Resilience Reconnaissance Activity
for the 2017 EERI LFE Travel Study Program in Chile

Alignment with EERI LFE Travel Study Program Goals and Outcomes

The LFE Travel Study Program is a new initiative of EERI to conduct field study trips to earthquake affected regions around the world that would offer members a unique opportunity to learn directly from local experts in the field, facilitating international knowledge transfer. Field study trips will also help participants understand the role and importance of EERI reconnaissance activities. Moreover, the impact of seeing and hearing about devastating earthquake consequences in person will inspire participants, who have not experienced a Northridge, Kobe, or Maule in their time of practice, to become future leaders in the field of earthquake engineering and earthquake risk reduction. While any EERI member may participate, the program is targeted at early career researchers or early career practicing engineers and graduate students.

The goals of the EERI LFE Travel Study Program are as follows (*items in **bold** are considered most closely aligned with the Resilience Reconnaissance Activity*):

- **Provide opportunities for EERI members to engage in learning from earthquakes activities as an alternative to participation in the limited post-earthquake reconnaissance opportunities.**
- **Foster dialogue and interaction amongst members in various disciplines, as well as participants and the host country.**
- Provide an experience that allows younger members to gain stronger connection to EERI and its LFE program, while also inspiring them to become future leaders in the field of earthquake engineering and earthquake risk reduction.
- **Increase the participants' knowledge in a wide range of earthquake engineering, earthquake response and recovery topics related to both research and practice; and encourage thinking about earthquake risk mitigation, preparedness and planning.**
- **Offer EERI members a unique opportunity to learn directly from local experts in the field, facilitating international knowledge transfer**
- Provide learning experiences that inspire participants to apply lessons learned to preparedness in their own community upon return home.
- Engage experience members who have conducted reconnaissance for EERI after past earthquakes and provide them an opportunity to transfer their knowledge to the future generation of members via an exciting activity.

For those who participate in the program, the learning outcomes are as follows (*It is expected that the all learning outcomes can be achieved by this activity, however primary focus will be on the item in **bold***):

1. Recognize the value of both immediate and long term reconnaissance activities.
2. **Know, for the visited region, the earthquake impacts; current levels of recovery to natural, built, economic and social environments; and constraints and challenges to recovery and the rebuilding process.**
3. Make connections between impacts, reconnaissance, and lessons learned, etc.
4. Understand the multidisciplinary processes and components and challenges in earthquake recovery.
5. Understanding the interdependencies and coordination necessary among the many disciplines involved in earthquake risk reduction and the differences around the world.

Objectives of the Activity

Beyond the broad program goals, this specific activity will have the two objectives that are shown below, in prioritized order:

1. Conduct resilience reconnaissance activities that provide opportunities for participants to actively learn about the process of reconnaissance
2. Observe and document community resilience in various Chilean cities resulting from the 2010 Maule earthquake and mitigation measures that have been tested 2014 Iquique and 2015 Illapel earthquakes.

Background for Resilience Reconnaissance

The goal of 'resilience reconnaissance' is to understand how an earthquake affects the continuity of different services and functions (e.g., transportation, water, food, shelter, etc.), and how disruption of these vital services and functions impacts different groups within a community. This approach to reconnaissance requires field investigations that span the dimensions of time, space, and perspective.

- TIME: attempt to understand the status of a service before the earthquake, immediately afterwards, and at subsequent time intervals following the event (e.g., during the response, restoration, short-term recovery, and long-term recovery phases). For this activity, the time is set for the dates of the visit, but participants can consider time from pre-earthquake mitigation through the current time in the recovery phase.

- SPACE: attempt to document the availability of a particular service across different spatial scales, ranging from an entire region or community to individual districts or neighborhoods.

- PERSPECTIVE: attempt to gain insights on earthquake impacts from a diverse group of stakeholders, including providers of the service (e.g., utility operators, government agencies, etc.), consumers of the service (e.g., businesses, households, etc.), and those entities that regulate or monitor the service (e.g., local, state, and/or federal government).

Design of the Activity

The participants will be divided into four small teams to conduct this activity with three or four participants in each team. Each team will focus on one vital community service/function. These services refer to those economic, social, cultural, political, and religious services and functions that are essential to the normal functioning of a community. Some examples include transportation, communication, water, energy, food, sanitation, shelter, healthcare, education, economy, government, and public safety. This focus on 'vital community services' is different than focusing on more traditional disciplinary topics for reconnaissance (buildings, bridges, tsunami, engineered components of the power grid, etc.), because each 'vital community service' includes interaction of many disciplines. Thus interdisciplinary thinking and broader consideration of vital community functions is required to do this resilience reconnaissance activity.

