorough description of the test, including diagrams of the test setup. Additionally, the standard provides alternate test methods to accomodate different situations. The standard was originally published in 2002 and is the industry standard for this type of testing. There is no reason for the IEBC to use a primitive test description when a detailed, established ASTM Standard for this type of testing exists.

Cost Impact: Will not increase the cost of construction
The industry already uses ASTM C1531 to perform this type of testing. Therefore, there should be no cost impact to replace the test description with a reference to ASTM C1531.

Analysis: A review of the standard(s) proposed for inclusion in the code, ASTM C1531-09, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2016.

EB59-16 : [BS] A106.3.3.1-HARVEY5080

EB60-16

IEBC: [BS] A301.2.

Proponent : Carl Baldassarra, P.E., FSFPE, representing the Code Technology Committee (CTC@iccsafe.org)

THIS CODE CHANGE WILL BE HEARD BY THE IBC-STRUCTURAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THIS COMMITTEES.

2015 International Existing Building Code

Revise as follows:

[BS] A301.2 Scope. The provisions of this chapter apply to residential buildings of light-frame wood construction containing one or more of the structural weaknesses specified in Section A303.

Exception: The provisions of this chapter do not apply to the buildings, or elements thereof, listed below. These buildings or elements require analysis by a registered design professional in accordance with Section A301.3 to determine appropriate strengthening:

1. Group R-1.
2. ~~Group R-1, R-2 or R-4 occupancies with more than four dwelling units.~~
3. Group R with more than four dwelling units.
4. Buildings with a lateral force-resisting system using poles or columns embedded in the ground.
5. Cripple walls that exceed 4 feet (1219 mm) in height.
6. Buildings exceeding three stories in height and any three-story building with cripple wall studs exceeding 14 inches (356 mm) in height.
7. Buildings where the *code official* determines that conditions exist that are beyond the scope of the prescriptive requirements of this chapter.
8. Buildings or portions thereof constructed on concrete slabs on grade.

Reason: The purpose of this code change is to coordinate the exceptions to Section A303 with the Group R occupancies and uses in the IBC. The original scope of this appendix in the UBC was limited to single-family homes, duplexes, and other small congregate residences. Proposal EB78-04/05 modified the scope and exception to replace the reference to UBC Group R, Division 1 with the what was intended to be the appropriate Group R categories in the IBC. The modification was not quite correct.
Detached small group homes/congregate residences are equivalent to single family homes, Thus, the exception needs to be modified to remove the limitation on Group R-4 buildings. These facilities should be able to use this appendix.

In addition, the language regarding number of dwelling units typically does not apply to Group R-1, but more typically to Group R-2 and R-3. It is noted the UBC originally excluded all multifamily occupancies and other Group R, Division 1 occupancies and uses from the appendix. Thus the limiting language is split between transient lodging (Group R-1) and facilities with dwelling units (all Group R).

Below is the original change.

EB78-04/05
A301.2
Proponent: Michael Valley, Magnusson Klemencic Associates, Seattle, WA, representing CSEA/Structural Engineers Association of Washington

Revise as follows:

A301.2 Scope. The provisions of this chapter apply to light, wood–frame residential buildings of light-frame wood construction~~that are in~~assigned to Seismic Design ~~Category~~Categories C, D, or E ~~and F of the 2003 IBC (located in Seismic Zones 3 and 4 of the UBC)~~, containing one or more of the structural weaknesses specified in Section A303.

Exception: The provisions of this chapter do not apply to the buildings, or elements thereof, listed below. These buildings or elements require analysis by an engineer or architect in accordance with Section A301.3 to determine appropriate strengthening.
1. Group ~~R, Division 1~~R-1, R-2 or R-4 occupancies with more than four dwelling units.
2. Buildings with a lateral–force–resisting system using poles or columns embedded in the ground.
3. Cripple walls that exceed 4 feet (1219 mm) in height.
4. Buildings exceeding three stories in height and any three–story building with cripple wall studs exceeding 14 inches (356 mm) in height.
5. Buildings where the building official determines that conditions exist that are beyond the scope of the prescriptive requirements of this chapter.

