

An Integrated Asset Management Workflow to Address Transportation Structures Issues

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Timely inspections are critical to maintaining bridges and other structural assets in safe condition and in a state of good repair. When safety-related or structurally critical findings are identified during an inspection, the deficits must be addressed promptly to ensure the safety of the asset and prevent worsening condition.

Transportation agencies with a mature asset management practice facilitate integrated workflows and seamless communication between the asset inspection teams and the maintenance management teams to ensure asset needs are addressed in a timely, efficient manner. An integrated asset management workflow that coordinates maintenance management and structures management functions is designed to streamline processes and improve the operational efficiency of all structures-related fieldwork—from discovering an issue to performing and verifying the work to resolve it. An asset management system that integrates and coordinates these processes provides numerous benefits by meeting the needs of the relevant business units, the agency, and, ultimately, the traveling public. In this paper we discuss integrated solution for Bridge structures as an example asset type. But the same concepts and recommendations apply to other structure types.

Seamless Workflows Reduce Information Gaps and Safety Risks

Bridge and maintenance operations represent an enormous part of the asset value of transportation agencies. Inspecting, maintaining, and managing bridges is crucial to public safety and regulatory compliance. These combined tasks require the efforts of multiple teams as well as a tremendous amount of time and money.

Yet more often than not, time and money are wasted when communication breaks down between the “bridge side” and the “maintenance side” of operations. This disconnect can cause inconsistent data across teams, delayed bridge repairs, loss of operational efficiency, loss of bridge service life and network performance, and—most importantly—higher public safety risks.

Siloed Systems Block Information Flow

It’s a familiar situation at many agencies around the world. Inspectors go out to assess bridge condition, identify problems, and then recommend any needed maintenance or repair work. After that, the maintenance team, which may be in a different business area, decides which work will be done and performs the work.

Unless communications and workflows are integrated across teams, the inspectors and bridge staff may not be aware of what maintenance work has been done on a bridge until the next inspection up to 2 years later. Two years is a long time for the bridge team to go without this information, because accurate knowledge about bridge conditions and work history is important for effective planning, budgeting, and bridge network management—including addressing compliance and safety concerns.

Communication gaps occur because, at most agencies, the inspection team's main data source and the maintenance team's data source are traditionally in different places. The inspection team's source of information is the bridge database of inventory and condition data. Meanwhile, the maintenance team uses an inventory of all asset types along with a catalog of work requests and work orders for the whole asset portfolio.

More often than not, an agency's organizational and IT structure keeps these systems separate, without a shared database or a free flow of asset-specific communication between the relevant teams.

Separate Workflows Cause Knowledge Gaps

Let's dive deeper into why these communication gaps occur and how to overcome them.

Bridge inspectors are focused on performing accurate and on-time inspections, then moving on to other bridge inspections to meet their compliance goals. Maintenance crews are concerned with completing assigned work orders on various asset types and moving on to other work. A natural disconnect occurs in information because the two business areas are focused on different priorities. But they also support one another's operations, so a certain amount of data sharing between them needs to take place routinely. Efficient communication should not require extra steps in the process.

For many agencies, communication delays can impact the bridge network forecasting and analysis performed by the bridge management team. Without current information on bridge conditions, bridge managers might recommend work that the maintenance crews have already completed. Not only could this lead to unnecessary effort by the maintenance crew (to resolve the communication discrepancy or, worse, perform duplicate fieldwork), but lack of accurate knowledge could lead to bridge managers allocating precious dollars to the wrong projects.

When asset databases share a common platform, data sharing can be seamless and efficient, helping to eliminate many of the problems caused by information gaps and delays.

Connecting Workflows & Information Across Roles

An integrated solution benefits everyone that uses the data on a daily basis. The bridge inspection staff, including the field inspectors and report reviewers, have the benefit of seeing the most current information about the maintenance work being done on bridges. At the same time, the maintenance supervisors and work crews can view information on what the bridge teams are doing. This real-time information access improves communication between departments and streamlines workflows.