For the Chile Pilot Study Trip, the following four vital community services have been identified:

- **Housing** -- both long and short term (to align with presentations by Mary Comerio and Farzad Naiem)
- **Healthcare** (to align with presentation by Judith Mitrani-Reiser)
- **Business & Economy** (with emphasis on the economic impacts on businesses and utilizing the survey developed for South Napa earthquake)

- **Education** (to integrate and share findings with EERI's School Earthquake Safety Initiative, and align with School Advocacy Special Session #74 at 16WCEE)

These services have been selected to align with existing EERI activities as well as document services with known impacts following the 2010, 2014, and 2015 Chile earthquakes.

The following resilience framework questions have been developed to guide investigation of each vital community service so that the interplay between different disciplines, perspectives and spatial scales can be observed.

- What was the overall performance of the service in past earthquakes?
- Which elements or components proved to be critical to the function of the service and why?
- Did the service have any cascading impacts—positive or negative—on other community systems, services, or functions? Did other community services (i.e. water, sanitation, electricity, communication, and transportation) have impacts on the performance of this service?
- Were transformative improvements made to the service (or any policies/codes/plans influencing its operation) before the earthquake(s) that somehow changed the service and its function in the earthquake?
- Are transformative improvements being undertaken in the aftermath of the earthquake (or have they already been undertaken) to allow the community to surpass its pre-disaster state/condition?

It is important for the participants to remember that these questions can be posed to anyone they encounter (not just service providers) because all community members interact and utilize these community services. Resilience reconnaissance should attempt to gain insights on earthquake impacts from a diverse group of stakeholders, including providers of the service (e.g., utility operators, government agencies, etc.), consumers of the service (e.g., businesses, households, etc.), and those entities that regulate or monitor the service (e.g., local, state, and/or federal government).

Note that an alternate way to guide resilience reconnaissance would be to collect data to support the following themes:

- Condition of each service or function before the earthquake (e.g., composition, configuration, interdependencies, vulnerabilities, etc.);
- Initial damage to supporting physical infrastructure;
- Extent and duration of service disruptions and their causes;
- Subsequent economic, social, political, and environmental impact of service disruptions;
- Strategies and processes for restoring and/or upgrading each service or function.

Participants should use these questions and/or themes to guide their study of their assigned community service during the trip, however they will need to develop and refine their plan throughout the trip. They will also have access to other resources like a field interview protocol to help them, but similar to what happens in immediate earthquake reconnaissance, they will need to revise and narrow (or widen) their focus as the trip evolves to yield interesting findings.

<u>Tasks and Assignments</u>

Prior to visiting Chile:

- Read reconnaissance reports and other documents summarizing impacts of the 2010 Maule, 2014 Iquique, and 2015 Illapel earthquakes to develop situational awareness and understand the context.

    - Spectra papers, virtual clearinghouse websites, etc.
- Read 16WCEE resilience reconnaissance framework paper
- Review interview protocol
- Review list of best practices/protocols for photo collection and watch training videos on photo processing and uploading to EERI's clearinghouse sites and tools.
- Prepare phone/camera to be able to geo-tag field images according to EERI protocols
- Review other relevant resources, e.g. South Napa Business Resilience Survey form for participants assigned to Business topic.

During the 16WCEE Conference:

- Attend Special Session 72SS "New approaches for conducting Resilience Reconnaissance"
- Based on their assigned vital community service, consider attending other relevant 16WCEE sessions, e.g. Special Session 74SS "Advocacy for School Earthquake Safety" for those assigned the education topic.

During their visits to Chile each team will do the following:

- Plan their reconnaissance approach: review questions, narrow focus as necessary
- Make observations and notes throughout trip on their topic by taking photos and asking questions to guest lecturers and others with local knowledge
- Conduct one interview using the framework interview protocol, if possible
- Develop report outline based on template and make team member writing assignments.

Upon return to home, team members will produce the following final products:

1. A short team report answering the questions from the framework for their vital community service.
    a. The audience for this report should include other interdisciplinary EERI members (from seismologist to sociologist), future reconnaissance teams to Chile, and others with whom they want to share findings (i.e. SESI for education topic).
    b. All team are encouraged to look at each other's drafts to share ideas.
2. Each participant shall use EERI tools to process and upload geolocated photos from their investigations with descriptive captions and notes.