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*GUIDE*

# **Making bridges safer with digital inspections**



The day that President Biden arrived in Pittsburgh to give a speech on the Infrastructure Bill – a recently-approved \$1 trillion investment in the country’s failing infrastructure – **a bridge collapsed** just outside the city center. Nobody was killed, but many were injured, and the irony of the timing is striking.

Bridge safety is arguably the most visible, serious, and long-standing infrastructure issue targeted by the Infrastructure Bill. Even beyond the tragic loss of life or property damage, a bridge disaster has a chilling effect because of their ubiquity of use, where **178 million trips** are taken across structurally deficient bridges every day.

Sadly, **bridge disasters are not uncommon**, but many of the country’s bridges are in such an advanced state of deterioration that it is both an unprecedented and worrying concern, especially when you consider that **42% of the United States’ 617,000 bridges are at least 50 years old**. The alarming situation is exacerbated by the long backlog of bridge inspections that traps jurisdictions in a vicious cycle of trying to catch up – often with very little resources – while everything crumbles around them.

However, with monies allocated specifically to bridge inspection and repair, the Infrastructure Bill is a rare chance to rectify the growing problem. And with the advancement of technology, new digital solutions have recently emerged that can help streamline the inspection process, reduce backlogs, and mitigate the growing public safety threat.

This guide will take an in-depth look at bridge safety by considering the scope of the bridge safety crisis, the causes of the inspection backlogs, and the untapped potential for new digital inspection tools to help turn the tide.

## **The scope of the problem**

The scope of the bridge safety crisis can be quickly mapped out with a series of disturbing statistics compiled by two of the most respected infrastructure players in the country when it comes to road, building and bridge safety: the American Road and Transporters Builders Association (**ARTBA**) and the American Society of Civil Engineers (**ASCE**), both non-partisan and not-for-profit organizations that are continually collecting data on the current state of infrastructure in the United States.

- 36 percent of U.S. bridges – nearly 224,000 spans – need repair (**ARTBA**)
- Around 1 in 8 of all the bridges in the country are in such poor condition that they need to be replaced (**ARTBA**)
- 46,154, or 7.5% of the nation’s bridges, are considered structurally deficient, meaning they are in “poor” condition (**ASCE**)
- 2,094 bridges are in “Critical” or “Imminent Failure” condition, showing advanced or major deterioration or section loss of primary structural elements (**ARTBA**)

- The cost of identified repairs for all 224,000 bridges that need repairs is \$260 billion (ARTBA)
- The worst offender, 20% of West Virginia's bridges are considered structurally deficient, followed by Iowa at 19%, for a total of 1490 and 4504 bridges respectively (ARTBA)

These figures paint a grim picture of the current state of bridge safety, which begs the question: how did it get this bad?

### **Causes of the crisis: backlogs and delays**

With statistics showing **90%** of the structurally deficient bridges in 2021 had the same rating as in 2020, it becomes apparent that the inspection backlog is one of the main causes of the overall poor state of bridge infrastructure, as well as a factor accelerating its decline. In addition, the slow pace of inspection means that even as the backlog is tackled, bridges further deteriorate, and the backlog keeps growing.

Unfortunately, recent labor issues are worsening this trend, as both a **massive skilled labor shortage** and a pandemic that sidelined employees are destabilizing the construction industry. Both private companies and government bodies are scrambling to tackle the growing backlog of required inspections of any kind, but with labor shortages becoming the norm, bridge inspections are poised to fall even more behind. And as the backlog increases, so do serious bridge safety hazards which, if gone unchecked, will run the risk of disaster-level events.



Another recurring challenge driving the issue is that, even when bridges are inspected, there are still outstanding delays in starting and completing critical repairs. In fact, **at the current pace, bridge repairs could easily take more than a half-century.** There are a host of reasons why bridge repairs are being delayed even once they are deemed necessary, including:

- *Funding.* Cash-strapped governments don't have the funding for repair work; in fact, the major impetus behind the Infrastructure Bill is to triage infrastructure problems and provide monies to those deemed most urgent.
- *Governance.* Ongoing jurisdictional disputes about whose responsibility it is to fix a particular bridge impede the repair process. State, local, and federal bodies – all facing budget constraints – ping-pong the responsibility back and forth while the bridge continues to deteriorate.
- *Scale.* With long inspection backlogs and so many bridges that need attention, many jurisdictions are paralyzed by the sheer enormity of the problem and don't know where to start. Even when municipalities focus on a particularly dangerous bridge, they may be uncertain about what to do with it – it's always a question of whether to repair, replace, or remove altogether.
- *Information.* Unable to grasp this breadth, governments often **lose track of all their inspection activities.** Housed across different agencies, stakeholders, and technologies, data from previous inspections is siloed, if it's not already lost or unavailable. Collected by different sources through different means across years, accurate information can't be shared with and between entities responsible for inspections and repairs.

