

**National Earthquake Hazards Reduction Program (NEHRP)**  
**Advisory Committee on Earthquake Hazards Reduction (ACEHR)**  
**National Institute of Standards and Technology (NIST)**  
**November 9-10, 2020**  
**Virtual Meeting Summary**

**Meeting Participants**

**ACEHR Members**

Glenn Rix, Chair	Geosyntec Consultants, Inc.
Lucy Arendt, Vice Chair	St. Norbert College
Ann Bostrom*	University of Washington
Robert Carey	Utah Division of Emergency Management
Gregory Deierlein	Stanford University
Susan Dowty	International Code Council
Robert Ezelle	Washington Military Department
Thomas Heausler*	Consulting Structural Engineer
Ryan Kersting	Buehler
Lisa Grant Ludwig	University of California, Irvine
Anne Meltzer	Lehigh University
Danielle Mieler	San Francisco Office of Resilience and Capital Planning
Lori Peek	University of Colorado, Boulder
Jonathan Stewart	University of California, Los Angeles
Douglas Wiens	Washington University in St. Louis

**Registered Guests**

Gregory Beroza	Stanford University
Craig Davis**	C A Davis Engineering
Eliana Perlmutter*	Lewis-Burke Associates
Jessica Robin	National Science Foundation
Yumei Wang**	Portland State University

**NEHRP Agency Representatives**

Luciana Astiz	National Science Foundation
Bill Blanton*	Federal Emergency Management Agency
John Filson*	United States Geological Survey
Gavin Hayes	United States Geological Survey
Mike Mahoney	Federal Emergency Management Agency
Jacqueline Meszaros	National Science Foundation

**NIST Management and Staff**

Walter Copan*	Director, NIST
Howard Harary	Director, Engineering Laboratory
Jason Averill*	Chief, Materials and Structural Systems Division
Judith Mitrani-Reiser	Associate Chief, Materials and Structural Systems Division
Steven McCabe	Director, NEHRP

John (Jay) Harris	Acting Deputy Director, NEHRP
Jazalyn Dukes	Research Structural Engineer, Earthquake Engineering Group
Katherine (Jo) Johnson	Social Scientist, Earthquake Engineering Group
Tina Faecke	Designated Federal Officer for ACEHR
Matthew Speicher*	Research Structural Engineer, Earthquake Engineering Group
Kevin Wong*	Research Structural Engineer, Earthquake Engineering Group

\*Attended Monday only

\*\*Attended Tuesday only

## I. Welcome

As Designated Federal Officer (DFO) for ACEHR, Ms. Tina Faecke called the meeting to order at 1:00 pm EST, took roll call, and introduced the NIST Director, Dr. Walter Copan.

Copan thanked everyone for participating in the virtual meeting and for their commitment to the future of earthquake resilience, especially during the pandemic. He values the work of the Committee and the tremendous passion that each member brings to reduce seismic risk in the U.S. NIST looks forward to receiving the Committee's assessment report and recommendations. NIST relies upon the consensus advice from this competent, diverse group.

Copan welcomed the five newest members to ACEHR: Dr. Ann Bostrom, Dr. Douglas Wiens, Dr. Anne Meltzer, Ms. Danielle Mieler, and Mr. Robert Carey.

Several NEHRP activities were completed since the March 2020 ACEHR meeting and are included as agenda topics for this meeting: 1) the Functional Recovery report was submitted to the Office of Management and Budget; 2) updates on the NEHRP Strategic Plan that is near completion; and 3) major steps towards implementing the earthquake early warning systems in the Pacific Northwest. Copan mentioned the Interagency Coordinating Committee (ICC) meeting held in August 2020 and said that Dr. Howard Harary will provide a brief summary of that meeting later in the afternoon. As the ICC Chair, Copan sees many elements of collaboration and synergy built across the participating federal agencies which brings together the stakeholder community in very impactful and important ways. Copan closed by reaffirming NIST's commitment, together with NEHRP's, to mitigating risks to life and property resulting from earthquakes and thanked the ACEHR members again for their commitment to this very important, worthwhile, and noble goal. Copan asked the Committee if they had any questions. There were none.

## II. Meeting Goals

Committee Chairperson, Dr. Glenn Rix, thanked Copan and asked Mieler, Carey, Meltzer, and Wiens to introduce themselves. Biographies of all the ACEHR members can be found at <https://www.nehrp.gov/committees/members.htm>.

