ADMINISTRATIVE BULLETIN

NO. AB-094

DATE : April 13, 2010 (revises bulletin dated May 26, 2009) (Updated 01/01/11 for code references)

SUBJECT : Permit Review and Operation

TITLE: : **Definition and Design Criteria for Voluntary Seismic Upgrade of Soft-Story, Type V (wood-frame) Buildings**

PURPOSE : The purpose of this Bulletin is to establish definitions and acceptable design criteria for voluntary seismic upgrade projects for soft-story Type V (wood-frame) buildings that may qualify for various incentives, such as expedited permit review and fee adjustments.

REFERENCE :
2010 San Francisco Building Code
Section 1613, Earthquake Loads
Section 3401.8, Lateral Force Design requirements for Existing Buildings
Section 1604.11, Minimum Lateral Forces for Existing Buildings
City and County of San Francisco Ordinance 54-10, Seismic Strengthening of Soft-Story, Wood-Frame Buildings
AB-004, Priority Permit Processing Guidelines
2009 International Existing Building Code, Appendix Chapter A4 with SEAOC recommendations
2007 California Historical Building Code, Chapter 8-7 and 8-8
ASCE/SEI Standard 31-03, 2003, Seismic Evaluation of Existing Buildings
ASCE/SEI Standard 41-06, 2007 Seismic Rehabilitation of Existing Buildings, with Supplement 1

DISCUSSION : A clear definition of "soft-story Type V (wood-frame) building" and the basic design criteria for seismic upgrades to such buildings are essential to the permit submittal and approval of projects that wish to take advantage of City-sponsored voluntary incentives to implement seismic upgrades of potentially seismically hazardous buildings.

Permits for voluntary structural work that do not reference meeting a specific code standard or that do not qualify for incentives for voluntary seismic upgrade work permit processing may meet any level of upgrade if such work does not increase the hazard of the building.

IMPLEMENTATION

Building owners who wish to take advantage of voluntary seismic upgrade incentives must meet the definition of a soft-story Type V (wood-frame) building and must comply with the retrofit standards as detailed below.

DEFINITIONS

For the purpose of this Administrative Bulletin the following definitions shall apply:

Soft-story Type V (wood-frame) building means a building that meets the following criteria:

A. a Type V (wood-frame) building as defined in the San Francisco Building Code, and

B. was constructed prior to May 21, 1973, and

C. has a ground floor (1st story) level in which

   a. at least 50% of the floor area of the ground floor is used for Occupancy Classifications A (assembly), B (business), M (mercantile), S (storage, open or enclosed parking garages), or U (private garages), or

   b. the building has been determined to have either a Weak Story or Soft Story deficiency when evaluated using the ASCE 31 Tier 2 procedure, or

   c. the building has been determined to have a soft-story deficiency based on engineering analysis acceptable to the Building Official.

RETROFIT STANDARDS

The standards to be applied to the seismic upgrade of soft-story wood-framed buildings in order to qualify for voluntary upgrade incentives shall be one of the following:

A. Meets the requirements of Appendix Chapter A4 of the 2009 International Existing Building Code, IEBC [Attachment A] with amendments by SEAOC (Structural Engineers Association of California) [Attachment B], or

B. Meets the requirements of ASCE 41 for the Life Safety Performance Level (S-3) in the BSE-1 earthquake hazard level, or

C. Meets any other alternate rational design and/or construction methodology that demonstrates compliance with the intent of San Francisco Building Code Section 1604.11. For qualified historic buildings, seismic upgrade designs may use the provisions and analysis techniques referenced in the California Historical Building Code, Chapter 8-7, Structural Regulations, and Chapter 8-8, Archaic Materials and Methods of Construction to assist in meeting the retrofit standards [Attachment C].

For the purposes of this bulletin, mitigation of the soft-story conditions at the ground floor (1st story) shall be considered the part of the voluntary soft-story wood-frame upgrade work eligible for incentives. Additional seismic upgrade work may be undertaken on the floors above the ground floor; however such additional seismic retrofit work is not considered part of the voluntary soft-story upgrade work and will be subject to standard permitting requirements.

PERMIT PROCESSING

Submittal Documents and Building Permit Application

Building permit applications for voluntary, soft-story Type V (wood-frame) building upgrade work must clearly state the intention to qualify for voluntary incentives in the Project Description portion of the building permit application form. Submittal documents should include the following:

A. Dimensioned plans showing all exterior walls, interior partitions and any lateral load-resisting, or plans showing Occupancy Classifications and uses of the ground floor if that is the method of qualifying as a soft-story building under this Administrative Bulletin, and

B. A photograph of the building exterior, and

C. Structural upgrade plans and necessary supporting calculations and documents prepared by a licensed design professional showing how seismic upgrade will meet the standards adopted in this Administrative Bulletin. Included in these submittal documents should be a listing of archaic materials and values for those materials, if these are to be used as part of the lateral force resisting system.

Expedited Permit Processing

Building permit applications for voluntary soft-story wood-frame seismic retrofit will be expedited as authorized under AB-004 and will be tracked by the Department of Building Inspection for reporting purposes.

Signed by:
Vivian L. Day, C.B.O. April 21, 2010
Director
Department of Building Inspection

Approved by the Building Inspection Commission on April 21, 2010

Attachment A	Excerpt from 2009 International Code for Existing Buildings with SEAOC (Structural Engineers Association of California) amendments (public document compilation)
Attachment B	Excerpt from California Historical Building Code, Chapter 8-7 and 8-8
Attachment C	Excerpts from Ordinance 54-10, Seismic Strengthening of Soft-Story, Wood-Frame Buildings

ATTACHMENT A

CHAPTER A4

EARTHQUAKE RISK ~~HAZARD~~ REDUCTION IN ~~EXISTING~~ WOOD-FRAME RESIDENTIAL BUILDINGS WITH SOFT, WEAK OR OPEN-FRONT WALLS

SECTION A401 GENERAL

A401.1 Purpose. The purpose of this chapter is to promote public welfare and safety by reducing the risk of death or injury that may result from the effects of earthquakes on existing wood-frame, multiunit residential buildings. The ground motions of past earthquakes have caused the loss of human life, personal injury and property damage in these types of buildings. This chapter creates minimum standards to strengthen the more vulnerable portions of these structures. When fully followed, these minimum standards will improve the performance of these buildings but will not necessarily prevent all earthquake-related damage.

A401.2 Scope. The provisions of this chapter shall apply to all existing Occupancy Group R-1 and R-2 buildings of wood construction or portions thereof where the structure has a soft, weak, or open-front wall line, and there exists one or more stories above. ~~:~~

1. ~~The ground floor portion of the wood-frame structure contains parking or other similar open floor space, which causes soft, weak or open-front wall lines as defined in this chapter, and there exists one or more stories above, or~~
2. ~~The walls of any story or basement of wood construction are laterally braced with nonconforming structural materials as defined in this chapter, a soft or weak wall line exists as defined in this chapter and there exist two or more stories above.~~
3. ~~The structure is assigned to Seismic Design Category C, D or E.~~

SECTION A402 DEFINITIONS

Notwithstanding the applicable definitions, symbols and notations in the building code, the following definitions shall apply for the purposes of this chapter:

~~**APARTMENT HOUSE.** Any building or portion thereof that contains three or more dwelling units. For the purposes of this chapter, "apartment house" includes residential condominiums.~~

ASPECT RATIO. The span-width ratio for horizontal diaphragms and the height-length ratio for shear walls ~~vertical diaphragms~~.

~~**CONGREGATE RESIDENCE.** A congregate residence is any building or portion thereof for occupancy by other than a family that contains facilities for living, sleeping and sanitation as required by the building code and that may include facilities for eating and cooking. A congregate residence may be a shelter, convent, monastery, dormitory, fraternity or sorority house, but does not include jails, hospitals, nursing homes, hotels or lodging houses.~~

~~**CRIPPLE WALL.** A wood-frame stud wall extending from the top of the foundation wall to the underside of the lowest floor framing.~~

Comment [DB1]: 2012 IEBC Chapter A4, shown relative to the 2009 edition, as expected based on results of Oct-Nov 2009 Code Development Hearings in Baltimore and May 2010 Final Action Hearings in Dallas. Annotations by David Bonowitz. Do not publish; for code development purposes only.

Comment [DB2]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

Comment [DB3]: SEAOC/NCSEA proposal EB55-09/10.
Reason: No need for special recognition of parking or occupancy, non-conforming materials, or SDC.

Comment [DB4]: The following definitions were deleted based on a SEAOC/NCSEA proposal, by the ICC Code Correlation Committee prior to the 2009 hearings:
Apartment House
Congregate Residence
Dwelling Unit
Guestroom
Hotel
Life Safety Performance Level
Lodging House
Motel
Multiunit Residential Buildings
Reason: With the exception of "Multiunit Residential Buildings," which does not require a definition here, the deleted terms do not appear in the text of the chapter.

