



FEMA-NIBS BSSC PROVISIONS UPDATE COMMITTEE

Burlingame, CA

July 20, 2016

Summary Minutes

Participants

Provisions Update Committee

David Bonneville, Degenkolb Engineers (Chair)
Pete Carrato, Bechtel Corporation
Kelly Cobeen, Wiss Janney Elstner
C.B. Crouse, AECOM
Dan Dolan, Washington State University
Anindya Dutta, Simpson Gumpertz & Heger (absent)
S.K. Ghosh, S.K. Ghosh Associates
John Gillengerten, Consulting Engineer
Ron Hamburger, Simpson Gumpertz & Heger
Jim Harris, James Harris & Associates
William Holmes, Rutherford & Chekene
John Hooper, Magnusson Klemencic Associates
Gyimah Kasali, Rutherford & Chekene
Charles Kircher, Charles Kircher & Associates
Philip Line, American Wood Council (absent)
Bret Lizundia, Rutherford & Chekene
Jim Malley, Degenkolb Engineers
Bonnie Manley, American Iron and Steel Institute (absent)
Robert Pekelnicky, Degenkolb Engineers
Rafael Sabelli, Walter P. Moore (absent)
John Silva, Hilti
Greg Soules, CB&I
Jonathan Stewart, University of California Los Angeles

BSSC Members and Guests

Patrick Bodwell, Verco Decking
Jason Collins, PCS Structural Solutions
John Heintz, Applied Technology Council

Sandy Hohener, Degenkolb Engineers (IT 2 Chair)
Perry Haviland, American Institute of Architects
Stephen Harris, Simpson Gumpertz & Heger Inc.(IT 7 Chair)
Jay Larson (by telephone)
Steve Kramer, University of Washington

USGS
Nicolas Luco
Sanaz Rezaeian

NIST
Steven McCabe
Siamak Sattar

FEMA/NIST/NIBS
Mai Tong, FEMA
Michael Mahoney, FEMA
Andrew Herseth, FEMA
Robert Hanson, University of Michigan
Philip Schneider, NIBS/BSSC
JQ Yuan, NIBS/BSSC

1. CALL TO ORDER:

David Bonneville started the meeting at 8:30 a.m. with member introductions, a reading of the anti-trust statement (David Bonneville), and a review of the agenda (see [Attachment No. 1](#)).

Mai Tong, the FEMA Project Officer, welcomed everyone for the second PUC meeting of this cycle and stated that FEMA is preparing next year funding for PUC and P17C.

2. APPROVAL OF MINUTES

The minutes of March 9, 2016 meeting were approved unanimously by the committee members who were present. That meeting was the first official face-to-face meeting for the 2020 Provisions update cycle.

3. REVIEW AND APPROVAL OF IT SCOPES AND MEMBERSHIPS

David Bonneville (PUC Chair) stated that nine ITs were initiated at the last PUC meeting and approved by BSSC Board of Direction. The scope of work and membership of each IT have been developed and will be finalized and approved in this PUC meeting. [Ed. Note: the finalized IT membership lists developed after the meeting is attached (see [Attachment No. 2](#))]. David stated that there will be work originated from Project 17 and moved to the PUC through IT1.

Concerns were raised about adding IT voting members that do not need funding support, either because they are funded by other organizations, or they are located on the west coast where meetings are likely to take place. It was agreed that the selection will be based on needed expertise and a balanced structure with representatives from different industries. All IT voting members will be reviewed and approved by the PUC. All the interested individuals, who are not voting members can serve as corresponding members, per the IT chairs' judgement, and will have opportunity to participate.

3.1 IT1 Seismic Performance Objectives, Chair: Bob Pekelnicky

(1) Scope (underlined text represents the updates):

The IT1 main scope will be to evaluate the adequacy of the qualitative performance objectives in Section 1.1 of the *Provisions* (not in currently ASCE-7) and determine if they are sufficient for the design of buildings and other structures. Moreover, IT 1 will look at ASCE-7 Chapter 1 that is not currently in the Provisions, and Provisions Commentary Chapters 11, 12, 13, and 15 that are currently not in ASCE-7. Since there is a Project 17 Committee (P17C) looking at the acceptable risk with regard to safety based on collapse of the structure, this issue team will focus on topics such as nonstructural performance, loss of function, and potentially, the level of damage. The Committee will review the Resource Paper on future directions in performance based design from the 2015 *Provisions* and other applicable research projects related to performance-based design (ATC 58-2, ATC-84 etc.).

