

# Reimagine the FUTURE OF BRIDGE INSPECTIONS

**Bentley**  
Advancing Infrastructure

One of the challenges facing transportation agencies today is how to conduct accurate, timely, and safe bridge inspections. Traditional visual inspections that take place on site are labor intensive, can require expensive equipment, often require lane closures that create inconvenience for travelers, may present safety risks, and can be inaccurate and error prone. And, in today's COVID-19 environment, maintaining social distancing and ensuring safety for employees and the public can present additional challenges.

Some of Bentley's most innovative users are reimagining inspections through the lens of digital twins. A digital twin is a digital representation of a physical asset, process, or system, as well as the engineering information that allows us to understand and model its performance. A digital twin can combine data from continuous surveys, photogrammetry, LiDAR, and sensors, as well as track changes to assets on a timeline, enabling owners to view the digital representation of the infrastructure asset and related real-world conditions over time.

As DOTs and agencies are being pressed to show the most effective use of their limited funding, taking advantage of digital twins can provide for safer, less expensive, and more timely and accurate inspections. Digital twins allow owners to track historical changes and understand information—such as the exact size of cracking, corrosion, or section loss—rather than trying to determine this information by looking at pictures taken over time.

We have seen transportation agencies, such as Minnesota DOT, use unmanned aerial vehicles (UAVs) to assist with their inspections and achieve savings of as much as 40% with these methods. Because bridges have such a long lifecycle, often up to 75 to 100 years, it is important to track change to the structures over time. These agencies have found that by deploying UAVs and having a digital twin, they were able to see

the change over time and have a holistic view of the bridge, including seeing past inspections laid on top of the current data, which can improve efficiency and help predict the future.

There is great opportunity for agencies to use UAVs to complement and augment standard and in-field inspections. The data from these inspections can be reviewed quickly and easily from anywhere, whether in the office or a remote location. When engineers review time-lapse comparisons of detailed changes, they can annotate specific areas of concern and designate anything that needs to be specifically reviewed in the field. Field crews can see all the inspector notes right on the structure, which is more visual, more accurate, and more efficient.

Taking advantage of digital twins allows inspectors to immerse themselves in the model of a bridge structure without being physically on site. Inspectors conduct reviews using the digital twin of the asset, along with immersive inspection capabilities in Microsoft HoloLens. Inspectors can conduct significant parts of their work while in the office, reducing the time required in the field, which makes the overall inspection quicker, more efficient, safer, and less costly. A digital twin provides flexibility, as you can conduct more in-depth inspections without having to schedule expensive equipment and labor for that purpose.

Utilizing digital twins and technology—including UAVs—to collect, process, store, and analyze large amounts of data can reduce costs and increase quality of inspections. The immersive inspection capabilities in Microsoft HoloLens can reduce the time required in the field, while making inspections more efficient, safer, and less costly. The technology can improve safety for inspectors and the public at large and help preserve bridge infrastructure into the future.

Imagine if you could conduct **90% of your bridge inspections** from the office? Now it is possible using UAVs, digital twins, and Microsoft HoloLens 2.

Immersive bridge inspections reduce time in the field, make the inspection process safer, and can **save up to 40% of inspection costs**.

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