T-MOBILE FOR BUSINESS

Drones—the key to building and maintaining America's infrastructure?

Connected drones—and the 5G networks that can power them—can enable faster, safer, smarter infrastructure inspections, while saving time and money and enhancing safety and visibility throughout a project or operation.

Here are three ways drones could help build and maintain the infrastructure of tomorrow.

Asset Management

One of the biggest expenses for construction companies is equipment and other assets.

Tools, vehicles, machines—many assets are used to finish an infrastructure project and conduct day-to-day operations on a completed worksite. Properly keeping track of them is crucial to project success, operational efficiency, and company profitability, especially since the global construction equipment **market size is valued at $205 billion (as of 2021) and estimated to achieve a market size of $352 billion by 2026.**[1]

HOW DRONES COULD HELP

Manual asset management—a method that involves workers physically treading the job site to keep tabs on equipment and vehicles—is inefficient, expensive, and potentially dangerous, especially in massive and crowded worksites.

Drones can be used to traverse a worksite, locate and identify assets, and transmit the information to other machines and authorized personnel. Connected to a reliable network, they could be remotely teleoperated by a worker from a centralized location or programmed to operate autonomously and quickly deliver accurate data to the construction team, which can support:

Faster asset management and inspection
Four smart drones could analyze 1,000 construction sites and status in **20 minutes** vs. 2 days for manual inspections.[2]

20% MORE

Better data visibility across the organization
Drone inspections could uncover **over 20% more** critical finds than traditional inspections.[3]

87% LESS

Improved worker productivity
Drones could use up to **87% less manpower** and resources per inspection compared to traditional inspections.[4]

1 BILLION

Reduced risk of equipment theft or vandalism at distant jobsites.
Drones could reduce the total cost of equipment theft, which has annual estimates ranging from $300 million to **$1 billion**, and improve the 21% equipment recovery rate.[5]

For transport fleets, these benefits can help make more efficient shipping operations across North America.

Inspection

Drones can be an indispensable tool in infrastructure inspection operations, including:

Site Inspection

In a recent study, the private construction industry reported **2.5 million nonfatal workplace injuries and illnesses**[6] and accounted for approximately **20% of total worker fatalities in private industry for that year**[7].

During infrastructure projects, inspectors may look to perform assessments in a variety of high-risk areas, such as bridges, dams and levees, tanks and towers, turbines and transmission lines, and pipelines, among others.

HOW DRONES COULD HELP

By using camera-equipped drones to remotely traverse and view the structure or site, inspectors can safely assess dangerous or hazardous areas and capture more comprehensive data with greater accuracy across larger areas in less time than would be possible by traditional methods, resulting in:

Reduced risk of inspector injury during assessments

Increased time and money savings during field surveillance

Since 5G networks have the potential to offer higher reliability, lower latency, increased data capacity, and faster data transmission rates than 4G networks, connecting drones to them could provide workers with real-time visibility that will help improve operational efficiency for site inspections.

Bridge Inspection

The U.S. has **617,000 bridges—42%** of which are at least 50 years old and **11%** of which are considered structurally deficient.[8]

Each day, 178 million trips are taken across these structurally deficient bridges.[9] These statistics underscore the need for bridge inspections, which inform maintenance and repair decisions, ensuring safe, timely and time-consuming upkeep of infrastructure. Yet that funding for bridge repairs is often insufficient. Fortunately, new techniques and technologies have helped to overcome this challenge.

HOW DRONES COULD HELP

Bridge assessors could deploy 5G-connected drones equipped with high-resolution cameras to inspect critical components. Compared to traditional methods, which may involve ropes and ladders, aerial work platforms, or snooper trucks, this solution is easier, faster, and safer.

The higher reliability and lower latency potential of 5G networks could enable drones to send, receive, and act on commands from the ground control system or pilot more quickly, as units can:

Navigate visually obscured or hard-to-reach areas

Capture detailed images of any damage

Relay information back to the assessor in real time

Some drones also offer advanced functions, such as AI-assisted navigation or autonomous capture, and additional features like thermal, UV, or other specialized cameras for broader data capture.