Other potential topics: the ATC 120 study funded by NIST. IT1 also might look at the R factor.

(2) Membership:

Add Greg Soules as a voting member, making IT1 having 14 members, 8 funded voting members.

(3) Vote:

18 in favor, none opposed, none abstaining.

3.2 IT2 Seismic-Force Resisting Systems and Design Coefficients, Chair: Sandy Hohener

IT2 already had a teleconference prior to this PUC meeting.

(1) Scope (underlined text represents the updates):

- Direction of loading (100%/30%)
- Incorporate recommendations coming out of ATC-116 and ATC-123 projects
- SDC ranges, height limits
- $R = C_d$ & corresponding changes to drift limits

- Bearing wall definition & $R = 5$ vs 6
- Coordinate with IT1 and P17C on issues affecting Chapter 12 (SDC, multi-period spectra etc.)
- Collector in light frame building vs. steel or concrete construction
- S12.3.3.1 prohibition of Type 1b for low-drift structures

(2) Membership:

Move Robert Tremblay and Richard Bennett from voting to corresponding member and add Greg Soules as a corresponding member, making IT 2 having 6 funded voting members.

(3) Vote:

18 in favor, none opposed, none abstaining

3.3 IT3 Modal Response Spectrum Analysis Considerations, Chair: Anindya Dutta

Anindya was absent due to some schedule conflicts and Jim Malley presented the updates. IT 3 already had a meeting prior to this PUC meeting.

(1) Scope (underlined text represents the updates):

Since IT3 has a long list of topics, Jim Malley pointed out that some are just commentary, or else only some might come up as a proposal to the PUC. It is suggested to shorten the list, revisit the fundamental issues of Modal Response Spectral proposed by Bob Hanson in last cycle, focus less on the modeling issues, and use ATC 123 as a reference.

Based on feedback from the PUC, Anindya developed a revised scope, as follows:

- Possible adjustment of CS in the short period range by the square root of $(2R/\Omega_0 - 1)$
- Reduction by R only in the first mode (assuming higher modes are elastic);
- Consideration (or reconsideration) of the appropriateness of current approaches for scaling to the results of an equivalent lateral force (ELF) analysis. This should include both the value matched (base shear, overturning moment, or other) and the scaling factor to be used for matching
- Application of a multi-degree-of-freedom factor
- Modification of MRSA to better target a probability of collapse of 1 % in 50 years
- Revisit triggers for Dynamic RSA in ASCE7 and realign with efforts of ATC 123

(2) Membership:

Move Finley Charney and Rob Tovani from voting to corresponding members, making IT 2 having 6 voting members, 4 funded.

(3) Vote:

18 in favor, none opposed, none abstaining

3.4 IT4 Shear Wall Design, Chair: S.K. Ghosh

(1) Scope (underlined text represents the updates):

Scope: The shear wall IT will consider the effects of external loads (gravity as well as lateral) on shear walls of concrete, steel, masonry, and wood. It will next consider the possible failure modes resulting from those load effects or internal forces. This will lead to a determination of the failure modes that are critical in design, which in turn should lead to possible areas of improvement in current design practice. Two of those areas are anticipated to be the following:

1. Coupled shear wall systems are recognized as distinct from isolated shear wall systems in Canadian and New Zealand codes; they are also accorded higher response modification factors in view of their superior seismic performance. The IT will examine whether ASCE 7 should go in the same direction. (Suggested by PUC members: different R factor for coupled and isolated; need a definition for a coupled shear wall (ACI 318 will develop the definition); new items in 12.1 for which Ron Hamburger suggested a P 695 study.)

2. Tall buildings in the 400-ft height range are increasingly being built in highly seismic areas, with seismic forces being resisted entirely by cores consisting of reinforced concrete shear walls. (Suggested by PUC members: coordinate with the multi-period spectra team.)

The shear design of these shear walls is absolutely crucial to the safety of these structures. However, we have at best an imperfect understanding of the maximum shear that can develop and how it is transferred at the base. It will be very beneficial for the IT to look into this design aspect.

The IT will develop Part 1 proposals and accompanying Part 2 commentary dealing with any topic on which the IT is able to progress to that point. All other findings of the IT and work leading to those findings will be recorded in a Part 3 Resource Paper.

(2) Membership:

Swap John Hooper with Jason Collins, which makes Jason as a voting member and John as a corresponding member.