Rix reviewed the goals of the meeting:

- Receive presentations from two guest speakers, Dr. Ann Bostrom and Dr. Craig Davis,
- Receive NEHRP agency activity updates since the March 2020 meeting, and
- Plan for the Committee's September 30, 2021 Biennial Report.

### III. Earthquake Scenarios Presentation

Rix introduced Bostrom, the Weyerhaeuser Endowed Professor in Environmental Policy at the University of Washington. Her scholarship focuses on risk perceptions, communication, and decision making, and she has contributed to National Academies reports on science communication and risk-related topics. Her presentation, *Magnitude 9 Earthquake Scenarios-- Probabilistic Modeling, Warnings, Response and Resilience in the Pacific Northwest*, is available at: [https://nehrp.gov/pdf/9-10Nov2020%20ACEHR%20agenda%20\(FINAL\).pdf](https://nehrp.gov/pdf/9-10Nov2020%20ACEHR%20agenda%20(FINAL).pdf).

After Bostrom's presentation, Dr. Lori Peek asked Bostrom what cultural impacts the M9 study has had on the regional society, and what tips on risk communication she had? Bostrom replied that Kathryn Schulz's 2015 New Yorker article on "*The Really Big One*" raised awareness of earthquake risks in the Pacific Northwest. For the M9 project Bostrom conducted short surveys across CA, WA, and OR using Google Surveys, and over one-third of respondents reported awareness of the article, which was widely discussed at the time. Bostrom emphasized that regional indigenous communities have long known of and shared knowledge about Cascadia event risk, but that information was not widely accepted by Western communities until recent decades. In terms of communicating results from the M9 study, the project PI (John Vidale) spoke with the media frequently, and did interviews with many journalists, resulting in project-related information being featured on the front page of the Seattle Times. In addition, the project coincided with efforts to promote and institute earthquake early warning in the Pacific Northwest. Bostrom highlighted that good journalism, project leadership, as well as ongoing relationships between the scientific and journalistic community are needed. Peek asked whether the project collected any longitudinal data? Bostrom said she had some data that could be analyzed longitudinally, but longitudinal analyses haven't yet been completed. She doesn't have data pre-dating the Schulz article, and awareness of the article has subsequently dropped. Bostrom's survey findings indicate a slight increase in general awareness over time, which could be due to diverse factors such as Californians moving to Washington, in addition to other events, such as the release of the *San Andreas* movie.

Rix asked if experience of the Nisqually earthquake makes a difference in risk perception? Yes, people who experienced Nisqually are more aware of earthquake risks, but they may underestimate the potential damage from other events since the Nisqually was small. However, people who experienced the Nisqually quake were more likely to report being prepared. In addition, Bostrom emphasized that Nisqually brought additional awareness regarding the problem of unreinforced masonry buildings (URM), and that some work has been done to address this since the Nisqually quake, including the identification of risky unreinforced masonry schools.

Wiens said Vancouver has much of the same hazards and asked if there are any collaborations between the regions? There are many disciplinary and interdisciplinary research exchanges, including grants to promote international collaborations between the University of Washington and the University of British Columbia. In addition, there are many ongoing regional collaborations in conjunction with ShakeAlert and the deployment of earthquake early warning systems. Due to COVID, many previously planned in-person interactions and workshops to address subduction zone and other seismic risks are currently on hold.

Dr. Gregory Deierlein suggested that earthquake duration can have a big effect on structural impacts, and asked if Bostrom's project considered earthquake duration and the multiple other faults or scenarios that the building codes are not necessarily set up to accommodate? Bostrom is working on the periphery of those concerns, with a focus on duration of earthquakes and frequency. To enable a clearer identification of potential earthquake impacts and their repercussions, planning should take into account the explicit differences between event types, rather than only focusing on an aggregate picture. Local effects can be unique to each city and may indicate different needs for building design. Bostrom emphasized that she and others are very interested in all-hazards mitigation strategies, and that an earthquake focus can help develop these.

Meltzer asked how do outcomes from the M9 project influence building design? M9 building engineers participate in ongoing discussions that may affect national-level codes. In addition, standards for tsunami evacuation towers has been a topic of discussion in the area. The city of Seattle is interested in changing their building code, but it is unclear how far along they are in that process. Retrofits are a challenge due to cost. Bostrom has several ongoing smaller projects that are related, but those are focused on communicating lessons learned in terms of improving knowledge related to risk.