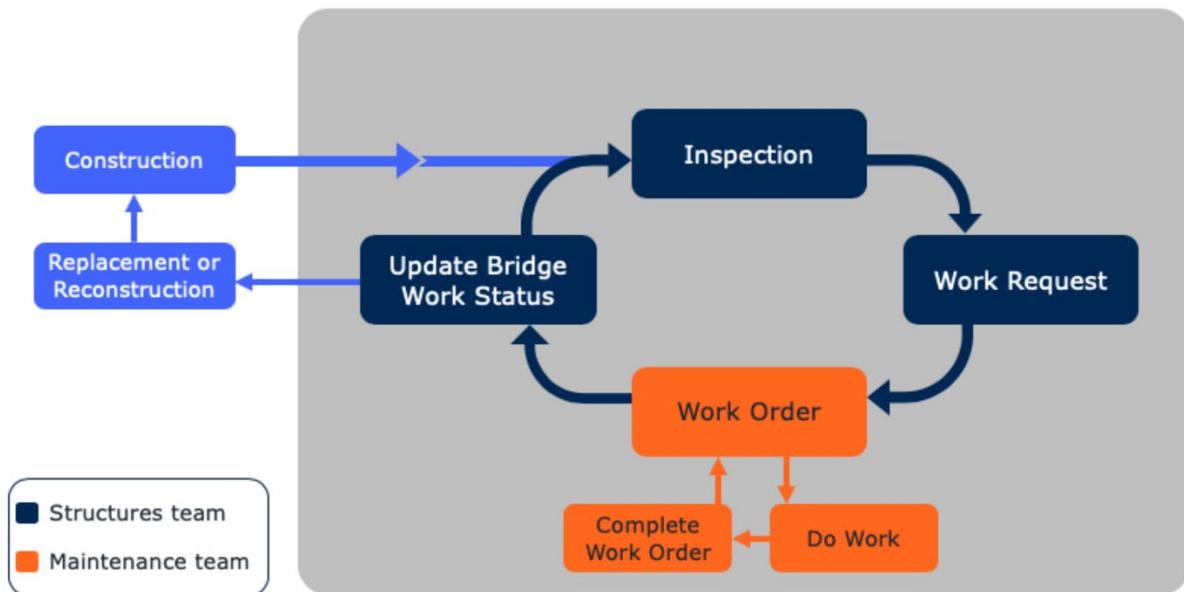
Seamless Workflows Across Teams

When an agency uses an integrated solution, information flows seamlessly between the structures and maintenance teams because they have an integrated workflow. Let's look at how this works.

After construction on a bridge is complete, the bridge enters the inspection cycle, with inspections usually taking place every 2 years. Over time, the bridge will need maintenance work. The structures team generates the work request, which the maintenance team turns into a work order. The maintenance crew completes the work order and updates the work data on the maintenance side. With the integrated solution, that work status also gets updated on the bridge side.

The diagram below shows how information flows from one functional area to the other, enabling all relevant team members to be informed in a timely and efficient way.

Integrated Workflow for Structures Inspection & Maintenance



An integrated workflow means communication flows seamlessly between teams.

Benefits of an Integrated Solution

An organization can achieve significant benefits from integrating bridge inspection and maintenance processes (and the applications that support them). For example, consolidating asset and work data on one platform not only helps improve data quality, but also streamlines data sharing between teams. Bridge management teams can stay consistently up to date on bridge condition and work history so they can better plan, analyze, and budget for projects to improve the bridge network.

Let's look at how a transportation agency's key stakeholder groups can benefit from these integrated processes.

Benefits for Transportation Agency Stakeholders

Program Management

At a high level within the agency, the goal is to have a safe and operable transportation network. To achieve this goal, timely resolution of asset-related issues is critical. As part of an enterprise asset management practice, identifying operational bottlenecks can help the agency establish more streamlined workflows across business units to address issues in a more efficient way.