Comment [DB5]: Definition revised based on a SEAOC/NCSEA proposal, by the ICC Code Correlation Committee prior to the 2009 hearings. Reason: to match terminology of IBC and ASCE 7.

Comment [DB6]: SEAOC/NCSEA proposal EB62-09/10. Definition deleted in coordination with deletion of section A403.8.1.

~~**DWELLING UNIT.** Any building or portion thereof for not more than one family that contains living facilities, including provisions for sleeping, eating, cooking and sanitation as required by the building code or congregate residence for 10 or fewer persons.~~

~~**EXPANSION ANCHOR.** An approved mechanical fastener placed in hardened concrete that is designed to expand in a self drilled or pre drilled hole of a specified size and engage the sides of the hole in one or more locations to develop shear and/or tension resistance to applied loads without grout, adhesive or drypack.~~

Comment [DB7]: Definition deleted per SEAOC/NCSEA proposal EB65-09/10, in coordination with revision to section A403.11.4.1.
Note: This definition was also modified by EB56 for consistency with ACI 318 Appendix D. SEAOC/NCSEA prefers the complete deletion per EB65. At the FAH in May 2010, EB56 was withdrawn, so deletion per EB65 stands.

GROUND FLOOR. Any floor whose elevation is immediately accessible from an adjacent grade by vehicles or pedestrians. The ground floor portion of the structure does not include any floor that is completely below adjacent grades.

~~**GUESTROOM.** Any room or rooms used or intended to be used by a guest for sleeping purposes. Every 100 square feet (9.3 m^2) of superficial floor area in a congregate residence shall be considered a guestroom.~~

~~**HOTEL.** Any building containing six or more guestrooms intended or designed to be used, rented, hired out to be occupied, or that are occupied, for sleeping purposes by guests.~~

~~**LIFE SAFETY PERFORMANCE LEVEL.** The building performance level that includes significant damage to both structural and nonstructural components during a design earthquake, though at least some margin against either partial or total structural collapse remains. Injuries may occur, but the level of risk for life threatening injury and entrapment is low.~~

~~**LODGING HOUSE.** Any building or portion thereof containing at least one but not more than five guest rooms where rent is paid in money, goods, labor or otherwise.~~

~~**MOTEL.** Motel shall mean a hotel as defined in this chapter.~~

~~**MULTIUNIT RESIDENTIAL BUILDINGS.** Hotels, lodging houses, congregate residences and apartment houses.~~

NONCONFORMING STRUCTURAL MATERIALS. Wall bracing materials other than wood structural panels or diagonal sheathing.

OPEN-FRONT WALL LINE. An exterior wall line, without vertical elements of the lateral-force-resisting system, that requires tributary seismic forces to be resisted by diaphragm rotation or excessive cantilever beyond parallel lines of shear walls. Diaphragms that cantilever more than 25 percent of the distance between lines of lateral-force-resisting elements from which the diaphragm cantilevers shall be considered excessive. Exterior exit balconies of 6 feet (1829 mm) or less in width shall not be considered excessive cantilevers.

RETROFIT. An improvement of the lateral-force-resisting system by alteration of existing structural elements or addition of new structural elements.

SOFT WALL LINE. A wall line whose lateral stiffness is less than that required by story drift limitations or deformation compatibility requirements of this chapter. In lieu of analysis, a soft wall line may be defined as a wall line in a story where the story stiffness is less than 70 percent of the story above for the direction under consideration.

STORY. A story as defined by the building code, including any basement or underfloor space of a building with cripple walls exceeding 4 feet (1219 mm) in height.

STORY STRENGTH. The total strength of all seismic-resisting elements sharing the same story shear in the direction under consideration.

WALL LINE. Any length of wall along a principal axis of the building used to provide resistance to lateral loads. Parallel wall lines separated by less than 4 feet (1219 mm) shall be considered one wall line for the distribution of loads.

WEAK WALL LINE. A wall line in a story where the story strength is less than 80 percent of the story above in the direction under consideration.

SECTION A403
ANALYSIS AND DESIGN

A403.1 General. ~~Buildings within the scope of this chapter shall be analyzed, designed and constructed in conformance with the building code, except as modified in this chapter.~~ All modifications required by the provisions in this chapter shall be designed in accordance with the International Building Code provisions for new construction except as modified by this chapter.

Exception: Buildings for which the prescriptive measures provided in Section A405 apply and are used.

No alteration of the existing lateral-force-resisting or vertical-load-carrying system shall reduce the strength or stiffness of the existing structure, unless the altered structure would remain in conformance with the building code and this chapter. ~~When any portion of a building within the scope of this chapter is constructed on or into a slope steeper than one unit vertical in three units horizontal, the lateral force resisting system at and below the base level diaphragm shall be analyzed for the effects of concentrated lateral forces at the base caused by this hillside condition.~~

A403.2 Scope of analysis. This chapter requires the alteration, repair, replacement or addition of structural elements and their connections to meet the strength and stiffness requirements herein. The lateral-load-path analysis shall include the resisting elements and connections from the wood diaphragm immediately above any soft, weak or open-front wall lines to the foundation soil interface or to the uppermost story of a podium structure comprised of steel, masonry, or concrete structural systems that supports the upper, wood-framed structure ~~floor or roof of a Type I structure below~~. Stories above the uppermost story with a soft, weak or open-front wall line shall be considered in the analysis but need not be modified. The lateral-load-path analysis for added structural elements shall also include evaluation of the allowable soil-bearing and lateral pressures in accordance with the building code. Where any portion of a building within the scope of this chapter is constructed on or into a slope steeper than one unit vertical in three units horizontal, the lateral-force-resisting system at and below the base level diaphragm shall be analyzed for the effects of concentrated lateral forces at the base caused by this hillside condition.

Exception: When an open-front, weak or soft wall line exists because of parking at the ground floor of a two-story building and the parking area is less than 20 percent of the ground floor area, then only the wall lines in the open, weak or soft directions of the enclosed parking area need comply with the provisions of this chapter.

A403.3 Design base shear and design parameters. The design base shear in a given direction shall be permitted to be 75 percent of the value required for similar new construction in accordance with the building code. The value of R used in the design of the strengthening of any story shall not exceed the lowest value of R used in the same direction at any story above. The system overstrength factor, Ω_0, and the deflection amplification factor, C_d, shall not be less than the largest respective value corresponding to the R factor being used in the direction under consideration.

Comment [DB8]: SEAOC/NCSEA proposal EB57-09/10. Editorial clarification.

Comment [DB9]: SEAOC/NCSEA proposal EB57-09/10. Editorial clarification.

Comment [DB10]: SEAOC/NCSEA proposal EB59-09/10. This sentence relocated to A403.2.

Comment [DB11]: "uppermost" should not have been underlined in proposal EB58.

Comment [DB12]: "but" should have been underlined in proposal EB58.

Comment [DB13]: SEAOC/NCSEA proposal EB58-09/10. Editorial clarification. "Type I" is a fire rating, not a structure type.

Comment [DB14]: SEAOC/NCSEA proposal EB59-09/10. This sentence relocated from A403.1.

Exceptions:

1. For structures assigned to Seismic Design Category B, values of R, Ω_0, and C_d shall be permitted to be based on the seismic force-resisting system being used to achieve the required strengthening.
2. For structures assigned to Seismic Design Category C or D, values of R, Ω_0, and C_d shall be permitted to be based on the seismic force-resisting system being used to achieve the required strengthening, provided that when the strengthening is complete, the strengthened structure will not have an extreme weak story irregularity defined as Type 5b in ASCE 7 Table 12.3-2.
3. For structures assigned to Seismic Design Category E, values of R, Ω_0, and C_d shall be permitted to be based on the seismic force-resisting system being used to achieve the required strengthening, provided that when the strengthening is complete, the strengthened structure will not have an extreme soft story, a weak story, or an extreme weak story irregularity defined, respectively, as Types 1b, 5a, and 5b in ASCE 7 Table 12.3-2.

~~**A403.4 Vertical distribution of forces.** The total seismic force shall be distributed over the height of the structure as for new construction in accordance with the building code. Distribution of force by story weight shall be permitted for two-story buildings. The value of R used in the design of any story shall be less than or equal to the value of R used in the given direction for the story above.~~

~~**A403.5 Weak story limitation.** Every weak story shall be strengthened to the lesser of:~~

1. ~~Ω_0 times the story shear prescribed by Sections A403.3 and A403.4.~~
2. ~~In two-story buildings up to 30 feet (9144 mm) in height, 65 percent of the strength of the story above. In all other buildings, 80 percent of the strength of the story above.~~

A403.4 ~~A403.6~~ Story drift limitation. The calculated story drift for each retrofitted story shall not exceed the allowable deformation compatible with all vertical-load-resisting elements and 0.025 times the story height. The calculated story drift shall not be reduced by the effects of horizontal diaphragm stiffness but shall be increased when these effects produce rotation. Drift calculations shall be in accordance with the building code.