Rail Inspection

The U.S. passenger rail system has a current state of repair backlog of **$43.2 billion.**[10]

The nation's passenger rail network requires significant engineering and maintenance due to various factors, including the high speeds and heavy weight of the rail cars and the amount of continuous rail traffic. As a result, the network is underfunded by the federal government, and the budget for inspection and repairs is limited.

HOW DRONES COULD HELP

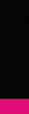
Long-range drones have improved visibility for field operations to inspect everything, from power lines to the alignment of tracks and switching points. 5G-powered drones with powerful cameras could help:

Detect rail cracks, switch defects, and other rail component damage

Spot vandalism and equipment theft along stretches of rail lines

Overall, more frequent inspections can help avert accidents, save lives, and improve the rail network. Pipelines would similarly benefit from drones' ability to provide visibility across a sprawling network that would otherwise be time- or cost-prohibitive.

Port Maintenance & Monitoring



The nation has more than **320 coastal and inland ports,** all of which need regular inspection and maintenance to stay safe and in service.[11]

Regular port inspections and repairs are a necessity due to seawater's corrosive effect on port infrastructure. Regulations, such as the International Maritime Organization's imposed limit on the amount of sulfur emissions from vessels, also make vessel monitoring necessary. However, performed manually, these operations are expensive, labor intensive, and dangerous.

HOW DRONES COULD HELP

In addition to underwater drones connected to cables, ports are experimenting with wireless underwater drones for easier navigation and improved data collection from obscure areas. Additionally, 5G autonomous drones carry out important inspections and repairs of ports in place of inspectors and maintenance workers.The combination of the two can help:

100+ YEARS

Prolong the lifespan of port assets.
The engineered design life of port infrastructure is typically 30–50 years, but structures often have lifespans of over **100 years.** Drones could help keep them in service.[12]

55% LESS TIME

Increase operational efficiency
Drone inspections of port infrastructure could take **55% less time** compared to traditional inspections.[13]

2X

Improve worker safety
A U.S. Bureau of Labor Statistics report found there was an average of 4,914 non-fatal injuries/illnesses per year **100 years** ago, which now occurs annually—**nearly double the overall U.S. workforce average.**

150 METERS

Enhance decision making
Drones could reach depths up to **150 meters** and generate analysis reports that help ports make decisions on infrastructure improvements.[14]

Some ports are also exploring using drones to monitor emissions on vessels before they enter a harbor to help comply with pollution regulations.

The Future of Drone Technology

Drone technology is constantly improving. Over the next few years, expect sophistication in the technology that makes these devices even more useful for improving operational efficiency while providing a safer work environment in infrastructure projects.

Mesh networks. Drones can communicate and collaborate with each other to cover wide areas more quickly and accurately—a key part of the connected jobsite.

AI-powered devices. Drones have the power to process images and make mission-critical decisions themselves based on real-time results.

Edge-powered infrastructure. 5G-connected drones could operate in a swath of geographical and other appropriate data in real time, using edge computing nodes, giving them the potential to make more informed decisions during inspections and other operations.

Repairs. Potential add-ons, such as an attachable 3D printer or cleaning apparatus, may make it possible for drones to conduct minor repairs and upgrades on site, guided by an experienced operator

Longer battery life. Advances in battery life are keeping drones in the air longer and enabling them to carry more weight leading to longer flights and greater carry and cargo capacities.

Drones and the 5G networks fueling their adoption and evolution are set to transform the way we do business. T-Mobile has America's largest, fastest, and most reliable 5G network, imagined for tomorrow but ready to give you an edge today. At T-Mobile for Business, we're focused on providing your business with connectivity solutions and dedicated, exceptional service you need to help you stay ahead.

To learn more about what this technology can do and how to put it into action, connect with T-Mobile for Business.

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Fastest: Based on median, overall combined 5G speeds according to analysis by Ookla® of Speedtest Intelligence® data 5G download speeds for Q1 2022. **Most Reliable:** According to independent third-party unbiased from crowdsourced user experience data including total completion (Jan to July 2022). See 5G device, coverage, & access details at T-Mobile.com/coverage.

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