# UAS Damage Assessment for Recovery

## Situational Awareness

Much of our homeland is exposed to one or more major natural disaster risks, and also remains vulnerable to man-made disasters such as terrorist attacks. When catastrophic incidents occur, damage of critical infrastructure can be among the most serious consequences. According to the National Oceanic and Atmospheric Administration (NOAA), the total damage from Hurricane Harvey (2017) is estimated at $125 billion. Further, America's infrastructure, which enables it to compete in a global market, is growing more brittle by the day, and the costs of inspection, rehabilitation and repairs on assets like our bridges, roads, ports, dams, and levees is exponentially rising. The Federal Highway Administration estimates that an additional $8 billion per year would be needed to eliminate all bridge deficiencies by 2028. In order to address this chronic challenge, there is an urgent need to develop new, and repurpose existing, technologies that can continuously and cost-effectively inspect infrastructure routinely and support post-disaster assessment of critical infrastructure after a catastrophic event.

## Project Overview

This project will engage multi-state, multi-sector Critical Infrastructure owners and operators to work with Northeastern University and Pacific Northwest Economic Region experts to define specific requirements on how Unmanned Aerial Systems (UAS) could increase the cost-effectively resilience of infrastructure in the Pacific Northwest region. Additionally, the project will develop cost-effective tools that can be implemented by owners and operators that will enhance their response and recovery from any disruption. The project will also encourage private sector organizations to develop protocols for deploying their UAS during a major emergency to support post-disaster response and recovery in regions throughout the country.

## Next Steps

On the technical front, by the mid-point of the project, investigators will have developed prototypical control and damage detection algorithms for traversing a damaged environment autonomously using UAS. These will include development of algorithms for bent and ruptured steel members, fractured and crushed concrete, bent reinforcement, and similar damages. By the end of the project, algorithms for detection of damaged structures from UAS will be fully developed, implemented, and demonstrated sufficiently to show the applicability of the technology. End users will be owners and operators of critical infrastructures, as well as emergency management professionals who need to assess critical infrastructures post event. By enlisting our extensive network of Critical Infrastructure partners through this entire process, the end product will include requirements, protocols, software and hardware components that can have an immediate use in daily monitoring of the region's critical infrastructure, as well as being available to the emergency management community in times of disaster, for quick assessment, response, and recovery in the Incident Command System process.


*Campground road off of Overseas Highway collapsed after Hurricane Irma in Big Pine Key, Florida on Sunday, September 17, 2017 (Source: FEMA)*

To learn more about this project, contact
Jay Robinson, DHS Program Manager, at jay.robinson@hq.dhs.gov or
Ewell Balltrip, CEO, NIHS at eballtrip@thenihs.org 2018-06.1pager