Summary Report on Kaohsiung Earthquake on February 6th 2016

Purpose: Information
Submitted by: Chinese Taipei
Summary Report on Kaohsiung Earthquake on February 6th, 2016 Chinese Taipei

National Sceince and Technology Center for Disaster Reduction, Chinese Taipei

2016.02.20

Summary of Kaohsiung Earthquake

• A magnitude-6.4
  – Date and Time: February 6, 2016 at 3:57 am
  – Epicenter: at Meinong, Kaohsiung City and with a focal depth of 16.6 Kilometers
  – Peak ground acceleration: 334.1 gal (intensity 6)
  – in-land and shallow earthquake

• Casualties
  – 117 died and 546 wounded

• Major losses
  – over 60 buildings totally or partially collapsed.
Strong Ground Motion

Earthquake Report

CWB EARTHQUAKE REPORT

[Map showing earthquake epicenter and intensity]

Shake Map

Emergency Operation

• Level 1 operation
  – Started from 4:15 am on Feb 6 to collect situations, and coordinate search and rescue efforts.
  – Ended at 4:00 pm on Feb 14

• In total
  – 29,000 of urban search-and-rescue team, firefighters, police officers, volunteers and soldiers had ever joined the operation.
Casualties

- **117 died**
  - 62 males, 55 females
- **546 injured**
  - 84 hospitalized, 29 severely wounded
- **Weiguan Jinlong building**
  - The 16-story building was completed in 1995 is a mixed-use RC complex for residential apartments and commercial units
  - 115 died (61 males and 54 females)
  - 95 residents escaped
  - USAR teams have found 289.

<table>
<thead>
<tr>
<th>Item</th>
<th>Num. of service suspension</th>
<th>Num. of Restoration</th>
<th>Under repair</th>
<th>Unrepairable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tap water (household)</td>
<td>400,300</td>
<td>395,300</td>
<td>5,000</td>
<td>0</td>
</tr>
<tr>
<td>Electricity ( household)</td>
<td>173,084</td>
<td>172,664</td>
<td>0</td>
<td>420</td>
</tr>
<tr>
<td>Natural gas ( household)</td>
<td>1,241</td>
<td>1,034</td>
<td>0</td>
<td>207</td>
</tr>
<tr>
<td>Land-line phone ( household)</td>
<td>1,248</td>
<td>1248</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cell-site for mobile phone (site)</td>
<td>131</td>
<td>131</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Damaged buildings

<table>
<thead>
<tr>
<th>Area</th>
<th>Report of possible damaged sites</th>
<th>Evaluated site</th>
<th>Site under evaluation</th>
<th>Red Tag</th>
<th>Yellow Tag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tainan City</td>
<td>589</td>
<td>553</td>
<td>36</td>
<td>61</td>
<td>52</td>
</tr>
<tr>
<td>Kaohsiung City</td>
<td>23</td>
<td>23</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sum</td>
<td>612</td>
<td>576</td>
<td>36</td>
<td>63</td>
<td>53</td>
</tr>
</tbody>
</table>

- Red Tag: dangerous structures to be demolished
- Yellow Tag: Repairable damage
- Data: Construction and Planning Agency

Locations of damaged buildings and soil liquefaction zone

Liquefaction Potential: Medium
Liquefaction Potential: High
Lessons learned

• Retrofit on old-existing buildings
  – Weak story (insufficient shear capacity): wide-and-open space.
  – Building designed before 1999: lateral reinforcement, seismic hooks and overlap of longitudinal reinforce bars
  – Mixed-use complex includes commercial and residential units

• Needs of modern technique to identify people under deep debris

• Enhance resilience of under ground pipelines

• Business continuity plan to help quick recovery

• Raise public risk perception: impacts by soil liquefaction

• Space remodeling requires a professional certificate to ensure seismic safety

Thanks for your attendance