Enhancing resilience of critical road infrastructure

Road networks and critical road structures such as bridges, culverts and floodways have a vital role before, during and after extreme events to reduce the vulnerability of the community. A major gap in the current research is the lack of assessment techniques and tools to reduce the vulnerability of road structures to enhance both community and structural resilience. This project is developing tools and techniques to enhance the resilience of road infrastructure to hazards such as floods, bushfires, earthquakes and climate change-related weather events.

Project: detail Notabs

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Description

Road networks and critical road structures such as bridges, culverts and floodways have a vital role before, during and after extreme events to reduce the vulnerability of the community.

A major gap in the current research is the lack of assessment techniques and tools to reduce the vulnerability of road structures to enhance both community and structural resilience. This project is developing tools and techniques to enhance the resilience of road infrastructure to hazards such as floods, bushfires, earthquakes and climate change-related weather events.

The study is undertaking research to:

- Advance the understanding of the factors required for quantifying the impact of hazards on road structures.
- Understand failure mechanisms under different hazards and vulnerable structural forms, with structures grouped according to vulnerability.

Case studies have been completed and numerical analyses have been conducted to understand the vulnerability of roads to different hazards.

Flood, bushfire and earthquake have been investigated, with two case studies on bridges, and one on floodway failure. The project has also begun the development of the methodology for vulnerability modelling of bridges and floodways. A field study was undertaken to examine the community impact due to failure of road structures during the 2011 and 2013 floods in the Lockyer Valley in Queensland.

A number of workshops were also held to identify case study data and refine the methodology for vulnerability modelling.

Australian design standards for bridges and floodways have been examined and a comparative study of international standards undertaken, along with an analysis of design standards and applied loads on road structures under extreme events.

The next stage of the study will expand the vulnerability modelling and develop a GIS tool which can be used to demonstrate the benefits of the approaches developed.

Related News

18 DEC 2018
New online - December 2018
EMERGENCY MANAGEMENT, MODELLING

17 NOV 2017
New online - November 2017
Symposium talks road infrastructure

ENGINEERING, EXPOSURE

Project team meets on Lockyer Valley case study

FLOOD, INFRASTRUCTURE

Publications
### Year Type Citation

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<tr>
<td>2017</td>
<td>Journal Article</td>
<td>Malizaar, M. [64], Zhang, L. [59], Miramini, S. [65], Mendis, P. [14] &amp; Thompson, R. G. [66] Detecting structural damage to bridge girders using radar interferometry and computational model</td>
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### Presentations & Resources

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<td>21 Mar 2014</td>
<td>Enhancing resilience of critical road structures [125]</td>
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<td>04 Dec 2014</td>
<td>Enhancing resilience of critical road structures [129]</td>
<td>1.4 MB</td>
<td>[130][57], environments [131], resilience</td>
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<td>Framework to inspect floodways towards estimating damage [133]</td>
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### Posters

Enhancing resilience of critical road infrastructure: Bridges, culverts and flood-ways under natural hazards [150]

Road networks and critical road structures such as bridges, culverts and floodways have a vital role before... 

Capturing the Impact of the Failure of Critical Road Structures on the Community [151]

How does the performance of critical road structures such as bridges, culverts and floodways affect the... 

Failure Mechanism of a Typical Girder Bridge in Australia due to Seismic Loads [152]

There is a significant need to perform adequate assessment of the vulnerability of bridges and bridge...
Vulnerability evaluation for bridges subjected to flood loadings
INFRASTRUCTURE [128], RESILIENCE [132]
It is important to assess the vulnerability of bridges in an extreme flood event as these critical...

Evaluating the performance of flood loadings on structural performance of a floodway
ENGINEERING [2], FLOOD [127]
It is important to investigate the vulnerability of floodways in an extreme flood event as these critical...

Collapse risk assessment of strengthened concrete bridge pier under flood loads
ENGINEERING [2], FLOOD [127]
A fluid structure interaction using particle finite element method for the full scale reinforced concrete...

Linked Projects

Quantifying catastrophic bushfire consequence
BUILT ENVIRONMENT [157]
A/Prof Trent Penman
University of Melbourne [15]

Improving the resilience of existing housing to severe wind events
BUILT ENVIRONMENT [157]
Prof John Ginger
James Cook University [158]

Natural hazard exposure information modelling framework
BUILT ENVIRONMENT [157]
Dr Krishna Nadimpalli
Geoscience Australia [20]

Cost-effective mitigation strategy for building related earthquake risk
BUILT ENVIRONMENT [157]
Prof Michael Griffith
University of Adelaide [162]

Cost-effective mitigation strategy for flood prone buildings
BUILT ENVIRONMENT [157]