1. INTRODUCTION

On 4 September 2010, a magnitude M_w 7.1 earthquake struck the Canterbury region on the South Island of New Zealand. The epicenter of the earthquake was located in the Darfield area about 40 km west of the Central Business District (CBD) of Christchurch. Extensive damage occurred to unreinforced masonry buildings throughout the region during the mainshock and subsequent large aftershocks. Particularly, extensive damage was inflicted to lifelines and residential houses due to widespread liquefaction and lateral spreading in areas close to major streams, rivers and wetlands throughout Christchurch and Kaiapoi. Despite the severe damage to infrastructure and residential houses, fortunately, no deaths occurred and only two injuries were reported in this earthquake. From an engineering viewpoint, one may argue that the most significant aspects of the 2010 Darfield Earthquake were geotechnical in nature, with liquefaction and lateral spreading being the principal culprits for the inflicted damage.

Following the earthquake, a geotechnical reconnaissance was conducted by a joint USA-NZ-Japan team, with the main funding for the USA contingent coming from GEER and partial support coming from PEER and EERI. The majority of the observations presented in this report resulted from reconnaissance efforts over a period of six days (10–15 September 2010). However, one member of the USA contingent was residing in Christchurch at the time of the earthquake and started performing the reconnaissance immediately following the earthquake, as did several members of the NZ contingent. Additionally, one member of the USA contingent performed a reconnaissance visit on the week of 10 October 2010, with the main focus of the visit being on the performance of lifelines. The team included the following members:

- **Assoc. Prof. Russell A. Green** – US Lead (Virginia Tech, Blacksburg, VA, USA)
- **Assoc. Prof. Misko Cubrinovski** – NZ Lead (University of Canterbury, Christchurch, New Zealand)
- **Mr. Tom Algie** – (University of Auckland, Auckland, New Zealand)
- **Mr. John Allen** – (TRI/Environmental, Inc., Austin, TX, USA)
- **Prof. Scott Ashford** – (Oregon State University, Corvallis, OR, USA)
- **Mr. Jawad Arefi** – (University of Canterbury, Christchurch, New Zealand)
- **Dr. Elisabeth Bowman** – (University of Canterbury, Christchurch, New Zealand)
- **Dr. Brendon Bradley** – (University of Canterbury, Christchurch, New Zealand)
- **Assist. Prof. Brady Cox** – (University of Arkansas, Fayetteville, AR, USA)
- **Dr. William Godwin** – (Fugro William Lettis and Associates, Inc., Walnut Creek, CA, USA)
- **Prof. Tara Hutchinson** – (University of California, San Diego, CA, USA)
- **Prof. Edward Kavazanjian** – (Arizona State University, Tempe, AZ, USA)
- **Dr**. **Tam Larkin** – (University of Auckland, Auckland, New Zealand)
- **Dr. Rolando Orense** – (University of Auckland, Auckland, New Zealand)
- **Prof. Thomas O'Rourke** – (Cornell University, Ithaca, NY, USA)
- **Prof. Michael Pender** – (University of Auckland, Auckland, New Zealand)
- **Dr. Mark Quigley** – (University of Canterbury, Christchurch, New Zealand)
- **Ms. Kelly Robinson** – (University of Canterbury, Christchurch, New Zealand)

- **Mr. Merrick Taylor** – (University of Canterbury, Christchurch, New Zealand)
- **Dr. Thomas Wilson** – (University of Canterbury, Christchurch, New Zealand)
- **Dr. Liam Wotherspoon** – (University of Auckland, Auckland, New Zealand)

The following JGS (Japanese Geotechnical Society) members from Japan also participated in the reconnaissance team from 13 to 15 September 2010:

- **Prof. Mitsu Okamura** – JGS Lead (Ehime University, Matsuyama, Japan)
- **Assoc. Prof. Takashi Kiyota** – (Institute of Industrial Science, University of Tokyo, Tokyo, Japan)
- **Assoc. Prof. Hirofumi Toyota** – (Nagaoka University of Technology, Nagaoka, Japan)

The GEER, NZ, and JGS members worked as one team and shared resources, information and logistics in order to conduct thorough and most efficient reconnaissance covering a large area over a very limited time period. This report summarizes the key evidence and findings from the reconnaissance. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of the associated organizations and funding agencies.

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