The 2020 NEHRP Recommended Seismic Provisions for New Buildings and Other Structures are nearing completion. Developed by the National Institute of Building Sciences Building Seismic Safety Council (BSSC) Provisions Update Committee (PUC) for the Federal Emergency Management Agency (FEMA), the 2020 NEHRP Provisions are a state-of-art resource and reference document that will help improve national standards and codes.

The symposium presents recommended changes to ASCE/SEI 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures. These changes may significantly impact future seismic design of buildings. The symposium also presents a report on the PUC identified unresolved issues and recommended future topics and research needs.

Most of the recommended changes in the Provisions are expected to be accepted by ASCE/SEI 7-22. The standard will be adopted by reference in the 2024 International Building Code.

- Learn the PUC/BSSC recommended changes regarding future seismic design requirements for buildings
- Network with BSSC Provisions Update Committee (PUC) and colleagues
- Provide input to help improve future seismic design and research
- Earn 6.5 Professional Development Hours (PDHs)

Symposium Website
https://www.nibs.org/bssc_2020nehrpsymposium

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Abstract
The 2020 NEHRP Recommended Seismic Provisions for New Buildings and Other Structures (2020 NEHRP Provisions) was recently completed by the Building Seismic Safety Council (BSSC) Provisions Update Committee (PUC). As with prior editions, this FEMA-funded state-of-the-art document will serve as a national resource for design professionals and the US standards and code-development agencies. Most significant PUC proposals are adopted by ASCE-7, Minimum Design Loads for Buildings and Other Structures, followed by the International Building Code.

The PUC conducts its technical proposal development process through a group of Issue Teams, which focus on topics ranging from ground motions to structural system design. Issue Teams develop technical proposals aimed at advancing various sections of the US seismic standards. These proposals are vetted through the PUC and eventually the BSSC member organizations.

This presentation provides a brief introduction to the day-long series of technical presentations that are intended to capture the essence of the technical proposal development in this provisions update cycle.

Bio
David Bonneville is a senior principal at Degenkolb Engineers in San Francisco. He serves as chair of the BSSC Provisions Update Committee (PUC) for the 2020 NEHRP Recommended Seismic Provisions and also chaired the PUC in the 2015 Provisions cycle. David is a past director of the Structural Engineers Association of California (SEAOC), past Chair of the SEAOC Seismology Committee, and past president of SEAOC’s Northern section. He is a SEAOC Fellow and an Honorary Member of SEAONC.
Ronald O. Hamburger  
SE, Simpson Gumpertz & Heger

Abstract
In the late 1990s, as the design community prepared for merger of the three legacy model building codes into a single model code (the IBC), FEMA and USGS jointly sponsored a project (Project 97) to develop a national consensus basis for seismic design value maps for the new code. In 2007, the agencies sponsored Project 07, to review and update the basis for the maps, given the substantive technical developments in ground motion prediction models since 1997. In 2015, following considerable controversy in adoption of the 2014 USGS Seismic Design Value maps, incorporated in current codes, the agencies funded Project 17. The primary purpose of the project was to explore means to stabilize the fluctuations in map values from edition to edition of the code. In the process, the project explored revisions to the risk basis underlying the maps, the role of Seismic Design Categories in design, and the adequacy of the standard spectral shape used for design. The Project team validated the risk basis underlying the present generation maps with minor revisions associated with deterministic earthquake definitions. However, the project recommended broad changes to Site Classes and spectral shapes associated with these classes. These recommendations are embodied in the 2020 NEHRP Provisions.

