Critical Lifeline Recovery:
Reusable Infrastructure Systems Modeling for Urban Recovery Planning

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Context

Increased natural hazard threats due to:

- Climate change
- Increased population/density in cities
- Interconnected infrastructure systems

Modeling

Used to characterize hazard:

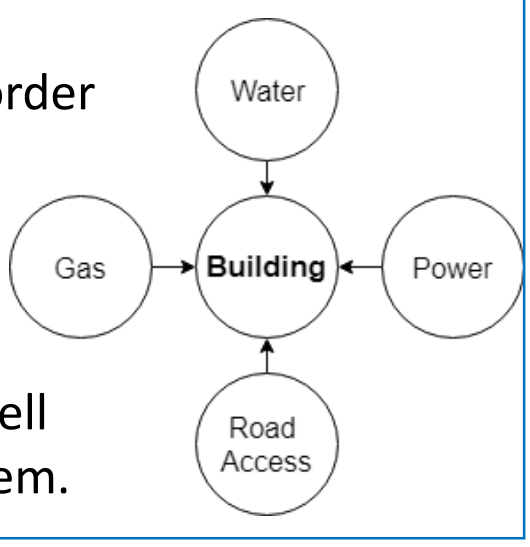
- Behaviour
- Impact
- Recovery

Graph Model for Operational Resilience (GMOR)

GMOR allows users to map dependencies between components in infrastructure systems and incorporate:

- failure,
- repair time, and
- resource

requirements in order to provide an estimate of recovery time for individual components as well as the whole system.

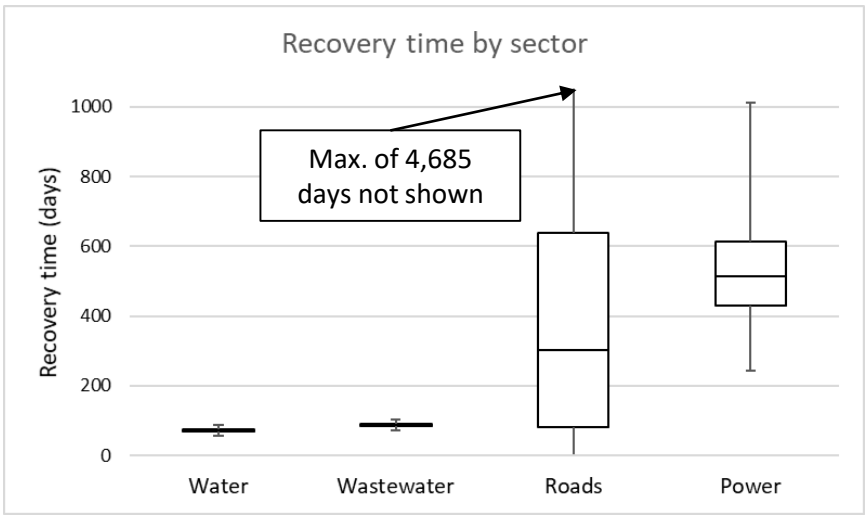


Case Studies

Two case studies are presented for infrastructure systems in the District of North Vancouver, British Columbia, subject to a hypothetical magnitude 7.3 earthquake nearby.

Case Study I: Water, Wastewater, Roads, Power

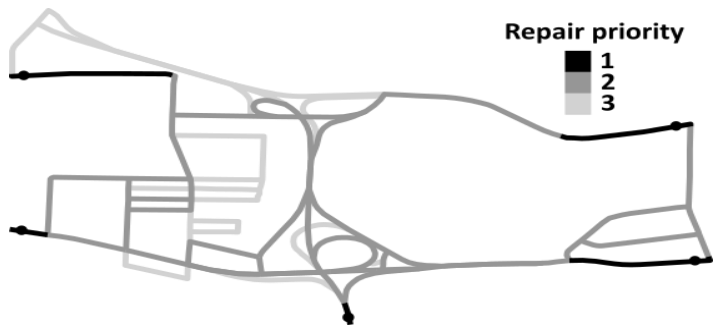
This study assessed the recovery time of these four systems in the District.



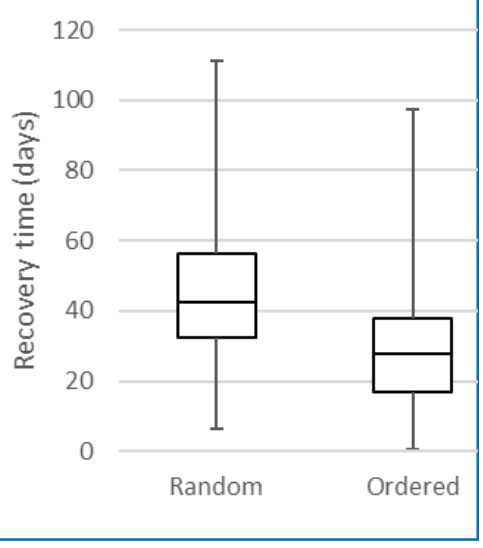
Results indicate relative consistency in water and wastewater system recovery, while road and power networks are highly variable in recovery time.

Case Study II: Critical Road Networks

This study assessed the recovery time of a group of road networks connecting specified origin and destination points in the District.



Results indicate that specifying an order of repair for road segments can improve recovery times vs random prioritization and reduce uncertainty for local areas compared to the method used in Case Study I.



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