

REPORT

NHERI Technology Transfer Committee

Meeting in Alexandria, VA, November 14-15, 2019

Attendance

| TTC Members | Representatives of NHERI Network |
|---|---|
| David Bonowitz, SE San Francisco, CA 94117 | Julio Ramirez, NCO, Purdue |
| Graham Brasic, PES Structural Engineers Atlanta, GA, 30345 | Ellen Rathje, Designsafe CI, UT |
| John Burton, PE Rutherford + Chekene San Francisco, CA 94105 | Tm Cockerill Designsafei |
| Joe Cibor PE, Cibor, Inc.. Houston, Texas 77024 | Joseph Wartman, RAPID |
| Kelly Cobeen, S.E. ,Wiss, Janney, Elstner Associates, Emeryville, CA 94608 | Lori Peek, CONVERGE |
| Jim Harris, J.R. Harris & Company Denver, CO 80203 | Pedro Lomonaco, Oregon State |
| Cherylyn Henry, ZAPATA Charlotte, NC 28210 | Joel Conte, UCSD |
| William T. Holmes, SE, Rutherford + Chekene San Francisco, CA 94105 | Liang Cao, Lehigh |
| Insung Kim, SE, Degenkolb Engineers San Francisco, CA 94105 | Ioannis Zisis, FIU |
| Phil Line, American Wood Council Leesburg, VA 20175 | Kurt Gurley, UF |
| James O. Malley, SE , Degenkolb Engineers San Francisco, CA 94105 | Farnyuh Meng, UT Austin |
| Bonnie Manley, American Iron and Steel Institute Norfolk, MA 02056 | Daniel Wilson, UCD (by phone) |
| Chris Rojahn Palo Alto, CA 94301 | Gregory Deierlein (by phone) |
| Michael Valley, P.E., S.E., Magnusson Klemencic Seattle, WA 98101-2699 | Shiling Pei, CO School of Mines |
| | Pedro Fernandez, Clarkson |
| | Joaquin Moris , Notre Dame |

Agenda

Attached

Slides presented by NHERI EFs (pdfs)

<https://www.designsafe-ci.org/data/browser/public/designsafe.storage.published/PRJ-2678>

Suggestions to TTC from NHERI Site Representatives

Suggestions to the TTC from EFs were requested. The following suggestions were presented.

UC Davis:

- *Consult with the PI's because mechanisms for tech transfer are going to be project specific and less structured than for buildings*
 - *Does the project have industry partners?*
 - *Does the work have the potential to impact practice immediately, or are other research/development steps required first?*
 - *Do the findings indicate a need for changes to any specific guidance/practice documents, such as by state/federal agencies or professional societies?*
 - *What other industry groups or meetings could help accelerate technology transfer?*
 - *Who are the ideal champions or early adopters of research findings in practice?*
 - *How could the TTC help the research team in fostering tech transfer?*
- *Possible actions by TTC for select projects / topics*
 - *Identify projects / topics that have*
 - *Untapped potential for technology transfer success*
 - *Teams who would welcome / need help in broadening their reach*
 - *Facilitate engagement of key industry groups or possible early adopters*
 - *Facilitate and support practice-oriented workshops*

RAPID:

1. *Building Codes*
2. *Industry Partnerships*
3. *Advancing Data Collection*
4. *Commercialization*
5. *Training*

WOW

- *TTC can establish communication with each WOW EF User to explore possibilities of translating their research to new technologies*
- *TTC can help in translating research findings from NHERI EF Users' projects to enhance building codes and standards (this is very long and tedious process for PIs)*
- *TTC can participate in the EF User Workshops to inform potential users about support provided for Technology Transfer (TT)*
- *TTC can work with NSF IUCRC WHIP Center Industry partners and faculty to help them with Technology Transfer*
- *TTC can develop articles on Success Stories on Technology Transfer and disseminate to natural hazards community via NHERI Newsletters*
- *TTC can provide sessions in wind conferences and workshops (and NHERI Summer Institute) to inform users on Technology Transfer support*

Presentation of selected NHERI Research

As shown on page 3 of the Agenda, several NSF Awards were selected by the TTC having implementation potential. Researchers were invited to the meeting to presents their findings and discuss implementation with the TTC. The results of this session are summarized below.

