# 7 Reasons to Integrate Your Pavement & Maintenance Management Systems

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# What's Inside

This ebook explores the benefits and best practices of integrating your pavement management system (PMS) and maintenance management system (MMS).

### Inside, you'll learn about:

- **The Challenge of Silos**
  Why having pavement management and maintenance management systems that do not communicate with each other leads to decreased efficiency, lower performance, and higher costs.
- **7 Reasons to Integrate your PMS & MMS**
  Why integration enables more streamlined workflows and better decision-making through shared data, cross-team coordination, and more effective use of funds.
- **Integration Challenges & Best Practices**
  How to overcome operational challenges and ensure a successful PMS-MMS integration.

# Introduction

Government agencies are complex organizations with vast public responsibilities and limited budgets. Even though most agencies have strategic goals that require several divisions to jointly manage the infrastructure network, often these business units operate separately, without access to the same information and without coordinating their efforts.

When key functions such as pavement management and maintenance management operate in silos, the organization loses opportunities to maximize efficiency, improve team performance, and facilitate cost savings.

For example, without visibility into planned maintenance projects, the pavement management team may fail to account for improvements in the road condition, leading planners to allocate funding toward unnecessary repairs instead of using the money where it's needed most. These types of missed opportunities magnify the operational challenges of silos and make organizational goals harder to meet.

The purpose of this ebook is to show that a new approach—coordinating asset management functions using integrated enterprise solutions—helps transportation agencies break down silos and do a better job of co-managing and maintaining their primary assets: pavements.



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# PMS & MMS: Counterparts for Pavement Lifecycle Management

Even though most agencies keep their pavement management system (PMS) and maintenance management system (MMS) separate by default, many functions work better when the two systems are connected.

From a workflow perspective, pairing the PMS and MMS is a logical step because their users support the management of the same pavement network. While the pavement management team focuses on planning and budgeting for capital improvement projects, preventive maintenance, and major rehabilitation of pavement assets, the maintenance management team carries out the work of routine maintenance and light preservation of those same assets.

Both teams need full information about the money spent on their shared pavement assets to be able to allocate funding most effectively to their projects. This coordination of functions and budgets empowers the agency to deliver a safer, longer-lasting, more cost-effective, and higher-performing road network.

Little wonder, then, that the most effective PMS and MMS solutions are designed to work together as operational counterparts in the pavement lifecycle management process. Integrating these two systems not only supports the coordination of related workflows and budgets for the same assets, but also helps overcome the challenges of disjointed information.

For example, when pavement and maintenance teams coordinate their efforts, the maintenance crews can plan to prepare the pavement surfaces in advance of scheduled projects by the construction team. Case in point: Maintenance crews would complete crack sealing a year prior to overlay or chip seal projects. Without this coordination and preparation, the result would be poorer performance of the pavement treatment—and a suboptimal return on the project investment.

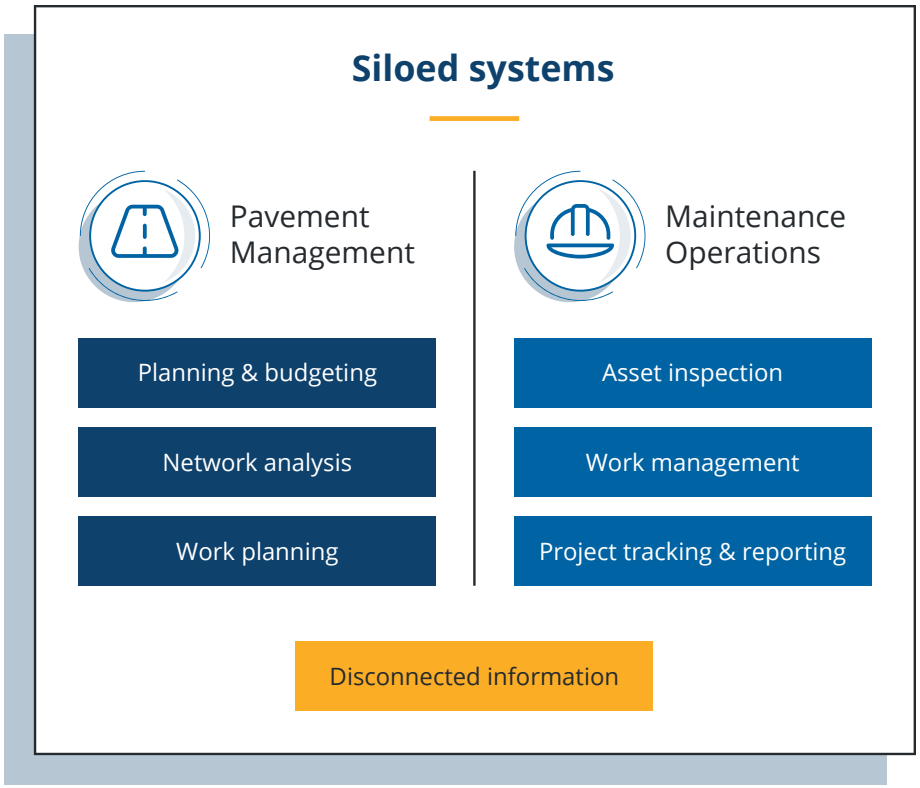
Although pairing the PMS and the MMS may be an ideal approach, the reality is that most agencies do not link these two systems effectively, often because legacy applications can make integration with modern systems more difficult. The resulting information silos can hamper agency operations and outcomes.