The provisions of this chapter do not apply to structures, or portions thereof, constructed on a concrete slab on grade.
The details and prescriptive provisions herein are not intended to be the only acceptable strengthening methods permitted. Alternative details and methods may be used when approved by the building official. Approval of alternatives shall be based on test data showing that the method or material used is at least equivalent in terms of strength, deflection and capacity to that provided by the prescriptive methods and materials.
The provisions of this chapter may be used to strengthen historic structures, provided they are not in conflict with other related provisions and requirements that may apply.

Reason: Editorial: Revise construction type to be consistent with IBC language (see IBC Section 2302.1), and revise occupancy in exception 1 to be consistent with the IBC (see IBC Section 310.1). Note that the IBC specifies four Group R occupancies, while the UBC specified only two such divisions. The added IBC divisions are added to the exception to maintain the previous scope of this chapter based on the UBC occupancy classification.
It is not appropriate to exempt buildings assigned to SDC C from these requirements as this covers buildings in what is considered a moderate level of seismic hazard. SDC F is only associated with Occupancy Category IV, to which this chapter does not apply.

This proposal is submitted by the ICC Code Technology Committee (CTC). The ICC Board has decided to sunset the CTC. The sunset plan includes re-assigning many of the CTC Areas of Study to the applicable Code Action Committee (CAC). The two remaining CTC Areas of

Study are Care Facilities and Elevator Lobbies/WTC Elevator issues. This proposal falls under the Care Facilities Area of Study. In 2014 and 2015 ICC CTC Committee has held 4 open meetings and numerous Work Group meetings and conference calls for the current code development cycle which included members of the committees as well as any interested party to discuss and debate the proposed changes. Information on the CTC, including: the sunset plan; meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the CTC website CTC.

Cost Impact: Will not increase the cost of construction
The original intent was for the provisions of Appendix A3 to apply to single family homes, including small group homes, for reasons of public health and safety. This proposal restores that intent. This is an allowance for group homes to utilize Appendix A3, not an additional requirement.

EB60-16 : [BS] A301.2-BALDASSARRA12036

EB61-16

IEBC: [BS] A304.3.1, [BS] TABLE A3-A (New).

Proponent : Randy Shackelford, representing Simpson Strong-Tie (rshackelford@strongtie.com)

2015 International Existing Building Code

Revise as follows:

[BS] A304.3.1 Existing perimeter foundations. Where the building has an existing continuous perimeter foundation, all perimeter wall sill plates shall be anchored to the foundation with adhesive anchors or expansion anchors in accordance with Table A3-A.

Anchors shall be installed in accordance with Figure A3-3, with the plate washer installed between the nut and the sill plate. The nut shall be tightened to a snug-tight condition after curing is complete for adhesive anchors and after expansion wedge engagement for expansion anchors. All anchors shall be installed in accordance with manufacturer's recommendations. ~~Where existing conditions prevent anchor installations through the sill plate, this connection shall be made in accordance with Figure A3-4A, A3-4B or A3-4C. The spacing of these alternate connections shall comply with the maximum spacing requirements of Table A3-A.~~ Expansion anchors shall not be used where the installation causes surface cracking of the foundation wall at the locations of the anchor.

Where existing conditions prevent anchor installations through the top of the sill plate, this connection shall be made in accordance with Figure A3-4A, A3-4B or A3-4C. Alternate anchorage methods having a shear capacity of 900 pounds parallel to the wall shall be permitted. The spacing of these alternate connections shall comply with the maximum spacing requirements of Table A3-A.

