2nd Member Organization Ballot for 2008 Proposals to the 2009 NEHRP *Provisions* (June 10, 2008 – August 10, 2008)

Note that, in accordance with the *Building Seismic Safety Council Charter, Organizational Rules, and Procedures* and the procedures adopted by the BSSC Board of Direction for the 2009 *Provisions* update project, this ballot provides four alternatives: "yes" (Y); "yes with reservations" (YR); "no" (N); and "not voting (NV). "Yes with reservation" and "no" votes are to be accompanied by a statement providing the full and sufficient basis for the vote, and a "No" vote is to be accompanied by specific suggestions for change if those changes would change the negative to affirmative.

Proposal Number	**Section Reference**	***Vote***			
		Y	**YR**	**N**	**NV**
Part 1	**Exceptions or Additions to ASCE 7-05**				
IT1-1 (2009)	Add new Sec. 1.1			X	
IT1-3R (2009)	Revise Sec. 11.1.4.1 and add Sec. 11.1.4.2		X		
2-2 (2009)	Revise Table 12.6-1	X			
2-4R (2009)	Part 1, Sec. 1.4 , Exception #1 (P-Delta)	X			
2-9 (2009)	Revise Introduction to Part 1	X			
3-1 (2009)	Revise Table 19.2-1	X			
3-2 (2009)	Revise Figure 19.2-1	X			
3-3 (2009)	New Chapter Proposal			X	
4-1 (2009)	Revise existing Chapter 23 *Seismic Design Reference Documents*		X		
4-2 (2009)	Revise Sec. 14.2, Concrete and 14.2.2, Modifications to ACI 318			X	
4-3 (2009)	Revise Sec. 14.2.3, Additional Detailing Requirements for Concrete Piles		X		
5-25R (2009)	Add to Table 12.2-1 (Autoclaved Aerated Concrete)			X	
6-3 (2009)	Revise Table 12.1-1	X			

7-1R (2009)	Revise Sec. 11.1.2, Scope and Delete Exception in Part 1	X			
8-1 (2009)	Revise Sec. 13.6.8.2 and 23.1		X		
8-2R (2009)	Revise Sec. 15.5.3 and 23.1	X			
8-4 (2009)	Revise Sec. 13.6.5.5		X		
8-10R5 (2009)	Revise Sec. 15.7.6.1	X			
8-43R1 (2009)	Revise Table 15.4-2 and Sec. 15.6.2 Stacks and Chimneys		X		
PUC-2 (2009)	Revise Sec. 12.11 and 12.14			X	
Part 2	**Commentary to ASCE 7-05**				
2-117 (2009)	Chapter 17, *Seismic Design Requirements for Seismically Isolated Structures*		X		
2-118 (2009)	Chapter 18, *Seismic Design Requirements for Structures with Damping Systems*		X		
3-119 (2009)	Chapter 19, *Soil Structure Interaction for Seismic Design*	X			
3-120 (2009)	Chapter 20, *Site Classification Procedure for Seismic Design*	X			
3-121 (2009)	Chapter 21, *Site-Specific Ground Motion Procedures for Seismic Design*		X		
3-122 (2009)	Chapter 22, *Seismic Ground Motion and Long Period Transition Maps*	X			
Part 3	**Special Topics in Seismic Design**				
2-6 (2009	White Paper – "Seismic Design Using Target Drift, Ductility, and Plastic Mechanism as Performance Criteria"	X			
4-5 (2009)	White Paper – "Seismic Design Methodology for Precast Concrete Diaphragms."	X			
4-6 (2009)	Delete "Appendix to Chapter 9" and Commentary "Untopped Precast Diaphragms."	X			
7-2R & 6-2R (2009)	White Paper - "Shear Wall Load-Deflection Parameters and Performance Expectations."	X			

7-3 (2009)	White Paper - "Special Requirements for Seismic Design of Structural Glued Laminated Timber (Glulam) Arch Members and Their Connections in Three-hinge Arch Systems	X			
IT3-01 (2009)	White Paper – "Appropriate Seismic Load Combinations for Base Plates, Anchorage and Foundations"	X			

Member Organization _________SEAONC (SEAONC SEISMOLOGY)_____________

Signature _____Nicolas Rodrigues_________ Printed Last Name __Rodrigues________

Please mail, fax, or e-mail this ballot, with any comments, to the BSSC office (fax -- 202-289-1092; bmurphy@nibs.org)) no later than
August 10, 2008.