Bio
Ronald O. Hamburger, SE, Senior Principal with Simpson Gumpertz & Heger in San Francisco, CA has more than 45 years of experience in structural engineering design, education, construction and failure investigation. Currently serving a second term as chair of the ASCE 7 Standards Committee, he has been an active participant in the NEHRP Provisions Update process since 1996, was a member of the Project 97 and Project 07 teams, was PUC chair for the 2003 and 2009 cycles and chair of the Project 17 team. In recognition of his work in developing and improving the nation’s building codes, he has been awarded NCSEA’s James Delehay award, SEI’s Walter P. Moore award, and Newmark Medal, and was elected to the National Academy of Engineering in 2015.
Abstract
This presentation summarizes a comprehensive set of new multi-period response spectra (MPRS) and related ground motion requirements of the 2020 edition of the NEHRP Recommended Provisions (and ASCE/SEI 7-22). These changes collectively improve the accuracy of the frequency content of earthquake design ground motions and enhance the reliability of the seismic design parameters derived from these ground motions by defining earthquake design ground motions in terms of MPRS. The new MPRS make better use of the available earth science which has, in general, sufficiently advanced to accurately define spectral response for different site conditions over a broad range of periods. Three new site classes are added to better describe site effects.

The new ground motion requirements eliminate the need for site-specific hazard analysis now required by ASCE/SEI 7-16 for certain (soft soil) sites. The new ground motion requirements directly incorporate site amplification and other site (and source) dependent effects in the design parameters $S_{DS}$ and $S_{DI}$ (two-thirds of $S_{MS}$ and $S_{M1}$) eliminating the need for site coefficients. Site-specific values of design parameters (and corresponding MPRS) are (or will be) available online at a USGS web site and presumably at other related web sites (e.g., SEAOC, ASCE and ATC web sites) for user-specified values of site location and site class. Traditional design methods (e.g., ELF procedure) familiar to and commonly used by engineering practitioners for building design remain the same.

Bio
Charles A. Kircher is a registered professional engineer with more than 40 years of experience in earthquake engineering, focusing on vulnerability assessment, risk analysis and innovative design solutions. As Principal of Kircher & Associates, he provides consulting services to a variety of clients that include commercial and industrial businesses, military and government organizations, and other engineering companies.

Dr. Kircher holds B.S., M.S., Engineer and Ph.D. degrees from Stanford University and is a Fellow of the Structural Engineers Association of California (SEAOC) and an Honorary Member of the Northern Section of SEAOC. In 2019 he was elected to the National Academy of Engineering “for advancing structural engineering practice in earthquake engineering and loss prevention in buildings.”
Dr. Kircher is active in seismic code development committees of the SEAOC, the American Society of Civil Engineers (ASCE) and the Building Seismic Safety Council (BSSC). He was a key participant in *Project 97*, *Project 07* (Chair) and *Project 17* of the BSSC that worked with the United States Geological Survey (USGS) to advance seismic design methods and improve the earthquake ground motion maps of the *NEHRP Recommended Provisions* and the *ASCE 7* standard.
Gyimah Kasali  
Ph.D, GE, Rutherford + Chekene (R+C)

Abstract
One of the major changes associated with the Multi Period Response Spectrum (MPRS) requirements in the 2020 NEHRP Provisions was the addition of three new site classes to Table 20.3-1 of ASCE 7-16. Addition of the three new site classes was aimed at better definition of site effects. To incorporate these three new site classes into the referenced table, adjustments had to be made to the entries in the referenced Table 20.3-1. The effort to make these adjustments ultimately led to a re-assessment of the basis for the correlations reflected in Table 20.3-1.

Table 20.3-1 seems to imply that there are correlations between shear wave velocity (Vs) and other geotechnical parameters in the table but that implication ignores a number of facts, including the lack of defensible published correlations between depth-averaged Vs (i.e., V_{530} – denoted as \( \bar{v}_s \) below) and similarly depth-averaged geotechnical parameters and the inherent uncertainty between \( \bar{v}_s \) and site class. Table 20.3-1 therefore has the following shortcomings: a) it uses time-averaged values of blow count (N) and shear strength (S\( _u \)), which have no physical meaning and for which no published correlations exist, b) the equivalence between N and S\( _u \) and the average shear wave velocity implied in the current table is questionable, c) the current correlations, even when applied to appropriate soil types, are out of date, and do not consider regional variations, d) the Geotechnical Engineer need not develop a Vs profile, and e) there is no need to recognize uncertainty in \( \bar{v}_s \) (and site class); hence, there is no incentive to perform a proper investigation.

