

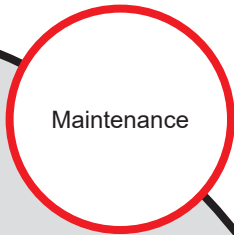


Caltrans Division of Research,
Innovation and System Information

Research



Results



Maintenance

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Project Title:

Introducing Resilience into the State
Transportation Network

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Introducing Resilience into the State Transportation Network

Investigating the current state of resilience of the state transportation network system and identifying one resilient tool that provides acceptable networking service to the system

WHAT IS THE NEED?

California has been a leader in adopting policies to reduce greenhouse gas emissions. Meanwhile, for too long, businesses have been warning of key routes that are stretched to breaking point. In too many places across California, it takes only a single incident to cause chaos – for instance, car accident across the intersection of I-5, I-10, and I-101.

Fast-pace California businesses demand a transport network that can cope better with accidents, severe weather - not to mention ubiquitous earthquake threats. Therefore, the state requires to provide and to maintain an acceptable level of service in face of faults and any challenges to normal operations. Sacramento should be tasked to immediately identify all the places where the road and rail networks need urgent attention in their state-wide long-range transportation plans.

WHAT WAS OUR GOAL?

The objective of this research project focused on:

1. Investigating the current state of resilience of the state transportation network system
2. Survey of the current policy planning and research projects aiming to bring resilience to the different state transportation mode to:
 - Recognize uncertainties to the California transportation system and,
 - Further identifying one resilient and survivable networking tool



Caltrans provides a safe, sustainable,
integrated and efficient transportation
system to enhance California's
economy and livability.

WHAT DID WE DO?

The proposed research design, methodology, or kind of creative activity to be undertaken, are presented as follows:

- Survey of the current policy planning and research projects aiming to bring resilience to the different state transportation mode;
- Recognize uncertainties to the California transportation system, which create huge challenges for transportation system that needs to ensure reliable transportation routes are available during any interrupts;
- Use science: survey available resilient and survivable networking tools (CARVER, TRAGIS, NETSCORE21, ResiliNets, etc) capable of providing acceptable service in the face of various challenges including unusual but legitimate traffic load and large-scale natural disasters, etc.
- Compare and identify one suitable network tool for the state transportation network system to run test benches in the future to obtain preliminary results to analyze the multilevel resilient transportation network based on California in different aspects: ability of network accessibility in face of faults; maintenance of end-to-end communication in face of faults; survivability of the network in face of faults.
- Prepare the manuscripts for both conference proceeding and peer-reviewed journal.

WHAT WAS THE OUTCOME?

Past research shows that a better understanding of the reliability of transportation networks can improve response to a disaster and lead to increased network resilience. Improving the reliability of transportation networks is especially important in leading to faster recovery times after uncertain disruptions on roads that serve as critical paths. This study focused on the quantification of the improved reliability of highway transportation

networks in California. Network reliability for the constructed California transportation network graph is estimated under both random path failure strategy and selective path failure strategy using UCINET by considering uncertainties in link-failure. The preliminary results can be considered to protect the important paths of the California transportation network.

WHAT IS THE BENEFIT?

To enable the state transportation network system to provide acceptable service in the face of various challenges including unusual but legitimate traffic load and large-scale natural disasters.

LEARN MORE

Review the complete report.

<https://ncst.ucdavis.edu/project/introducing-the-resilience-into-the-state-transportation-network/>