A403.4.1 Pole structures. The effects of rotation and soil stiffness shall be included in the calculated story drift where ~~when~~ lateral loads are resisted by vertical elements whose required depth of embedment is determined by pole formulas. The coefficient of subgrade reaction used in the deflection calculations shall be based on a geotechnical investigation conducted in accordance with the building code or based on other methods approved by the code official ~~provided from an approved geotechnical engineering report or other approved methods~~.

A403.5 ~~A403.7~~ P-Δ effects. The requirements of the building code shall apply, except as modified herein. All structural framing elements and their connections not required by design to be part of the lateral-force-resisting system shall be designed and/or detailed to be adequate to maintain support of design dead plus live loads when subjected to the expected deformations caused by seismic forces.

The stress analysis of cantilever columns shall use a buckling factor of 2.1 for the direction normal to the axis of the beam.

Comment [DB15]: Proposal EB60 changed by floor modification from "Category A or B" at 2009 hearings.

Comment [DB16]: SEAOC/NCSEA proposal EB60-09/10.
Reason: Important substantive change that tentatively solves the "R-value problem," in which a code limit appropriate for new construction restricts the retrofit system to an R of 2, resulting in excessive strength and stiffness, as well as expensive and disruptive work and a disincentive to use ductile detailing. This proposal is discussed further in Harris et al. paper from December 2009 ATC-SEI conference. ATC 71-1 is expected to refine this approach.

Comment [DB17]: SEAOC/NCSEA proposal EB60-09/10.
Reason: See previous comment re R-values. Distribution by weight is already permitted by ASCE 7 section 12.14, so need not be repeated here.

Comment [DB18]: SEAOC/NCSEA proposal EB60-09/10.

Comment [DB19]: Renumber for coordination with EB60.

Comment [DB20]: SEAOC/NCSEA proposal EB61-09/10. In addition to edits as shown, proposal moves second part of A403.6 (now A403.4) into a separate subsection.

Comment [DB21]: Renumber for coordination with EB60.

A403.6 ~~A403.8~~ Ties and continuity. All parts of the structure included in the scope of Section A403.2 shall be interconnected as required by the building code.

~~**A403.8.1 Cripple walls.** Cripple walls braced with nonconforming structural materials shall be braced in accordance with this chapter. When a single top plate exists in the cripple wall, all end joints in the top plate shall be tied. Ties shall be connected to each end of the discontinuous top plate and shall be equal to one of the following:~~

1. ~~Three inch by 6 inch (76mm by 152mm), 18 gage galvanized steel, nailed with six 8d common nails at each end.~~
2. ~~One and one fourth inch by 12 inch (32 mm by 305 mm), 18 gage galvanized steel, nailed with six 16d common nails at each end.~~
3. ~~Two inch by 4 inch by 12 inch (51 mm by 102 mm by 305 mm) wood blocking, nailed with six 16d common nails at each end.~~

A403.7 ~~A403.9~~ Collector elements. Collector elements shall be provided that can transfer the seismic forces originating in other portions of the building to the elements within the scope of Section A403.2 that provide resistance to those forces.

A403.8 ~~A403.10~~ Horizontal diaphragms. The strength of an existing horizontal diaphragm sheathed with wood structural panels or diagonal sheathing need not be investigated unless the diaphragm is required to transfer lateral forces from vertical elements of the seismic-force-resisting system above the diaphragm to elements below the diaphragm because of an offset in placement of the elements.

Wood diaphragms with stories above shall not be allowed to transmit lateral forces by rotation or cantilever except as allowed by the building code; however, rotational effects shall be accounted for when unsymmetric wall stiffness increases shear demands.

Exception: Diaphragms that cantilever 25 percent or less of the distance between lines of lateral-load-resisting elements from which the diaphragm cantilevers may transmit their shears by cantilever, provided that rotational effects on shear walls parallel and perpendicular to the load are taken into account.

A403.9 ~~A403.11~~ Wood-framed shear walls. Wood-framed shear walls shall have strength and stiffness sufficient to resist the seismic loads and shall conform to the requirements of this section.

A403.9.1 ~~A403.11.1~~ Gypsum or cement plaster products. Gypsum or cement plaster products shall not be used to provide lateral resistance in a soft or weak story or in a story with an open-front wall line, whether or not new elements are added to mitigate the soft, weak or open-front condition.

A403.9.2 ~~A403.11.2~~ Wood structural panels.

A403.9.2.1 ~~A403.11.2.1~~ Drift limit. Wood structural panel shear walls shall meet the story drift limitation of Section A403.4 ~~A403.6~~. Conformance to the story drift limitation shall be determined by approved testing or calculation~~, not by the use of an aspect ratio. Calculated deflection shall be determined according to *International Building Code* Equation 23-1 and shall be increased by 25 percent. Contribution to the shear wall deflection from the anchor or tie-down slippage shall also be included. The slippage contribution shall include the vertical elongation of the connector metal components, the vertical slippage of the connectors to framing members, localized crushing of wood due to bearing loads and shrinkage of the wood elements because of changes in moisture content as a result of aging. The total vertical slippage shall be multiplied by the shear panel aspect ratio and~~

Comment [DB22]: Renumber for coordination with EB60.

Comment [DB23]: SEAOC/NCSEA proposal EB62-09/10. Also deletes definition of Cripple Wall. Reason: A403.11.1 (now A403.9.1) already rules out gypsum and stucco. Also, cripple walls are not fully addressed in this chapter and need not be partially addressed with this provision. Requirement for full load path design will catch any existing cripple walls.

Comment [DB24]: Renumber for coordination with EB60.

Comment [DB25]: Renumber for coordination with EB60.

Comment [DB26]: Renumber for coordination with EB60.

Comment [DB27]: Renumber for coordination with EB60.

Comment [DB28]: Renumber for coordination with EB60.

Comment [DB29]: Renumber for coordination with EB60.

Comment [DB30]: Renumber for coordination with EB60.

~~added to the total horizontal deflection.~~ Individual shear panels shall be permitted to exceed the maximum aspect ratio, provided the allowable story drift and allowable shear capacities are not exceeded.

A403.9.2.2 ~~A403.11.2.2~~ Openings. Shear walls are permitted to be designed for continuity around openings in accordance with the building code. Blocking and steel strapping shall be provided at corners of the openings to transfer forces from discontinuous boundary elements into adjoining panel elements. Alternatively, perforated shear wall provisions of the building code are permitted to be used.

~~**A403.11.2.3 Wood species of framing members.** Allowable shear values for wood structural panels shall consider the species of the framing members. When the allowable shear values are based on Douglas fir-larch framing members, and framing members are constructed of other species of lumber, the allowable shear values shall be multiplied by the following factors: 0.82 for species with specific gravities greater than or equal to 0.42 but less than 0.49, and 0.65 for species with specific gravities less than 0.42. Redwood shall use 0.65 and hem fir shall use 0.82, unless otherwise approved.~~

~~**A403.11.3 Substitution for 3-inch (76 mm) nominal width framing members.** Two 2-inch (51 mm) nominal width framing members shall be permitted in lieu of any required 3-inch (76 mm) nominal width framing member when the existing and new framing members are of equal dimensions, when they are connected as required to transfer the in-plane shear between them, and when the sheathing fasteners are equally divided between them.~~

A403.9.3 ~~A403.11.4~~ Hold-down connectors.

A403.9.3.1 ~~A403.11.4.1~~ Expansion anchors in tension. Expansion anchors that provide tension strength by friction resistance shall not be used to connect hold-down devices to existing concrete or masonry elements. ~~Expansion anchors that provide tension strength by bearing (commonly referenced as "undercut" anchors) shall be permitted.~~

A403.9.3.2 ~~A403.11.4.2~~ Required depth of embedment. The required depth of embedment or edge distance for the anchor used in the hold-down connector shall be provided in the concrete or masonry below any plain concrete slab unless satisfactory evidence is submitted to the code ~~building~~ official that shows that the concrete slab and footings are of monolithic construction.

~~**A403.11.4.3 Required preload of bolted hold-down connectors.** Bolted hold-down connectors shall be preloaded to reduce slippage of the connector. Preloading shall consist of tightening the nut on the tension anchor after the placement but before the tightening of the shear bolts in the panel boundary flange member. The tension anchor shall be tightened until the shear bolts are in firm contact with the edge of the hole nearest the direction of the tension anchor. Hold-down connectors with self-jigging bolt standoffs shall be installed in a manner to permit preloading.~~

~~**SECTION A404**~~
~~**PHASED CONSTRUCTION**~~

~~The work specified in this chapter shall be permitted to be done in the following phases. Work shall start with Phase 1 unless otherwise approved by the building official. When the building does not contain the conditions associated with the given phase, the work shall proceed to the next phase.~~

~~**Phase 1 Work.** The first phase shall include all work in the lowest story with a soft, weak or open front wall line and all foundation work.~~

~~**Phase 2 Work.** The second phase shall include wood framed~~

Comment [DB31]: SEAOC/NCSEA proposal EB63-09/10.
Reason: Limit on "aspect ratio" is not needed if a drift check is required. Other drift provisions no longer needed because IBC now has formula for deflection calc.