The modifications described in this presentation address the above shortcomings of Table 20.3-1 by effecting the following: a) linking site classes to only \( \bar{v}_s \) in the Provisions, b) allowing for Vs profile to be measured directly or developed from suitable correlations, c) allowing for a penalty to be imposed when uncertainty in \( \bar{v}_s \) results in more than one site class, and d) enabling different relevant parameters for Vs correlations to be used over different depth intervals having different soil types.
Bio
Gyimah Kasali is a principal at Rutherford + Chekene (R+C) and has about 35 years of experience in geotechnical engineering. As head of the firm’s geotechnical department for the last 20 years, he has led many major projects working closely with owners and multi-disciplinary project teams. Dr. Kasali continually champions the development of innovatively practical approaches and solutions to geotechnical challenges.

Dr. Kasali obtained his B.S degree from University of Science and Technology in Ghana and his M.S., Engineer, and Ph.D. degrees from Stanford University. He has served as a member of: the Technical Advisory Committee of ATC 83, Improved Procedures for Modeling and Characterizing SSI for Performance Based Design, City of San Francisco Seismic Advisory Committee, BSSC Provisions Update Committee (PUC) for the NEHRP 2015 Provisions, and as a Contributor to FEMA 547 Techniques for Seismic Rehabilitation of Existing Buildings.

Dr. Kasali is currently serving as a member of: BSSC Provisions Update Committee (PUC) for the NEHRP 2020 Provisions, Engineering Design Review Team (EDRT) for the City of San Francisco Department of Building Inspection, and the Advisory Committee on Structural Safety of Department of Veterans Affairs (VA) Facilities.
Abstract
One of the recommendations of the BSSC Project ‘17 committee was to base the deterministic caps of probabilistic MCE and MCEG ground motions in the 2020 NEHRP Provisions on scenario earthquakes from hazard deaggregation. The current deterministic caps in the ASCE/SEI 7-16 Standard are based on “characteristic earthquakes,” which are no longer defined in the California earthquake forecast used for the probabilistic ground motions. Characteristic earthquakes are considered to be inconsistent with recent earthquakes such as the 2010 El Mayor – Cucapah event in Baja California. To resolve this issue, the Project ‘17 committee initially considered eliminating the deterministic caps altogether but was unable to reach consensus. Ultimately, the committee agreed to instead redefine the earthquakes for which the deterministic ground motion caps are computed. The new “scenario earthquakes” are determined from hazard deaggregation for the probabilistic ground motion at a given site and spectral period. Deaggregation provides a mean earthquake magnitude on each fault contributing to the probabilistic hazard, weighting all of the magnitudes that could occur on the fault. This is in contrast to the single magnitude that must be chosen for each characteristic earthquake. The deaggregation-based scenario earthquakes, unlike the current characteristic earthquakes, are fully consistent with the earthquake forecasts used for the probabilistic ground motions. The magnitudes of the scenario earthquakes in some cases differ from those of the characteristic earthquakes; generally speaking, on longer faults scenario earthquake magnitudes are somewhat smaller, whereas on shorter faults they are somewhat larger.

Bio
Nicolas Luco, Ph.D., is a Research Structural Engineer with the Geologic Hazards Science Center of the U.S. Geological Survey (USGS) in Golden, Colorado. There he serves as a co-leader of the National Seismic Hazard Modeling project and also the Engineering & Risk project. For the BSSC, he has served as a USGS Liaison on the Provisions Update Committee since 2005, and also served on the BSSC Project ‘07 and Project ‘17 committees. Prior to joining the USGS in 2004, for three years he was a Senior Analysis Engineer with the catastrophe risk modeling company AIR Worldwide Corporation. His Ph.D. is in civil (structural) engineering from Stanford University, where he also earned a B.S. in civil engineering and an M.S. in statistics. He earned an M.S. in civil engineering from the University of California, Berkeley.
Sanaz Rezaeian  
Ph.D., U.S. Geological Survey  