Mr. Robert Ezelle mentioned he is constantly asked, "how do we prepare the public?" He often relies on Nisqually to communicate impacts, while emphasizing that shaking from Nisqually lasting only 40 seconds and shaking from a Cascadia event is expected to last 4-5 minutes. He uses this comparison to give the public a sense of how much worse the Cascadia event will be. Bostrom expressed her appreciation for the work Ezelle and his office are doing. She would like to see improved communications, connections, and collaborations across the research and outreach sectors.

#### **IV. Interagency Coordinating Committee (ICC) Meeting**

Harary provided an overview of the August 20, 2020 virtual ICC meeting. The ICC committed to measurable progress in producing NEHRP deliverables. There was a particular focus on resilience of buildings, in terms of their ability to recover faster. The outline for updating the NEHRP Strategic Plan was approved. The ICC also recognized the need to update the post-earthquake investigation plans. The functional recovery report was submitted to the Office of Management and Budget and the agencies are resolving final comments. The FEMA and NIST ICC principals committed to future work on lifelines. Harary expressed his appreciation for the efforts of the NIST NEHRP Office and Copan in gaining participation from the other agency representatives.

Peek underscored the importance of having the ICC meet and asked Harary to identify the deliverables prioritized by the ICC principals. Harary replied that NEHRP agencies committed to updating the NEHRP Strategic Plan and the USGS Circular 1242, and are working in the spirit of the reauthorization.

Ms. Susan Dowty asked if there were ICC meeting minutes available to the public, and the answer was no. Dowty also asked who attended the ICC meeting and Harary read the list of

attendees. The ICC plans to meet again in 2021. Harary mentioned that the virtual meeting increased participation.

## **V. NEHRP Strategic Plan Update**

Dr. Jay Harris provided an overview of the NEHRP Strategic Plan updates since the March 2020 ACEHR meeting. A copy of his presentation is available at:

<https://nehrp.gov/pdf/ACEHR%20Strategic%20Plan%20Presentation%20110920%20FINAL.pdf>.

## **VI. Program Activity Updates**

Dr. Steven McCabe presented an update on the NEHRP legislative obligations and each NEHRP agency presented NEHRP activity updates since the March 2020 ACEHR meeting. The updates were organized by NEHRP's strategic goals. A copy of the presentation is available at:

<https://nehrp.gov/pdf/ACEHR%20NEHRP%20Update%20110920%20FINAL.pdf>.

The NEHRP agencies also provided the following agency-specific updates.

- **FEMA:** Mr. Bill Blanton reported that the Building Science Branch (housing NEHRP, NWIRP, Mitigation Assessment Team, Building Science Support and Flood Program) split into two branches, enabling a greater focus on earthquake and wind efforts under his leadership.
- **NIST:** Harris reported that Dr. Sissy Nikolaou was hired to lead the Earthquake Engineering Group (EEG). Mr. Ron Hamburger chaired the National Academies of Sciences, Engineering, and Medicine Panel that reviewed the NIST Engineering Laboratory activities, including those of NEHRP and EEG. A new structural testing laboratory for structural and earthquake engineering research, PERFORM, is being constructed at NIST. Dr. Judith Mitrani-Reiser added that NIST recently restructured its statutory programs, under her leadership, to enable better coordination and collaboration across programs.
- **NSF:** Dr. Luciana Astiz announced three staff changes: 1) a new Director in the Earth Science Division, 2) a new Program Director in Engineering, and 3) a search for two other new program directors. NSF recently held the Civic Innovation Challenge which invited, among other things, proposals for technology to help communities enhance disaster resilience. Dr. Jacqueline Meszaros is currently reviewing proposals submitted in response to the joint solicitation with NIST for Disaster Resilience Research Grants. The Southern California Earthquake Center meeting was held in September, and emphasized eight areas of earthquake research. COVID has not impacted progress on upgrades to the University of California San Diego shake table. NSF is currently writing a solicitation to support a single Geophysical Facility that will support activities currently spread across the Seismological Facilities for the Advancement of Geoscience and Earthscope and the Geodesy Advancing Geosciences and Earthscope.
- **USGS:** Dr. Gavin Hayes introduced himself as the new USGS NEHRP representative and mentioned that he recently hired an Assistant Coordinator for the ANSS program to

support Cecily Wolfe. In their latest round of earthquake solicitations, they received 250 proposals and are funding a total of 31 proposals, summing to \$2M.

Rix thanked the agencies for their updates under the new reporting format, and opened the floor for questions.