Member Organization: SEAONC
By: SEAONC Seismology Committee

PROPOSAL IT1-1 (2008)

YR vote will be changed to Y if this entire proposal is placed in the commentary.

Reason: Language in this proposal is overly simplistic related to "large uncertainties as to the intensity and duration of shaking in any earthquake," and, in addition, the anticipated dynamic effects of earthquake and performance of buildings and structure. In general, provisions in ASCE 7 as well as other model codes should be considered minimum requirements.

The 1st and 2nd bullet points on page 1 lines 7 and 8 using the word "avoid" can subject to legal challenge. The evolution of earthquake science and improvements in our model building code requirements have been direct results from our painstaking past experience. It could be argued that failure to provide adequate anchorage could lead to exterior wall collapse, and could have been "avoided" if the state of practice were different at that time on the magnitude of anchorage force.

*The purposes item 1 and item 2 stated under 1.1.1, **Purpose**, in the 2003 NEHRP Provisions are considered more acceptable for ASCE 7.*

PROPOSAL IT1-3R (2008)

YR vote will be changed to Y if the following modifications are made:

1. Page 1, Line 26 - Change to read: "seismic performance will be met by generally following one of the ~~two~~ following methods:"
2. Page 1, Line 37 – Add item 3, "3. Other method that satisfies and complies with the intent of these provisions, and the related detailing is found equivalent of that prescribed in these provisions in strength, ductility, toughness and safety.

Reason: ASCE 7 provision is intended for evaluation of complete seismic force resisting system. No guidelines are provided for evaluation of components/ products (e.g. alternative hold downs, shear walls, etc.) Also recommend providing commentary to establish and demonstrate equivalency for elements / products in terms of toughness, strength, and ductility. Other alternative should be included. ATC-63, although may serve as good source document, is not yet available and its methodology has not been widely adopted by building officials or ICC-ES. Other innovative systems should be permitted, such as ACI ITG1.2R-03, Special Hybrid Moment Frames Composed of Discretely Joined Precast and Post-tensioned Concrete Members, or ACI ITG 4.3R-07, Structural Design and Detailing for High –Strength Concrete in Moderate to High Seismic Applications, and others.

PROPOSAL 3-3 (2009)

N vote will be changed to Y if this proposal is place under Part 3 of the Provision.

Reason: Despite the background information attached to this proposed new chapter, we have concerns on assumptions on damping and acceptable procedure in modeling, which, in turn, influence the vertical fundamental period, the mode shapes and design spectrum. The vertical response spectral acceleration of not less than 50% is also considered too high.

The proposal identifies different values for soil site classes, yet the spectrum in this procedure is independent of the fault mechanism. The referenced paper by Campbell and Bozorgnia shows large differences in the spectrum based on the fault mechanism. For example in "Firm Soil" the Sav for a "Strike Slip" fault mechanism at 10 km is 0.90g at T = 0.10s and for the corresponding "Thrust" fault mechanism the Sav is 1.10g. The commentary for this proposal should describe why the vertical design spectrum is independent of the fault mechanism, when the referenced paper clearly indicates the dependency of vertical response on the type of faulting mechanism.

In the TS3 response to Kircher et al., the writers indicate that the design spectrum is appropriate for long span structures. For these types of structures where the vertical periods that are in the long period range, i.e. greater than 1 second, could this proposed spectrum cause the vertical response to be lower than code? A comparison study should show the code based approach using the Code value (Ev=0.2SdsD) versus the proposed vertical response spectrum analysis. Can this proposal be used to scale vertical response histories?