TABLE [BS] TABLE A3-A
SILL PLATE ANCHORAGE AND CRIPPLE WALL BRACING

NUMBER OF STORIES ABOVE CRIPPLE WALLS	MINIMUM SILL PLATE CONNECTION AND MAXIMUM SPACING[a, b]	AMOUNT OF BRACING FOR EACH WALL LINE[~~c,d,~~ed,e,f]	
		A Combination of Exterior Walls Finished with Portland Cement Plaster and Roofing Using Clay Tile or Concrete Tile Weighing More than 6 psf (287 N/m^2)	All Other Conditions
One story	1/2 inch (12.7 mm) spaced 6 feet, 0 inch (1829 mm) center-to-center with washer plate	Each end and not less than 50 percent of the wall length	Each end and not less than 40 percent of the wall length
Two stories	1/2 inch (12.7 mm) spaced 4 feet, 0 inch (1219 mm) center-to-center with washer plate; or 5/8 inch (15.9 mm) spaced 6 feet, 0 inch (1829 mm) center-to-center with washer plate	Each end and not less than 70 percent of the wall length	Each end and not less than 50 percent of the wall length
Three stories	5/8 inch (15.9 mm) spaced 4 feet, 0 inch (1219 mm) center-to-center with washer plate	100 percent of the wall length[~~f~~g]	Each end and not less than 80 percent of the wall length[~~f~~g]

a. Sill plate anchors shall be adhesive anchors or expansion bolts in accordance with Section A304.3.1.
b. All washer plates shall be 3 inches by 3 inches by 0.229 inch minimum. The hole in the plate washer is permitted to be diagonally slotted with a width of up to 3/16 inch larger than the bolt diameter and a slot length not to exceed 1 3/4 inches, provided a standard cut washer is placed between the plate washer and the nut.
c. This table shall also be permitted for the spacing of the alternate connections specified in section A304.3.1.
~~c.~~d. See Figure A3-10 for braced panel layout.
~~d.~~e. Braced panels at ends of walls shall be located as near to the end as possible.
~~e.~~f. All panels along a wall shall be nearly equal in length and shall be nearly equal in spacing along the length of the wall.
~~f.~~g. The minimum required underfloor ventilation openings are permitted in accordance with Section A304.4.4.

Reason: The reason for this code change is to allow alternate connections to the prescriptive 7 X 9 steel plate with retrofit bolts and lag screws. Allowing alternate connections will spur innovation, leading to more cost-effective methods. Also a flat plate is not the best solution in all cases, such as when the sill plate width is less than the foundation wall width. A short shim is not the best solution here, and is only allowed when the gap is less than 1-1/2 inches.
To reach the 900 pound capacity, I used the AWC Connection calculator to calculate that the shear capacity of a 1/4" lag screw, through

3/16" (7 ga.) steel with the mandated 2-1/2" length is 299 pounds. Since three lag screws are used, it came out to a rounded 900 pounds. The calculations are:

Design Method	Allowable Stress Design (ASD)
Connection Type	Lateral loading
Fastener Type	Lag Screw
Loading Scenario	Single Shear

Main Member Type	Hem-Fir
Main Member Thickness	3.5 in.
Main Member: Angle of Load to Grain	0
Side Member Type	Steel
Side Member Thickness	7 gage
Side Member: Angle of Load to Grain	0
Washer Thickness	0 in.
Nominal Diameter	1/4 in.
Length	2.5 in.
Load Duration Factor	C_D = 1.6
Wet Service Factor	C_M = 1.0
End Grain Factor	C_eg = 1.0
Temperature Factor	C_t = 1.0

Connection Yield Modes

Im	1290 lbs.
Is	1374 lbs.
II	537 lbs.
IIIm	550 lbs.
IIIs	299 lbs.
IV	310 lbs.

Adjusted ASD Capacity	**299 lbs.**

- Lag Screw bending yield strength of 70000 psi is assumed.
- The Adjusted ASD Capacity is only applicable for lag screws with adequate end distance, edge distance and spacing per NDS chapter 11.
- ASTM A36 Steel is assumed for steel side members 1/4 in. thick, and ASTM A653 Grade 33 Steel is assumed for steel side members less than 1/4 in. thick.

While every effort has been made to insure the accuracy of the

information presented, and special effort has been made to assure that the information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility for any particular design prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability from its use.

The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Washington State University. Support for development of the Connection Calculator was provided by American Wood Council.

This change will also clarify that the spacings in Table A3-A also apply to the alternate fastening methods. Currently the table seems to only apply to bolts.

Cost Impact: Will not increase the cost of construction
This proposal will not increase the cost of construction. It simply provides for an alternate type of connection to be provided, at the choice of the designer, installer, or homeowner.

EB61-16 : [BS] A304.3.1-SHACKELFORD13429