Abstract  
Updates to the design ground motions of the 2020 NEHRP Recommended Seismic Provisions come from two main sources: 1) updates for the 2018 U.S. Geological Survey (USGS) National Seismic Hazard Model (NSHM), which improved the scientific modeling of earthquake sources and ground motions, and 2) recommendations from the Building Seismic Safety Council (BSSC) Project ‘17 committee, which updated the design ground motion procedures. Major updates for the 2018 NSHM included: 1) incorporation of new ground motion models and site amplification factors in the central and eastern U.S., including the new “NGA-East” models; 2) incorporation of deep sedimentary basin effects in the four regions of Los Angeles, San Francisco Bay, Salt Lake City, and Seattle; 3) relatively minor modifications to the western U.S. crustal and subduction zone ground motion models; and 4) updates to the seismicity catalogs outside of California. USGS computed the design ground motions of Chapter 22 by combining hazard results from the 2018 NSHM with the new BSSC design ground motion procedures. One of the major updates to the design procedures was the recommendation to use Multi-Period Response Spectra, which also affected the 2018 NSHM update (in particular, decisions made in items 1 to 3 listed above). This connection and the implications for design ground motion values will also be briefly discussed.  

Bio  
Sanaz Rezaeian, Ph.D., is a research structural engineer at the U.S. Geological Survey in Golden, CO. She graduated from UC Berkeley in 2010 and joined the USGS in 2011 as a Mendenall Fellow. Rezaeian specializes in earthquake engineering, stochastic simulation of ground motions, and modeling of ground motion prediction equations. She has been a collaborator with the Pacific Earthquake Engineering Research center (PEER) on the Next Generation Attenuation (NGA) projects since 2010, and a co-leader of the Southern California Earthquake Center’s (SCEC) “Ground Motion Simulation Validation” group since 2012. https://www.usgs.gov/staff-profiles/sanaz-rezaeian
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. ASCE 7 has so far made no such distinction.

A ductile coupled wall system of reinforced concrete has now been defined in ACI 318-19. Part 1 of the 2020 NEHRP Provisions will add three line items to ASCE Table 12.2-1, Design Coefficients and Factors for Seismic Force-Resisting Systems, featuring the ductile coupled wall system of reinforced concrete. The line items will be under: A. Bearing Wall Systems, B. Building Frame Systems, and D. Dual Systems with Special Moment Frames. Based on a FEMA P-695 study, \( R, C_d, \) and \( \Omega_o \) will equal 8, 8, and 2.5, respectively in all three line items. The height limits are the same as for corresponding uncoupled isolated wall systems.

Composite Plate Shear Wall—Concrete Filled (C-PSW/CF) is an efficient seismic force-resisting system for buildings and is already addressed in ASCE 7-16. Coupled Composite Plate Shear Walls—Concrete Filled (Coupled-C-PSW/CF) are more ductile and have more redundancy than non-coupled composite plate shear walls, but ASCE currently does not assign them seismic design coefficients and factors in Table 12.2-1. A second FEMA P-695 study was conducted to substantiate the design coefficients and factors that should be used for such Coupled-C-PSW/CF structures. Adding this as a separate category in Table 12.2-1 was important because modern high-rise buildings often have core-wall systems; many of these core walls could utilize the Coupled-C-PSW/CF. Part 1 of the 2020 NEHRP Provisions will add two line items featuring this system in ASCE 7-16 Table 12.2-1 under Building Frame Systems and Dual Systems with Special Moment Frames. \( R, C_d, \) and \( \Omega_o \) will equal 8, 5.5, and 2.5, respectively in both line items. The height limits are the same as for corresponding uncoupled isolated wall systems.

A definition for the above system and design and detailing requirements for it are so far not given in AISC 360 or AISC 341. Part 1 of the 2020 NEHRP Provisions will add an ASCE 7 Section 14.3.5, which provides specific provisions for the definition and application of
this Coupled-C-PSW/CF system, including details on the design philosophy and limits of applicability. It is anticipated that the provisions in Section 14.3.5 will ultimately end up distributed in AISC 360 and AISC 341 (2022).

The proposed presentation will outline the above developments and will include relevant details.