Comment [DB32]: Renumber for coordination with EB60.

Comment [DB33]: SEAOC/NCSEA proposal EB64-09/10.
Note: This or similar info now found in footnote a to IBC Table 2306.4.1.

Comment [DB34]: SEAOC/NCSEA proposal EB64-09/10.
Note: This or similar info now found in footnote i to IBC Table 2306.4.1, referencing section 2306.1.

Comment [DB35]: Renumber for coordination with EB60 and EB64.

Comment [DB36]: Renumber for coordination with EB60 and EB64.

Comment [DB37]: SEAOC/NCSEA proposal EB65-09/10. This proposal also eliminates the definition of Expansion Anchor.
Reason: Editorial clarification. Also, expansion anchors and undercut anchors are now defined separately in ACI 318 Appendix D.

Comment [DB38]: Renumber for coordination with EB60 & EB64.

Comment [DB39]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

Comment [DB40]: SEAOC/NCSEA proposal EB67-09/10.
Reason: Provision makes a requirement that is not made for new construction and that could conflict with installation procedures for proprietary hardware.

~~walls in any story with two or more stories above that are laterally braced with nonconforming structural materials.~~

~~**Phase 3 Work.** The third and final phase shall include all required work not performed in Phase 1 or Phase 2.~~

Comment [DB41]: SEAOC/NCSEA proposal EB68-09/10.
Reason: Section deemed unnecessary and overly restrictive (especially for triggered work where the full scope will be shown on plans).

SECTION A404 ~~A405~~ PRESCRIPTIVE MEASURES FOR WEAK STORY

Comment [DB42]: Renumber for coordination with EB68.

A404.1 ~~A405.1~~ Limitation. These prescriptive measures shall apply only to two-story buildings and only when deemed appropriate by the code official. These prescriptive measures rely on rotation of the second floor diaphragm to distribute the seismic load between the side and rear walls of the ground floor open area. In the absence of an existing floor diaphragm of wood structural panel or diagonal sheathing, a new wood structural panel diaphragm of minimum thickness of $^{3}/_{4}$ inch (19mm) and with 10d common nails at 6 inches (152mm) on center shall be applied.

Comment [DB43]: Renumber for coord w/ EB68.

A404.1.1 ~~A405.1.1~~ Additional conditions. To qualify for these prescriptive measures, the following additional conditions need to be satisfied by the retrofitted structure:

Comment [DB44]: Renumber for coord w/ EB68.

1. Diaphragm aspect ratio L/W is less than 0.67, where W is the diaphragm dimension parallel to the soft, weak or open-front wall line and L is the distance in the orthogonal direction between that wall line and the rear wall of the ground floor open area.
2. Minimum length of side shear walls = 20 feet (6096 mm).
3. Minimum length of rear shear wall = three-fourths of the total rear wall length ~~three fourth of rear wall~~.
4. No plan or vertical irregularities other than a soft, weak or open-front wall line.
5. Roofing weight less than or equal to 5 pounds per square foot (240 N/m^2).
6. Aspect ratio of the full second floor diaphragm meets the requirements of the building code for new construction.

Comment [DB45]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

A404.2 ~~A405.2~~ Minimum required retrofit.

Comment [DB46]: Renumber for coord w/ EB68.

A404.2.1 ~~A405.2.1~~ Anchor ~~bolt~~ size and spacing. The anchor ~~bolt~~ size and spacing shall be a minimum of $^{3}/_{4}$ inch (19 mm) in diameter at 32 inches (813 mm) on center. Where existing anchors ~~bolts~~ are inadequate, supplemental or alternative approved connectors, such as new steel plates bolted to the side of the foundation and nailed to the sill, shall be used ~~may be used, such as an approved connector~~.

Comment [DB47]: Renumber for coord w/ EB68.

Comment [DB48]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

A404.2.2 ~~A405.2.2~~ Connection to floor above. Shear wall top plates shall be connected to blocking or rim joist at upper floor with a minimum of 18-gage galvanized steel angle clips 4$^{1}/_{2}$ inches (114 mm) long with 12-8d nails spaced no farther than 16 inches (406 mm) on center, or by equivalent shear transfer methods.

Comment [DB49]: Renumber for coord w/ EB68.

A404.2.3 ~~A405.2.3~~ Shear wall sheathing. The shear wall sheathing shall be a minimum of 15/32 inch (11.9 mm) 5-Ply Structural I with 10d nails at 4 inches (102 mm) on center at edges and 12 inches (305 mm) on center at field; blocked all edges with 3 by 4 or larger. Where existing sill plates are less than 3-by thick, place flat 2-by on top of sill between studs, with flat 18-gage galvanized steel clips 4$^{1}/_{2}$ inches (114 mm) long with 12-8d nails or $^{3}/_{8}$-inch-diameter (9.5 mm) lags through blocking for shear transfer to sill plate. Stagger nailing from wall sheathing between existing sill and new blocking. Anchor new blocking to foundation as specified above.

Comment [DB50]: Renumber for coord w/ EB68.

A404.2.4 ~~A405.2.4~~ Shear wall hold-downs. Shear walls shall be provided with hold-down anchors at each end. Two hold-down anchors are required at intersecting corners. Hold-downs shall be approved connectors with a minimum $^{5}/_{8}$-inch-diameter (15.9 mm) threaded rod or other approved anchor with a minimum allowable load of 4,000 pounds (17.8 kN). Anchor embedment in concrete shall not be less than 5 inches (127 mm). Tie-rod systems shall not be less than $^{5}/_{8}$ inch (15.9 mm) in diameter unless using high strength cable. Threaded rod or high strength cable elongation shall not exceed $^{5}/_{8}$ inch (15.9 mm) using design forces.

Comment [DB51]: Renumber for coord w/ EB68.

SECTION A405 ~~A406~~
MATERIALS OF CONSTRUCTION

Comment [DB52]: Renumber for coordination with EB68.

A405.1 ~~A406.1~~ New materials. New materials shall meet the requirements of the *International Building Code*, except where allowed by this chapter. ~~All materials approved by the building code, including their appropriate allowable stresses and limiting aspect ratios, shall be permitted to meet the requirements of this chapter.~~

Comment [DB53]: Renumber for coord w/ EB68.

Comment [DB54]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

A405.2 ~~A406.2~~ Allowable foundation and lateral pressures. The use of default values from the building code for continuous and isolated concrete spread footings shall be permitted. For soil that supports embedded vertical elements, Section A403.4.1 ~~A403.6~~ shall apply.

Comment [DB55]: Renumber for coord w/ EB68.

Comment [DB56]: Renumber to coordinate with EB61 and EB68.

A405.3 ~~A406.3~~ Existing materials. ~~All existing materials shall be in sound condition and constructed in general conformance to the building code before they are permitted to be used to resist the lateral loads prescribed in this chapter.~~ The physical condition, strengths, and stiffnesses of existing building materials shall be taken into account in any analysis required by this chapter. The verification of existing materials conditions and their conformance to these requirements shall be made by physical observation ~~reports~~, material testing or record drawings as determined by the registered design professional subject to the approval of the code official ~~structural designer and as approved by the building official~~.

Comment [DB57]: Renumber for coord w/ EB68.

Comment [DB58]: SEAOC/NCSEA proposal EB69-09/10. Editorial clarification and removal of unenforceable provision.

~~**A406.3.1 Horizontal wood diaphragms.** Allowable shear values for existing horizontal wood diaphragms that require analysis under Section A403.10 are permitted to be taken from Table A4-A. The values in Table A4-A shall be used for allowable stress design. Design forces based on strength design shall be reduced to allowable stress levels before comparison with the limiting values in the table.~~

Comment [DB59]: SEAOC/NCSEA proposal EB69-09/10. Table A4-A deleted as part of proposal EB69 as well.
Reason: Provision is incomplete (e.g. lacking stiffness values) and uses terminology borrowed from Chapter A1 that does not apply to Chapter A4.

A405.3.1 ~~A406.3.2~~ Wood-structural-panel shear walls.

Comment [DB60]: Renumber for coord w/ EB68 and EB69.

A405.3.1.1 ~~A406.3.2.1~~ Existing nails ~~Allowable nail slip values.~~ ~~The use of box nails and unseasoned lumber are permitted to be assumed.~~ When the required ~~drift~~ calculations ~~of Section A403.11.2.1~~ rely on design ~~the slip~~ values for common nails or surfaced dry lumber, their use in construction shall be verified by exposure. ~~The design value of the box nails shall be assumed to be similar to that of common nails having the same diameter. Verification of surfaced dry lumber shall be by identification conforming to the building code.~~

Comment [DB61]: Renumber for coord w/ EB68 and EB69.

