

Research in Earthquake Engineering



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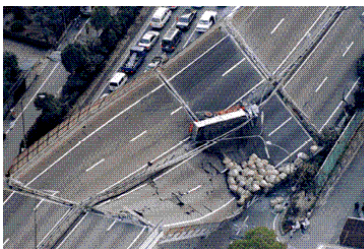
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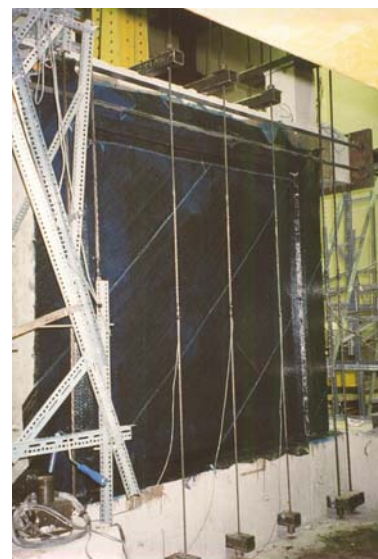
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Earthquake engineering research at the University of Ottawa includes experimental and analytical components. Tests of large-scale and full-size building and bridge components are conducted under simulated seismic loading in the Structures Laboratory to investigate the strength and ductility of reinforced concrete structures. Analytical research includes dynamic inelastic response history analysis of structures and development of mathematical models for hysteretic behaviour of structural elements.

The main thrust of current research is the development of innovative seismic retrofit methodologies for concrete columns, structural walls and masonry infill panels. The techniques researched include external prestressing and the use of fiber reinforced polymer (FRP) sheets. In addition, a new seismic retrofit methodology is being developed involving active structural control and the smart structure technology.

Another area of research concentration includes the investigation of seismic performance of concrete structures reinforced with FRP bars and grids and high-strength concrete columns cast in stay-in-place FRP formwork. This project includes a large number of column and beam tests under simulated earthquake loading as well as the development of design procedures on the basis of experimental data.



Experts

- **Simon Foo** – seismic screening; seismic risk assessment of structures; FRP retrofit of masonry walls; seismic response of operational and functional components
- **Nove Naumoski** – dynamic analysis of structures; structural response to seismic excitations; spectrum compatible earthquake records; synthetic seismic records for structural design; floor design spectra
- **Dan Palermo** – performance of concrete shear walls under reversed cyclic loading; earthquake resistant design and retrofit
- **Murat Saatcioglu** – performance, design and retrofit of concrete structures under earthquake loads; concrete confinement; use of FRP sheets for seismic retrofitting; FRP reinforced new concrete structures; hysteretic modelling of R/C elements; dynamic inelastic analysis of structures
- **Sai Vanapalli** – Soil-structure interaction during earthquakes; behaviour of saturated and un-saturated soils during seismic events

Some Current Projects

- Development of seismic design provisions for building codes and standards
- Concrete column confinement by FRP jacketing
- Behaviour and design of concrete structures reinforced with CFRP bars and grids
- Seismic drift demands for reinforced concrete buildings in Canada
- Performance of high-strength-concrete columns confined by stay-in-place FRP formwork
- Risk-based seismic evaluation of reinforced concrete buildings
- Development of computer software for dynamic inelastic response history analysis
- Seismic retrofit of non-ductile reinforced concrete buildings with and without masonry infill walls
- Seismic retrofit of concrete bridge and building columns by external, transverse prestressing (RetroBelt technology)
- Use of scrap steel-belted tires as column confinement reinforcement
- Development of design floor response spectra for buildings' operational, functional and non-structural components
- Active structural control and the use of smart-structure techniques for seismic risk mitigation