Bio
Dr. S. K. Ghosh heads the consulting practice, S. K. Ghosh Associates LLC, Palatine, Illinois, now a subsidiary of the International Code Council. Dr. Ghosh is active on many national technical committees, is an Honorary Member of ACI, and is a Fellow of ASCE, SEI, and PCI. He is a member of ACI Committee 318, Standard Building Code and the ASCE 7 Standard Committee (Minimum Design Loads for Buildings and Other Structures). He is a former member of the Boards of Direction of ACI, the Earthquake Engineering Research Institute and the Building Seismic Safety Council. He is a member of the Board of Governors of ASCE’s Structural Engineering Institute.

Dr. Ghosh has influenced seismic design provisions in the United States for many years. In addition to authoring many publications in the area of structural design, Dr. Ghosh has investigated and reported on structural performance in most recent earthquakes.
Abstract
Seismic force resisting systems based on Cross Laminated Timber (CLT) shear walls have garnered considerable attention for use in building structures around the world for many years while standardization in US codes and design standards is in the early stages. This presentation summarizes the CLT shear wall system proposed for addition to the 2020 edition of the NEHRP Recommended Provisions and ASCE/SEI 7-22. Over six years of study based on use of the FEMA P695 methodology, two variants of the CLT shear wall system are proposed: (a) CLT shear walls: $R = 3$, $C_d = 3$, and $\Omega_0 = 3$; and (b) CLT shear walls with shear resistance provided by high aspect ratio panels only: $R = 4$, $C_d = 4$, and $\Omega_0 = 3$. Early motivations for the CLT shear wall system, major aspects of the P695 study, examples of system behavior, and design requirements will be summarized.

The CLT shear wall project funded by the USDA Forest Products Laboratory was led by Professor John van de Lindt (Colorado State University). Project team members included Mr. Doug Rammer (U.S. Forest Products Laboratory), Mr. Philip Line (American Wood Council), Dr. M. Omar Amini (Colorado State University), Professor Shiling Pei (Colorado School of Mines) and Dr. Marjan Popovski (FPInnovations). The three members of the Project Review Panel were Dr. Charles Kircher (Kircher & Associates), Professor Daniel Dolan (Washington State University) and Ms. Kelly Cobeen (Wiss Janney Elstner Associates).

Bio
Philip Line is AWC’s director of structural engineering with 28 years of experience in structural engineering, building codes, standards, and guideline development. His work includes planning of structural research, and working with AWC’s consensus standards committee to update the National Design Specification® for Wood Construction (NDS®), Wood Frame Construction Manual (WFCM), and Special Design Provisions for Wind and Seismic (SDPWS). Mr. Line participates in code development hearings, product evaluation hearings, and in ASTM and ASCE consensus standards committees.
Abstract
The ATC-123 (FEMA P2012) project quantitatively examined the structural irregularities, and associated design penalties, contained in ASCE 7-16 Tables 12.3-1 and 12.3-2. The work completed as part of this project formed that analytical basis for a number of code change proposals that will appear in the 2020 NEHRP Provisions and the upcoming publication of ASCE 7-22. These code changes include an overhaul to the Torsional Irregularity Provisions, the elimination of the Mass Irregularity and modifications to the Horizontal Diaphragm Irregularity triggers. This presentation will provide an overview of the ATC-123 project and it’s major findings, and will provide an overview to the upcoming code changes within Chapter 12 of the NEHRP Provisions and ASCE 7.

Bio
Conrad “Sandy” Hohener is an Associate Principal with Degenkolb Engineers in Los Angeles. He primary practices in the area of existing buildings, and specializes in seismic evaluation and retrofit as well as structural peer review. His code work lies in the new structures arena. He has been a voting member of the ASCE 7 Seismic Subcommittee for the past two code cycles, and served as the chair of IT-2 for the NEHRP Provisions Update Committee this past cycle.
Abstract
In 2015, the Applied Technology Council (ATC) began a multi-year project, ATC-120, to study the current practice for seismic analysis and design of nonstructural components, and to develop recommendations for improving the seismic performance of nonstructural components. Sponsored by the Engineering Laboratory of the National Institute of Standards and Technology, the project resulted in two reports: Seismic Analysis, Design, and Installation of Nonstructural Components and Systems – Background and Recommendations for Future Work (NIST, 2017) and Recommendations for Improved Seismic Performance of Nonstructural Component (NIST, 2018). One of the goals of the ATC-120 effort was to develop lateral force equations that have a more rigorous scientific basis, capturing key parameters that influence nonstructural component response. The ATC-120 project used nonlinear analyses of archetype buildings and components as well as analysis of strong motion records from instrumented buildings, and focused on parameters shown to strongly affect response. A set of equations combining all the selected parameters of interest was developed and tested.