Swap Laura Lowes with Andy Taylor, which makes Andy as a voting member and Laura as a corresponding member.

Add Jose Restrepo and Andrew Whittaker as corresponding members. Dick Bennett will not be funded as a voting member through NCMA.

SK will contact the team members to confirm their participation and will maintain 8 voting and funded members.

(3) Vote:

18 in favor, none opposed, none abstaining

3.5 IT5 Nonstructural Components, Chair: John Gillengerten

(1) Scope (underlined text represents the updates):

During the development of the 2015 *NEHRP Provisions*, there was extensive discussion on establishing performance objectives for nonstructural components. In addition, specific issues have been identified that significantly influence the performance of nonstructural components, but are not adequately covered in the current Provisions. With the exception of a review of R_p factors, all of the nonstructural items listed in the 2015 NEHRP Issues and Research Recommendations report were research needs. NIST is supporting the ATC-120 project that directly addresses a substantial number of the research needs, including the force equations and performance objectives for nonstructural components.

Two of the areas of investigation in the second phase of ATC-120 are a detailed evaluation of the nonstructural design provisions, and development of performance objectives for nonstructural components. The detailed evaluation will include development of a design philosophy for nonstructural components that identifies desirable post-yield and failure mechanisms for components, supports and attachments, and a method for producing generic floor spectra for design of nonstructural components.

IT5 will incorporate information from ATC-120 to develop proposals for updating the force equations and nonstructural anchorage to concrete and masonry provisions to reflect the most current research, and proposals to update the R_p factors. Depending on the outcome of the ATC-120 effort on nonstructural performance objectives, IT5 will produce either a proposal or white paper.

Note: ATC 120 might have some preliminary results in 6 months (the end of 2016).

(2) Membership:

Add Matthew Hoeler a corresponding member. [Ed notes: after the meeting, John added Phil Caldwell and Hussain Bhatai as corresponding members.]

This team has 8 funded voting members.

(3) Vote:

18 in favor, none opposed, none abstaining

3.6 IT6 Nonbuilding Structures, Chair: Peter Carrato

(1) Scope (underlined text represents the updates):

To identify seismic design issues unique to non-building structures. Specific items currently identified for consideration include:

- Thin walled storage tanks, including corrugated, for unique liquids such as wine, or bulk solids such as grain.
- Design of large bore piping systems, where the pipe provides significant stiffness relative to the supporting structure.
- Anchorage to concrete, including resistance mechanisms, and load combinations.(might cross over with IT5)
- Seismic classification of unusual structures such as airplane hangers.

Might expand the topics, but the same concept. It was suggested not going too industry specific.

(2) Membership:

Add John Silva as a corresponding member. This team has 4 funded voting members.

(3) Vote:

19 in favor, none opposed, none abstaining

3.7 IT7 Soil-Structure Interaction Update, Chair: Stephen Harris

(1) Scope (underlined text represents the updates):

- Review 2015 Chapter 19 provisions. Consider modifications to limitation on damping and base shear reduction, relationships of foundation damping to superstructure damping, and effects of base slab stiffness.
- Review proposed changes to ASCE 41-17. Bring forward pertinent modifications in the Provisions to accommodate updated approaches, revising wording for improved clarity where appropriate. (Pekenicky comment: there were changes, but most are minor)
- Consider development of provisions relating to seismic earth pressure on basement walls.
- Consider development of provisions related to rocking in flexible-base foundation modeling.
- Look at load factors on soil and hydrostatic pressure.

Charlie Kircher suggested a new title: Structure Foundation Interface.

(2) Membership:

No change. This team has 6 funded voting members.

(3) Vote:

19 in favor, none opposed, none abstaining

3.8 IT8 Base Isolation and Energy Dissipation, Chair: Bret Lizundia

(1) Scope (underlined text represents the updates):

- Improve coordination and reduce inconsistencies between ASCE 7 Chapters 16, 17, 18 and Chapter 12.
- Review and refine quality assurance procedures.
- Review proposals received

(2) Membership:

Move Keri Ryan, Anthony Giammona, and Charlie Kircher from voting to corresponding members. This team has 7 funded voting members.