Award 1636164: A Resilience-based Seismic Design Methodology for Tall Wood Buildings
Shiling Pei

This research is developing a rocking shear wall version of a Cross Laminated Timber (CLT) system already in use in several areas of the country. The non-rocking system is currently being considered for inclusion into ASCE/SEI 7 as an approved lateral system. This research has been partially funded by industry and partially by NSF. Industry and the researcher are well aware of implementation processes for new seismic force resisting systems and intend to pursue building code approval when all development is complete.

Awards 1055744, 1151003, 1234004: Miscellaneous hurricane (wind) related research.

Pedro Fernandez presenting for Forrest Masters

One aspect of this research program was aimed at better identification of wind speeds in coastal suburban areas. The ASCE 7 wind committee is aware of this research so implementation advice from the TTC is not needed.

Other aspects were aimed at improving detailing of various parts and portions of residential construction to reduce wind induced damage. These details are generally not included in building codes and implementation will come through insurance companies, and other organizations such as the National Association of Home Builders and the Institute for Building and Home Safety. Several products developed could become proprietary, either through patents or by further development by industry.

Award 1661015: Wave, Surge, and Tsunami Overland Hazard

Joaquin Morris presenting for Andrew Kennedy

This research studied the sheltering affect in structural wave loads created from other structure in the wave path. Such effects were shown to occur and the data could be used to micro-zone beach-front communities. It was pointed out in the discussion that building codes typically do not consider such reductions in loads because the sheltering structures may not be permanent. However, if permanent protective structures were provided (rather than privately owned residences), this sheltering could be considered in design.

Award 1635784: Numerical and Probabilistic Modeling of Aboveground Tanks Subjected to Multi-Hazard Storm Events

Joe Cibor for Jamie Padgett

This research was focused on the significant risk from above ground tanks (often in the petroleum industry) in areas subject to storm surge or other flooding. This issue is severe in the Houston area and along the southeast coast. Tanks can be damaged in a variety of ways and often contain hazardous materials. This research has already generated considerable interest in the southeast as a way to identify risks and priorities.

Discussion of TTC's proposed publication: "Common Mechanisms for Implementation of NHERI Research"

Suggestions for improvement before publication:

- Add intro clarifying purpose and directions to reader
- Add more information about implementation other than buildings and building codes.

- Describe research that is more applicable to development of proprietary components or systems rather than general application
- Add info re ASCE/SEI 41 (seismic issues with existing buildings) and other information regarding existing buildings
- Separate information about construction of single family dwellings (the International Residential Code, IRC) from code for commercial and multi-family residential buildings (the International Building Code, IBC). Include information about the NHBA and IBHS.

Suggestions for distribution

- Summer Institute
- Post on Designsafe
- Create webinar
- Provide information about the publication at EF site workshops

TTC Discussion regarding future TTC activity

The following points were made in the discussion. The TTC Executive Committee will study suggestions in the next few months and develop plans to implement promising and practical suggestions. TTC Members interested in pursuing these suggestions should contact Bill Holmes.

1. Start review at closer to 50% complete (maybe earlier). Start of work is a good time to offer resources, if the researchers are interested.
2. Being more proactive about, putting researchers in touch with people on committees, other experts
3. Consulting with proposers? Could offer review on design safe or a Summer Institute.
4. Summer institute presentations is good opportunity to reach both proposers and EF PIs
5. Regular webinar - bi-annually, on Designsafe
6. Local members of TTC could attend users workshop at NHERI EFs reaching people planning to write proposals - would be on volunteer basis. Create one-page flyer to hand to persons attending EF workshops.
7. Research follow up on similar topic could incorporate input from TTC as future proposals. See item 3. - offering to discuss with proposers what they are doing and if they are interested in implementation/
8. Active role in linking researchers to both code end and manufacturer end - matching people to resources, bridging - Match with who is doing this in industry -
9. Designsafe site webinar on demystifying the ASCE process, etc. - is there one available? Check with ASCE.
10. Current process - point TT persons are supposed to be in contact - it is up to the committee member to choose level of contact – TTC process should be to get someone assigned to promising projects. C. Rojahn and others had positive experience with contact that he reached out to.
11. TTC could organize webinar presentation from selected researchers on our calls.
12. Encourage young researchers to transfer researcher into practice - make it seem more plausible. See items 4 and 5.
13. Champions (often not the researcher) are required in investing time to make significant changes. Not expected of TTC members but if interested could become involved. TTC members could also look for possible champions.