Comment [DB62]: SEAOC/NCSEA proposal EB70-09/10.
Reason: Editorial clarification. Assumption of box nails or unseasoned lumber is conservative and need not be explicitly allowed. Nails affect strength as well as stiffness, so drift references are removed.

A405.3.1.2 ~~A406.3.2.2~~ Existing pPlywood ~~panel construction~~. When verification of the existing plywood ~~materials~~ is by use of record drawings alone, ~~the panel construction for~~ plywood shall be assumed to be of three plies. ~~The plywood modulus "G" shall be assumed equal to 50,000 pounds per square inch (345 MPa).~~

Comment [DB63]: Renumber for coord w/ EB68 and EB69.

Comment [DB64]: SEAOC/NCSEA proposal EB70-09/10. Reason: Editorial clarification. Last sentence is deleted because it conflicts with AF&PA. Shear modulus is a function of plywood thickness. Also, "apparent shear stiffness," G_a in AF&PA, is a preferred value.

A405.3.2 ~~A406.3.3~~ Existing wood framing. Wood framing is permitted to use the design stresses specified in the building code under which the building was constructed or other stress criteria approved by the code ~~building~~ official.

Comment [DB65]: Renumber for coord w/ EB68 and EB69.

Comment [DB66]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

A405.3.3 ~~A406.3.4~~ Existing s~~S~~tructural steel. All existing structural steel shall be permitted to be assumed to comply with ASTM A36 ~~use the allowable stresses for Grade A36~~. Existing pipe or tube columns shall be assumed to be of minimum wall thickness unless verified by testing or exposure.

A405.3.4 ~~A406.3.5~~ ~~Strength of~~ Existing concrete. All existing concrete footings shall be permitted to be assumed to be plain concrete with a compressive strength of 2,000 pounds per square inch (13.8 MPa). Existing concrete compressive strength taken greater than 2,000 pounds per square inch (13.8 MPa) shall be verified by testing, record drawings or department records.

A405.3.5 ~~A406.3.6~~ Existing sill plate anchorage. The analysis of e~~E~~xisting cast-in-place anchors ~~anchor bolts~~ shall be permitted to assume proper anchor embedment for purposes of evaluating ~~use the allowable service loads for bolts with proper embedment when used for~~ shear resistance to lateral loads.

Comment [DB67]: Renumber for coord w/ EB68 and EB69.

Comment [DB68]: "Existing" should have been underlined in proposal EB66.

Comment [DB69]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

Comment [DB70]: Renumber for coord w/ EB68 and EB69.

Comment [DB71]: "Existing" should have been underlined in proposal EB66.

Comment [DB72]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

Comment [DB73]: Renumber for coord w/ EB68 and EB69.

Comment [DB74]: SEAOC/NCSEA proposal EB66-09/10. Editorial.

SECTION A406 ~~A407~~
INFORMATION REQUIRED TO BE ON THE PLANS

Comment [DB75]: Renumber for coordination with EB68.

A406.1 ~~A407.1~~ General. The plans shall show all information necessary for plan review and for construction and shall accurately reflect the results of the engineering investigation and design. The plans shall contain a note that states that this retrofit was designed in compliance with the criteria of this chapter.

Comment [DB76]: Renumber for coord w/ EB68.

A406.2 ~~A407.2~~ Existing construction. The plans shall show existing diaphragm and shear wall sheathing and framing materials; fastener type and spacing; diaphragm and shear wall connections; continuity ties; and collector elements. The plans shall also show the portion of the existing materials that needs verification during construction.

Comment [DB77]: Renumber for coord w/ EB68.

A406.3 ~~A407.3~~ New construction.

Comment [DB78]: Renumber for coord w/ EB68.

A406.3.1 ~~A407.3.1~~ Foundation plan elements. The foundation plan shall include the size, type, location and spacing of all anchor bolts with the required depth of embedment, edge and end distance; the location and size of all shear walls and all columns for braced frames or moment frames; referenced details for the connection of shear walls, braced frames or moment-resisting frames to their footing; and referenced sections for any grade beams and footings.

Comment [DB79]: Renumber for coord w/ EB68.

A406.3.2 ~~A407.3.2~~ Framing plan elements. The framing plan shall include the length, location and material of shear walls; the location and material of frames; references on details for the column-to-beam connectors, beam-to-wall connections and shear transfers at floor and roof diaphragms; and the required nailing and length for wall top plate splices.

Comment [DB80]: Renumber for coord w/ EB68.

A406.3.3 ~~A407.3.3~~ Shear wall schedule, notes and details. Shear walls shall have a referenced schedule on the plans that includes the correct shear wall capacity in pounds per foot (N/m); the required fastener type, length, gauge and head size; and a complete specification for the sheathing material and its thickness. The schedule shall also show the required location of 3-inch (76 mm) nominal or two 2-inch (51 mm) nominal edge members; the spacing of shear transfer elements such as framing anchors or added sill plate nails; the required hold-down with its bolt, screw or nail sizes; and the dimensions, lumber grade and species of the attached framing member.

Comment [DB81]: Renumber for coord w/ EB68.

Notes shall show required edge distance for fasteners on structural wood panels and framing members; required flush nailing at the plywood surface; limits of mechanical penetrations; and the sill plate material assumed in the design. The limits of mechanical penetrations shall also be detailed showing

the maximum notching and drilled hole sizes.

A406.3.4 ~~A407.3.4~~ General notes. General notes shall show the requirements for material testing, special inspection and structural observation.

Comment [DB82]: Renumber for coord w/ EB68.

SECTION A407 ~~A408~~ QUALITY CONTROL

Comment [DB83]: Renumber for coordination with EB68.

A407.1 ~~A408.1~~ Structural observation, testing and inspection. Structural observation, in accordance with Section 1709 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.

Comment [DB84]: Renumber for coord w/ EB68.

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

~~TABLE A4-A—ALLOWABLE VALUES FOR EXISTING MATERIALS~~

~~EXISTING MATERIALS OR CONFIGURATIONS OF MATERIALS[a]~~	~~ALLOWABLE VALUES~~ ~~14.594 for N/m~~
~~1. Horizontal diaphragms[b]~~	
~~1.1. Roofs with straight sheathing and roofing applied directly to the sheathing~~	~~100 lbs. per ft. for seismic shear~~
~~1.2. Roofs with diagonal sheathing and roofing applied directly to the sheathing~~	~~250 lbs. per ft. for seismic shear~~
~~1.3. Floors with straight tongue and groove sheathing~~	~~100 lbs. per ft. for seismic shear~~
~~1.4. Floors with straight sheathing and finished wood flooring with board edges offset or perpendicular~~	~~500 lbs. per ft. for seismic shear~~
~~1.5. Floors with diagonal sheathing and finished wood flooring~~	~~600 lbs. per ft. for seismic shear~~
~~2. Crosswalls[b,c]~~	~~Per side:~~
~~2.1. Plaster on wood or metal lath~~	~~200 lbs. per ft. for seismic shear~~
~~2.2. Plaster on gypsum lath~~	~~175 lbs. per ft. for seismic shear~~
~~2.3. Gypsum wallboard, unblocked edges~~	~~75 lbs. per ft. for seismic shear~~
~~2.4. Gypsum wallboard, blocked edges~~	~~125 lbs. per ft. for seismic shear~~
~~3. Existing footings, wood framing, structural steel and reinforced steel~~	
~~3.1. Plain concrete footings~~	~~1,500 psi (10.3 MPa) unless otherwise shown by tests[d]~~
~~3.2. Douglas fir wood~~	~~Allowable stress same as D.F. No. 1[d]~~
~~3.3. Reinforcing steel~~	~~f_s = 18,000 psi (124 MPa) maximum[d]~~
~~3.4. Structural steel~~	~~f_s = 20,000 psi (138 MPa) maximum~~

~~For SI: 1 foot = 304.8 mm.~~

~~a. Material must be sound and in good condition.~~

~~b. A one-third increase in allowable stress is not allowed.~~

~~c. Shear values of these materials may be combined, except the total combined value shall not exceed 300 pounds per foot.~~

d. ~~Stresses given may be increased for combination of loads as specified in the building code.~~

Comment [DB85]: SEAOC/NCSEA proposal EB69-09/10. In coordination with deletion of 2009 section A403.8.1.
Reason: Tabulated values and terminology, borrowed from Chapter A4, are incomplete and inapplicable for Chapter A4, as well as in conflict with other provisions of 2009 A406.3 (now A405.3).
Note: Relevant material values may be found in other standards, such as ANSI/AF&PA SDPWS-2005 "Special Design Provisions for Wind and Seismic," ASCE 31, and ASCE 41. Also, ATC 71-1 is expected to recommend new default values suitable to Chapter A4.