(3) Vote:

19 in favor, none opposed, none abstaining

3.9 IT9 Rigid-Wall Flexible Diaphragm (RWFD) Buildings, Chair: Kelly Cobeen

(1) Scope (underlined text represents the updates):

- Determine next steps required to advance the rigid wall - flexible diaphragm seismic design methodology of the FEMA P-1026 guideline document to a Part 1 proposal ready for incorporation into ASCE 7. This will include consideration of technical gaps as well as mandatory language. If possible with IT resources, begin next steps.
- Determine next steps required to fully develop and document the methodology for deriving R_s diaphragm design force reduction factors for the alternative provisions for diaphragm seismic design developed by PUC last cycle. If possible with IT resources, begin next steps. (More likely this will be a Part III document.)
- Coordinate with the steel industry for the steel deck diaphragm .

(2) Membership:

Ben Schafer will be a voting member representing SDII Group.

This team will have 6 funded voting members, 4 of which are confirmed. Kelly will contact Tom Sabol and Ron La Plante's to check their availability)

(3) Vote:

19 in favor, none opposed, none abstaining

4. RISK TARGETED LIQUEFACTION PGA MAPS, Steve Kramer (attachment 3)

The presentation described the basic issues and benefits of a liquefaction-targeted PGA maps. PUC members suggested the Steve consider a proposal once the USGS maps are developed.

5. ASCE 7-16 UPDATE, John Hooper

- The Supplement 1 will have the final ballot in next month, then will go for public comments.
- For the October IBC hearing in Kansas City, ASCE has offered a public comment to adopt ASCE 7-16 with Supplement 1, which has 16 co-proponents (including CRSC). (Ron Hamburger commented that the ICC might not be adopting Supplement 1, as the document was approved in the last minute.)
- ASCE will always sell ASCE7 with Supplement 1 as one document.
- The PUC might have the ASCE7-16 white cover version in next few weeks (Ron Hamburger can send the white cover document sooner if needed), but the final publication may take a few months.
- The PUC probably will vote on the adoption of ASCE 7-16 as a whole in November.

6. ATC UPDATE by John Heintz (attachment 4)

John presented ATC projects related to upcoming IT efforts:

- ATC116 (related to IT2), short period building performance by Kircher et al.
- ATC123 (related to IT2) Improving seismic design of buildings with configurations of Irregularity
- ATC 120 (related to IT5) Seismic analysis and design of non-structural component and systems (NIST)
- ATC 58-2 project (related to IT1) Phase II, development of performance –based seismic design Guideline
- ATC 94 (related to IT4) performance of reinforced concrete buildings in the 2010 Chile earthquake

7. P17 UPDATE, Ron Hamburger (attachment 5)

P17 will develop a consensus among the structural, geotechnical engineering and earth sciences communities for developing the next generation seismic design value maps, which will be used in *2020 NEHRP Provisions*, ASCE7-22, and IBC 2024. The work is expected to be complete by the end of 2017, so that USGS will have enough time to develop the maps. There are four work groups under the P17C now:

- Acceptable Risk: uniform hazard vs uniform risk vs uniform protection
- Accuracy vs Uncertainty: Bring stability to the maps over time, with three potential options: blend old science with the new to moderate changes over time; round off fractions; use some form of zonation maps.
- Deterministic Earthquakes: This task is dependent on the definition of acceptable risk, and whether it is necessary to “cap” probabilistic motions. Will likely involve disaggregation of hazard to evaluate dominant sources, and reducing ϵ to comfortable levels.
- Multi-point Spectra: Charlie Kircher delivered the recommendations to develop the simple 3-domain shape of the design response spectrum based on site-specific multi-period spectra S_{ms} and S_{m1} . The concept was accepted by the P17 committee and it is agreed that possible proposal will be initiated from P17 and then move to the PUC.

8. MULTI-PERIOD SPECTRUM PRESENTATION, Charlie Kircher (attachment 6)

A more detailed technical presentation about developing multi-period spectrum was given by the Project 17 work group chair, Charlie Kircher. It was agreed at the PUC meeting that the proposal will move forward and be further developed in P17.

9. PLAN TO NEXT MEETING

The next P17 and PUC meetings will be held on 11/29/16 and 11/30/16.

All ITs, except for IT 5, are planning to have an in-person meeting before 9/28/16. It was suggested that ITs stage a web-meeting before the November PUC meeting. IT chairs will initiate these meetings.

Projecting outward, it is anticipated that the ITs will have face-to-face meetings in January-February, 2017 followed by a PUC meeting in the March time frame, with another set of IT meetings in May followed by a July-August PUC meeting.