Dr. Jonathan Stewart highlighted a geotechnical issue based on the proposed NEHRP Strategic Plan changes, resulting in a gap in engineering practice. He emphasized there is no requirement for considering ground failure hazards in combination with ground motion hazards unless it is legislated at the state level, which it is in California. Building codes require, through the USGS maps, that engineers deal with ground shaking, but they do not require addressing hazards related to liquefaction or seismic landslides. Specificity on this issue should be incorporated into the Strategic Plan goal statements to move the nation forward in holistically mitigating seismic risk, as these hazards can also drive the negative performance of infrastructure. Harris stated that NEHRP is required in the 2018 reauthorization to develop maps for other seismic hazards including landslides and liquefaction. Harris reported that when the PCWG developed the enhanced outline for presenting the core of the strategic plan, we did not discuss ongoing legislative responsibilities, for example developing maps, but chose to focus on the strategic priorities during the plan period. These ongoing legislative responsibilities will be addressed in the strategic plan when it is fleshed out. Stewart agreed that maps are a good first step.

Mr. Ryan Kersting pointed out that many activities under strategic priority 8 (enhance risk mitigation strategies for federal agencies) are applicable beyond federal agencies. Therefore, he strongly recommends strengthening the priority language to indicate those strategies also apply to developing tools and techniques for state and local agencies as well. He suggested creating a fact sheet on ways to mitigate existing buildings. Harris replied that strategic priority 8, as it is currently written, covers risk mitigation strategies for federal agencies for two reasons: Executive Order 13717 and the Interagency Committee on Seismic Safety in Construction. Harris agrees that the activities are applicable to other entities besides the federal agencies, and Kersting's comment will be considered. Kersting feels it is important to support local mitigation plans and he will provide some suggested language for consideration.

Kersting also commented that for strategic priority 2 (develop definitions of enhanced performance metrics) there is a need to develop the metrics (not the definitions) and focus on the goals and targets. Kersting will provide some language for consideration.

Stewart emphasized that in terms of post-earthquake research the community does a good job in immediate reconnaissance of an earthquake. However, it is difficult for a researcher to obtain funding to utilize the data collected and use it for learning something practical for reducing earthquake risk. Proposals for applied research such as this are probably not appropriate for NSF, and it is not clear where a researcher would go to acquire such funding. USGS grant funding is focused on science and ground motion issues, but not engineering issues. Finding a way to fund applied research which utilizes data collected from reconnaissance is important and is not addressed in the proposed Strategic Plan. Mitrani-Reiser mentioned the recent joint solicitation between NSF and NIST, the Disaster Resilience Research Grants Program, which tries to meet the need for a partnership between science and applied research. Meszaros provided additional

details on the joint solicitation. Meszaros emphasized that this effort will help us all better understand the research lifecycle from fundamental to basic.

## **VII. Adjournment**

Faecke adjourned the meeting at 4:05 pm EST.

# **ACEHR VIRTUAL MEETING SUMMARY – Day Two November 10, 2020 (1:00-4:00 pm, EST)**

## **I. Opening Remarks**

As DFO for ACEHR, Faecke called the meeting to order at 1:00 pm EST, took roll call, and turned the meeting over to Rix.

Rix stated that yesterday’s presentation and updates are foundational for today’s goal in preliminary planning for the Committee’s 2021 biennial report. After a presentation from Dr. Craig Davis on lifelines, Rix will present an overview of how the ACEHR reports have been generated in the past. He would like to discuss the major themes to be addressed in the 2021 report for further development during the spring meeting so that writing can commence after that.

## **II. Public Input Period**

Committee DFO Faecke reported that no one from the public registered to speak and asked if anyone else joined the meeting remotely. There was no response.

## **III. Lifelines Presentation and Discussion**

McCabe introduced Davis, outlining his past ACEHR membership, experience with lifelines, water systems, resilience, and the Los Angeles Department of Water and Power. Davis is focused on improving policy for resilience to hazards and was recently elected to the Board of Directors of the Building Seismic Safety Council. A copy of his presentation, *Recommendations for Incorporating Recovery-Based Objectives into Lifeline Infrastructure Systems*, is available at [https://nehpr.gov/pdf/CDavis\\_Lifeline%20Recovery%20Based%20Obj%20pres\\_11-10-20.pdf](https://nehpr.gov/pdf/CDavis_Lifeline%20Recovery%20Based%20Obj%20pres_11-10-20.pdf).