This presentation summarizes a proposal that implements and adopts the nonstructural seismic design equations developed by the ATC-120 project into the 2020 edition of the NEHRP Recommended Provisions. The findings of the ATC-120 project were reviewed by the Building Seismic Safety Council (BSSC) Issue Team 5, and the formats of the equations were structured to facilitate adoption into a building standard. Implementation of the improved equations simplifies the design coefficients for nonstructural components. Provisions for the design of equipment supports such as platforms, and frames and bracing assemblies for distribution systems were also developed. The design of support platforms and frames are coordinated with Chapter 15, Nonbuilding Structures, of ASCE 7, and will be designed using coefficients based on their structural properties, rather than the properties of the components they support.
Bio

John Gillengerten has over 40 years of professional structural engineering and management experience in both the public and private sectors. He retired in 2011 from the California Office of Statewide Health Planning and Development, where he served in a number of different capacities, including Deputy Director (Building Official). As a consulting structural engineer, he has assisted public and private clients with issues related to seismic design and structural safety. The emphasis of these efforts is in performance-based design, regulation development, peer review of new and retrofitted structures, rapid seismic evaluation of structures, and nonstructural component anchorage and bracing. For over 20 years, he has served on the Provisions Update Committee for the NEHRP Recommended Provisions for Seismic Regulations for New Buildings. He chaired Issue Team 5, Nonstructural Components for the 2020 edition of the NEHRP Provisions, and serves on the Seismic Task Committee of ASCE 7, Minimum Design Loads for Buildings and Other Structures. He serves as chair of the Advisory Committee on Structural Safety for Veterans Affairs Facilities and is a past member of the NEHRP Advisory Committee on Earthquake Hazard Reduction.
Abstract
The 2020 NEHRP Provisions incorporate several notable changes to seismic design of diaphragms. This includes expanding the applicability of the ASCE 7-16 Section 12.10.3 alternative design provisions for diaphragms, originally developed in the 2015 NEHRP Provisions. This also includes new Section 12.10.4 provisions codifying the rigid wall-flexible diaphragm (RWFD) methodology published in FEMA P-1026, Seismic Design of Rigid Wall-Flexible Diaphragm Buildings: An Alternative Method (and Part 3 of the 2015 NEHRP Provisions). The Section 12.10.3 provisions are expanded to include bare steel deck diaphragms, drawing from significant new research undertaken by the steel deck industry. The new Section 12.10.4 provisions provide a permitted alternative method for design of wood and bare steel deck diaphragms in RWFD structures. This is based on the understanding that the seismic response of RWFD buildings is governed by the response of the diaphragm much more than the vertical elements. The new RWFD provisions are thought to provide improved seismic performance without increasing construction cost. Sections 12.10.3 and 12.10.4 incorporate new ductile detailing provisions for bare steel deck diaphragms. In addition to these two items, a number of resource papers addressing diaphragm design topics are included in the 2020 Provisions. This presentation will introduce the Section 12.10.3 and 12.10.4 provisions, and note the topics addressed by the resource papers.

