REAAA – Young Presenter Competition 2017

North Canterbury Earthquakes – Earthquake Response from a Bridging Perspective

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Bridge Earthquake Response

1. Emergency Response Procedures
2. Understanding the scope of damage
3. Inspections
4. Communications and Logistics
5. Damage Summary
6. Recovery
Earthquake Response Procedures

“Engineering for Disaster” can be applied to the systems and procedures that NZTA and Local Authorities had in place to assist in the recovery of the road network after this event. They include:

- NZTA Network Contracts (Hurunui District Council Similar)
  - Network Management (Consultant)
  - Bridge Management (Consultant)
  - Network Maintenance (Contractor)

- Contracted to respond to Emergency Events (accidents, floods, snowfall, earthquakes, environmental, bridge strikes etc.)

- Local Emergency Procedures
  - Policies and procedures
  - Roles, responsibilities and communication protocols
  - Emergency contacts
  - Key Network Information (e.g. restrictions, detours, signage)

- Personnel familiar with Network and Bridges
Understanding the scope of damage
Inspections
Communications & Logistics

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FILE: SHTS BRIDGE DAMAGE MAP (21/12/2016)

- SEPARATION BETWEEN UNITS OF UP TO 100mm
  - 5-2 = 100mm
  - 5-3 = 60mm
  - 5-4 = 40mm
  - 5-5 = 30mm

- BOTH PIERS HAVE HINGED UPSTREAM

- ABUTMENT A (SOUTH) HAS SUNK 60mm & REMAINED SUPPORTED
  - BASE OF ABUTMENT HAS ROTATED IN TOWARD SPAN NOTE: HAD BEEN CAMOUFLAGED FOR AREN IN BALANCE

- PIER B - HINGED UPSTREAM, SPALLED OUT CONCRETE

  - BRICKS ON HINTER HEAD PER TOPS, EXPOSING PCIe STILL WELL CONTAINED

  - CRACKING BETWEEN PIER HEADS Column 60mm

- HINGING HAS TAKEN PLACE IN BOTH U/S & D/S DIRECTIONS

- CAUSING BUCKLING OF VERTICAL BARS

- PIE B VERTICALLY 1900mm, BASE 1300mm, U/S

- ABUTMENT D (NORTH) HAS SUNK 60mm, U/S

- ENDBEAM SPALLED OFF CONCRETE - Lateral movement of all units near abutment of up to 650mm

- OTHER COMMENTS ON SITE

  - 100 METRES U/S OLD ABUTMENTS Usable & Old Road Approaches - Rock Protection here - Very Good - Good location for Bailey Bridge or Ford

- PER C VERTICALLY 700mm, BASE 950mm, U/S

  - SPALLED @ FILL BASE Above & 100mm CONCRETE LINKED TO EXPOSED REINFORCEMENT BELOW

- RECOMMEND

  - Light vehicles only (3.5T)
  - Adequate temporary road • vehicles on inside of curve
  - Options for works for heavy vehicles

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# Damage Summary

<table>
<thead>
<tr>
<th>Network</th>
<th>Significant Damage</th>
<th>Total number of structures</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Zealand Transport Agency</td>
<td>10</td>
<td>153</td>
<td>6.5</td>
</tr>
<tr>
<td>Hurunui District Council</td>
<td>17</td>
<td>285</td>
<td>5.9</td>
</tr>
</tbody>
</table>

Significant damage is defined as bridges requiring “interim repairs or active monitoring and future significant repairs expected”

Fortunately many significantly damaged bridges were able to carry traffic or be temporary bypassed.
Recovery
Should we move to Australia?

I will leave that up to you…

Questions?

Photo References