Rix said that Task 4.2 of the recent functional recovery study identifies the need for long-term sustained improvement through research and implementation to meet lifeline system-level recovery-based objectives. Rix asked how to evaluate the performance of lifeline systems, particularly at the systems level? How mature are those tools and technologies? Davis replied that in terms of research, methods for evaluation exist and are mature; in practice they are immature. It is a function of who performs the modeling. A lot of work still needs to be done. Larger systems with unlimited resources are performing better than small systems with little or no experience. Validation at the system level is difficult and requires case studies. Los Angeles has been used as a case study, but the data collected is not enough to validate resilience. In addition, there are complex interrelationships of different owners and operators, who are unwilling to take responsibility outside of their own systems.

Stewart asked how well can we predict demands on buried pipeline systems? What are the main drivers of pipeline failures? Is there a national need for instrumentation of pipelines to monitor performance during earthquakes? The main drivers of pipeline failures are a combination of shaking, which causes more damage, and ground failure, which causes the most devastating damage to pipelines but in fewer locations. In different earthquakes, the infrastructure can suffer diverse damage. It would help to have instrumentation at key locations to better understand pipelines. The problem is the different types of materials and different systems.

Mieler mentioned that the San Francisco Lifelines Council conducted an interesting study in which they set performance targets and then evaluated performance of those goals against scenarios. The Council used a qualitative approach for their study and it was difficult to validate although the study proved valuable. Even though many lifeline system operators had done a robust risk-based assessment of their systems and designed their retrofit programs to meet restoration goals, this study helped to get everyone on the same page.

Davis summarized that regional councils can be very beneficial although there may be some challenges with the shared number of lifeline systems and overlapping geographic boundaries in defining the council. He added that San Francisco is a leader in this area and the functional recovery report relied on the San Francisco council's experience to inform report content. The systems issue involves two metrics: service loss and recovery time.

Kersting asked if the NEHRP agencies plan to reinvigorate the American Lifelines Alliance? FEMA and NIST have had conversations about further work on lifelines, and are continuing work on the development of a framework. McCabe believes that some national entity is necessary to produce results. FEMA stopped supporting lifelines work previously due to funding constraints, but they recently began doing some work in that area to build upon the previously published NEHRP Lifelines Roadmap.

Kersting asked if USGS plans to do assessments of lifelines infrastructure such as transportation systems? Hayes is not aware of any ongoing lifeline efforts at present. Davis suggested Hayes check with Dr. Nico Luco, who is doing limited work on gas and liquid fuel pipelines. Davis is working with ASCE to develop seismic design guidelines for buried water and wastewater pipelines. He added that Nico did an excellent job of developing peak ground velocity mapping specifically for lifelines, soon to be published. Davis acknowledged Kersting's excellent leadership on the difficult functional recovery effort.

Dr. Lucy Arendt commented that lifelines is also a social science problem and very complex in terms of the interdependencies and trying to ascertain what kind of leverage is necessary to move in the right direction for a resilient community.

Meltzer is unsure of how lifeline councils function, but asked how someone would tackle this problem given the different components of the system and motivations for different parts of the system? How do you expect to make progress in this area and get some sort of system implementation incorporated? The challenge with lifelines is trying to get people to do something they are afraid to tackle. Davis concluded based on his career experience, we need to get lifeline system owners to address how their system will perform and how long recovery would take, and be open to their customers/constituents and those who govern over them.

Evaluation is a top priority in functional recovery but he doesn't recommend starting with the regulatory part. The most useful place to start is the framework and genesis of what states or federal entities will pick up. Utility companies should be motivated to do these kinds of activities when they have the resources.

Deierlein asked what we can do to motivate utilities to develop a framework? Davis replied it is very important to allow the utilities to be motivated by participating in setting the agenda via the framework, rather than having the federal government set the agenda for them. We want to encourage the utilities to be engaged and assure them it is cost effective and offer to assist them in accomplishing their goals without doing things they don't want to do (such as replacing all the pipelines). Once the framework is created, then conduct evaluations to see how well the system meets those goals. In order to accomplish this, collaboration is needed between the academics (researchers) and practitioner. Dr. Gregory Beroza mentioned that USGS and NSF fund the Southern California Earthquake Center, focused on risk to distributed infrastructure particularly via ground motion simulation.

Rix asked if the NEHRP priorities presented yesterday by Harris are linked to the recommendations in the NIST-FEMA Functional Recovery report? Harris responded that the Functional Recovery report and the NEHRP Strategic Plan are interrelated, but not formally linked.