Bio
Kelly Cobeen is an Associate Principal with Wiss Janney Elstner Associates in their San Francisco office, and is a registered Civil and Structural Engineer with more than 30 years of experience. Her work includes a wide range of project types, sizes and construction materials, with a special interest in seismic resistance of light-frame construction. She has been involved in numerous code, standard and guideline development projects, research, and educational activities. This includes involvement in updates to the NEHRP Recommended Provisions for Seismic Regulations for New Buildings, the ASCE 7 seismic provisions, numerous Applied Technology Council publications, and International Building Code and International Residential Code development. Kelly is also coauthor of the Design of Wood Structures textbook.
Robert Pekelnicky  
SE, Degenkolb Engineers

Abstract
Section 1.1 of the NEHRP provisions sets the intent of the provisions, which describe both qualitative and some quantitative seismic performance objectives. The provisions seek to protect against serious injury and loss of life, preserve egress, avoid loss of function of critical facilities, and reduce structural and nonstructural repair costs wherever practicable. In the 2009 edition of the provisions, there was shift to an explicit risk target for building collapse. In this edition of the provisions, the reliability target was extended to failure of individual members. Revisions in the 2020 edition expound on the statement, “avoid loss of function of critical facilities” to discuss in greater detail qualitatively what should be considered when targeting that performance in Risk Category IV buildings and other structures.

Bio
Robert “Bob” Pekelnicky, SE is a Senior Principal at Degenkolb Engineers in the firm’s San Francisco office. Bob joined Degenkolb in 2001 and has focused on taking new, innovative structural engineering concepts from research and applying them to practice to better meet clients’ needs. A recognized expert in earthquake hazard mitigation of existing structures, he has applied his knowledge to high profile retrofit projects for building owners and corporate clients during the past 19 years with our firm. Beyond business, his work has been instrumental in developing recommendations and guidelines that promote disaster-resilient communities. He is a true leader within the firm and out, involved in numerous professional societies and leading committees to help advance the state of the practice.
Abstract
A Part 3 Resource Paper approved for the next edition of the NEHRP *Provisions* addresses the potential relationship between future *Provisions* and resilience-based earthquake design, especially in the context of definitions and priorities established in federal law by the 2018 NEHRP reauthorization. It extends concepts proposed in Resource Paper 1 in Part 3 of the 2015 *Provisions*. Federal policy now calls for increasing earthquake resilience at the community scale and identifies building codes and standards as tools for doing so. Resilience relies on the timely recovery of the built environment. Building codes and standards can therefore serve a resilience goal, at any scale, by providing design criteria based on functional recovery time. The current code-and-standard model is adaptable to resilience-based design, with the standard providing technical definitions and design criteria, and the code setting policy goals. The NEHRP *Provisions* can support resilience-based design by providing source material for a functional recovery standard. Specific design strategies and criteria would be required for different functional recovery times, much in the same way that the current *Provisions* set specific criteria for different seismic design categories. While many questions remain to be answered through research, the current *Provisions* suggest a set of requirements that might be used in the short term.

Presenter
David Bonowitz is a structural engineer practicing in San Francisco. He is a Fellow Member of SEAONC and SEAOC, and past chair of the NCSEA Existing Buildings and Resilience committees. Bonowitz is an appointed member of the new FEMA-NIST working group on Functional Recovery of the Built Environment and Critical Infrastructure. He is a co-author of an EERI white paper, “Functional Recovery: A Conceptual Framework,” and lead author of “Resilience-based Design and the NEHRP *Provisions*” for the next edition of the *Provisions*. 
SK Ghosh and Kelly Cobeen

Abstract
The Building Seismic Safety Council is charged by the Federal Emergency Management Agency (FEMA) to identify and recommend, at the end of each NEHRP Provisions update cycle, issues to be addressed and research needed to advance the state of the art of earthquake-resistant design. These recommendations are intended to serve as the basis for future refinement of the Provisions. Towards the end of the 2020 NEHRP Provisions update cycle, the various Issue Teams and study groups that generated proposals for Provisions Update Committee and Member Organization ballots identified specific items that could not be addressed during 2020 Provisions update. These were assembled and edited by PUC members S. K. Ghosh and Kelly Cobeen. An overview of the resulting recommendations will be presented, and opportunity will be provided for input from the workshop attendees. Participants will be asked which of the recommendations they favor or disfavor, and what further recommendations they may have for the next update cycle or research needs.

Bio
Presenters’ bios are included in previous program.
SK Ghosh bio on pg. 12, and Kelly Cobeen bio on pg. 18.