For horizontal (lateral) response spectrum calculations, the Code provides guidance to the designer for the analysis procedure based on years of empirical evidence and research. The proposal indicates how a vertical response spectrum is created, however, there is no indication of what analysis procedure is to be used using the vertical spectrum, how the procedure is triggered in the code, or how the vertical response is to be combined with the horizontal response.
The proposal should provide guidance for calculating vertical period of the structure,, the number of vertical modes to consider for analysis, how modes are to be combined, suggested damping of vertical modes, and maximum and minimum values for vertical response. Typically, analysis programs lump masses as the columns which is adequate for dynamic lateral analyses, but will not provide an accurate vertical period calculation unless the mass and stiffness are properly distributed

In conclusion, this proposal fails to provide a complete procedure and it is not clear how this proposal would work with other requirements of ASCE 7.

PROPOSAL 4-1 (2009)

YR vote will be changed to Y if modifications under 4-2 and 4-3 are made.

PROPOSAL 4-2 (2009)

N vote will be changed to Y if the following modifications are made:

1. **Page 3 Line 34 -** Revise title to read: "**21.9.10 Wall Piers and Wall Segments** ***in High Seismic Design Categories***"

2. **Page 5 Line 4 –** Revise line to read: "21.4.5 Wall piers **and Wall Segments in Moderate Seismic Design Categories** not designed as part of a moment frame shall have transverse …. (balanced of text remain no change)"

3. **Page 8 Line 36 –** Revise beginning of line to read: "reinforcement between panels or between panels and foundations. "

4. **Page 8 Line 43 –** Delete the words "panels and foundations"

5. **Page 8 Line 43 –** Move the second sentence starting with "The 2006 edition of the IBC" to the beginning of the following paragraph pm page 9.

Reason:

Items 1 and 2. On page 8 Line 41, proposal made reference to ".... requirements of Section 14.2.2.4 for wall piers that are part of structures in high seismic design categories" a statement which we concur. Added clarification to title of subsection under the Provisions reinforced the need for the design requirements and special detailing of wall piers in SDC D, E or F.

Additionally, the two closely worded pier requirements can mislead engineers. For example, buildings designed under intermediate structural wall system in SDC D which needs to comply with ACI 318 chapters 1 to 19 and section 21.4. Based on commentary under C14.2.2.7, the wall pier provision under 14.2.2.7 does not be applied in high seismic design categories. Yet 14.2.2.4 applies only when 21.9 (special structural wall system) is used in design. Proposed modification separates wall piers designed for structures assigned to SDC C from those assigned to SDC D, E or F.

Item 3 and 4 are editorial.

Item 5 – individual wall piers may or may not be connected directly using steel connectors, particularly when the pier is part of a "pierced" wall. The relocation of the second sentence alleviates the possible incorrect connotation.

***Background information**:* The design provision for wall pier detailing was originally introduced by SEAOC in 1987 to legacy Uniform Building Code and was included in 1988 UBC through 1997 UBC. The wall pier detailing was intended for high seismic zones equivalent to current SDC D, E or F. ACI 318-08 Commentary R 21.1.1 stated: "it is the intent of ACI 318 that seismic-force-resisting system for buildings assigned to SDC D, E or F be provided by special moment frames, special structural walls, or combination of the two." ASCE 7 Table 12.2-1, Design Coefficient and Factors for Seismic-Resisting System, permits intermediate precast structural wall system in SDC D, E or F. The renumbered Section 14.2.2.7, introduced by others into ASCE 7 when intermediate structural wall was first introduced and was meant for lower ductility requirement for structures assigned to SDC C and lower seismic design categories. The required shear strength in 21.3.3 [ACI 318-08] is based on V_u under either nominal moment strength or two times the code prescribed earthquake force. The required shear strength in 21.6.5.1 [ACI 318-08] is based on probable shear strength, V_e under the probable moment strength, M_{pr}. In addition, the spacing of required shear reinforcement is 8 inches on center under 21.4.5 instead of 6 inches on center with seismic hooks at both ends under 21.9.10.2.

Current practice in commercial buildings construction using precast panels wall system frequently include large window and door openings and/or narrow wall piers. Wall panels, in high seismic design categories, varying up to three stories high with openings resembles wall frame which is not currently recognized under any of the defined seismic-force resisting systems other than consideration of structural wall system. Conformance to special structural wall system detailing will ensure minimum life safety performance in resisting earthquake forces in SDC D, E or F.