ATTACHMENT B

Excerpt from California Historical Building Code

CHAPTER 8-7
STRUCTURAL REGULATIONS

SECTION 8-701
PURPOSE, INTENT AND SCOPE

8-701.1 Purpose. The purpose of the CHBC is to provide alternative regulations for the structural safety of buildings designated as qualified historical buildings or properties. The CHBC requires enforcing agencies to accept any reasonably equivalent alternatives to the regular code when dealing with qualified historical buildings or properties.

8-701.2 Intent. The intent of the CHBC is to encourage the preservation of qualified historical buildings or properties while providing a reasonable level of structural safety for occupants and the public at large through the application of the CHBC.

8-701.3 Application. The alternative structural regulations provided by Section 8-705 are to be applied in conjunction with the regular code whenever a structural upgrade or reconstruction is undertaken for qualified historical buildings or properties.

SECTION 8-702
GENERAL

8-702.1. The CHBC shall not be construed to allow the enforcing agency to approve or permit a lower level of safety of structural design and construction than that which is reasonably equivalent to the regular code provisions in occupancies which are critical to the safety and welfare of the public at large, including, but not limited to, public and private schools, hospitals, municipal police and fire stations and essential services facilities.

8-702.2. Nothing in these regulations shall prevent voluntary and partial seismic upgrades when it is demonstrated that such upgrades will improve life safety and when a full upgrade would not otherwise be required.

SECTION 8-703
STRUCTURAL SURVEY

8-703.1 Scope. When a structure or portion of a structure is to be evaluated for structural capacity under the CHBC, it shall be surveyed for structural conditions by an architect or engineer knowledgeable in historical structures. The survey shall evaluate deterioration or signs of distress. The survey shall determine the details of the structural framing and the system for resistance of gravity and lateral loads. Details, reinforcement and anchorage of structural systems and veneers shall be determined and documented where these members are relied on for seismic resistance.

8-703.2. The results of the survey shall be utilized for evaluating the structural capacity and for designing modifications to the structural system to reach compliance with this code.

8-703.3 Historical records. Past historical records of the structure or similar structures may be used in the evaluation, including the effects of subsequent alterations.

SECTION 8-704
NONHISTORICAL ADDITIONS AND NONHISTORICAL ALTERATIONS

8-704.1. New nonhistorical additions and nonhistorical alterations which are structurally separated from an existing historical structure shall comply with regular code requirements.

8-704.2. New nonhistorical additions which impose vertical or lateral loads on an existing structure shall not be permitted unless the affected part of the supporting structure is evaluated and strengthened, if necessary, to meet regular code requirements.

> **Note**: For use of archaic materials, see Chapter 8-8.

SECTION 8-705
STRUCTURAL REGULATIONS

8-705.1 Gravity loads. The capacity of the structure to resist gravity loads shall be evaluated and the structure strengthened as necessary. The evaluation shall include all parts of the load path. Where no distress is evident, and a complete load path is present, the structure may be assumed adequate by having withstood the test of time if anticipated dead and live loads will not exceed those historically present.

8-705.2 Wind and seismic loads. The ability of the structure to resist wind and seismic loads shall be evaluated. The evaluation shall be based on the requirements of Section 8-706.

8.705.2.1. Any unsafe conditions in the lateral-load-resisting system shall be corrected, or alternative resistance shall be provided. Additional resistance shall be provided to meet the minimum requirements of this code.

8.705.2.2. The architect or engineer shall consider additional measures with minimal loss of, and impact to, historical materials which will reduce damage and needed repairs in future earthquakes to better preserve the historical structure in perpetuity. These additional measures shall be presented to the owner for consideration as part of the rehabilitation or restoration.

SECTION 8-706
LATERAL LOAD REGULATIONS

8-706.1 Lateral loads. The forces used to evaluate the structure for resistance to wind and seismic loads need not exceed 0.75 times the seismic forces prescribed by the 1995 edition of the *California Building Code* (CBC). The seismic forces may be computed based on the *Rw* values tabulated in the regular code for similar lateral-force-resisting systems. All deviations of the detailing provisions of the lateral-force-resisting systems shall be evaluated for stability and the ability to maintain load-carrying capacity at increased lateral loads.

Unreinforced masonry bearing wall buildings shall comply with Appendix Chapter 1 of the *Uniform Code for Building Conservation*™ (*UCBC*™), 1994 edition, and as modified by this code. Reasonably equivalent standards may be used on a case-by-case basis when approved by the authority having jurisdiction.

8-706.2 Existing building performance. The seismic resistance may be based upon the ultimate capacity of the structure to perform, giving due consideration to ductility and reserve strength of the lateral-force-resisting system and materials while maintaining a reasonable factor of safety. Broad judgment may be exercised regarding the strength and performance of materials not recognized by regular code requirements. (See Chapter 8-8, Archaic Materials and Methods of Construction.)

8-706.2.1. All structural materials or members that do not comply with detailing and proportioning requirements of the regular code shall be evaluated for potential seismic performance and the consequence of noncompliance. All members which might fail and lead to possible collapse, or threaten life safety, when subjected to seismic demands in excess of those prescribed in Section 8-706.1, shall be judged unacceptable, and appropriate structural strengthening shall be developed. Anchorages for veneers and decorative ornamentation shall be included in this evaluation.

8-706.3 Load path. A complete and continuous load path, including connections, from every part or portion of the structure to the ground shall be provided for the required forces. It shall be verified that the structure is adequately tied together to perform as a unit when subjected to earthquake forces.

8-706.4 Parapets. Parapets and exterior decoration shall be investigated for conformance with regular code requirements for anchorage and ability to resist prescribed seismic forces.

An exception to regular code requirements shall be permitted for those parapets and decorations which are judged not to be a hazard to life safety.

8-706.5 Nonstructural features. Nonstructural features of historical structure, such as exterior veneer, cornices and decorations, which might fall and create a life-safety hazard in an earthquake, shall be investigated. Their ability to resist seismic forces shall be verified, or the feature shall be strengthened.

8-706.5.1. Partitions and ceilings of corridors and stairways, serving an occupant load of 30 or more shall be investigated to determine their ability to remain in place when the building is subjected to earthquake forces.

CHAPTER 8-8
ARCHAIC MATERIALS AND METHODS OF CONSTRUCTION

SECTION 8-801
PURPOSE, INTENT AND SCOPE

8-801.1 Purpose. The purpose of the CHBC is to provide regulations for the use of historical methods and materials of construction that are at variance with regular code requirements or are not otherwise codified, in buildings or structures designated as qualified historical buildings or properties. The CHBC require enforcing agencies to accept any reasonably equivalent alternatives to the regular code when dealing with qualified historical buildings or properties.

8-801.2 Intent. It is the intent of the CHBC to provide for the use of historical methods and materials of construction that are at variance with specific code requirements or are not otherwise codified.

8-801.3 Scope. Any construction type or material that is, or was, part of the historical fabric of a structure is covered by this chapter. Archaic materials and methods of construction present in a historical structure may remain or be reinstalled or be installed with new materials of the same class to match existing conditions.

SECTION 8-802
GENERAL ENGINEERING APPROACHES

Allowable stresses or ultimate strengths for archaic materials shall be assigned based upon similar conventional codified materials, or on tests as hereinafter indicated. The archaic materials and methods of construction shall be thoroughly investigated for their details of construction in accordance with Section 8-703. Testing shall be performed when applicable to evaluate existing conditions. The architect or structural engineer in responsible charge of the project shall assign allowable stresses or ultimate strength values to archaic materials. Such assigned allowable stresses, or ultimate strength values, shall not be greater than those provided for in the following sections without adequate testing, and shall be subject to the concurrence of the enforcing agency.

SECTION 8-803
NONSTRUCTURAL ARCHAIC MATERIALS

Where nonstructural historical materials exist in uses which do not meet the requirements of the regular code, their continued use is allowed by this code, provided that any public health and life-safety hazards are mitigated subject to the concurrence of the enforcing agency.

SECTION 8-804
ALLOWABLE CONDITIONS FOR SPECIFIC MATERIALS

Archaic materials which exist and are to remain in historical structures shall be evaluated for their condition and for loads required by this code. The structural survey required in Section 8-703 of this code shall document existing conditions, reinforcement, anchorage, deterioration and other factors pertinent to establishing allowable stresses and adequacy of the archaic materials. The remaining portion of this chapter provides additional specific requirements for commonly encountered archaic materials.

SECTION 8-805
MASONRY

For adobe, see Section 8-806.

8-805.1 Existing solid masonry. Existing solid masonry walls of any type, except adobe, may be allowed, without testing, a maximum value of nine pounds per square inch (62.1 kPa) in shear where there is a qualifying statement by the architect or engineer that an inspection has been made, that mortar joints are filled and that both brick and mortar are reasonably good. The allowable shear stress above applies to unreinforced masonry, except adobe, where the maximum ratio of unsupported height or length to thickness does not exceed 12, and where minimum quality mortar is used or exists. Wall height or length is measured to supporting or resisting elements that are at least twice as stiff as the tributary wall. Stiffness is based on the gross section. Allowable shear stress may be increased by the addition of 10 percent of the axial direct stress due to the weight of the wall directly above. Higher-quality mortar may provide a greater shear value and shall be tested in accordance with UBC Standard 21-6.