NHERI TTC In Person Meeting

November 14-15, 2019

The Westin Alexandria Old Town

Alexandria, Virginia

Agenda 11/ 13/19

| | November 14 | |
|-------|---|----------------------------|
| 9 am | Welcome Purpose of the meeting Interaction of Interdisciplinary implementers Interaction with EFs and Researchers | Bill Holmes |
| 9:05 | Self Introductions | All |
| 9:20 | Introduction to elements of the NHERI Network: <ul style="list-style-type: none">• 5-10 min description of facility• 5-10 minutes on specific research and thoughts on how can TTC help your part of NHERI | |
| 9:20 | NHERI NCO | Julio Ramirez |
| 9:30 | Designsafe CI | Tim Cockerill |
| 9:40 | RAPID UW | Joseph Wartman |
| 10:00 | CONVERGE | Lori Peek |
| 10:20 | Oregon State | Pedro Lomonaco |
| 10:40 | Break | |
| 11:00 | UCSD | Joel Conte |
| 11:20 | Lehigh | Liang Cao |
| 11:40 | FIU | Ioannis Zisis, |
| 12:00 | Lunch | |
| 1:00 | UF | Kurt Gurley |
| 1:20 | UT Austin EF | Faryuh Menq |
| 1:40 | UCD | By Phone Daniel Wilson |
| 2:00 | Simcenter | By Phone Gregory Deierlein |
| 2:20 | Break | |
| 2:40 | Presentation and discussion of Implementation Paper (to be distributed before meeting) | Bill Holmes |
| 3:40 | Discussion with invited researchers (see page 3) 20-30 min presentation + q/a + discussion of implementation | |
| 3:40 | Award Nos.1151003 (see attached for titles) 1234004 1541142 | Ioannis Zisis, |
| 4:20 | 1636164 | Shiling Pei |
| 5:00 | Adjourn | |

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Agenda

Continued

| | November 15 | |
|---------|--|--|
| 9:00 am | 1055744 (see attached for titles) | Pedro L. Fernández-Cabán for Forrest Masters |
| 9:40 | 1661015 | Joaquin Moris for Andrew Kennedy |
| | Possibly Award Number 1635784 | Joe Cibor |
| 10:20 | Break | |
| 10:50 | Open Discussion: Where do we go from here? | Bill Holmes |
| 12:00 | Adjourn | |

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| NEHRP TTC | <u>Researchers for Nov 14 meeting</u> | <u>PI</u> |
|----------------------|--|--------------------------------------|
| Award Number:1055744 | Behavior of Hurricane Wind and Wind-Driven Rain in the Coastal Suburban Roughness Sublayer | Forrest Masters |
| Award Number 1151003 | Full-Scale Simulation of Peak Responses to Reduce Hurricane Damage to Low Buildings and Use of Related Research to Develop Hurricane-Engineering Expertise | Arindam Chowdhury |
| Award Number 1234004 | Progressive Failure Studies of Residential Houses towards Performance Based Hurricane Engineering | Arindam Chowdhury |
| Award Number 1541142 | Innovative Hurricane Damage Mitigation Systems | Arindam Chowdhury |
| Award Number 1635784 | Numerical and Probabilistic Modeling of Aboveground Storage Tanks Subjected to Multi-Hazard Storm Events | Possibly Joe Cibor for Jamie Padgett |
| Award Number 1661015 | Wave, Surge, and Tsunami Overland Hazard, Loading and Structural Response for Developed Shorelines | Andrew Kennedy |
| Award Number 1636164 | A Resilience-based Seismic Design Methodology for Tall Wood Buildings | Shiling Pei |
| Award Number 1635784 | Numerical and Probabilistic Modeling of Aboveground Storage Tanks Subjected to Multi-Hazard Storm Events | Jamie Padgett |