**The most effective PMS and MMS solutions work together as operational counterparts in the pavement lifecycle management process.**

# The Challenge of Silos

First, a clarification: It's normal to have some silos at your agency. Compartmentalizing information is often necessary to manage organizational complexity and maintain data integrity. However, when multiple teams manage the same infrastructure assets, siloed systems cause communication breakdowns and inefficiency.

Several problems can arise when pavement and maintenance management systems do not communicate with each other. For example, when both systems' datasets are maintained independently, without cross-referencing or sharing information, there is no "single source of truth," so data is often inconsistent or inaccessible. For pavement managers, this means work history may be out of date or unavailable, resulting in information gaps that hinder decision-making and planning.




At the network level, disjointed PMS and MMS data can lead to a misalignment between strategic planning by the pavement management team and work management by the maintenance operations team. The result is that pavement work plans may not account for scheduled maintenance projects. Repairs may be delayed, and long-term plans may fail to recognize already-completed work projects, leading to ineffective funding allocations.

Overall, siloed systems can have a negative impact on the agency's efficiency and performance.

## Siloed PMS & MMS solutions lead to:

- Data redundancy
- No single source of truth
- Lack of work history and layer data
- Misalignment between strategic planning and work management
- Inefficiency and lower performance

**By coordinating pavement and maintenance management functions, the agency can deliver a safer, longer-lasting, more efficient, and higher-performing road network.**

# 7 Reasons to Integrate Your PMS & MMS

The need for integration typically begins with identifying what information gaps exist in your agency's current processes. That's hard to do when working with separate PMS and MMS applications, because data is often fragmented or duplicated across systems.

For most agencies, data integration occurs through manual, ad hoc processes such as sharing spreadsheets between functional teams. However, ad hoc integration often leads to decisions based on partial information because this form of data-sharing is person dependent and sporadic.

A better approach is systemic integration of your PMS and MMS applications, which provides an effective, scalable way of sharing accurate information across relevant divisions at your agency.

Here are seven reasons why PMS-MMS integration helps your agency improve both pavement management and maintenance operations while saving time and money.

## 1 Data accessibility & quality

When your PMS and MMS share the same data on your pavement inventory, condition, and work history, both the pavement management and maintenance operations teams have access to the most accurate, current information necessary to perform their part of the asset lifecycle management process. Integration eliminates the need to maintain redundant data sets, which are time-consuming to sync and inefficient to reconcile. Your teams can work from reliable data in real time—without waiting for dual system updates.

For example, when maintenance team members conduct maintenance quality assessments, they can use pavement condition data from the PMS (such as rutting, cracking, and ride quality) instead of having to collect that data all over again. On the flip side, tracking work history and repair work in the MMS helps the pavement team determine the surface age and pavement performance of the different maintenance treatments—which leads to better forecasting and pavement planning.

## 2 Reduced dependency

With current data readily accessible, members of different teams can be more self-sufficient, reducing the person-dependency of working with separate systems. Maintenance crew members don't need to ask for reports from the pavement division or make the extra effort to navigate an unfamiliar PMS. Similarly, the pavement team can have visibility into maintenance work progress without having to request a status report from the maintenance team.