PROPOSAL 4-3 (2009)

YR vote will be changed to Y if the following modification to C14.2.3.1.5 is made:

Page 3, line 44 - revise sentence to read: "Outside of the potential plastic hinge region, the transverse reinforcing spacing is restricted to sixteen (16) times the longitudinal bar diameter. This should permit the longitudinal bars to reach compression yield before buckling."

Reason: Statement as written is misleading. It can be construed as increase of spacing of longitudinal bar.

PROPOSAL 5-25R (2009)

N vote will be changed to Y if structural system limitation in Table 12.2-1 is changed to NP under SDC C as shown below:

Seismic Force-Resisting System	ASCE 7 Section Where Detailing Requirements are Specified	Response Modification Coefficient, R^a	System Overstrength Factor, Ω_0^g	Deflection Amplification Factor, C_d^b	Structural System Limitations and Building Height (ft) Limit [c]				
					Seismic Design Category				
					B	C	D[d]	E[d]	F[e]
A. BEARING WALL SYSTEMS									
1. Ordinary Reinforced AAC Masonry Shear Walls	14.4.5.4	2	2 ½	2	NL	~~35~~ **NP**	NP	NP	NP
2. Plain AAC Masonry Shear Walls	14.4.5.3	1 ½	2 ½	1 ½	NL	NP	NP	NP	NP

Note: New system coefficients are not underlined for clarity.

Reason: At present, there is insufficient evidence of actual structures built using AAC that have undergone a moderate level of earthquake. We feel the use of AAC system for building structures should be excluded from SDC C, D, E and F.

Background Information*:*

SEAOC Seismology Committee position paper

Aerated Autoclaved Concrete and Seismic Design

Scope:

This document presents the position of the SEAOC Seismology and Structural Standards Committee on the development and use of Aerated Autoclaved Concrete (AAC) for seismic design. This statement is the product of the Committee's opposition to the current effort by the proponents of AAC to obtain an International Building Code Revision to allow the use of AAC in the higher Seismic Design Categories. This document is an update related to our earlier position statement regarding the general development of seismic design factors for new materials to specifically address the concerns regarding Aerated Autoclaved Concrete. Terms used are as defined in the 2003 Edition of *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, ASCE 7-05,* 1997 *Uniform Building Code* and the 2003 *International Building Code*. SEAOC has severe reservations about the independent, individual establishment of seismic design values without the checks and balances of BSSC review and consensus. Currently the ATC-63 project addresses many of our concerns, but is not complete. The Seismology Committee recommends waiting for the completion of the ATC-63 research project before including this material for use in the higher Seismic Design Categories.

Position Statement:

Before the Building Code is amended to permit the use of Aerated Autoclaved Concrete (AAC) elements as Seismic Force Resisting Systems in the higher Seismic Design Categories, the SEAOC Seismology Committee believes the following major issues need to be resolved:

1. **Provide clear and specific limits on the use of the material for specific applications** – For instance: Use as a unit masonry type block in similar fashion to CMU block would be significantly different behavior from the use of larger panels for bearing or shear walls that support a floor or roof load. Also these applications differ significantly from the use of panels as floor or roof elements for horizontal framing / horizontal diaphragms. Research should be done on several samples within the size and use range for each particular application including component design, connection design, and system design detailing. This research also should be repeatable by independent labs before that particular application with its specified limits should be brought up for consideration in a code application.

2. **Provide clear design methods, detailing provisions, and inspection requirements directly related to a specific application and limited use.** Each specific limited use and application needs to have clear design methods and detailing provisions that are tied to the application, with sufficient research that clearly documents the detailing used in the research and testing program. This includes component design, connection design, and system design detailing. Items critical for inspection during construction should be identified in the research.

3. **Research and testing should follow ASTM national standards and be of the same rigor as that done for other similar building materials such as concrete, precast concrete, concrete masonry, and steel.** Materials used for grouting or bonding reinforcing to the AAC material, as well as reinforcing materials need to be tested and qualified for use in the specific application.