Wiens asked how the lifeline problems and recommendations vary based on the level of seismic risk? For example, it may be easier for the leadership of companies and critical infrastructure that experience problems with high seismic risk to be engaged in the lifeline problems compared to the rest of the country. Based on Davis' personal experience, there is an analogy to building structures driven more to those with high risk on the west coast. Many organizations/companies on the west coast don't feel the need to address this because they have not experienced earthquake damage or they don't acknowledge the risk. Perspectives on this issue vary depending upon the leadership and it isn't consistent across the country. Leadership by companies/organizations could matter more than the leadership of elected officials. Davis recommends capturing the interest of the companies/organizations based on regional dynamics, rather than via state-level policy.

Rix thanked Davis for his presentation and leadership on this topic.

Dr. Yumei Wang mentioned that Oregon has had a lot of success in addressing vulnerabilities in the lifelines systems via regulations. In these efforts, a key component for success has been the process of evaluating the owner's system. Even though some utilities require assessments and mitigation plans, these are not publicly available due to security concerns. The Oregon Health Authority requires all water systems to conduct vulnerability assessments and they are required to integrate into their master plans to include mechanisms to address seismic risk, as well as plans to quickly restore water service. Regulating lifeline owners and operators to do a certain amount of evaluation may help to address seismic vulnerability. However, that regulation process does not address the interdependencies (and potential negative cascading consequences) among the lifeline systems.

The city of Portland had a five-year effort to address unreinforced masonry (URM) buildings. After a few years, the city did not make any requirements except for mandating placards posted outside the buildings, which resulted in resistance from many parties. Last month, the city council decided to discontinue their effort to address URMs out of consideration for high racial tension across the nation. The city of Portland's Bureau of Emergency Management supports two efforts to address high-risk incidents: (1) increase resiliency of the Critical Energy Infrastructure hub housing all of Portland's liquid fuel and (2) empower the Portland Community Emergency Response Team to be more proactive and ready to respond to any disaster. The hub fuel tanks are vulnerable to a Cascadia Subduction Zone event given their age and that they were constructed on seismically vulnerable soils susceptible to liquefaction. Additionally, risks to the environment, life, safety, and property at and near the site are unclear. Peek added that although the NEHRP Strategic Plan is focused on earthquakes, Portland is our ultimate test case in terms of how communities move forward with mitigation in the face of all of these pressing crises. Unfortunately, there aren't enough official first responders, so there is a greater need to enlist local citizens to be better prepared. We also need to diversify the pool of volunteers to adequately respond to disasters.

#### **IV. Preliminary Planning for the 2021 ACEHR Biennial Report**

Rix gave an overview of how the reports have been generated in the past and asked the Committee what they believe the broad themes should be for the next report.

Rix suggested the following report development timeline:

- January – Rix and Arendt will: (1) develop a draft detailed report outline with writing assignments; (2) assemble and provide a reading list to ACEHR members
- March/April meeting – receive agency updates, review and receive Committee consensus on the draft report outline and writing assignments
- May/June meeting - discuss and edit the draft sections
- August meeting - resolve any issues and finalize the report

Arendt emphasized the need to be concise, and reminded the members that the report content should be actionable and usable by the agencies.

Peek suggested keeping the legislative mandate (ACEHR charge) front and center throughout the report development process. She also suggested acknowledging the GAO assessment report on the Program is forthcoming.

The Committee discussed and agreed on the following broad themes for their 2021 report:

- Assessment of agency progress over the past two years
- Implementation of the NEHRP Strategic Plan
- Initiatives
  - Research coordination networking across disciplines
  - Open data publication and sharing
  - Implications of the pandemic on earthquake preparedness
  - Earthquake early warning and social science research (technical and social)
  - Understanding of earthquake processes and fundamental improvements

- Identification of recommendations early in the process and make sure the report supports those as being important
- Determination of what agencies do to address the implementation gap
- Continuance of emphasis on functional recovery and community resilience
  - Leverage the NIST-FEMA Functional Recovery report
- Emphasis on getting lifelines “caught up” with existing building structures

#### **V. Closing Remarks & Next Meeting(s)**

Rix asked Faecke to send out a Doodle poll to obtain availability for scheduling three virtual 2021 meetings for March/April, late May, and mid-August timeframes. Rix and Arendt will develop and send a reading list in January for the members to review and prepare for a productive spring meeting. Arendt also suggested polling topic areas to obtain preliminary agreement prior to the spring meeting.

#### **VI. Adjournment**

Harary thanked the Committee members for their engagement and commitment to NEHRP and the nation.

Rix thanked everyone for their work and participation.

Faecke thanked everyone for taking the time to participate, and expressed hope for progress towards continued development of the report. The meeting adjourned at 4:00 pm EST.