## 3 Increased efficiency

Reduced dependency leads to greater efficiency, since separate teams can make decisions faster and take action sooner with the right information at their fingertips. For example, maintenance crews can access a PMS work plan report and condition report directly from the MMS to determine the scope of work for that roadway. Without shared data, determining the scope of work would require additional steps and time-consuming manual processes.

In addition, with visibility into major rehabilitation projects planned by the pavement team, maintenance crews can avoid doing short-term maintenance where future rehab is planned, and instead focus their work on roadways where no major projects are scheduled. This enables better use of resources where they can add the most benefits.

## 4 Better strategic planning

An integrated solution helps ensure better strategic planning because pavement managers can take a more holistic approach to performance modeling and budget forecasting by including maintenance-related data, such as work history and maintenance funds, in their analysis.

Knowing the work history for a section of roadway helps pavement managers justify the timing and scope of future work plans for that location and eliminates unnecessary repetition of repairs. In addition, knowing the status and history of maintenance projects helps pavement managers identify not only the most appropriate future interventions, but also their predicted costs. The PMS can incorporate planned maintenance work and recommend alternatives that may be more cost-effective in the long run (e.g. thin overlay vs. chip seal).



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## 5 Longer asset lifecycles

Having access to the right data improves the pavement managers' ability to recommend preventive maintenance before pavement deterioration reaches a critical stage. Timing the right treatments for the right locations allows better allocation of resources when and where they are needed, extending the life of the roadways.

## 6 Higher network performance

Ready access to maintenance schedules, interfaces with materials management databases, and information about specific jobs empowers pavement managers to make more accurate assessments of the overall health of the road network. In addition, having immediate access to historical information makes it possible to more accurately calibrate performance models and predict the impact of planned work. With better performance modeling, agencies can set strategic targets to maximize network-wide performance.

## 7 Lower costs

The efficiency gains, strategic enhancements, prolonged asset lifespans, and improved network performance all add up to cost savings for the organization with an integrated PMS and MMS solution. Time saved on data retrieval and reporting translates into labor savings, and more effective work management leads to savings of time, labor, and materials.

Plus, when the integrated PMS and MMS are delivered through a subscription-based **software-as-a-service model**, the agency saves additional costs on capital expenses and IT resources, since IT infrastructure, system security, software and hardware maintenance, upgrades, and application support are all included in the subscription and require no additional purchases or fees.



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## Integrated PMS & MMS solutions empower:

| Pavement Management teams to... | Maintenance Management teams to... |
|---|---|
| + Use MMS data to track work history in real time for more effective long-term planning | + Use PMS work plan information to plan work orders and schedule activities to maximize efficiency and cost-effectiveness |
| + Use work history to gauge the impact of maintenance work on pavement condition for more precise pavement analysis | + Use PMS distress data for the Maintenance Quality Assurance (MQA) survey to avoid having to collect the same data |
| + Use work data to calibrate performance models and better predict future maintenance needs | + Access construction history for major construction and rehabilitation projects to understand what's below the pavement surface and better plan for light preservation activities |
| + Identify the cost per mile of maintaining a particular roadway, to identify problem spots that might require heavier rehabilitation | + Access data on pavement and roadway attributes (such as number of lanes, road geometry, traffic levels, and more) to improve maintenance project planning and operations |
| + Evaluate the cost-effectiveness of various treatments, to improve budget forecasting and funds allocation | |

**Integrated PMS and MMS solutions lead to increased efficiency, including savings of time, labor, and materials.**

# Integration Challenges & Best Practices

To ensure a successful PMS-MMS integration, agencies typically need to overcome two major challenges to unifying data between pavement management and maintenance teams. These challenges include 1) differing requirements for data updates and 2) differing location referencing methods across teams. Here we present best practices for overcoming these challenges.

CHALLENGE 1:

# Different Requirements for Data Updates

Pavement management teams and maintenance crews have very different requirements regarding how often they need access to certain types of pavement data. Maintenance crews working in the field need real-time access to current data on asset locations and conditions to be able to perform their day-to-day tasks.

By contrast, pavement managers may need pavement data updates much less frequently—sometimes as little as once a year—because their focus is on long-term planning. In fact, pavement managers may actually *prefer* less frequent updates to avoid having to continually revise their network analyses because of micro-shifts in the data.