## **A new hope**

The Infrastructure Bill provides states with additional resources to make long overdue infrastructure improvements. **Under a program specifically targeting bridges, the U.S. Department of Transportation (DoT) will distribute more than \$27.5 billion to states for bridge repairs over the next five years,** in addition to a newly-created DoT discretionary bridge program which will provide an additional \$12.5 billion for projects through 2026.

Every state will also be able to access newly-funded federal formula highway programs for bridge improvements, including the National Highway Performance Program and the Surface Transportation Block Grant Program, with the total funds of these programs **increasing to \$59 billion in 2022.**

Outside of funding distribution, further hope can be found in **newly decreed highway bridge inspection standards**, updated and revised for the first time since 2009 by the Federal Highway Administration (FHWA). The standards adopt a “risk-based” approach to prioritize urgent inspections and optimize limited resources. And, both an incrimination of the dire state of highway bridges and a cause to celebrate, the FHWA set forth that highway bridges must now be inspected every 24 months.

## **Getting started with digital**

Given the enormity of the issue, tackling bridge safety can be daunting at every step – inspection, planning, repair – more so with the number of public and private stakeholders involved. But it doesn’t have to be this way, and a major part of the solution is probably already in your hands.

The recent advance of digital inspection platforms that can be accessed and operated directly from a mobile device represent the cutting edge in the fight against a crumbling infrastructure. Affordable, powerful, and user-friendly digital platforms specifically designed to both collect reliable inspection data can effectively manage inspection programs, regardless of size, sector, or infrastructure issue.

Ready for use out-of-the-box by inspectors, repair teams, and supervisors alike, leading platforms like Fulcrum empower your workforce with customizable digital checklists that define accurate inspections procedures, give everyone access to always-updated, cloud-based information in real-time, and have diverse information-sharing options.



With these features, digital checklists facilitate both the accurate and consistent collection of pertinent information and its rapid, seamless communication, connecting critical and value-rich inspection data to the right people at the right time – the foundation for a rigorous inspection program necessary for bridge safety.

*The Federal Highway Administration ruled in 2022 that highway bridges must now be inspected at least every 24 months.*

## **Getting started with digital**

Digital inspection platforms not only serve to prioritize work, but can become the central hub through which you can collect and share relevant data, manage workers, analyze data for better insights, assign and execute tasks, all in a seamless, efficient way that promotes safety. Let's look at some critical areas that digital solutions can bring bridge inspections and safety up to speed and quality.

### *Bridge triage*

With the high number of bridges in disrepair, the crippling inspection backlog, and the lack of visibility into the scope of the problem, prioritizing urgent repairs is an uphill battle – a fight made more difficult when many parts of the inspection process are stuck in antiquated paper-based systems that silo critical information, leaving responsible government bodies unsure of what to do next.

With bridges – or any other potential safety hazards – the faster and more you know, the better you can respond. Unfortunately, both legacy processes and technology hamper the reliable and quick collection and circulation of information.

With cloud-based, real-time synchronization of digital platforms, inspection teams instantly share updated data so that it is always available, to all stakeholders, at any stage of the inspection process. This opens communication between field and office, better positioning both sides to identify potential hazards, adapt to any situation, and reliably prioritize inspections with comprehensive, data-driven decisions. This kind of responsive triage is accelerated even further by real-time notifications and automated workflows, so more urgent needs are always rising to the top.

### *Labor*

Individual governments will likely have multiple bridges that require inspections and repairs and will need to either hire new contractors or transfer employees to new departments. However, no matter how many people are working from any number of organizations, a digital inspection platform unites inspectors, repair teams, and management across a shared tool that has everyone working from the same underlying, cloud-connected data.

What's more, digital checklists can be tailored with exact SOPs and easy-to-follow dropdown menus so that even new employees can follow specific instructions and

never miss an important detail. And with access to shared data, supervisors have greater oversight to monitor inspection progress and check the quality of work – remotely and in real-time – guaranteeing its integrity and ensuring a timely response.