4. **For seismic design, cyclic testing needs to be included and validated for components, connections, and systems in order to validate their use in a particular application and structural system.** This becomes increasingly important for Seismic Design Categories B, C, D, E, and F. Independent reviews need to validate the seismic testing for each specific application and structural system. Testing done to date has been called into question, as indicated by the attached documents described above (J. Kariotis, July, 2006). Further cyclic testing is needed. Review of the research with comparison to other systems, such as that expected from the ATC-63 research program is also needed to properly benchmark seismic performance parameters such as R, Ωo, and Cd. We strongly recommend waiting for the ATC-63 research to be completed. See our position on Seismic Design Factors and Coefficients in Seismic Force Resisting Systems, May, 2005.

5. **We strongly recommend that AAC not be included as a structural building material for Seismic Design Categories B, C, D, E, or F at this time, given the broad range of uses and applications and the lack of adequate design methods, detailing provisions, and inspection requirements specific to those applications.** For the future, we recommend that the material be classified by its use and application with required design methods, detailing provisions and inspection requirements that are backed by rigorous research. Code provisions should recognize

the specific application and detailing provisions commensurate with traditional materials used in the higher Seismic Design Categories.

6. **As a compromise position, the Seismology Committee would concede to the following:**

   AAC should be Not Permitted in Seismic Design Categories C, D, E, and F; and for Seismic Design Category B its use be limited to Reinforced AAC with a height of 2 stories or less and that $R = \Omega o = Cd = 2$

Symbols and Abbreviations:

R — Numerical coefficient representative of the inherent overstrength and global ductility capacity of lateral force resisting systems (UBC); Response Modification Coefficient (IBC)

Ω_o — Seismic Force Amplification Factor (UBC); System Overstrength Factor (IBC)

ASCE — *American Society of Civil Engineers*

ATC — *Applied Technology Council*

C_d — Deflection Amplification Factor (IBC)

BSSC — Building Seismic Safety Council

TC — Technical Committee (AISC)

TS — Technical Subcommittee (BSSC)

Commentary:

Aerated autoclaved concrete (AAC) has several positive characteristics which make it an attractive building material. It is lighter in weight than normal weight and light weight concrete, while being able to support a moderate amount of load. It is an insulator, and desirable for its fire protection characteristics. It can also be formed into a variety of configurations that can mimic unit masonry and precast concrete.

The use of this material as the sole lateral force resisting elements comprising a complete seismic force resisting system requires a comprehensive and systematic research program. The research needs to be done with the same rigor as that which is used in the masonry industry, concrete industry, and precast concrete industry. For inclusion of this system/material as a recognized seismic force resisting system within the building code, research should address design, detailing, and quality assurance provisions that are necessary to achieve the level of safety commensurate with performance and behavior similar to that expected of other codified building materials. From what the Structural Engineers Association of California (SEAOC) Seismology Committee has observed, the inclusion of AAC as a seismic force resisting system using this specialized material appears to have been based on insubstantial technical data in order to gain a foothold into the current building codes and standards for use in burgeoning building markets.

The Seismology Committee has corresponded with proponents for the use of AAC in all regions of the US. A statement provided by the Seismology Committee dated June 3, 2003 summarizes our concerns from that time. See "Comments on Proposed ICC ES Acceptance Criteria for Establishing Seismic Design Factors and Coefficients in Undefined Seismic-Force Resisting Systems Subject AC215-0603-0603-R1". Subsequent to that, the ICC approved acceptance criteria AC215, specifically developed for AAC as a building material, but generally consistent with the original methodology presented in the first efforts associated with AC215-0603-0603-R1. The approval of AC215 led to the development of the SEAOC Seismic Design Factor position statement dated May, 2005. AAC proponents continued to promulgate the use of the material in all applications to the MSJC, resulting in a methodology and recommendations published in the MSJC Standard Appendix. Currently, AAC proponents are moving towards total integration of the material and its use in high seismic regions into the International Building Code. SEAOC Seismology strongly opposes the use of seismic force resisting systems comprised of AAC in higher seismic design categories. Regional chapters of SEAOC, specifically SEAOSC, indicated that TS5 and MSJC ignored voiced concerns about research test results and system performance in seismic environments. SEAOC member John Kariotis has written several articles that provide specifics regarding some of these points (July 2006; "History of seismic design values for AAC Masonry" and July 2006; "Reinforced AAC masonry as designed by Appendix A").