Structures Unit

Structures asset managers need to make effective work plans to address any identified issues in the network. Timely communications that facilitate appropriate work planning are critical to maintaining a safe network and mitigating the risks of causing injuries and damages to the public.

Maintenance Unit

Maintenance managers need to be notified when a critical finding is discovered on a structure. Having timely access to accurate information such as the location, description, and details of the issue helps the maintenance unit to estimate and prioritize the work and assign it to the right crews to fix the issue.

Inspection Team

Inspection teams need to view and verify any progress on projects that address the previously identified issues. Having prompt access to the completed work report prepared by the maintenance team helps inspectors to verify that past issues have been correctly addressed.

Traveling Public

As the end users of the transportation structures, members of the public demand a safe and reliable transportation system. These users of the transportation network expect that the agency addresses safety and structural issues in a timely, efficient manner.

Recommended Workflow Integrating Structures Inspection & Maintenance

The following steps make up an integrated workflow that is recommended to maximize the efficiency and effectiveness of structures inspections and maintenance activities.

1. All structural defects to be addressed should be documented, along with all details and a description of the work required. This is usually part of the inspection report, as the safety and structural issues are discovered by inspectors in the field.
2. The work recommendation and structural deficiencies are visible to the structures administrator, who can review the recommendations and ensure the details are complete and accurate. The structures manager will create work request(s) and assign priority to each work request. All work requests remain visible to the structures manager so that details may be added, if needed.
3. Once the work requests are complete with all the required details, the structures manager sends the requests from the structures management system to the maintenance management system.

4. An automatic notification sent to the maintenance manager can help the maintenance manager pay immediate attention to the critical finding. Based on the identified details and recommended priority of the work requests, the maintenance manager can prioritize the work requests and take follow-up action. If more information or clarification is needed, the maintenance work manager can comment on the work requests. These comments or requests for more information are visible to both the structures manager and the maintenance manager. Having clear communication between the two business units mitigates the risk of assigning the wrong resources to the work requests and decreases the time to address the work requests.
5. When the maintenance manager is satisfied with the provided details, a work order is created in the maintenance management system. As part of the work order creation, the maintenance crew, material, and equipment will be assigned to the work order. The system will notify the maintenance crew, and they will prioritize the work based on the work order priority.
6. While in the field, the maintenance crew has access to all details of the work order, along with the work requests and additional details about the structure. An integrated asset management solution lets the maintenance crew access the last inspection report and other structural details.
7. The integrated system will send all updates on the work request to all relevant parties, including the structures manager and the maintenance manager. The structures management system will receive all updates on the work requests, including the corresponding work orders and the status of the work orders.
8. Once the work order is complete, the maintenance crew will add the work completion report to the work request.
9. With the completion of the work completion report, the work request status will change to completed, and all details pertaining to the work order will remain visible in the structures management system.
10. The structures manager can schedule a post-repair inspection for the structure or wait until the next routine inspection, when the inspection team can validate that the work was completed as intended.
11. A mature asset management system includes reporting tools that can display the end-to-end process for work activities, from issue discovery through work completion. Managing the repairs in a single, integrated system enables the program managers to audit the steps to address critical findings and to identify and eliminate the bottlenecks in the process.

Bottom Line

The communication gaps that typically occur between the bridge and maintenance teams at most agencies are generally the result of each team's data sources being stored in different places. Using integrated solutions and workflows is an effective way to streamline outdated processes, share data more quickly and easily, and improve productivity and outcomes.

Having automated access to shared information between bridge asset management and maintenance operations benefits everyone who relies on that data to perform their daily tasks. The timely repair of structures defects and the routine maintenance of structural assets leads to cost savings because issues are discovered and addressed before they become critical, eliminating the need for more costly repairs.

Ultimately, integrating structures inspection and maintenance activities in this way helps the agency meet compliance standards more efficiently and improve overall bridge network performance.

Authors & Acknowledgements

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