### *Information-sharing*

With different state and local agencies simultaneously involved in a bridge's safety and repair, information is too often dispersed across various, disconnected silos – even more so when relying on a paper-based inspection system. But deploying a singular digital inspection platform breaks down jurisdictional information barriers by bringing together all players involved and unleashing the free movement of always-updated data between them.

And when every stakeholder involved in the inspection process – inspection teams, project managers, public officials, repair teams – can access a single digital repository of uniform, reliable, and context-rich data in real-time, information gaps close.

Sharing data also goes beyond the inspection and repair process. Digital tools let the home office collate all the various inspection data in their jurisdiction, giving them higher visibility to make better decisions along with data sets that can be easily analyzed, parsed, and then submitted to the federal government for grant approval and fund reimbursement. Horizontally or vertically, information flows through a digital platform, where any data segments can be captured and shared in a variety of different reporting formats.



## *Data quality*

Before funds are released for repairs, inspectors need to collect as much reliable data as possible on the structural integrity of bridges so that regulatory bodies can accurately prioritize those bridges that pose an imminent safety threat and allocate resources accordingly.

Collecting evidence for funding triage is stifled, however, when the inspection process is limited to words written on paper – for example, a written description would not easily convey the urgency of extensive structure damage. And while a picture may normally be worth a thousand words, it is worth much more when public safety is on the line.

Digital inspections platforms allow anyone to upload and attach multimedia files to checklists and inspection records so that a clear and true picture can be painted of the physical condition of a bridge. When inspectors can include photos and videos showing the severity of cracks, exposed rebar, or crumbling concrete, it will be these value-rich and detailed images that persuade regulatory bodies to make funds available.

## *Daily work*

Once repairs are underway, digital inspection platforms streamline workflows to make sure every worker is on task and executing exactly what needs to be done, safely, while still incorporating real-time flexibility to adapt to changing circumstances. Here are some of the benefits of digital tools that make this happen:

- **Checklists.** As mentioned, checklists can be tailored to specific tasks and populated with SOPs so that everyone on site knows what exact procedures to follow, helping eliminate the individual mistakes that eventually lead up to costly delays and rework.
- **Task assignment.** When everyone works from the same platform uploaded on the device in their pockets, supervisors can monitor overall progress and assign individual tasks on the fly, responding to any situation that comes up.
- **Issue reporting.** As repair work unfolds, further safety issues will likely crop up that need to be quickly identified. Even if they aren't trained as such, on-site workers can assist in ad hoc inspections. For example, leading platforms like Fulcrum incorporate a convenient QR code to report safety issues which are then seamlessly imported into the field inspection database so remediation can begin right away.
- **Safety protocols.** As repairs progress, the complexity of bridge repair likely means that safety protocols will change for both workers and the public. Updated safety protocols for each stage can be quickly sent around to all team members to adjust how they are doing their jobs and what measures should be in place to protect public safety.

- **Efficiency and speed.** Bridge work causes significant public inconvenience, putting repair teams under considerable pressure to complete the work as quickly as possible. A digital inspection platform features – shared data updated in real-time, task assignment, visibility and oversight, easy-to-follow checklists, and more – equals a field team directly engaged in streamlined workflows that can get the work done on time and without the need for rework.
- **Back-end data and visibility.** Successful bridge triage and repairs are premised on the collection of a wide variety of data points. When digital platforms can quickly merge and parse the totality of data, supervisors gain valuable data-driven insights into how work is being performed and how it can be improved. Data analysis makes visible roadblocks otherwise left unseen, leading to better decisions that optimize workflows. It is this kind of high-level, single-pane visibility – merging inspection data with a wide range of tasks and SOPs, available to all stakeholders – that sets a successful digital platform apart.

## Let's build this together

With the passing of the momentous Infrastructure Bill, there is an exciting and unique opportunity for state and local governments to finally tackle bridge projects that have been both lingering necessities and public safety threats for decades.

A digital field inspection platform is the next step forward for responsible agencies, deployable every step of the way and by everyone involved, from on-site workers to budget officers.

Fulcrum has all the tools you need in one platform to fortify the inspection process and make sure you successfully make the case for funding to safely and efficiently perform quality repair work that will last for decades.

Learn how Fulcrum can **help you ensure and prove safety and quality** under the new Infrastructure bill.