8-805.2 Stone masonry.

8-805.2.1 Solid-backed stone masonry. Stone masonry solidly backed with brick masonry shall be treated as solid brick masonry as described in Section 8-805.1 and in the UCBC, provided representative testing and inspection verifies solid collar joints between stone and brick and that a reasonable number of stones lap with the brick wythes as headers or that steel anchors are present. Solid stone masonry where the wythes of stone effectively overlap to provide the equivalent header courses may also be treated as solid brick masonry.

8-805.2.2 Independent wythe stone masonry. Stone masonry with independent face wythes may be treated as solid brick masonry as described in Section 8-805.1 and the UCBC, provided representative testing and inspection verify that the core is essentially solid in the masonry wall and that steel ties are epoxied in drilled holes between outer stone wythes at floors, roof and not to exceed 4 feet (1219 mm) on center in each direction, between floors and roof.

8-805.2.3 Testing of stone masonry. Testing of stone masonry shall be similar to UBC Standard 21-6, except that representative stones which are not interlocked shall be pulled outward from the wall and shear area appropriately calculated after the test.

8-805.3 Reconstructed walls. Totally reconstructed walls utilizing original brick or masonry, constructed similar to original, shall be constructed in accordance with the regular code. Repairs or infills may be constructed in a similar manner to the original walls without conforming to the regular code.

SECTION 8-806
ADOBE

8-806.1 General. Unburned clay masonry may be constructed, reconstructed, stabilized or rehabilitated subject to this chapter. Alternative approaches which provide an equivalent or greater level of safety may be used, subject to the concurrence of the enforcing agency.

8-806.2 Protection. Provisions shall be made to protect adobe structures from moisture and deterioration. The unreinforced adobe shall be maintained in reasonably good condition. Particular attention shall be given to moisture content of adobe walls. Unmaintained or unstabilized walls or ruins shall be evaluated for safety based on their condition and stability. Additional safety measures may be required subject to the concurrence of the enforcing agency.

8-806.3 Requirements. Unreinforced new or existing adobe walls shall meet the following requirements. Existing sod or rammed earth walls shall be considered similar to the extent these provisions apply. Where existing dimensions do not meet these conditions, additional strengthening measures may be required.

1. One-story adobe load-bearing walls shall not exceed a height-to-thickness ratio of 6.

2. Two-story adobe buildings' or structures' height-to-thickness wall ratio shall not exceed 5 at the ground floor and 6 at the second floor, and shall be measured at floor-to-floor height when the second floor and attic ceiling / roof are connected to the wall as described below.

3. Nonload-bearing adobe partitions and gable end walls shall be evaluated for stability and anchored against out-of-plane failure.

4. A bond beam or equivalent structural element shall be provided at the top of all adobe walls, and for two-story buildings at the second floor. The size and configuration of the bond beam shall be designed in each case to meet the requirements of the existing conditions and provide an effective brace for the wall, to tie the building together and connect the wall to the floor or roof.

8-806.4 Repair or reconstruction. Repair or reconstruction of wall area may utilize unstabilized brick or adobe masonry designed to be compatible with the constituents of the existing adobe materials.

8-806.5 Shear values. Existing adobe may be allowed a maximum value of four pounds per square inch (27.6 kPa) for shear, with no increase for lateral forces.

8-806.6 Mortar. Mortar may be of the same soil composition as that used in the existing wall, or in new walls as necessary to be compatible with the adobe brick.

SECTION 8-807
WOOD

8-807.1 Existing wood diaphragms or walls. Existing wood diaphragms or walls of straight or diagonal sheathing shall be assigned shear resistance values appropriate with the fasteners and materials functioning in conjunction with the sheathing. The structural survey shall determine fastener details and spacings and verify a load path through floor construction. Shear values of Tables 8-8-A and 8-8-B.

8-807.2 Wood lath and plaster. Wood lath and plaster walls and ceilings may be utilized using the shear values referenced in Section 8-807.1.

8-807.3 Existing wood framing. Existing wood framing members may be assigned allowable stresses consistent with codes in effect at the time of construction. Existing or new replacement wood framing may be of archaic types originally used if properly researched, such as balloon and single wall. Wood joints such as dovetail and mortise and tenon types may be used structurally, provided they are well made. Lumber selected for use and type need not bear grade marks, and greater or lesser species such as low-level pine and fir, boxwood and indigenous hardwoods and other variations may be used for specific conditions where they were or would have been used.

Wood fasteners such as square or cut nails may be used with a maximum increase of 50 percent over wire nails for shear.

SECTION 8-808
CONCRETE

8-808.1 Materials. Natural cement concrete, unreinforced rubble concrete and similar materials may be utilized wherever that material is used historically. Concrete of low strength and with less reinforcement than required by the regular code may remain in place. The architect or engineer shall assign appropriate values of strength based on testing of samples of the materials. Bond and development lengths shall be determined based on historical information or tests.

8-808.2 Detailing. The architect or engineer shall carefully evaluate all detailing provisions of the regular code which are not met and shall consider the implications of these variations on the ultimate performance of the structure, giving due consideration to ductility and reserve strength.

SECTION 8-809
STEEL AND IRON

The hand-built, untested use of wrought or black iron, the use of cast iron or grey iron, and the myriad of joining methods that are not specifically allowed by code may be used wherever applicable and wherever they have proven their worth under the considerable span of years involved with most qualified historical structures. Uplift capacity should be evaluated and strengthened where necessary. Fixed conditions or midheight lateral loads on cast iron columns that could cause failure should be taken into account. Existing structural wrought, forged steel or grey iron may be assigned the maximum working stress prevalent at the time of original construction.

SECTION 8-810
HOLLOW CLAY TILE

The historical performance of hollow clay tile in past earthquakes shall be carefully considered in evaluating walls of hollow clay tile construction. Hollow clay tile bearing walls shall be evaluated and strengthened as appropriate for lateral loads and their ability to maintain support of gravity loads. Suitable protective measures shall be provided to prevent blockage of exit stairways, stairway enclosures, exit ways and public ways as a result of an earthquake.

SECTION 8-811
VENEERS

8-811.1 Terra cotta and stone. Terra cotta, cast stone and natural stone veneers shall be investigated for the presence of suitable anchorage. Steel anchors shall be investigated for deterioration or corrosion. New or supplemental anchorage shall be provided as appropriate.

8-811.2 Anchorage. Brick veneer with mechanical anchorage at spacings greater than required by the regular code may remain, provided the anchorages have not corroded. Nail strength in withdrawal in wood sheathing may be utilized to its capacity in accordance with code values.

SECTION 8-812
GLASS AND GLAZING

8-812.1 Glazing subject to human impact. Historical glazing material located in areas subject to human impact may be approved subject to the concurrence of the enforcing agency when alternative protective measures are provided. These measures may include, but not be limited to, additional glazing panels, protective film, protective guards or systems, and devices or signs which would provide adequate public safety.

8-812.2 Glazing in fire-rated systems. See Section 8-402.3.

ATTACHMENT C

Excerpts from Ordinance 54-10, Seismic Strengthening of Soft-Story, Wood-Frame Buildings

File No. 09113 Substitute 11/10/2009 ORDINANCE NO. 54-10

[Seismic Strengthening of Soft-Story, Wood-Frame Buildings]

Ordinance finding a compelling public policy basis for expediting the processing and review of permits for voluntary seismic retrofit upgrades of soft-story, wood-frame buildings and amending the Planning Code, Building Code, Fire Code, and Public Works Code to waive permit processing fees for the proportionate share of work related to such seismic retrofit upgrades; making environmental findings and findings of consistency with the City's General Plan and Planning Code Section 101.1.

Note: Additions are *single-underline italics Times New Roman*;
deletions are ~~*strike-through italics Times New Roman*~~.
Board amendment additions are double underlined.
Board amendment deletions are ~~strike-through normal~~.

Be it ordained by the People of the City and County of San Francisco:

Section 1. City Policy Concerning Seismic Retrofit Upgrades for Soft-story, wood-frame Construction.

(a) Findings. (1) Soft-story, wood-frame buildings are structures where the first story is substantially weaker and more flexible than the stories above due to lack of walls or moment-resisting frames at the first floor and a significant number of walls in the floors above. Typically, these are apartments and condominiums that have parking or open commercial space–for businesses such as restaurants or grocery stores–on the first floor, which makes the first story "soft" and likely to lean or collapse in earthquakes. As a consequence, such buildings are highly vulnerable during seismic events, as the City witnessed during the Loma Prieta earthquake in 1989.

(2) The San Francisco Department of Building Inspection (DBI) is responsible for enforcing the San Francisco Building Code and serves the City and County, and the general public, by ensuring that life and property within the City is safeguarded. DBI fulfills its responsibilities through plan check review of construction documents; the issuance of permits; the inspection of construction as stipulated by permits; and through code enforcement procedures that compel property owner compliance and that may include prosecution of code violations. DBI and its governing body, the Building Inspection Commission, also provide a public forum for community involvement in permit review, approval and enforcement processes.