Best Practice

## Determine the Right Timing

Pavement and maintenance teams need to negotiate to determine an appropriate, agreed-upon cadence for data updates.

CHALLENGE 2

# Different Location Referencing Methods

Pavement and maintenance teams each use a different Location Referencing Method (LRM) for pavement assets. Maintenance teams use field markers to reference asset locations, whereas pavement teams usually use true Distance from Origin (DFO) measurements.

Best Practice

## Translate Data Between LRMs

When integrating the PMS and MMS, agencies usually need to maintain two sets of LRMs—one for each group of users. Typically, the distance-based LRM is considered the base, and the field marker is managed as an alternative LRM. Once the agency has established a translation process for LRM data, the system can transform the dataset from one LRM to another in real time.

**Pavement management teams and maintenance crews have very different requirements regarding how often they need access to certain types of pavement data.**

# More Best Practices

In addition to overcoming the major challenges discussed above, agencies can get more value from their PMS-MMS integration by implementing the following best practices:

## Choose a SaaS Deployment

Implementing both the PMS and the MMS in a subscription-based, **software-as-a-service (SaaS)** environment lowers the agency's upfront costs and reduces the dependency on IT resources, since IT infrastructure (hardware), system security, application maintenance, upgrades, and support are all included in the subscription. SaaS solutions also provide better performance than on-premise systems because the subscription-based model delivers frequent updates, giving users access to the latest features and fixes.

## Use Integrated Mobile Solutions

Using a mobile-enabled MMS gives field crews more flexibility to manage their tasks with a mobile device, working online or offline in remote locations. Maintenance workers can improve the accuracy and efficiency of their data collection using a mobile application to add an asset or update its attributes in the pavement inventory, perform a simple asset inspection, or manage work requests, work orders, and day cards. An MMS mobile application also improves real-time work tracking and reporting.

## Select Solutions on a Shared Platform

For a more streamlined integration process and simpler data sharing, select a PMS and MMS that share a common platform as part of a single enterprise solution. A unified enterprise solution provides "native" integration capabilities so that multiple applications can access shared core datasets without the need for an API or interface.

The End-to-End Workflow Integration diagram below illustrates an integrated workflow for pavement management and maintenance management activities in **Trimble's transportation asset lifecycle management**. The arrows in the diagram show how information flows from one functional area to the other, enabling all relevant team members to be informed in a timely and efficient way.

After pavement construction is complete, the pavement enters the pavement management cycle. Over time, the pavement will need maintenance work. The pavement management team analyzes the pavement network and creates work plans, which the maintenance team uses to generate work orders. The maintenance crew completes the work orders and updates the work data on the maintenance side. With the integrated solution, the work status also gets updated in the pavement management system.

Jointly, PMS and MMS support critical processes across the entire pavement asset lifecycle. On the pavement side, the solution enables long-term planning, budgeting, network analysis, work planning, and more. On the maintenance side, the solution supports preventive maintenance, repairs, and rehabilitation, including work order management, project tracking, and reporting.

### What is Digital Project Delivery?

Digital project delivery is the use of digital data to plan, design, construct, inspect, and record as-built conditions throughout a construction project. With digital project delivery, owners build public trust by coordinating stakeholders and using reliable data to deliver projects on time and on budget. In addition, the resulting data—when carried forward to later phases of the asset lifecycle—empowers owners to manage their assets for better performance and cost-effectiveness, lowering the overall cost of ownership.

## Partner with One Provider Team

To get the most value from integrating your PMS and MMS, work with one solutions provider who can deliver, integrate, and support both applications over the long term. Having a single provider brings many advantages, such as simpler contracting and deployment processes as well as consistent knowledge of both systems and how best to integrate data to achieve agency objectives. Ideally your solutions partner should have proven expertise and success in delivering enterprise asset management solutions to agencies like yours.

**With a unified enterprise solution, multiple applications can access shared core datasets without the need for an API or interface.**

# Learn More

Find more information about transportation asset lifecycle management strategies and integrated solutions at **assetlifecycle.trimble.com**, or **contact us** to set up a call.

## Contributors

Many thanks to the following Trimble subject matter experts who contributed to this ebook by sharing their research-based insights and agency experiences.

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