The Seismology Committee believes that AAC is a viable building material with applications in both non-seismic and seismic regions. Should the proponents follow proper research protocols and develop the case for specific applications – we believe that AAC could be codified for virtually all areas of the United States in the future. However, the rush to put this material into the building code at the present time is premature and potentially dangerous for the public. It would be inappropriate to place material standards within a building code that have not been properly vetted with clear design methods, detailing requirements, and inspection requirements specific to each application supported by specific research.

The ATC-63 project addresses several of the seismic concerns for new systems (like AAC). Until completion of the ATC-63 project, the alternate materials provision within the code is an appropriate place for this material. As an alternate material, it is up to the jurisdiction to accept the design methodology, based on the research and ICC approvals submitted. The jurisdiction would have the final say about whether the alternate satisfies the level of safety of other materials, and whether special inspections are required.

With regard to the current proposed building code change, we strongly recommend that AAC not be included as a structural building material for Seismic Design Categories B, C, D, E, or F at this time, given the broad range of uses and applications and the lack of adequate design methods, detailing provisions, and inspection requirements specific to those applications. For the future, we recommend that the material be classified by its use and application with required design methods, detailing provisions and inspection requirements that are backed by rigorous research. Code provisions should recognize the specific application and detailing provisions commensurate with traditional materials used in the higher Seismic Design Categories.

As a compromise position, the Seismology Committee would concede to the following:
AAC should be Not Permitted in Seismic Design Categories C, D, E, and F; and for
Seismic Design Category B its use be limited to Reinforced AAC with a height of 2 stories or less and that $R = \Omega o = Cd = 2$

Authorship:

This recommendation represents the official position of the Seismology Committee. It may differ from the policies and interpretations of some building authorities. Engineers are cautioned to ascertain such policies and interpretations in advance of design.

This document was approved by the SEAOC Seismology Committee August 2006.

Proposal 8-1 (2009)

YR vote will be changed to Y if the basic structural design requirements are repeated in either ASCE 7 or IBC-2012

1. Line 3 – retain deleted reference to seismic design category C.
2. Line 11 - Retain deleted section 13.6.8.3

Reason: We would like to fully understand the prescriptive requirements in NFPA 13-07, however, it is not yet available. Certainly future changes to NFPA may compromise the intended minimum structural design requirements.

Proposal 8-4 (2009)

YR vote will be changed to Y if the following modification is made:

1. Line 6 - Change “355.2” to “318 Appendix D section D.2.3.”

Reason: ACI 318 Appendix D makes direct reference to ACI 355.2 document. This will eliminate unnecessary quoted another reference standard in IBC Chapter 35.

Proposal 8-43R1 (2009)

YR vote will be changed to Y if the following modification is made:

1. Line 24 – Revise to "below the opening, but no less than development length of longitudinal bars."

Reason: Chimneys and stacks may be relatively tall but with a high aspect ratio. Jamb reinforcement bars need to be fully developed.

Proposal PUC -2 (2009)

N vote will be changed to Y if the material is included in Part 2, Commentary as advisable for special hurricane and high wind areas.

Reason: Attempt to have uniform anchorage provision to materials other than concrete or masonry is unfounded and not based on research needs. Concrete and masonry walls are heavier in weight and normally used for taller buildings or other structures. Requirement for a minimum level of anchorage force in concrete and masonry walls provides a minimum structural integrity to protect life safety. The exception may be straight forward for a rectangular building with approximately uniform wall height; but may create unnecessary imposition for irregular shaped building with redundant interior shear walls or high pitched roofs as common in dwellings.