(3) DBI has initiated the Community Action Plan for Seismic Safety (CAPSS) Initiative to better understand the types of buildings in San Francisco that are most vulnerable to seismic events and recommend measures, including legislation to retrofit and improve the public safety related to soft-story, wood-frame buildings. The CAPSS recently completed identification of one type of soft-story wood-frame buildings in San Francisco and their location; evaluated a range of vulnerability factors; and designing retrofit options and costs, all while engaging and alerting the public to make property owners and tenants aware of potential seismic vulnerabilities. The CAPSS initiative completed its seismic soft-story report in February 2009 and recommended to the Mayor elements to include in a seismic strengthening ordinance for vulnerable soft-story wood-frame buildings.

(4) In furtherance of this effort and other City actions to ensure and enhance public protection during seismic events, Mayor Newsom, on July 7,2008, issued Executive Directive No. 08-07 concerning seismic strengthening of soft-story, wood-frame buildings. Said Directive is on file with the Clerk of the Board of Supervisors in File No. 091113 and is incorporated herein by reference.

(5) The public and media outlets share in the concern of the City's elected and appointed officials that City government do all that it can to significantly expand and accelerate ongoing efforts to ensure the safety of life and property in the City and County of

San Francisco. Such concern is demonstrated in articles such as those of the New York Times dated February 21, 2009, and San Francisco Chronicle, dated February 13, 2009, January 22, 2009, and June 29,2008, and other media coverage promoting voluntary retrofits as an immediate action. Said articles are on file with the Clerk of the Board of Supervisors in File No. 091113 and are incorporated herein by reference.

(6) On January 21, 2009, at a duly noticed public hearing, the Building Inspection Commission reviewed, approved, and recommended to Mayor Newsom, the CAPSS report entitled, *Here Today – Here Tomorrow: Earthquake Safety for Soft-Story Buildings*. Said report is on fife with the Clerk of the Board of Supervisors in File No. 091113 and is incorporated herein by reference. The Department finalized said report, which included various recommendations for City actions to address soft-story buildings, and delivered it to the Mayor on February 20, 2009.

(7) As a consequence of this public concern on the vulnerability of soft-story buildings to seismic events, during the pendency of the abovementioned CAPSS process and the City's ability to implement one or more of the recommendations of the CAPSS report on soft-story buildings, and in response to Mayor Newsom's Executive Directive No. 08-07, the City should encourage residents and property owners to voluntarily perform seismic retrofit upgrades for soft-story, wood-frame buildings.

(8) The intent of this legislation is to provide such encouragement through specified permit fee waivers and permit expediting in the near term, while the City develops and implements long-range strategies, including legislation, to address this issue.

(9) The City further declares, as a matter of public policy, that if properties owners take advantage of this voluntary program and complete the seismic retrofit upgrade within the permitted time frame, such projects would be exempt for 15 years from compliance with any subsequent CAPSS-related legislation that imposes mandatory seismic retrofit upgrades for soft-story, wood frame buildings.

(b) (1) In accordance with San Francisco Campaign and Governmental Conduct Code Section 3.400(b), the City hereby finds there is a compelling public policy basis to expedite the review and permitting process for projects where the scope of work includes voluntary seismic retrofit upgrades to soft-story, wood-frame buildings, as defined by the Director of the DBI (the "Building Official"). The Ethics Commission, Building Official, Director of Planning, Fire Marshal, Director of Public Works, and directors of other affected departments are urged to amend their respective codes of conduct for permit processing to reflect this City policy.

(2) To assist the public and City departments in ascertaining what types of structures can take advantage of this voluntary program and the seismic retrofit necessary to qualify, the Department of Building Inspection ~~will issue an~~ issued Administrative Bulletin 094 on the definition of soft-story and the design criteria for seismic upgrades. ~~A draft of s~~ Said Bulletin is on file with the Clerk of the Board of Supervisors in File No. 091113 and is incorporated herein by reference. The Building Inspection Commission, at a duly notice public hearing on May 20, 2009, reviewed and approved said Bulletin.

(3) On January 20, 2010. the Building Inspection Commission held a duly noticed public hearing on this legislation and recommended its approval to the Board of Supervisors.

Section 2. Environmental findings and findings of consistency with the City's General Plan.

(a) Pursuant to Planning Code Section 302, this Board of Supervisors finds that this Ordinance will serve the public necessity, convenience and welfare for the reasons set forth in Planning Commission Resolution No. 17957 and incorporates those reasons herein by reference. A copy of said Planning Commission Resolution is on file with the Clerk of the Board of Supervisors in File No. 091113.

(b) The Board of Supervisors finds that this ordinance is, on balance, consistent with the General Plan and the Priority Policies of Planning Code Section 101.1(b) for the reasons set forth in Planning Commission Resolution No. 17957, and incorporates those reasons herein by reference.

(c) The Planning Department has completed environmental review of this ordinance pursuant to the California Environmental Quality Act ("CEQA"), the CEQA Guidelines, and Chapter 31 of the San Francisco Administrative Code. Documentation of that review is on file with the Clerk of the Board of Supervisors in File No. 09113 and is incorporated herein by reference.

Section 3. The San Francisco Planning Code is hereby amended by amending Section 355, to read as follows:

SEC. 355. PERMIT APPLICATIONS.

(8) Permit review fees shall be waived for seismic upgrade work on soft-story wood-frame, buildings, as defined by the Department of Building Inspection in its Administrative Bulletin. These fees will be waived only if a proposal to retrofit a building triggers Planning Department review. The fee waiver shall not apply to other components of work that may be included in the application.

Section 4. The San Francisco Building Code is hereby amended by amending Section 107A.3, to read as follows:

Sec. 107A.3. Plan Review Fees.

(a) When submittal documents are required by Section 106A.3.2, a plan-review fee shall be paid at the time of filing an application for a permit for which plans are required pursuant to Section 106A.3.2. Said plan review fee shall be based on the valuation determined by Section 107A.1. See Section 110A, Table 1A-A - Building Permit Fees - for applicable fee.

The plan review fees specified in this section are separate fees from the permit issuance fees specified in Section 107A.2 and are in addition to the permit fees.

(b) If a project involves voluntary seismic retrofit upgrades to soft-story, wood-frame buildings, as defined by the Building Official, the applicant for said project shall be exempt from the proportionate share of plan review fees specified under this Chapter that is related to such retrofit work, provided all permit conditions and timelines are met.

Section 5. The San Francisco Fire Code is hereby amended by adding Section 112.21 of Appendix Chapter 1, to read as follows:

Sec. 112.21. Notwithstanding the fees established herein, if a project involves voluntary seismic retrofit upgrades to soft-story, wood-frame buildings, as defined by the Director of the Department of Building Inspection, such project applicant shall be exempt from the proportionate share of plan review fees specified herein that is related to such retrofit work.

Section 6. The San Francisco Public Works Code is hereby amended by amending Section 723.2, to read as follows:

Sec. 723.2. MINOR SIDEWALK ENCROACHMENTS.

(l) Notwithstanding the fees specified herein, if a project involves voluntary seismic retrofit upgrades to soft-story. wood-frame buildings, as defined by the Director of the Department of Building Inspection, such project applicant shall be exempt from the proportionate share of fees specified under this Section and Sections 2.1.1 et seq. that is related to suck retrofit work.

Section 7. This Section is uncodified. (a) In order to facilitate administration of this voluntary seismic retrofit program for soft-story wood-frame buildings, all permit issuing departments may treat the seismic retrofit portion of the project application as a separate permit so long as other related permits for the subject property receive the expedited permit review specified in Section (b)(1) of this Ordinance.

(b) Reporting requirement. After the effective date of this Ordinance, the Department of Building Inspection shall submit annual reports to the Building Inspection Commission, Board of Supervisors, and Mayor concerning the effectiveness of the voluntary seismic retrofit program for soft-story wood-frame buildings. The report specifically shall include information on the number of permittees who have taken advantage of the program, the number of retrofits completed, and the permittees' costs for the retrofits. This reporting requirement shall be in effect for 5 years or until the City adopts an alternate program to address seismic retrofit of soft-story wood-frame buildings, whichever first occurs.

March 16, 2010 Board of Supervisors - FINALLY PASSED

Ayes: 9- Avalos, Campos, Chiu, Chu, Daly, Dufty, Elsbernd, Mar and Maxwell
Excused: 2 Alioto-Pier and Mirkarimi

File No. 091113

I hereby certify that the foregoing Ordinance was FINALLY PASSED on 3/16/2010 by the Board of Supervisors of the City and County of San Francisco

/signed/
Angela Calvillo, Clerk of the Board

/signed/
Mayor Gavin Newsom

3-19-2010
Date Approved

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