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Is your project a candidate for drone technology?

Using drones for transportation infrastructure projects could cut costs and enhance quality

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In this white paper:

- An update on the state of drone use in the U.S.
- Six criteria projects must meet
- FAA's foundational rules
- Envisioning drone applications and benefits

A new landscape

The same drones used to count sea lions in Alaska, monitor drug trafficking across U.S. borders and conduct weather and environmental research surely have applications in transportation infrastructure, and with new relaxed Federal Aviation Administration restrictions, the stage is set for a major growth opportunity for widespread adoption.

The FAA, which regulates drone use, has introduced Small Unmanned Aircraft Regulations (Part 107 of the FAA Regulations), which loosen the previous Section 333 regulation. Under the Part 107 requirement, commercial drones can now be used in many more instances, as long as they:

1. Are registered with the FAA and have a tail number
2. Are not operated within 5 miles of a towered airport or within 2 miles of a non-towered (e.g., regional) airport
3. Are operated by someone with a remote pilot airman certificate or under the direct supervision of a person that has one
4. Not flown above 400 feet
5. Not flown over anyone who is not directly involved in the operation and not under a covered structure
6. Remain visible to the operator while in flight

If an infrastructure project meets those six criteria, drone use could be considered without approaching the FAA for a rule waiver. However, the FAA considers thousands of waivers for many creative uses for drones during a year. The new FAA rule changes have opened new opportunities for transportation projects to take advantage of drone technology. The new remote pilot airman certificate alone provides a reduced barrier to deployment and makes project site selection broader.

Understanding current applications

Many local and state DOTs, as well as toll authorities, are now using drones to develop entirely new programs. For example, the Rhode Island Turnpike and Bridge Authority has developed a drone-based bridge paint inspection program. RITBA can cost-effectively deploy drones to identify painting defects and needs on their bridges. The agency has realized a significant return on investment by deploying drones, compared to its traditional inspection methods. RITBA quickly realized that the imagery collected from the drone was detailed enough to also identify structural defects, thus allowing the agency to pinpoint exact locations for further analysis, specific to the exact disciplines required. If an in-person follow-up inspection is required, the exact location provides deployment efficiencies and added safety by keeping field work to a minimum.

As the example in the previous paragraph illustrates, drones are a tool to supplement tasks done by people, not replace people. With the recent relaxed restrictions, examples of drones in transportation infrastructure include but are not limited to:

- **Continually monitoring projects**. A project owner could send a drone on repeat missions to capture the hour-by-hour progress of construction, which could be especially helpful on fast-paced design-build projects or to monitor the status of barrier walls suspected of sliding.
- **Adding another layer of detail to mapping and surveying.** For example, HNTB just helped a transit owner collect 160 miles of mobile LiDAR along its transportation system and now is producing a comprehensive database of its assets. In the future, owners could collect both mobile LiDAR data and drone images and then fuse the sets of information to create a more detailed, highly accurate database.

  Currently, drones provide higher-resolution photos and video than satellite or other aerial sources, at about one-fourth the cost. Further, a hardware manufacturer in Austria has produced a LiDAR sensor small enough to mount on a drone. The technology is available in the U.S. HNTB is taking advantage of this technology on Minnesota Department of Transportation's Third Avenue Bridge study to efficiently capture existing, as-built conditions.

  In addition, drones can be equipped with sensors to identify and collect data on vegetation health, wetland areas and surface temperatures.
- **Providing initial views of dangerous or difficult-to-reach areas on complex structures.** Drone images could supply engineers with initial images of hard-to-reach or dangerous areas on bridges, for example. With these images, engineers could determine if further inspection is needed.
- **Assessing preliminary damage.** After a major storm, deploying a drone would be a safe and immediate way to conduct an initial assessment of assets. Results could help the owner prioritize precious resources and recovery efforts.
- **Responding to incidents.** Transportation agencies could dispatch drones to accidents, helping them to determine if lane closures are needed and the best resources and equipment to deploy.

A promising tool for the toolbox

Drone technology promises greater safety, efficiency, immediacy, cost savings and enhanced quality in an age where budget and time constrains rule projects. Widespread use of drones in transportation projects is now taking place every day and the applications are continuing to grow.

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Federal Aviation Administration Small Unmanned Aircraft Regulations - Part 107 of the Federal Aviation Regulations
https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=20516

Federal Aviation Administration's Section 333 of the FAA Modernization and Reform Act of 2012
https://www.faa.gov/uas/legislative_programs/section_333/