Proposal 2-117 (2009)

YR vote will be changed to Y if the following modification is made:

Commentary as written may not meet the current state of practice standards for several reasons:

The commentary for Chapter 17 should include an explanation that the Code assumes a design and analysis process of isolated structures which has since changed. While the approach of performing prototype testing prior to analysis and design was correct for the time when the code was first written, the current state of the practice is to design the structure for one or more isolation systems, and then confirm properties of the isolators with testing when the competitively bid isolator vendor has been chosen.

In the current common practice of designing isolated structures the designer will approach various isolator vendors to determine reasonable estimates of isolator properties to use in the analysis and design process. These properties will typically be given as a range instead of a finite value. The designer will then perform the analysis and design using upper-bound and lower-bound properties that are related to the property range from the vendor with additional effects of aging, contamination, environmental exposure, loading rate, scragging, and temperature incorporated. When a vendor has been chosen for a project, then isolator testing will commence with prototype testing followed quickly by production testing. The testing is used to confirm that the isolators fall within the specified limits of upper-bound and lower-bound properties used during analysis and design.

Proposal 2-118 (2009)

YR vote will be changed to Y if the following modifications are made:

1. Page 2, line 11- revise sentence to read: "Compliance with these design requirements is intended to produce higher performance or performance comparable to that for a structure with a conventional seismic-force-resisting system~~, but the same methods can be used to achieve higher performance~~."

2. Page 2, line 19 – add new sentence at end of paragraph: "In the systems that DS and SFRS have no common elements, the damper force may have to be collected and distributed to the slab or some members of the SFRS."

3. Page 3, line 12 – revise to read: "seismic-force-resisting system (and not less than 100 percent if the structure is horizontally or vertically irregular). The damping systems may, however, be used to meet the drift limits for irregular structures as well as for structures without irregularity. This approach, having a SFRS with a 75% V_b minimum, provides safety in the event of damping system malfunction …. (balance of sentence unchanged)"

4. Page 4, line 2 – revise to read: "For certain elements of the damping system, such as the connections and drivers or the members to which the dampers frame into, other than damping devices … (balance of sentence unchanged)"

5. Page 4, line 5 – revise paragraph "**C18.2.3 Ground Motion.** ~~Similar to seismic isolators, damping devices must have design and prototype testing for maximum considered earthquake displacements, velocities, and forces.~~ (proposed sentence is a capacity issue and not ground motion. This section should clarify that the DE and MCE to be used for design and analysis)"

6. Page 4, line 7 – revise paragraph to read: "~~This chapter provides~~ Linear static and response spectrum analysis methods can be used for design of structures with damping systems that meet certain configuration and other limiting criteria (for example, at least two damping devices at each story configured to resist torsion). In such cases, additional nonlinear response history analysis is then used to confirm peak responses for structures subjected to a one second spectral acceleration of 0.6g or larger.

7. Page 4, line 12 – revise to read: "~~New~~ Analysis methods are presented for structures with dampers based on nonlinear static "pushover" ….(balanced remain)"

8. Page 4, line 17 – delete the last sentence because isolated structures could also yield depending on the design and relative stiffness of structure and the isolator.

9. Page 4, line 27 – delete the last sentence since the procedure described maybe more subjected to yielding based on linear static analysis when a single mode is used; but for modal analysis, this is not the case.

10. Page 6, line 7 – Clarify the intent of the hysteretic damping component. What about contribution from hysteretic dampers? Perhaps this section should be divided into two. One the supplementary hysteretic/friction dampers and one from yielding of the structure members themselves.

11.
12. Page 6, line 20 – change “The chapter” to “This section”

13. Page 10, line 1 – change “2001 California Building Code” to “2007 California Building Code”

Reason: Except as noted for items 5 and 10, all suggested modifications are editorial, and /or attempt to remove ambiguity. For example, item 1 as written can be read to mean that damping devices can be substituted for SFRS. Also, it is expected that the performance of a system with supplementary damping will in general be better than a similar conventional system without dampers.

Proposal 2-121 (2009)

YR vote will be changed to Y if this commentary chapter were held until the next M.O. ballot.

Reason: The BSSC Ground Motion committee is in the midst of a re-write for the entire chapter on ground motions. Any commentary developed for current ASCE 7 will probably be replaced in the next ballot.

