

Unmanned Aerial Systems (UAS)

What are Unmanned Aerial Systems (UAS)?

Unmanned aerial systems, sometimes referred to as drones, are multi-use aircraft controlled from a licensed operator on the ground.

The benefits of UAS are wide-ranging and impact nearly all aspects of transportation—replacing boots on the ground, increasing accuracy, accelerating data collection, and providing access to hard-to-reach locations.

UAS offer several transformative applications for transportation, enhancing safety and productivity while also reducing costs for transportation agencies.

FHWA promoted UAS through EDC-5. UAS can assist transportation agencies by:

Providing high-quality survey and data mapping that can be collected automatically or remotely, and relatively quickly in comparison to traditional survey and mapping practices. Other uses include survey and imagery as part of emergency response events.

Supplementing conventional activities, such as bridge safety inspection and routine construction inspection, to increase safety and collect data from otherwise unattainable perspectives.

Improving operations, construction, inspection, and safety by collecting data needed to design, build, and operate the highway system.

Construction inspection with UAS allows for a bird's eye view of a project's progress and for the development of three-dimensional (3D) terrain models that document the construction process.

Offering eyes-in-the-sky during incident responses for roadway disturbances and for



damage assessments following fires, earthquakes, avalanches, and bridge hits. It allows states to obtain quality data to make better-informed decisions, all collected from a relatively low-cost platform.

BENEFITS

Safety. UAS technology can speed data collection while reducing risk to work crews and the traveling public.

Accelerated Construction. UAS technology can accelerate the rate of data collection operations, and facilitate exact quantity calculation. It can be used for routine and high-risk inspections.

Asset Maintenance. UAS technology can consistently map terrain to isolate problem areas before an emergency occurs, and can quickly and inexpensively survey the damage if an emergency does occur.



NJDOT used UAS to monitor real-time traffic conditions during lane closures along I-495. Photo credit NJDOT

WHAT NJ HAS DONE

NJDOT has been a national leader in UAS and initiated several activities before EDC-5. The NJ STIC characterizes its current stage of innovation implementation of UAS as “Institutionalized.” This means that the state has adopted the innovation as a standard process or practice and uses it regularly on projects.

Established Drone Program. NJDOT’s Division of Multimodal Services established a drone program and hired a UAS Coordinator in Aeronautics to lead NJDOT’s UAS initiatives.

Leveraged Federal Financial Assistance. NJDOT successfully applied for three FHWA grants, including:

- **FHWA Tech Transfer Deployment Funds** to hold a UAS Peer Exchange on Best Practices.
- **FHWA STIC Incentive Program Funding** to purchase equipment and training to evaluate the use of UAS for structural inspections and Traffic Incident Management (TIM).
- **FHWA State Planning & Research Program Funds** for research into Best Practices, Policies and Procedures to recommend potential legislative and regulatory remedies, enforcement and compliance strategies and tools, and training products for engineers and consultants involved in UAS operations.

Conducted Research and Field Demonstration Studies. Integrating UAS in transportation has been the subject of research and field studies to demonstrate the use case for high-mast light pole

inspections, traffic incident management, real-time construction project monitoring, dredging and beach replenishment, 3-D reality modeling with photogrammetry, bridge inspection, and watershed management, among other topics.

WHAT’S NEXT?

Going forward under EDC-5, the goal of the NJDOT UAS Program is the integration of UAS technology throughout NJDOT operations. NJDOT hopes to leverage a recently awarded **STIC Incentive Funding** grant to invest in equipment and training to advance several potential use cases, including: survey rendering of 3-D models; construction project management; pothole and longitudinal joint separation identification; and improved thermal imaging capabilities for several activities (e.g., watershed resiliency, bat counts under bridges, concrete bridge inspections, paving project management).

RESOURCES

FHWA EDC-5 Unmanned Aerial Systems (UAS)
https://www.fhwa.dot.gov/innovation/everydaycounts/edc_5/uas.cfm

FHWA Unmanned Aerial Systems
<https://www.fhwa.dot.gov/uas/>

NJDOT UAS Innovative Initiatives
<https://www.njdottechtransfer.net/uas/>

NJDOT UAS Peer Exchange
<https://www.njdottechtransfer.net/2017/12/05/unmanned-aerial-vehicle-uav-peer-exchange/>