With regards to the work being performed by the BSSC Ground Motion Group and others we offer the following:

There has been an “overreaction” with respect to the use of NGA in estimating ground motions, specifically, that NGA estimates of response spectra are “too low”. While there may be some validity in this belief, the entire picture has not completely been evaluated.

Most of the comparisons of NGA with older relationships and the code mapped values have been done for B/C boundary site, i.e. Vs30 = 750 m/s. Such comparisons have shown that NGA for such sites (Vs30 of 750 m/s) tend to provide estimates of ground motion that are about 30% lower than the previous relationships. However, this trend is not consistent for all sites. For example, for class D sites, NGA for long periods provides estimates of ground motion which are similar to the estimates using the circa 1997 relationships. Hence, very little difference for softer site with current standards.

Future codes which use uniform risk procedures to determine spectral design values will still use a deterministic limit. In current codes this limit is 150% of Median Deterministic spectrum (for sites in close proximity of major faults such as San Francisco and Los Angeles). Furthermore, the intent of 150% Deterministic Limit has been based on the acknowledgment of the fact that Probabilistic Seismic Hazard Analysis (PSHA) for 2% probability of exceedance in 50 years is too large for sites in close proximity of major faults in highly active seismic regions. This is both reasonable and prudent.

It has been reported that the intent of the150% deterministic cap has been to capture the 84th percentile of the deterministic estimate of ground motions. However, the 150% of median deterministic level has never been the same as 84th percentile of deterministic ground motion. The 150% of median deterministic is about 20% lower than the 84th percentile deterministic ground motion.

Future codes developed using NGA relationships are limiting the deterministic cap to 84th of the maximum rotated component of ground motion. The NGA, and virtually all other attenuation relationships, provide estimates of geometric mean of the recorded motions (i.e., the square root of the product of the two orthogonal recordings). While this point may have not been completely clear in the past, the fact that NGA appears to estimate lower spectral values has brought this to the forefront. To go from the geometric mean to the maximum rotated ground motion the short periods and long periods (> 1 sec.) should be increased by about 20% and over 30% percent, respectively. Such proposed increases in the deterministic cap will in effect have the following effects on the site class B/C boundary mapped values:

1. *Deterministic NGA estimates are about 30% lower than current maps using the 150% of Median Deterministic criteria*
2. *Using NGA and increasing the deterministic estimate from 150% of Median to 84th percentile results in 20% increase*
3. *Going to the 84th percentile estimate for maximum rotated component results on average in another 30% increase*
4. *The combined effect of 2 and 3 is an increase of a factor of about 1.56 over the 150% of Median Deterministic estimate.*
5. *Considering these cumulative effects and comparing it to current site class B/C mapped values there would be an increase of about 10%.*
6. *The other issue with this proposed deterministic approach is that in some cases especially in long periods, the PSHA for 2% probability of exceedance in 50 years spectrum is lower than the deterministic maximum rotated 84th percentile spectrum. Considering the fact that PSHA for 2% in 50 has always been considered excessive for areas such as SF and LA, it is interesting that ground motion estimates using the current approach will effectively get us to a perhaps unrealistically high level of MCE design spectrum.*
7. *Because site-specific estimates for softer sites (site class D and lower Vs30 C sites) using NGA results in similar spectral values to those using circa 1997 relationships for long periods, the proposed code for deterministic spectral estimates will result in spectral values that are on the order of about 1.6 times higher than current estimates!*

The NGA project took a very long and hard look to comprehensively consider parameters that affect ground motion estimates as well as the best most up to date processing of the recorded data. It seems rather arbitrary to just say increase the design ground motion level (i.e. from geomean of the 84th percentile to the 84th percentile maximum rotated component) because the ground motion estimates using the NGA relationships are somewhat lower for certain sites than those estimated from older relationships. We seem to be ignoring what the most recent science is telling us. The point is not that the design ground motion level should not be changed; however, before making any significant changes, some justification for the changes should be made and consideration of the ramifications should be evaluated by the engineering and design community as well as public officials.